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

Empowered lives.
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Project Title: Initial Implementation of Accelerated HCFC Phase Out in the CEIT Region

UNDAF Outcome(s): Government adopts policy frameworks and mechanisms to ensure reversal of environmental degradation; climate change mitigation and adaptation; and prevention of and response to natural and human-caused disasters.

UNDP Strategic Plan
Primary Outcome: Environment and Sustainable Development
UNDP Strategic Plan Secondary Outcome: .....
Expected CP Outcome(s):
Government of Ukraine adopts policy frameworks and mechanisms to ensure reversal of environmental degradation, climate change mitigation and adaptation, prevention and response to natural and man-made disasters

Expected CPAP Output (s)
Capacity to meet international climate change obligations, including the Montreal protocol and Stockholm convention improved

Implementing Partner: UNDP

Brief Description

The current full-size proposal is an initial response to the obligations incurred by Ukraine under the phase out schedule for HCFCs of the Montreal Protocol. It is a timely capacity building effort to support the country institutionally and provide assistance to its manufacturing sector to convert to HCFC-free technologies and is primarily designed to rapidly return the country into compliance with 2010-2014 HCFC reduction requirements.

In the following document the two primary project components listed in the PIF are described along with their sub-components, namely:

- Component 1 (Regional information exchange and networking component), which addresses barriers associated with incomplete knowledge and awareness and which is aligned with PIF Component 1; Outcomes 1(a-d).
- Component 2 (National capacity building and technical assistance component), which targets support to the finalization of the initial outline of HCFC phase-out strategy (with selected legislative options to control HCFC import/use), capacity building and supply of analytical tools for Environmental Inspectorate and Customs Department to properly enforce HCFC import quota system and monitor the HCFC statistics in support of required Government interventions, and HCFC phase-out in the eligibly manufacturing enterprises with establishment of a technology information platform on new HCFC technologies for ineligible enterprises - Ukraine.

Programme Period:	2012-2015
Atlas Award ID:	00066300
Project ID:	00082497
PIMS #	4309
Start date:	
End Date	June 2015
Management Arrangements	DIM
PAC Meeting Date	20 December 2012

Total resources required	US$ 13,090,000
Total allocated resources:	
• Regular	
• Other:	
o GEF	US$ 3,190,000
o Government	US$ 1,350,000
o Other	US$ 8,550,000
In-kind contributions	US$1,015,000

Agreed by (UNDP): 29 May 2013

[1] For UNDP supported GEF funded projects as this includes GEF-specific requirements

List of Abbreviations and Acronyms

A/C	Air Conditioner
CEIT	Countries with Economies in Transition
CFC	Chlorofluorocarbons
CIS	Commonwealth of Independent States
EU	European Union
ExCom	Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol
GEF	Global Environmental Facility
GDP	Gross Domestic Product
GWP	Global Warming Potential
HCFC	Hydrochlorofluorocarbons
HFC	Hydrofluorocarbons
HFO	Hydrofluoroolefins
HPMP	HCFC Phase Out Management Plan
PIC	Prior Informed Consent
MLF	Multilateral Fund for the Implementation of the Montreal Protocol
MP	Montreal Protocol
MENR	Ministry of Ecology and Natural Resources of the Government of Ukraine
MSP	Medium Size Project
MT	Metric Tonne
NOU	National Ozone Unit
ODP	Ozone Depleting Potential
ODS	Ozone Depleting Substance
PU	Polyurethane
QPS	Quarantine Pre-Shipment
RAC	Refrigeration and Air Conditioning
RMP	Refrigerant Management Plan
TA	Technical Assistance
TEAP	Technology and Economic Assessment Panel
TEWI	Total Equivalent Warming Impact
UNEP	United Nations Environmental Programme
UNDP	United Nations Development Programme

1. SITUATION ANALYSIS

1.1 Global context and significance

1.1.1 Issue background and baseline

HCFCs, a group of ozone-depleting chemicals, are used in a variety of applications such as refrigerants, foam-blowing agents, solvents, fire extinguishers and aerosols. In some cases HCFCs have replaced CFCs use due to their lower ozone depleting potential (ODP). The use of HCFCs is controlled by the Montreal Protocol on Substances that Deplete the Ozone Layer (Montreal protocol).

The Montreal Protocol was designed to reduce the production and consumption of ozone depleting substances in order to reduce their abundance in the atmosphere, and thereby protect the earth's fragile ozone Layer. The original Montreal Protocol was agreed on 16 September 1987 and entered into force on 1 January 1989. The Montreal Protocol includes a unique adjustment provision that enables the Parties to the Protocol to respond quickly to new scientific information and agree to accelerate the reductions required on chemicals already covered by the Protocol. The Parties to the Montreal Protocol have amended the Protocol to enable, among other things, the control of new chemicals and the creation of a financial mechanism to enable developing countries to comply. Specifically, four Amendments – the London Amendment (1990), the Copenhagen Amendment (1992), the Montreal Amendment (1997) and the Beijing Amendment (1999) have been made to the Protocol. Amendments must be ratified by countries before their requirements are applicable to those countries[2].

The Copenhagen Amendment of the Montreal Protocol of 1992 stipulated that Article 2 countries need to reduce their HCFC consumption to 65% of their baseline in 2004, to 35% of that level in 2010, to 10% by 2015, to 0.5% in 2020 and finally achieve full phase out in 2030. The Beijing Amendment of 1999 extended control measures for HCFCs to production with a freeze in production by 2004 at the baseline. In September 2007, MOP 19 adopted the Montreal Adjustment on Production and Consumption of HCFCs, which entered into force on 14 May 2008. This requires that Article 2 countries accelerate both HCFC consumption and production to 25% of the baseline in 2010.

CEIT (countries with economies in transition) countries in the Former Soviet Union (fSU), which are not operating under article 5, are generally eligible for GEF funding in support of HCFC phase out, subject to having ratified the Copenhagen amendment, which Ukraine did in 2002.

Ukraine was among the first countries to sign the Vienna Convention and the Montreal Protocol in the region. By signing the Montreal Protocol in 1988, Ukraine undertook to reduce and phase out the consumption of ODSs. The first of these obligations was practically assumed with the ratification of the London Amendment in 1997. On February 6, 2002, the Copenhagen amendment to the Montreal Protocol was ratified. And, on May 4, 2007, the two other amendments, Montreal and Beijing, were further ratified by the country.

Ukraine is a developed country or non Article 5 Party (to the Montreal Protocol and all the amendments to it). As such it is subject to the phase out obligations so dictated, including those applied under Decision XIX/6 as addressed in the draft HCFC phase-out strategy. At present, Ukraine faces a prospect of non-compliance with these obligations and requires GEF assistance to sustain compliance from present to 2015.

Ukraine was the last of Eastern European CEIT countries to adopt a Country Program on ODS Phase-out which was formulated with the bilateral assistance of the Government of Denmark in 1996. At that time, Ukraine was considered as one of the largest consumers of ODSs. In 1991, the consumption of Annex A and B ODS

[2] http://ozone.unep.org/new_site/en/montreal_protocol.php

chemicals was estimated to be approximately 4,500 ODP tons/year with then a rapid decline recorded to 1,700 ODP by 1993 and then stabilization at 1,400 ODP level in 1996/97. This ODS consumption occurred in the refrigeration, aerosol, solvent sectors and fire protection sectors[3]. The refrigeration sector accounted for approximately 67% of the consumption, followed by the aerosol sector (28%), and solvent sector (5%) industries.

The previous ODS phase-out assistance to Ukraine was a result of the international community's recognition of the difficulty that the country, among other CEITs, would have in meeting its obligations under the 1990 London Amendment to the Montreal Protocol (MP), namely the elimination of Annex A and B Ozone Depleting Substances (ODS) consumption and production by December 31, 1996. In response, the Global Environmental Facility (GEF) opened an Ozone Focal Area Strategic Program in 1995 for CEITs who had ratified the London Amendment.

The ODS Phase-out project package for Ukraine, to allow for transition to alternative non-ODS (non-Annex A/B) technologies, was formulated in line with the GEF strategy of that programmatic period. In terms of its design it was consistent with relevant GEF policies, particularly those on cost effectiveness, retroactive financing, operational costs, and financial viability. The project involved substantial investment in modernization of industrial production in the refrigeration and aerosol sectors as well as developing capacity for refrigeration servicing and halon management. It provided a number of major enterprises in Ukraine with co-financing to convert technologies such that they are competitive in manufacturing exportable products. However, this major phase-out of Annex A&B chemicals was only achieved in 2003.

During its practical implementation in the field the International Bank for Reconstruction and Development (IBRD) realized a number of successful investment and capacity building sub-projects in the country[4]:

- Investment Component: This component involved a portfolio of appraised enterprise specific investment sub-projects plus a framework sub-project covering the refrigeration servicing sector. The initial portfolio consisted of sub-projects in the consumer aerosol, domestic refrigeration, commercial/industrial refrigeration, and solvent sectors, and in addition pilot sub-projects for the recovery and recycling of ODS refrigerant;

- Technical Assistance: The technical assistance (TA) component was intended to strengthen country institutional capacity for management of ODS phase out and eventual elimination within MP's Ozone Office, undertake a specific initiative related to the transfer of hydrocarbon refrigerant technology to Nord (Nord Group Holding) for domestic refrigerator manufacture, development of a halon management plan and associated implementation capacity within the national fire protection service, and support the implementation Project's investment component with respect to safety audits and external procurement management capacity;

- Project Implementation Unit (Ozone Office) Support Component: This component supported the operation of the PIU inclusive of staffing required for project supervision, procurement administration, and financial management, all on the understanding that the Country would sustain this function on an ongoing basis.

[3] Implementation Completion Report (TF-20426), World Bank, June 2005: http://www.gefonline.org/ProjectDocs/M&E/Documents%20and%20data/DatabaseContent/TE/FY%202006/Terminal%20evaluations%20-%20ICRs%20-%20Audits/WB/107%20Ukraine%20ODS%20phaseout.pdf

[4] Implementation Completion Report (TF-20426), World Bank, June 2005: http://www.gefonline.org/ProjectDocs/M&E/Documents%20and%20data/DatabaseContent/TE/FY%202006/Terminal%20evaluations%20-%20ICRs%20-%20Audits/WB/107%20Ukraine%20ODS%20phaseout.pdf

Upon completion of the projects and evaluation of their impacts and results (as summarized below[5]), by December 2001 Ukraine returned into compliance with its obligations under the London Amendment, which was the revised target set by the Parties to the Montreal Protocol for rectifying its previous non-compliance status.

The ODS phased out achieved was 4,580 MT based on appraised consumption. This covered virtually all Annex A and B ODS consumption in the manufacturing sector as well as a substantial portion of residual consumption in the refrigeration servicing sector. Institutional strengthening support helped create a dedicated NOU for regulatory management of ODS phase-out and it resulted in the development of the necessary regulatory framework for ODS control, including licensing of ODS use and control of import and export, although some questions, as reported in the project evaluation report remained respecting the level of enforcement that existed to support these measures. Finally, Ukraine generally improved its compliance with international reporting obligations. The total GEF investment to support ODS phase-out in Ukraine at that time comprised US$ 23 mln.

A US$4.7 million GEF grant for Methyl Bromide phase out was initiated in 2003, approved in 2005, obtained GEF CEO Endorsement in 2007, but was cancelled in 2008 due to general governance issues in the Ministry of Environment.

As is the case for the majority of industrialized countries, Ukraine has been a substantial consumer of CFCs in the region and more recently of HCFCs. As summarized previously, as Article 2 CEIT country, Ukraine received GEF assistance in relation to Annex A and B ODS phase out efforts under the Montreal Protocol, and the present proposal builds on these past efforts. The GEF Council included HCFCs in the 2003-2006 GEF Business Plan. This support is reflected in the GEF focal area strategy and strategic programming for GEF-4 which targets HCFC phase out.

In terms of initial response to the GEF-4 cycle programme, formulation of a draft outline of HCFC strategy document was initiated as part of a regional GEF supported project with UNDP acting as the lead implementing agency, and UNEP as a collaborating agency. The main objective of the strategy was to:

- help ensure that the country is prepared to respect the obligations assumed under Decision XIX/6 of the Parties to the Montreal Protocol on the accelerated phase of HCFC's, and
- that such strategy outline was to form the justified basis for a follow-up intervention on capacity building of the country to implement the Montreal Protocol and investment support to strengthen national capabilities in dealing with HCFCs.

In the process of collecting HCFC related consumption data, it appeared not to be possible at that stage to aggregate such information in a comprehensive manner through a "top-down" approach, by utilizing accurate HCFC import data from the import quota system. Similarly, there was a general absence of cooperation between consumers and the national authorities in developing an effective "bottom up" survey. The three principal reasons for that were:

- continued restructuring of Government authorities (from 2008 through to 2011, and ongoing);
- resultant minimal attention to Montreal Protocol issues with low level institutional capacity,
- inconsistencies in national reporting to the Ozone Secretariat since 2003, and
- limited effective regulatory/consumer cooperation as well as cooperation between the various authorities involved in the issue.

[5] Implementation Completion Report (TF-20426), World Bank, June 2005: http://www.gefonline.org/ProjectDocs/M&E/Documents%20and%20data/DatabaseContent/TE/FY%202006/Terminal%20evaluations%20-%20ICRs%20-%20Audits/WB/107%20Ukraine%20ODS%20phaseout.pdf

At the time of implementation of the regional MSP project on formulation of HCFC strategy outlines, there have been several national counterparts engaged in administering HCFC quota system. In the beginning, in 2008 through to late 2009, the system was handled by the State Environmental Inspectorate (SEI) which was able to maintain only residual institutional capacity towards implementation of the Montreal Protocol. Due to presidential elections and consequent major institutional re-organization, the mandate of SEI to manage the quota system was requested by a separate Cabinet of Minister decision to be transferred to the central authority of the Ministry of Environmental Protection (presently, the Ministry of Ecology and Natural Resources - MENR). With certain delays recorded, the transfer of responsibilities and then archives to the Ministry was finally completed in 2010.

The situation is somewhat similar to circumstances documented during the previous CFC phase-out in Ukraine. At that time, based on terminal evaluation[6] results of that assistance package, it was concluded that high turn-over of staff, both at the senior management and technical levels, affected the projects efficiency, resulted in low attention to interdepartmental coordination beyond environment protection authorities and overall delayed the implementation of the Montreal Protocol's program in the country. Considering the above experience, the existence of a sustainable National Ozone Unit (NOU) is seen as a fundamental requirement for protecting the national interest and meeting international obligations.

Historically, Ukraine was relatively late in addressing ODS issues institutionally and following the original GEF project only maintained nominal institutional capacity to continue providing attention on the issue. In 2010, there was an attempt to address this situation with the re-establishment of an NOU/Ozone Office in the Ministry of Environmental Protection, something that was believed to be consistent with international expectations of countries such as Ukraine, particularly one pursuing harmonization with the EU and international standards generally. However, followed by additional institutional perturbations during early 2011, this initial capacity was again impacted negatively. Therefore, sustaining this capacity should be seen as an essential pre-requisite for success of any future GEF assistance.

During the data collection process for preparation of this FSP, a number of observations were made respecting the current situation and actions that should be undertaken in relation to the national ODS licensing system for ODS chemical imports and ODS containing equipment, as well as international compliance reporting. In particular:

- Only a limited amount of information related to licensing of HCFC imports was made available by initial counterparts (SEI) and only for the period 2005-2008, and none by its successors;
- These limited data respecting import of HCFC chemicals were confined to the annual "quota" licenses granted to importers and this has been used for Montreal Protocol reporting. These licenses represent an upper limit on imports rather than actual imports, which should better reflect national consumption;
- Later, in 2009 after the transfer of responsibility to the Ministry of Environmental Protection data reported to the Ozone Secretariat were said to be based on actual imports;
- Overall, during the survey it was considered that the consumption of HCFCs, that historically has been officially reported to the Ozone Secretariat (Table 1) and based on the annual licenses that would over estimate actual consumption, and licenses applicable to actual import transactions or end user reporting would better reflect actual national consumption;
- No information has been made available on the licensing HCFC containing equipment and products which are also supposed to be covered by the license system, noting this information is important to estimate the "bank"[7] of HCFCs in operating refrigeration and air condition equipment that exists.

[6] Implementation Completion Report (TF-20426), World Bank, June 2005: http://www.gefonline.org/ProjectDocs/M&E/Documents%20and%20data/DatabaseContent/TE/FY%202006/Terminal%20evaluations%20-%20ICRs%20-%20Audits/WB/107%20Ukraine%20ODS%20phaseout.pdf

[7] Project team was in position to carry out only partial estimates

Table 1: Ukraine[8], Reported HCFC consumption (Ozone Secretariat Records - in metric tons**)**

HCFC/Year	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
HCFC 21							2.2		4	1.9	2.8	-	
HCFC 22	79.1	18.3	84.5	82.1	420	468.1	1,069.5	1,128	1,039	1,307	962.6	840	712
HCFC 124							1.4					0.2	0,14
HCFC 133													
HCFC 141b	182.8	180.2		190*			177.8		157.2	112.9	189.6	121.4	102.8
HCFC 142b	3.3	3.3				0.2	29.8	202	89.2	198.3	301.3	137.5	201.1
Total Net ODS MT	265.2	201.8	84.5	272.1	420	468.3	1,280.7	1,330	1,289.4	1620.1	1,456.3	1,199	1,015.6
Total Net ODP MT	17.4	13.9	4.7	25.4	23.1	25.8	80.4	84.3	80.4	97.3	93.5	74.7	63.5

The reference HCFC baseline for Ukraine is of 164.2 ODP tons. Beginning in 2003, there has been a dramatic rise in reported HCFC consumption in the country as indicated in the table above and shown graphically below (Figure 1), something that is attributed to HCFC use as a replacement for CFCs and to significant economic growth and infrastructure modernization in this period.

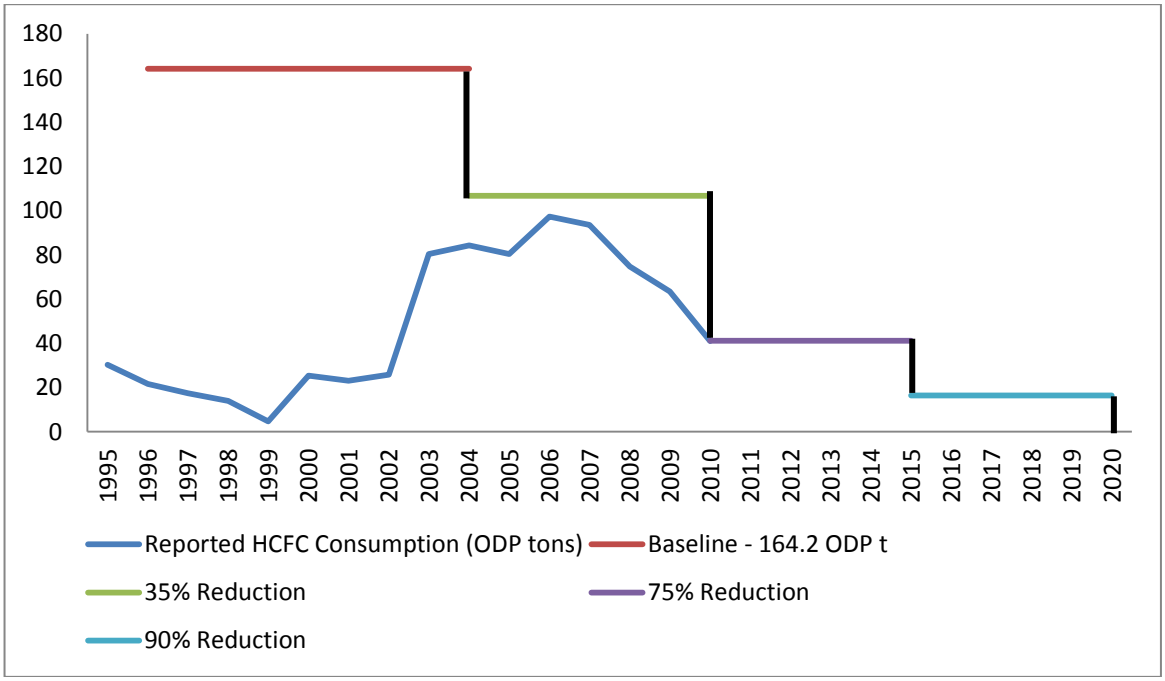
While reported consumption has declined somewhat in preceding years, the country's officially reported consumption in 2008 and 2009 was 45.5% and 38% of the base line respectively meaning that substantial reductions would still have had to occur to meet the January 1, 2010 compliance level of 25% and be sustained at rapid rate through to 2015 when the allowed consumption level will be further reduced to 10% of the baseline. In that regard, a figure of 40.7 t ODP was reported somewhat late which is almost exactly 25% of the baseline and, and provided results of the field survey data, it is unclear how this was arrived at.

In the presence of only very limited data from the licensing system (initial quality of which was also questionable), the national counterpart, under guidance from the team of experts, contacted the identified importers (several of which were considered to be end-users) through official channels. Throughout 2010 this "top-down" approach yielded a minimal response rate and it was decided to concentrate on a "bottom-up" approach collecting HCFC consumption data through work in the field and direct contacts with potential HCFC consumers.

The approach involved was HCFC data collection through larger importers and known HCFC-dependent system houses, manufacturing and servicing companies by identifying all possible medium-to-large size end-users in each potential group of HCFC users: foams (PU rigid/soft; system houses; XPS; EPS), solvents, refrigeration manufacturing and servicing sectors. The resultant information had helped, at that stage, identify virtually all main HCFC users on the market.

[8] Additional information: Population (2008): 43 million; GDP/Capita (IMF 2008): $4,319; HCFC Consumption per million population (2009): 1,476 kg ODP

Figure 1: Ukraine, Reported HCFC consumption (Ozone Secretariat Records - in ODP**)**



Resulting from the survey, current HCFC consumption in Ukraine can be summarized in the following end-user categories:

- XPS manufacturing (HCFC-22 and as an mixture with HCFC-142);
- PU foam application (system and blending houses with small-to-medium downstream users dependent on HCFC-141b);
- Refrigeration manufacturing (HCFC-141b based polyols) – sub-sector depends on the supply of polyols from local/regional/international system houses;
- Solvents (HCFC-141b); and
- Equipment servicing sector (HCFC-22).

Generally, as indicated in Table 2, approximately 75% of HCFC consumption in the country was found to be associated with manufacturing of refrigeration equipment, foam products (PU and XPS), blending fully formulated polyol, and as a solvent in manufacturing. The remaining part (based on partial information available from field survey and further expert estimates[9]) is related to mainly servicing of existing equipment stocks and some local equipment assembly. The average expected growth rate in production output, and therefore HCFCs, as per responses from the field, is 5-7% annually.

Table 2: Field survey data on distribution of HCFC consumption by main sectors[10]

Sector	HCFC consumption (metric tons)	HCFC consumption (ODP tons)	%
XPS	643	36.8	47%
System/ blend houses (PU)	105	11.55	14.8%

[9] Considered to be somewhat underestimated due to lack of accurate and complete estimates of the HCFC-based equipment bank in the country
[10] Based on three years average (2007-2009) data from respondents and importers for information cross-check purposes

Refrigeration manufacturing	61.1	6.72	8.6%
Solvents	28	3.08	3.9%
Refrigeration servicing	366 (450)[11]	20.1 (24.75)	25.7% (30%)
Total	**1,203.1 (1,287.1)**	**78.25 (82.9)**	**100%**

Elimination of manufacturing consumption will require investment in current non-ODS technologies, including those that also have low global warming potential and higher energy efficiency. No technological barriers exist to do this. In most cases, this investment will be required for enterprises to remain viable in the long term, given the growing restriction and ultimately ban of these products in other countries (already banned in the EU). This can be achieved rapidly with appropriate investment primarily by enterprises with international co-financing from the GEF; however, eligible for GEF assistance HCFC consumption in the manufacturing sector represents only 36% of the total estimated HCFC consumption. The rest of the sector is believed to be negatively impacted by the assistance cut-off date of September 21, 2007 and this dictates the need for at least information awareness activities for such enterprises on new technological developments available for HCFCs replacement with technically and economically viable non-ODS substitutes.

The other principal sector that uses HCFCs in the country is refrigeration servicing. Its importance should be emphasized since it also represents consumption that will be sustained in the long term. It will also continue to increase as long as new or used HCFC based RAC equipment (primarily imported) continues to be available on the domestic market. At the same time, ensuring that supplies of HCFCs are available for critical existing equipment is of major economic and social importance. For this reason, an action plan in this area is of major importance in both achieving international compliance and protecting national interests. Action in this area should include introducing controls to reduce and ultimately eliminate the import of HCFC equipment (particularly small domestic air conditioners and commercial refrigeration appliances), and building on the substantial investments made during the original GEF project to modernize the refrigeration servicing sector in terms of training, capacity and equipment to reduce losses and replace new HCFCs with recycled refrigerant.

Based on the available information, the current GEF/UNDP full-sized project was designed to co-finance four (4) investment sub-projects in the manufacturing sector with future GEF funds if available being directed to additional sub-projects including those in the servicing sector, assuming the country maintains the required level of attention to compliance commitments and appropriate implementation of Montreal Protocol's obligations.

At the moment of completing the HCFC data collection, out of this end-user sub-groups:

- Ten (10) enterprises operate in the XPS sector with one (1) producing fast-food storage containers and the rest functioning in the construction sector. Only three (3) enterprises were found to be eligible for GEF assistance, and only two (2) were in operation in 2010/11;
- Four (4) PU system houses, inclusive of one (1) blending-type and one (1) hand-mixing type of operation enterprises, with eligibility confirmed for two full-cycle system houses;
- Two (2) commercial refrigeration manufacturing enterprises with confirmed eligibility one of which reduced the dependence on HCFCs considerably through in-house investments;
- One (1) solvent user with confirmed eligibility; and
- At least, fifteen (15) larger, decentralized equipment servicing networks (due to low feedback, the survey for the servicing sector is considered 70% complete with some estimates existing for informal sector).

Additionally, there are also several companies of large size operating in the manufacturing sector, both in PU and XPS, which have been established utilizing ozone-safe technological solutions such as the ones based on propane, pentane and carbon dioxide. Such evolution of the sector is considered as a beneficial trend, and

[11] Approximately 450 MT of HCFC-22 is considered to be the more accurate estimate for the servicing sector

according to survey data it mainly resulted from bilateral cooperation of Ukrainian companies with mostly European, and in one case with Turkish, partners where the use of HCFCs is currently strongly discouraged. At the same time, due to a comparably substantial number on ineligible companies, specifically in XPS sector, they are mostly 100% of Ukrainian ownership or joint ventures with partners from the Russian Federation, and operate manufacturing equipment that originated from China.

While this partial evolution of PU and XPS sectors resulted in reducing burden on HCFC dependence, the factor of not least importance which intervened in the reduced dependence on HCFC based foam products is the import of ready products from abroad (Poland, Slovakia, Greece, Russia, Turkey). This was roughly estimated, though the construction association and importers, to represent 35-45% of the current demand in the construction sector. The following producers supply these non-ODS imports: Ursa (SK), Technoplex (RU), Fabian Eco (GR), Izocam (TR).

XPS sector

Based on the field survey data, the major sector that is responsible for a large portion of HCFC consumption with lower ODP index is the extruded polystyrene foam (XPS) sector responsible for at least 640 MT/year of varying, due to economic slowdown of past years, HCFC consumption. Out of this amount, at least 355 MT/year should correspond to 60 to 40% mixture of HCFC-22 and 142b, with the rest related to HCFC-22 standalone applications.

The following summarizes the information in the XPS sector by individual company, as identified during the field survey and with assistance from the All-Ukrainian Construction and Building Material Association (UCBA):

#	Company name/XPS brand	# of plants	Chemicals used	Cut-off date	Current in operation	Annual average demand in HCFC (metric tons – MT)	Remarks
1	**Sobraniye group (LTD "Sobranie-PRO-UG)**	**3**	**HCFC-22**	**Eligible** Established 1997 Extruder 2006	**Yes**	**228.00**	Largest of XPS companies with 3 eligible plants. Financially stable as leading the market for XPS plank.
2	**Stirol**	**1**	**HCFC-22**	**Eligible** Established 1995 (original 1933) Extruder 1975	**No**	**75.00**	A large chemical plant established in 1933. Not operational during visit (stocks of ready products recorded). Main production is food containers (half-shelves).
3	**Atols (PenAtols)**	**1**	**HCFC-22**	**Eligible** Established 2001 Extruder 2006	**Yes**	**10.00**	Eligibility confirmed at late stage due to unwillingness to cooperate. Company carried out tests with propane for foam manufacturing
4	**Symmer Ind (Symmer XPS)**	**1**	**HCFC-22/142b**	**Not eligible** Established 1997 Extruder 2008	**Yes**	**~5.00**	Tests on HFC-365; joint venture with Germany
5	**Technonikol (Technoplex)**	**1**	**HCFC-22/142b**	**Not eligible** Established 2004 Extruder 2008	**Yes**	**100.00**	One line on CO2 (Italy); joint venture with Russia; Umbrella group uses ODS free technology in Russia
6	**Elit-Plast (Penoboard)**	**1**	**HCFC-22/142b**	**Not eligible** Established 2007 Extruder 2008	**Yes**	**150.00**	Past and current pilot production trials on CO2 with local supply. Chinese equipment
7	**PoliInPlast**	**1**	**HCFC-**	**Not eligible**	**Yes**	**70.00**	Not reported correct

	(Extraplex)		**22/142b**	Established 2007 Extruder 11/2007			information on production equipment. After equipment cross-checks found to be ineligible. Chinese equipment.
8	**Isoplex (Isoplex)**	**1**	**HCFC-22/142b**	**Not eligible** Established 2007 Extruder 2008	**Yes**	**<10.00**	Reported as reducing HCFC consumption by shifting to another technology with only residual HCFC use planned for future operations.
9	**Vinitex (Vinitex XPS)**	**1**	**HCFC-22/142b**	**Not eligible** Established 2011	**Yes**	**<10.00**	A part of same-named large leather production factory; newly established side production
10	**StirolPlast**	**1**	**HCFC-22/142b**	**Not eligible** Established 2008	**Yes**	**<10.00**	Confirmed by all-Ukrainian Construction and building material Association as started in 2008
Sub-total HCFC consumption (MT)						**643.00**	
out of, HCFC-22						501.00	
out of, HCFC-142b						142.00	
Eligible for phase-out consumption (MT; HCFC-22 only)						**288.00**	

This sector has witnessed the establishment of enterprises in their vast majority in the middle of 2008, thus, creating an eligibility issues for the GEF, with only three (3) enterprises, one of which is a large-size company, having started their operations in 2007 and earlier. Eligible enterprises together are responsible for 290 MT of annual consumption, or approximately 45% of the total HCFC consumption in the XPS sector, entirely in the form of HCFC-22 in its pure form. In terms of ODP values, this eligible consumption represents 15.8 ODP tons.

In the list of eligible companies proposed to participate in the project there is currently the largest HCFC consumer – Sobraniye group (LTD "Sobranie-PRO-UG") with three (3) active and eligible plants. The Stirol Company was not operational at the time of field visits in 2011, and is not involved into the construction sector. The third eligible company, Atols, has shown only low-level interest in the project and has low demand for HCFCs. Due to low level consumption of HCFCs in the production processes, it is not considered as a cost-effective project that is implementable in practice, and only technical assistance to the company can be planned in terms of helping with a switch.

System/blend house sector

With regard to the PU system and blending houses identified in the country, as shown below, only two (2) can be categorized as full-cycle system houses with only one (1) of them being eligible. The other two enterprises have blending operations: one (1) eligible with automated processes, and one (1) applying hand-mixing techniques and demonstrating irregular HCFC consumption.

#	Company name	# of plants	Chemicals used	Cut-off date	Current in operation	Annual average demand in HCFC (metric tons – MT)	Remarks
1	**Advance**	**1**	**HCFC-141b**	**Eligible** Established 1991 Equipment 2006	**Yes**	**30.00**[12]	Closely partners with BASF (Germany) which supplies HCFC-free polyols, and blending of components (A) with HCFC-141b is completed locally. Mostly spray foam. Company is prepared to move to HFC-365/227a with the help of the current partner.

[12] Minimal level consumption recorded at the time of survey. This may underestimate the HCFC consumption figures.

2	**HimPostavshik**	**1**	**HCFC-141b**	**Eligible** Established 1997 Equipment 2008	**Yes**	**30.00**[13]	Main function is producer of lacquer and paint products. Independent system house function added in 2008. Old tanks were re-furbished for polyol mixing.
3	**Malakion**	**1**	**HCFC-141b**	- No equipment	**Irregular, seasonal**	**20.00**	Eligibility was not confirmed due to lack of access. As reported by HCFC importers (suppliers to Malakion), company uses hand-mixing for polyols seasonally in the period of hot temperatures for easy blending.
4	**Polyfoam (POLYFOAM LTD)**	**1**	**HCFC-141b**	**Eligible** Established 1998 Equipment 1970s	**Yes**	**60.00**[14]	Eligibility confirmed. Independent local system house. Supply of polyols goes for sandwich panels manufacturing, rigid foams in automobile industry, spray. Extremely old mixing equipment.
Sub-total HCFC-141b consumption (MTons)						**140.00**	
Eligible for phase-out consumption (MTons)						**65.00**	
Eligible for phase-out consumption (ODP tons)						**7.15**	

Together, all four companies depend on at least 140 MT/year of pure HCFC-141b. The eligible consumption in terms of ODP values represent 7.15 ODP tons, or 50% of total HCFC use for this sub-sector.

Out of the list of companies in this sub-sector which are currently considered as eligible for assistance - Advance and Polyfoam (POLYFOAM LTD) - , the operation of Advance fully depends on its partnership with BASF (Germany), and, the company was not able to decide whether it would participate in the project independently of its partner. The main principal conversion plan for the company is to proceed with technological conversion to HFC based polyols for spray foam applications. In support of this, the company completed production trials and the only point of concern is the current high price of HFC365/227 a mixture for processing purposes by downstream clients. With regard to Polyfoam (POLYFOAM LTD), the company is fully eligible with a settled list of more than 50 downstream clients and will participate in the GEF assistance package.

The other two enterprises will not participate in the project, in one case due to cut-off date eligibility issue and in another one due to lack of technological equipment for polyol mixing and irregular operations.

Refrigeration manufacturing sector

The third group in the PU foam sector is represented by two (2) refrigeration manufacturing companies, which depend on HCFC-141b based polyol mixtures. The total consumption in this sector represents 61 MT/year at its peak demand, or approximately 6.6 tons in ODP equivalent.

#	Company name	# of plants	Polyols used	Cut-off date	Current in operation	Annual average demand in HCFC (metric tons – MT)	Remarks
1	**Intertehnika**[15]	**1**	**HCFC-**	**Eligible**	**Yes**	**56.09**[16]	Manufactures ice-cream freezers and

13 Project team recorded pure response rate from the company. Average consumption was estimated on the basis of a feedback from competitors which are more technically advanced than HimPostavshik.

[14] Recorded as a supplier of HCFC-141b based polyols for local refrigeration manufacturing companies (20 metric tons/yearly)

[15] Established in 1997 at Nord (Nord Group Holding) initiative

[16] Receives a mix of supplies from local system houses and from Russia (previously from Germany)

	(PSC "Intertekhnika")		**141b**	Established 1997 Equipment 1988, 2002, 2008			drink stands with charges of HFC-134a. Has two detached facilities with several foam lines. For equipment insulation uses HCFC-141b based polyols.
2	**UBC – Ukraine Beverage Company**	**1**	**HCFC-141b**	**Eligible** Established 1998 Equipment: Eligible one piece installed 2005	**Yes**	**5**[17]	State-of-art factory with participation of foreign capital (EBRD). Main production (99%) is based on propane/HFC-134a refrigerant filling with CO2 based technological lines for insulating layers. For clients wishing lower thermal conductivity in equipment, operate two (2) PU lines based on HCFC-141b with residual consumption. Reported as proceeding with investment to change foam production to c-pentane technology.
Sub-total HCFC-141b consumption (MTons)						**61.00**	
Eligible for phase-out consumption (MTons)						**57.00**	
Eligible for phase-out consumption (ODP tons)						**6.6**	

This sector has two eligible companies, and one – Intertehnika (PSC "Intertekhnika") – is planning, with the assistance of the project, to convert to c-pentane technology, while UBC (partial eligibility due to foreign ownership by the European Bank on Reconstruction and Development - EBRD) has only residual HCFC consumption , given that the main production is based on CO2/water blown technology with reported current plans of further switching some of existing lines to c-pentane due to strategic considerations related to reducing operational costs of input materials. There is only one eligible line of small capacity (30 kg/min) available at UBC, and eligible consumption is equivalent to 1 MT/year which is further complicated by irregularity of production due to adhoc demands from clientele. Therefore, it is proposed that only Intertehnika (PSC "Intertekhnika") participates in the assistance package.

Solvents

The solvents sector in Ukraine is represented, at the time of completion of the field survey, by one enterprise consuming HCFC-141b in pure form for degreasing of metal parts in the manufacture of compressors and parts for household refrigerators. The peaking consumption is estimated to be 28 MT/year of HCFC-141b, or 3.08 tons in ODP value.

While collecting data on this sub-sector, one more potential user (Alpha) was detected through importers reportedly requiring sporadic supply of pure HCFC-141b, though, after direct discussions with the company, it was concluded that the company does not consume HCFC substances.

#	Company name	# of plants	Chemicals used	Cut-off date	Current in operation	Annual average demand in HCFC (metric tons – MT)	Remarks
1	**Nord (Nord Group Holding)**	**1**	**HCFC-141b**	**Eligible** Established 1963 Equipment Open trays	**Yes**	**28.00**	Manufacturer of household refrigerated equipment (refrigerators). Received previous assistance for conversion to non-ODS for foam insulation and refrigerant filling. Currently uses HCFC-141b (open cycle) for cleaning metal parts (inclusive of compressors) for

[17] Out of 4 machines which use HCFC-141b polyols, only one is eligible in terms of cut-off date

							refrigerator assembly at several sites
Sub-total HCFC-141b consumption (MTons)						**28.00**	
Eligible for phase-out consumption (MTons)						**28.00**	
Eligible for phase-out consumption (ODP tons)						**3.08**	

Refrigeration servicing sector

The last HCFC consuming sector is the RAC equipment servicing sector which includes elements of equipment assembly from imported components. According to available to-date data on this sector, it represents another major consumer of HCFCs, - HCFC-22 – for primarily equipment servicing needs and equipment filling requirements during assembly of ready components.

Overall HCFC consumption in this sector is believed to be increasing with the majority (>70%), according to approximate expert estimates, of it attributable to the recent rapid growth in RAC servicing demand, principally for HCFC-22, created by a relatively new and expanding inventory of HCFC based (and primarily imported) equipment over the last five years. Refrigeration equipment is also assembled domestically, though accurate estimates of its market share are yet to be performed in various regions.

The amount of imported household A/C split systems, in 2008, constituted approximately 370,000 units with 20% growth rate expected in future years. In 2010, it was around 375,000 units - the overall economic slowdown resulted in excessive accumulation of stocks in 2008 and 2009 and these stocks went on sales in subsequent years, and then further reached 265,000 units for the first 3 months of 2011[18]. It could be assumed that this growth is remarkable and would certainly create an HCFC "consumption bubble" in the country if no rapid actions to control import of such equipment are taken.

According to another data source[19], around 60% of the household A/C conditioners are comparably more expensive models starting from US$ 340 up to US$ 440 and higher, per unit. The lower range A/C models start at US$ 275/unit, and take 40% of the market. The market is dominated by Chinese and South Korean manufacturers where the latter (LG and Samsung) is responsible for almost 40% of it, and the rest of brands available such as Delfa and Saturn despite origins in EU or U.S. respectively are primarily produced in China along with original Chinese products such as Midea. Finally, approximately 54% of sales take place through various small stores with 46% of sales happen through dedicated product chains.

Through selected market studies which were carried out by the project team at several A/C sale points, approximately 40-45% of A/C split systems on sale contained charges of HCFC-22. In terms of future perspective, if on average 300,000 split system units are imported annually into the country (with an approximate charge of 1.5 kg of HCFC-22 for 40% of the supply), after 5-7 years of operation the equipment will require more frequent repairs and refrigerant top-ups, and the bank of HCFC will reach 180 metric tons of HCFC-22 with annual servicing demand for 25%, it will lead to an annual demand of 45 metric tons of HCFC-22 (with onwards accumulation of stock of such equipment), and this situation will deteriorate over a longer period of time to further complicate the country's compliance prospects at the fast approaching 2015 HCFC import reduction milestone and beyond.

These are the low range estimates and also only relate to the household A/C equipment sub-sector. The complete estimate on the latent demand for HCFC in the servicing sector will form a part of the implementation of the current project, which will complete the formulation of the HCFC phase-out strategy and transform the current outline document into the country's Strategy for rapid and then consistent and gradual reductions of HCFC import and consumption into the country to sustain its compliance perspectives with the Montreal Protocol obligations.

[18] Household A/C split systems. Market review summary. Domotehnika-Nord (Nord Group Holding), Ukraine 2011: 75% of imports of ready product originates from Chinese distributors and manufacturers with no warranty support available. In Asia, only Korean manufacturers base their operations on post-sale warranty services to A/C split system holders.

[19] Gfk-RTGroup, Small domestic appliances and air-conditioners, Ukraine, 2011

With regard to the structure of this sector, it consists of several decentralized larger-to-medium size servicing enterprises. It was also concluded that larger enterprises specialize on the specific type of equipment: air conditioning equipment (all categories), commercial/industrial storage and processing equipment, and household equipment. Smaller service centers prefer to deal with household equipment, both refrigerators and A/C splits, and have less technical staff, or employ seasonal technicians. Larger companies normally employ from 30 up to 100 full-time technicians and operate under sub-contracts with organized food distribution chains and larger organizations (Auchan and other supermarket chains, food processing industry, hospitals etc). Furthermore, each of the larger size servicing networks, in their vast majority, is present in larger cities in the country with population over 1 mln inhabitants. These thresholds determine business development plans for the servicing networks.

Typical annual dependence on HCFCs varies starting with 5 up to 40 metric tons of ODSs (average value is 15-20 MT), with the latter values attributed to only a limited number of larger servicing enterprises which, in addition to in-house requirements for servicing, also prepare HCFC and HFC blends and sell their ready products on the market. PPG work also detected some ongoing voluntary equipment retrofit work when a service center requests HCFC based equipment owners to allow HCFC recovery from their systems with follow-on retrofit to HFC blends.

In terms of the professional level of technicians working of the larger servicing networks, there is a tendency that it is being maintained in-house. Well-established enterprises seem to have consolidated strong partnerships with equipment component suppliers (Bitzer, Danfoss, etc) who provide consultative and technician certification services to work with their manufactured products/equipment. It has been seen that some A/C specializing enterprises convene regular training conferences; though, it is not a common practice across the sector, but rather an exception.

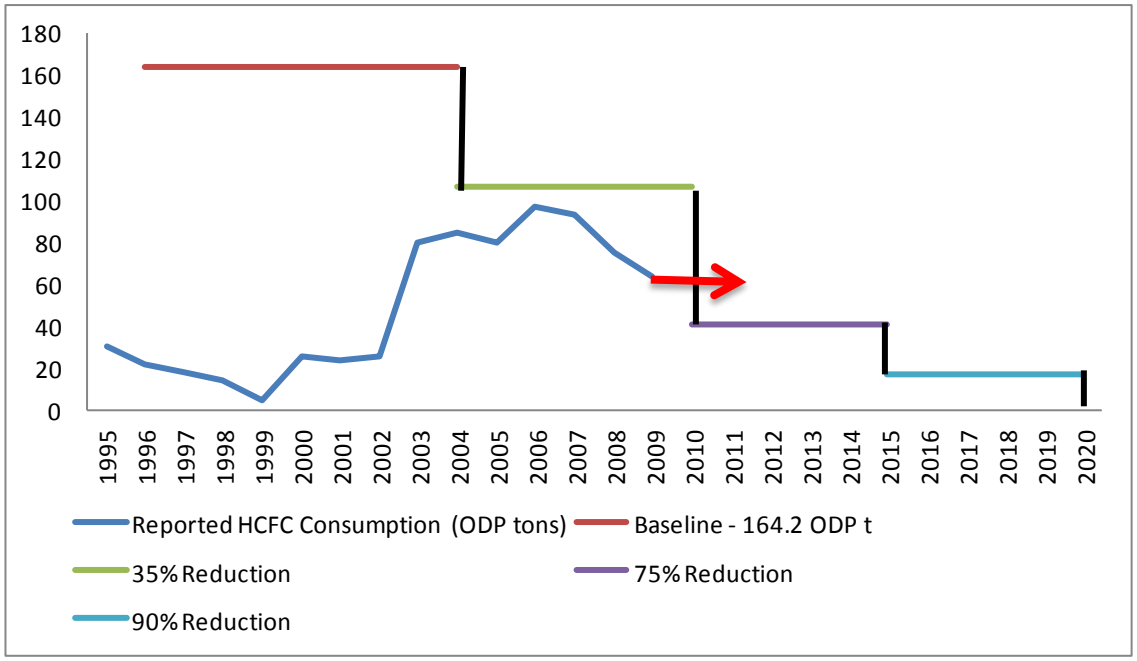
As mentioned, there are also a number of smaller size companies identified by the survey. These frequently combine their servicing activities with general household appliances and equipment repairs and maintenance (washing machines, telephones, fans, and other electric equipment). These are the companies which mostly hire seasonal or individual technicians to mostly work with maintenance of A/C split systems used by households. By being closely associated with individual technician market, it is estimated that these companies can be found in the country in vast numbers and this sub-sector is heavily fragmented and not stable.

While, with help of PPG resources, it was possible to collect preliminary information on larger servicing networks present with their branches in all principal regions of the country, there is still limited information available on medium-sized companies and estimates of the informal sector. During formulation of Stage II of GEF assistance to Ukraine which will specifically target capacity building and technical assistance in the HCFC re-use in the servicing sector, such information should be collected and cross-checked for accuracy and consistency.

As a summary of findings, the work undertaken to obtain estimates of actual HCFC consumption in the country is not definitive but allows defining an approximate, though yet still low range estimate of HCFC consumption amount to be used for purposes of more realistic reporting and for completing the development of a full-fledged phase out strategy for the country. As referred to in Table 2 previously in the section, approximately 75% of HCFC consumption in the country was found to be associated with the manufacturing sector consisting of refrigeration, foam products (PU and XPS) manufacturing, blending of fully formulated HCFC containing polyols for downstream users, and HCFC applications as solvents. The rest is taken up by the servicing sector where it is believed the largest future consumption of HCFCs will take place due to latent demand related to the large and growing installed capacity which will age and require equipment servicing in the medium to longer run.

On the basis of the set of information collected during the process of formulating the outline of the HCFC phase-out strategy, it is clear that the country faces difficulties at this current stage and that these are likely to continue in the future, with respect to its ability to meet the HCFC phase-out obligations with respect to the Montreal Protocol. Several institutional changes have led to deterioration of the capacity of the country to comprehensively manage the HCFC phase-out process, and in order to achieve compliance and sustain such status in the longer term perspective the country requires international assistance. As a result of the collection and analysis of field survey data, it was found that the level of dependence of the manufacturing and equipment servicing sectors in the country well exceeds the allowed HCFC import and consumption thresholds (Figure 2).

Figure 2. Ukraine's compliance prospects with its Montreal Protocol obligations



Current results from field surveys confirmed that the principal issue in achieving and sustaining compliance with the accelerated HCFC phase-out in Ukraine is the reduction of the current growth in HCFC consumption in the country, and the long-term process of reversing it. In a view of the adjusted HCFC use data, Ukraine was already challenged in meeting its 2010 phase-out obligations and, if no action is taken, will have difficulty meeting the 2015 phase-out obligations, in the absence of rapid action to control HCFCs use and specifically the continued installation of new and mainly imported HCFC-containing equipment. This requires immediate action in laying the institutional and regulatory groundwork, and formalizing national commitments in management plans firmly linked to national policy, building institutional and technical capacity, and undertaking targeted investment to the direct sources of consumption (manufacturing sector, or Stage I), and the refrigeration-servicing sector, (Stage II).

The following is a list of urgently required actions to return Ukraine into compliance with the Montreal Protocol which will be implemented in the immediate future along with the submission of the current project proposal:

- Immediately report to the Ozone Secretariat about challenges the country faces in controlling the import of HCFCs due to high demand for HCFC on the local market and propose a plan of actions to return to compliance with Montreal Protocol obligations;

- On the basis of the existing outline, finalize the full-fledged HCFC phase-out action plan for Ukraine (with accurate estimates of HCFC consumption and the amount of HCFC based equipment imported and installed in the country) to help meet compliance obligations - implementation of the strategy will require a combination of upgraded regulatory measures and strict enforcement of the quota system, technical and institutional capacity strengthening, and direct investment;
- Facilitate approval/endorsement of the HCFC Phase Out strategy as soon as possible in 2012 or early 2013 in order to assist the country returning into compliance with Montreal Protocol obligations;
- Introduce overall quotas for the maximum allowed annual import of HCFCs in 2012 based on the MP compliance level (41 tons ODP) and implement mechanism for distributing this (by specific chemical) to importers based on priorities determined in the above strategy (manufacturing sector, servicing sector);
- Ensure strict monitoring of licensing of HCFC consumption and actual imports against the 2010 control measure (41.05 tons ODP) from 2011 throughout 2015 with further reduction in HCFC consumption after 2015 milestone;
- Initiate regulatory action approved in the phase out strategy, particularly controls on the import of HCFC based equipment and products. This should target used equipment (bans) and small domestic A/C equipment (quotas and ultimately bans);
- Continue with awareness activities on HCFC phase out priorities with stakeholders (Importers/distributors/end users/public);
- Effectively implement the current phase of HCFC phase-out (Stage I); and
- Initiate formulation of a capacity building sub-project for the servicing sector (HCFC re-use) in GEF-5 cycle, approval of which by GEF will be dependent on the adoption of the HCFC phase-out strategy by Ukraine.

The current full-size proposal is an initial response (Stage I) to the obligations incurred by Ukraine under the phase out schedule for HCFCs of the Montreal Protocol, as amended by the Copenhagen amendment and the subsequent adjustment adopted by the Parties to the Montreal Protocol at MOP 19 in September 2007. It provides a follow up to the previous GEF regional HCFC project, whose main objective was the development of HCFC survey data in CEITs and outlines of the phase-out strategies.

In order to respond to the country's needs and initiate the return to compliance; Stage I targets as a priority the completion of the HCFC phase-out strategy formulation in its full format as well as rapid eligible consumption phase-out activities in the refrigeration manufacturing, solvent and XPS sectors, through HCFC-based industry (manufacturing sector) conversions to non-HCFC technologies (zero ODP and low GWP), as well as technical assistance and support (capacity building, awareness raising, etc) to non-eligible enterprises in support of their self conversion. It further plans for enhanced capacity building of re-structured Government authorities (Environmental Inspectorate and Customs) to exercise more effective HCFC related regulatory measures with technical support and supply of modern portable analytical instruments to properly detect and identify HCFCs at entry points and enforce HCFC quota legislation to facilitate the return of the country into compliance with the Montreal Protocol obligations. Modest institutional support to re-build the capacity of the Government through regional networking is another essential element which is proposed for support in line with the original PIF design.

This approach will help in rapid removal from use of substantial amounts of HCFCs in identified eligible companies. For the rest of the companies that are considered ineligible it is also able to offer the establishment of information exchange platforms on new and emerging non-HCFC/low GWP substitute technologies. Stage I also provides modest technical assistance at the institutional level to facilitate the completion of HCFC phase-out outline document through experience exchange with other partner countries in the region (both MLF and GEF supported).

A total of 25.64 ODP tons/year of HCFC consumption would be phased out under the project by providing direct assistance to selected eligible enterprises. The project will further facilitate the indirect phase-out of an additional amount of 33.55 ODP tons annually in ineligible enterprises. This will be supported through information exchange on technological innovations in the area of PU and XPS foam production, and then through enforcement of implementation of HCFC import quota system to return the country into compliance in the period from 2010 to 2015. Based on the results of the field survey the phase-out might be revised and upwardly adjusted after completion of the formulation of the full-fledged HCFC phase-out strategy for the country.

Implementation of these actions will be supported by financing from the GEF, along with national co-funding.

The project design included elements required to improve the baseline situation, address key barriers and prepare the country to meet its HCFC phase-out obligations through capacity building and investment projects to meet global environmental benefits in line with the GEF-4 strategy.

1.1.2 Global and environmental benefits

The principal global environmental benefit from the project is the phase-out of current eligible HCFC consumption in Ukraine as well through assisting the country to maintain and improve compliance prospects in line with Montreal Protocol provisions such that it can creditably meet its 2015 reduction obligations.

The first important objective will be achieved directly during the project period by activities related to rapid technological conversions in eligible enterprises in the manufacturing sector and supporting the government's efforts to create national institutional capacity to effectively regulate and control HCFC consumption control imports of HCFCs and HCFC based equipment and their use in the country.

Component 1 (regional networking) will support the country in receiving valuable experience in ODS regulatory control measures and practices as they are currently exercised in other countries in the region, thus, improving HCFC management approaches at the national level.

Component 2 will specifically equip the Government and private sectors with tools/technologies and capacity to reduce their dependence on imports of HCFCs through:

- as a priority, the completion and adoption of HCFC phase-out strategy formulation in its full format;
- rapid eligible HCFC consumption phaseout activities in the refrigeration manufacturing, solvent and XPS sectors, through HCFC-based industry (manufacturing sector) conversions to non-HCFC technologies (with zero ODP and low GWP);
- enhanced capacity building of re-structured Government authorities (Environmental Inspectorate and Customs) to exercise more effective HCFC related regulatory measures with technical support by supply of modern portable analytical instruments to properly detect HCFCs at entry points and enforce HCFC quota legislation to return country into compliance with the Montreal Protocol obligations.

The following summarizes specific global environmental benefits attached to phase-out of HCFCs in Ukraine that will be derived from the project:

- Country's compliance with the Montreal Protocol by directly phasing out 25.64 ODP tons/year of HCFCs in the eligible manufacturing sector, indirectly facilitating the phase-out of 33.55 ODP tons/year by 2015 in the ineligible manufacturing sector and preparing the country's capacity to sustain this achievement beyond 2015 (through an additional separate project);

- Adoption of the HCFC phase-out strategy as a part of existing ODS Country Programme in Ukraine and its consistent implementation;
- Strengthened institutional capacity of the country to improve decision-making related to HCFC phase-out approaches and to exercise effective regulatory controls over the import of HCFCs and HCFC based equipment. This will be achieved through regional experience exchange with other Parties to the Montreal Protocol from the region, improvements in the current legislation as well as through building capacities of Customs and Environmental Inspectorate to detect and identify HCFCs/blends at the entry points and enforce regulatory measures as required by the law;
- Resulting enhanced knowledge base in terms of information management and technical capacity to sustain planning, decision making and program execution related to HCFC phase-out, as well as engage in effective information exchange nationally and globally;
- Improved HCFC/blends analytical capacity at the country level will help to resolve arguments on the content of incoming refrigerant gas in case of mislabeling of packaging and in support of the HCFC re-use system to certify the quality of purified refrigerants;
- Demonstration of strong synergies between the ozone layer depletion (HCFC phase-out) and climate change benefits (low GWP technologies) when implementing technological conversions in the manufacturing sector;
- Creating a high level of awareness by policy makers, stakeholders and the public on the need for HCFC phase-out, which will stimulate sustained attention to the issue and timely responses

In the context of inter-departmental cooperation, the project will facilitate collaboration between key Governmental departments (Ministry of Ecology and National Resources, Customs Department) to strengthen implementation of the Montreal Protocol on ozone-depleting substances and, therefore, in preparing the country institutionally for more effective general sound chemicals management.

1.1.3 Linkages with CP, UNDAF and CCA

The current project seeks to give input to the preparation and implementation of formal HCFC Phase out strategy and action plan consistent with Decision XIX/6 and which will serve as direct input to the updating of the existing ODS Management Country Program of Ukraine. The formal adoption of Decision XIX/6 control measures within the country's legal and regulatory system, will give practical substance to being able to achieving and maintaining country compliance as committed to by countries through their ratification of current amendments to the Montreal Protocol.

Ukraine was among the first countries to sign the Vienna Convention and the Montreal Protocol in the region. By signing the Montreal Protocol in 1988, Ukraine undertook to reduce and phase out the consumption of ODSs. The first of these obligations was practically assumed with the ratification of the London Amendment in 1997. On February 6, 2002, the Copenhagen amendment to the Montreal Protocol was ratified. And, on May 4, 2007, the two other amendments, Montreal and Beijing, were further ratified by the country.

Ukraine belongs to a non-Article 5 category under Montreal Protocol and acceded to all the amendments to it. As such it is subject to the phase out obligations so dictated, including those applied under Decision XIX/6 as addressed in the draft HCFC phase-out strategy. At present, Ukraine is in a prospect of non-compliance with these obligations and requires GEF assistance to sustain its compliance prospect from the present to 2015 and beyond.

The project is consistent with UNDAF and Country Programme Action Plan through the following outcomes and outputs:

UNDAF outcome:

Government adopts policy frameworks and mechanisms to ensure reversal of environmental degradation, climate change mitigation and adaptation, and prevention and response to natural and man-made disasters

Country Programme Action Plan outputs:

Capacity to meet international climate change obligations, including the Montreal protocol and Stockholm convention improved

The project is aligned with the Country Programme in ODS phase-out - specific policy priorities and commitments related to ODS phase-out are defined by Resolution of the Cabinet of Ministers of Ukraine No. 256 dated March 4, 2004. In parallel, the country has made similar policy commitments to a number of other chemicals related environmental conventions and agreements. These include the Stockholm Convention on Persistent Organic Pollutants (2007), and the Basel Convention on the Control of Trans-boundary Movement of Hazardous Waste and its Disposal (1999).

1.2 Key Barriers

Ukraine faces a non-compliance situation prospect with 2010-2014 HCFC consumption reduction milestone. This situation may further deteriorate by 2015 in a situation if the government does not demonstrate commitment to HCFC phase out as would be evidenced by implementing widely accepted measures that will control HCFC import and use. International support can assist this, subject to the existence of creditable commitment. At a more specific level, the following major barriers can be identified and which are being explicitly targeted in the project's design:

- *Low creditability in terms of demonstration of compliance with Montreal Protocol obligations and associated government commitment to seriously address the issue:* Due to multiple institutional re-organizations in the Government in recent years (2009-2011), the country's capacity to address HCFC phase-out has substantially deteriorated. Initial capacity re-building efforts which are being currently carried out by the Government need international support to be more effective and successful. As an important priority in getting the government to focus on this situation, the non-compliance reporting to the Ozone Secretariat and completion of HCFC phase-out strategy will be the first two steps in demonstrating the country's intentions to comply with the Montreal Protocol provisions. Correspondingly, any future assistance from international community to Ukraine should depend on adoption of a complete HCFC strategy as a part of Ukraine's existing ODS Country Programme;
- *Sustainability of institutional capacity:* At a general level, the institutional capacity of Ukraine as a party to the Montreal Protocol has historically been weak and remains so. As such this represents a significant risk to obtaining sustained progress with HCFC phase-out as well as providing the country with needed creditability in meeting its international obligations. Such capacity requires re-building and strengthening, and this process can significantly benefit from regional knowledge sharing platforms and collaboration with other Governmental partners active in implementation of the Montreal Protocol in the region. More specifically, this will allow exposure to and support in implementation of best available regulatory approaches in controlling HCFC import and phase-out. The project will facilitate this by supporting regional and sub-regional cooperation of responsible government organizations;
- *Weak interest from HCFC end-users to cooperate with the Government*: Private sector demonstrated only limited interest in cooperation with the Government authorities and implementing agency on HCFC data collection at end-user level. This has negatively impacted the previous and current work. The project can serve to facilitate improvement in the creditability and trust that is required through a series of awareness

raising seminars which would be intended to improve the rapport between the parties and assist in the formulation of a creditable and fully endorsed HCFC phase-out strategy in full;

- *Weak interdepartmental coordination resulting in inaccurate data collection and ineffective HCFC import controls*: The current system of permitting is considered as relatively immature. Historically it has not accurately or consistently captured or controlled HCFC imports. Equally important, it has been inconsistently administered due to changing responsible authorities. As such it is still developing in terms of coverage, coordination and interagency reporting, and there is a need to improve interdepartmental cooperation to ensure its effective functioning and supply of reliable import data. Enhanced coordination between MENR and customs authorities is required with respect to adoption of methodologies where by customs codes can better discriminate between and among those items of specific interest (i.e. HCFC chemicals, HCFC containing equipment/products, HFCs) and other imports, preparation of practical instructions on labeling and designations of items being controlled, development of streamlined reporting and information exchange procedures;
- *Limited enforcement capacity and capability to control imports at points of entry:* Environment and Customs inspectorates lack knowledge and skills in order to professionally support proper HCFC import enforcement activities and this requires training and use of modern gas detection tools. Currently, these departments lack such portable instruments. This is considered as a barrier for effective monitoring and control of HCFC imports, and technical assistance should be provided in support of such capacity building elements for the mentioned enforcement agencies;
- *Partial eligibility of the manufacturing sector which is the principal HCFC consumer in Ukraine:* The consumption of HCFCs in the manufacturing sector is considered to dominate over other sectors and represents approximately 75% of the overall country's dependence level on HCFCs. Out of this amount, around 29.5 ODP tons, or 50% of the total use in the manufacturing sector, is eligible for GEF assistance. Given a substantial amount of ineligible HCFC consumption, extra efforts to sustain information exchange on new and emerging technologies in the foam sector through workshop and seminar platforms are justified and should be promoted;
- *Refrigerant management capacity:* While related to a future Stage II action in the servicing sector, this barrier is worthwhile flagging in the current document. At least, 50% of refrigerant consumption in the servicing sector can be attributed to HCFCs, and primarily HCFC-22. With lack of control on imports of HCFC containing equipment, the country risks creation of a long term HCFC consumption bubble, or, in other words, latent demand. The country's overall capacity in refrigerant management will need to be maintained and strengthened during Stage II to ensure recovery and recycling is maximized, capacity for alternative technologies exists, and ultimately management of "end of life" refrigerants is provided for.

1.3 Stakeholder analysis

During the formulation of the HCFC phase-out strategy a stakeholder analysis was performed which is summarized below.

Name of the institution, organization	Description of the role and activities
Ministry of Ecology and Natural Resources	Control of the use and consumption of ODS, HCFC and HCFC product licensing, formulation of legal-normative documents; Main coordination function on the implementation of Montreal Protocol.
State Environmental Inspectorate	Regulatory measures enforcement function: screening of incoming materials identified by Customs for pre-clearance or rejection of import.

Name of the institution, organization	Description of the role and activities
State Customs Committee	Customs clearance of goods imported into (exported from) the country (ODS and ODS-containing products)
Environmental and Customs Academies	Provide education and trainings for environmental inspectors and Customs agents
All-Ukrainian Construction and Building Material Association (UCBA)	Unifies XPS producers in one main umbrella organizational platform and serves for protection of industry interests. The association is a trusted information channel which is important for the purposes of the current project and overall HCFC phase-out strategy on the Government regulation of HCFC imports.
HCFC importers and end-users in the manufacturing sector	Supply and distribution of HCFCs. Use of HCFCs in manufacturing processes (PU foam, system houses, XPS, solvents)

The project will be implemented in close coordination and collaboration with relevant government institutions, regional authorities, industries, public and local authorities and NGOs, as well as with other related relevant projects in the region through enhanced networking.

There are a number of related international initiatives in neighboring countries and regionally with which this project will coordinate activities.

The following lists these specific initiatives:

- Regional MSP GEF/UNDP/UNIDO/UNEP/WB : "Preparing for HCFC phase out in CEITs: needs, benefits and potential synergies with other MEAs: Bulgaria, Kazakhstan, Ukraine, Tajikistan, Belarus, Uzbekistan, Azerbaijan and the Russian Federation" which has been instrumental in collecting HCFC consumption related data and formulating draft outlines of HCFC phase-out strategies for the involved countries;
- Regional FSP GEF/UNDP: "Initial Implementation of Accelerated HCFC Phase Out in the CEIT Region: Ukraine, Belarus, Tajikistan and Uzbekistan" is currently under formulation (last stage) and helps develop approaches to HCFC phase-out in the region through future regional information and experience exchange;
- MLF/UNDP/UNEP project on implementation of HPMP (HCFC phase-out management plan) in Kyrgyzstan (Stage 1 until 2015) which was approved in 2010 and is currently under implementation. The project has been designed to explore similar activities;
- MLF/UNIDO project on implementation of HPMP in Turkmenistan (Stage 1 until 2020) which was approved in 2010 and is currently under implementation. The project has been designed to explore similar activities;
- MLF/UNDP/UNEP project on implementation of HPMP in Armenia (Stage 1 until 2015) which was approved in 2010 and is currently under implementation. The project has been designed to explore similar activities;
- MLF/UNDP project on implementation of HPMP in Moldova (Stage 1 until 2015) which was approved in 2010 and is currently under implementation. The project has been designed to explore similar activities;
- MLF/UNDP project on implementation of HPMP in Georgia (Stage 1 until 2020) which was approved in 2010 and is currently under implementation. The project has been designed to explore similar activities;
- MLF/UNDP PRPs for formulation of ODS waste destruction project in Brazil, Georgia, Colombia;
- MLF/UNDP ODS waste destruction projects in Ghana and Cuba.

The project will also cooperate with other HCFC phase-out initiatives in the region once those are formulated and approved for implementation.

1.4 Baseline analysis

At the start of the previous regional MSP project on HCFC data collection and formulation of HCFC phase-out strategic outlines, there was no active work in place in Ukraine on addressing HCFC phase-out by HCFC consumers, except for routine operation of HCFC and HCFC containing product import quota system. The institutional structure identified at that time was in continued change, and, among other factors such as lack of cooperation from private sector side, this has resulted in collection of only partially comprehensive HCFC consumption data for the purposes of priority setting in the current work.

At PPG stage, initial limited activities were initiated by the Government to re-establish the NOU capacity and start addressing HCFC import and use control process. The capacity is still weak and only emerging, and it requires demonstration of sustained and expanded government commitment, which if realized would allow effective international support. High-level policy commitment towards implementation of the Montreal Protocol and on the lower level limited institutional capacity is a barrier towards effective or creditable implementation of HCFC import monitoring and HCFC quota system enforcement.

With both weak Government's commitment and in the absence of international assistance and specifically GEF funding, it is reasonable to assume that progress on the implementation of the HCFC phase-out strategy in the country and efforts toward achieving compliance with the Montreal Protocol would have been minimal. Essentially, the business as usual case would be the continuation of the situation that currently exists – a prospect of non-compliance of Ukraine in front of the Montreal Protocol and its HCFC phase-out requirements. With potential growth in HCFC consumption at a rate of 5-7% annually, the non-compliance prospect will even more substantially deteriorate and will cost more resources to bring the country back into compliance status. While some players in the private sector will self-convert using their own financial resources, the process is expected to be slow and not timely as to match the HCFC reduction steps as specified by the Montreal Protocol.

In response to these challenges (baseline), GEF assistance will serve to support HCFC phase-out in the country as was the case in the past with CFC phase-out.

2. STRATEGY

2.1 Project Rationale and Policy Conformity

The project is designed to be aligned with GEF strategic programs and priorities, and specifically the GEF Operational Strategy for ODS. This project is a response to the obligations incurred by Ukraine as CEITs (non-Article 5) under the phase-out schedule for HCFCs of the Montreal Protocol, as amended by the Copenhagen amendment and Decision XIX/6.

At a high level, the project directly supports the overarching GEF goal for the ODS focal area to protect human health and the environment by assisting countries to phase out consumption and production, and prevent releases of ozone-depleting substances (ODS) according to their commitments to the Montreal Protocol phase-out schedules, while enabling energy-efficient alternative technologies and practices, and consequently contribute generally to capacity development for the sound management of chemicals.

In meeting this overall objective, the project was designed to address the ODS focal area's strategic programme, which is aimed at phasing out of HCFC (from production and consumption) and strengthening of capacities and institutions in participating countries. More specifically, this is in reference with the GEF Focal Area Strategy and Strategic Programming for GEF-4 document on Ozone (GEF/C, 31/10 May 11, 2007), which contains the following main objective:

- For the period of GEF-4, the GEF will assist eligible countries in meeting their HCFC phase out obligations under the Montreal Protocol, and strengthening capacities and institutions in those countries that still are faced with difficulties in meeting their reporting obligations.

More specifically, the project addresses the following two Outcomes of Strategic Program 1 on phasing out HCFCs and strengthening of capacities and institutions for GEF-4:

- HCFCs are phased-out according to Montreal Protocol schedule, or faster, in GEF-eligible countries;
- GEF-eligible countries meet their reporting obligations under the Montreal Protocol

The GEF goal and its strategic objective are directly addressed in the project objective and its overall design. Similarly the project outcomes and the indicators match the impacts and main indicators defined in the GEF strategy as related to HCFCs, and the project meets the requirements of the Strategic Program 1 in the following Indicators:

- ODP adjusted tons of HCFCs phase-out from consumption: For Ukraine, the project will achieve the reduction of 25.64 ODP tons of HCFCs through direct technological conversions at eligible manufacturing enterprises with use of project resources and further facilitation of reduction of 33.55 ODP tons of HCFCs indirectly in ineligible enterprises through awareness raising on new and emerging technological substitutes to replace HCFCs;
- Percentage reduction in HCFC consumption in the participating countries: The project will assist the country with rapid reduction of HCFC consumption in the manufacturing sector (Stage I) and facilitate the maintenance of creditable compliance with Montreal Protocol provisions for the period of 2010-2014 and meet the 2015 control measures;
- Percentage of GEF-funded countries that meet their reporting obligations under the Montreal Protocol: As a result of the project, Ukraine will have established institutional and technical capacity to meet its reporting obligations under the Montreal Protocol for the period 2010-2014.

In line with the GEF's requirements for the type of projects to be supported, the present project is of a dual nature:

- enabling-type of activities (such as regional Component 1 on experience exchange and networking as well as the full formulation and adoption of the HCFC phase-out strategy); and
- technical assistance with investment element and capacity building activities:
    a. completion of HCFC phase-out strategic document and its approval (as a prerequisite for the approval of Stage II);
    b. capacity building for MENR, Environmental Inspectorate and Customs;
    c. technological conversions in eligible enterprises the manufacturing sector and information exchange on new HCFC substitute technologies for ineligible companies in the same sector.

Through a combination of the two approaches (regional and national), the project is expected to add to the the realization of the GEF-4 indicators as listed out above and help the country address HCFC related challenges in the main current HCFC dependent sector - manufacturing. Rapid implementation of the project will create an enabling institutional environment for the country to creditably present its self as being in compliance with the Montreal Protocol.

An additional aspect that needs to be considered is the integration of HCFC Phase out with other global environmental priorities as promoted by both Decision XIX/6 and the GEF-4 Operational Strategy for the Ozone Focal Area[20] and looking forward to the GEF-5 Chemicals Focal Area Strategy[21] that ODS interventions are a part of. The project is aligned with and reinforces broader global environmental priorities related to climate change and the principles of sound chemicals management.

The project is consistent with GEF strategic objectives related to linkages to the Climate Change Focal area through promotion of low GWP alternatives. Minimizing climate change impacts as part of HCFC phase out will generally involve the integration of the use of low GWP non-ODS alternative technology. Indeed, technological solutions offered to eligible companies in the manufacturing sector aim at low GWP impacts such as c-pentane, methyl formate and carbon dioxide/water based technologies.

2.2 Project Goal, Objectives, Outcomes and Outputs/Activities

The overarching theme that underlies the GEF Project Scenario described below is providing the country with the tools to return to into compliance with respect its obligations in front of the Montreal Protocol for 2010-2014 period.

In the following the two primary project components listed in the Project Framework are described along with the sub-components each of which are aligned with the outcomes and outputs as elaborated in Annex A:

- Component 1 (Regional information exchange and networking component). It addresses barriers associated with incomplete knowledge and awareness and is aligned with the PIF Component 1; Outcomes 1(a-d);
- Component 2 (National capacity building and technical assistance component with investment elements) targets support to the completion and adoption of comprehensive HCFC phase-out strategy (with selected legislative options to control HCFC import/use), capacity building and supply of analytical tools for HCFC control enforcement agencies (Environmental Inspectorate and Customs),

[20] http://www.thegef.org/gef/sites/thegef.org/files/documents/GEF_4_strategy_ODS_Oct_2007.pdf
[21] http://www.thegef.org/gef/sites/thegef.org/files/documents/GEF5%20Focal%20Area%20Strategies.pdf

technological conversions in eligible companies in the manufacturing sector (Polyfoam, Intertehnika, Sobraniye group and Nord) and is very closely aligned with Outcome 2 (c) – Ukraine with exception for HCFC re-use investments in the servicing sector, which, given the limited funding availability, is proposed to be covered in Stage II of the HCFC phase-out assistance for Ukraine.

The regional component aims to provide common Russian language regulatory guidance, "train the trainers" opportunities related to regulatory enforcement, customs control, expanded licensing and integration of HCFC Phase-out with energy efficiency/GHG reduction, training materials for transfer to national level programs, and expanded country exposure within the existing ECA network. It has been developed to build on the tools and networks currently in place for some CEITs and the Article 5 countries in the CIS and is to be accessible to all non-Article 5 CIS countries in the region, although direct participatory funding support will be confined to the four countries participating in this project (Belarus, Tajikistan, Ukraine and Uzbekistan).

At the regulatory level, the country specific components will ensure the implementation of enhanced HCFC regulation/import control, enhanced licensing systems, and introduction of HFC monitoring inclusive of working enforcement level training. These components will be complemented by training to strengthen enforcement (environmental and Customs officers to control HCFC end-use and imports) and, promotion of energy efficiency and GHG reductions during servicing. In addition, under this component, investment programs will cover technological conversions and technology information exchange in solvent and foam sectors (PU and XPS).

2.2.1 Component 122 - Regional accelerated phase-out capacity building (GEF financing US$ 407,501 (inclusive of US$ 45,000 for PMC); national co-financing US$ 420,000)

The component common across the four beneficiary countries consists of four sub-outcomes to clearly identify the institutional capacity building efforts through regional networking with non Art 5 and Art 5 countries.

Activities are in full alignment with the PIF design. These are listed below and their details are provided in the table following this list.

Given that activities above are interlinked with similar activities in the rest of participating countries in this regional project, it is expected to achieve savings in some of the budget items such as translation of materials (in case if materials are homogeneous in thematic focus and the language of translation is common) and further publication at one source. In this sense, it is planned to utilize the remaining resources at the end of the project more flexibly giving priority to the support of additional participation of NOUs in the network meetings.

Outcome 1(a) - Legislative and Policy Options for HCFC phase-out and control (US$ 80,556)

The countries are provided with information resources and the necessary level of decision maker awareness to undertake national level updating of ODS legislation, regulations, licensing and reporting systems, economic instruments and qualification requirements necessary to ensure control of HCFC import and use consistent with phase-out obligations (inclusive of quota systems).

Outcome 1(b) - Capacity Building for Enforcement of HCFC control measures by customs and environmental/technical inspection authorities (US$ 80,556)

Russian language resource documentation and national trainers will be prepared for undertaking national working level training in Component 2 to equip customs and environmental/ technical inspection authorities in the enforcement of HCFC control measures related to import and application of HCFCs and HCFC containing equipment.

Outcome 1(c)23 - Capacity Building for the Refrigeration Sector, Incorporation of Energy-Efficiency and GHG reduction elements (US$ 161,111)

User awareness tools, training modules and national trainers delivered for undertaking national working level training in Component 2 refrigeration technicians related to HCFCs and alternatives, taking Energy efficiency and GHG reductions into consideration, and enhancing the sustainability of such training by embedding it in national institutions

Outcome 1(d) - Support for the development of regional institutions, capacity, and cooperation (US$ 40,278)

Regional cooperation, information exchange, and joint initiatives in areas of collective interest and concern, namely:

- Development of a regional network of RAC associations;
- Data collection and regional planning for ODS destruction;
- Development of robust Prior Informed Consent (PIC) mechanisms across the region;
- Ongoing and expanded participation of non-Article 5 countries in the ECA regional network.

[22] Due to regional character, this component is to be implemented regionally through UNDP Bratislava Regional Center. This component has a similar design of other three participating countries and is specifically designed for Ukraine.

[23] To be implemented in conjunction with Stage II

Component 1 - Regional accelerated phase-out capacity building

Outcome/Output	Description	Budget (US$)
Outcome 1(a) - Legislative and Policy Options for HCFC phase-out and control (MNER, NOU)		**80,556**
Output 1a.1 Preparation of Russian language resource materials	The materials will be prepared for use by NOUs, customs authorities and other stakeholder government agencies on the legislative and regulatory actions required for HCFC phase-out (i.e. step down quotas, bans, single use and container size restrictions, prior informed consent measures, proof of origin documentation, certification systems for technicians, and fiscal instruments to promote price equalization). In addition an assessment of the different modalities for ensuring the rapid and effective incorporation of HCFC phase-out elements and HFC monitoring in national ODS licensing mechanisms and associated regulations will be undertaken for each country.	20,556
Output 1a.2 Awareness training on legislative and regulatory actions	Training sessions for national decision-makers and NOUs respecting legislative and regulatory actions required for HCFC phase-out will be carried out in each of the four countries once yearly. An environmental expert (International Consultant) will be requested to prepare the required materials to be delivered during an intensive training seminar. The costs associated cover fees, travel and home based work for international expertise and costs associated with local organization of the workshops.	20,000
Output 1a.3 Regional networking	Regional networking between countries on implementation experience, consistency and cross border impacts related to HCFC control measures.	40,000
Outcome 1b - Capacity Building for Enforcement of HCFC control measures by customs and environmental/technical inspection authorities (MENR, Environmental Academy, Environmental Inspectorate, Customs)		**80,556**
Output 1b.1 Russian language resource documentation and Training of National Trainer	Russian language resource documentation and national trainers will be prepared and delivered for undertaking national working level training in Component 2 to equip customs and environmental/ technical inspection authorities in the enforcement of HCFC control measures related to import and application of HCFCs and HCFC containing equipment.	10,000
Output 1b.2 Awareness raising activities	These will take place at the management level of enforcement authorities on CFC entry-point control measures, major enforcement issues involved (packaging, labeling, identification, container sizes) and collectively identify the detailed scope, trainee numbers and supporting equipment requirements for Component 2.	5,000
Output 1b.3 Training of Trainers	This activity aims to establish national cadres of trainers via ”TOT” training of customs and environmental authority decision-making staff to enforce the HCFC control measures related to import/export, distribution, and application of HCFCs and HCFC containing equipment.	15,000
Output 1b.4 PIC Network	Technical support for comprehensive PIC network for ODS import/transit/export in the region linked bilaterally with major producing countries.	25,000
Output 1b.5 Regional networking	Networking will be implemented through exchanges between countries on implementation experience, consistency and cross border impacts related to import/export issues and related enforcement. It is expected that one cross fertilization workshop will take place per year which will allow for all participants to learn from successes and challenges in order to facilitate	25,556
Outcome 1c - Capacity Building for the Refrigeration Sector, Incorporation of Energy-Efficiency and GHG reduction elements[24]		**161,111**
Output 1c.1 Preparation of Russian language training manuals and information materials	Preparation (and publishing and/or procuring ready sufficient number of copies in Russian) of these materials will take place in support of targeted national awareness on HCFCs and energy efficiency for leaders in the refrigeration sector (major users and service sector association representatives), NOUs and agencies responsible for certification on: (i) Addressing long-term HCFC demand, and benefits of energy-efficient retrofit/replacement and the use of ‘natural’, low GHG refrigerants;	100,000

[24] This sub-component will be initiated during the 2nd year of the current project implementation to align its activities with Stage II formulation and implementation of tools supply for the refrigeration servicing sector

	(ii) Strengthening of Refrigeration Associations; (iii) Enhanced certification of service organizations and technicians; and (iv) Sustainable mechanisms for future training.	
Output 1c.2 ToT on Best Refrigeration Practices	Enhanced general best practices "TOT" training at the regional level for selected principal staff from technical universities and training centers involved in educational programmes for refrigeration technicians to incorporate handling of HCFCs, promotion of 'natural'/low GHG alternatives, energy efficiency aspects etc, with commensurate updating of national certification training curricula.	61,111
Outcome 1d - Support for the development of regional institutions, capacity, and cooperation		**40,278**
Output 1d.1 Preparation of Russian language information materials	These will be prepared on RAC technical issues, PIC, ODS destruction and other subjects of collective interest.	3,278
Output 1d.2 Promotion of Information exchange mechanisms	These will be actively promoted between RAC associations (i.e. web site, workshops, training/certification practice) and with major international networks and resources (i.e. IIR, AREA, ASHRA). Consultancy based.	7,000
Output 1.d3 Facilitation of regional dialogue	This will focus in particular on and plans for ODS destruction including requirements for capture and secure storage and linkages to general chemicals waste management (specifically POPs/chemicals disposal) in the region.	30,000
Project Management for regional component		**45,000**
GEF financing of this component will be directed to international experience inputs as required, contractual services for compilation and translation of the documents as requested by the country, publication of materials in local language and facilitation of regional dialogues and networking with partner countries (including attendance of CAP assisted networks and sub-regional meetings, and conferences in the European Union). National co-financing will be provided through staff and coordination logistics related cost contributions (for example when/if the country plays the role of a host country for any of thematic sub-meetings for the rest of participating non Art 2 countries) from principal institutional stakeholders in the government (Ministry of Ecology and Natural Resources, Environmental Training Academy, Environmental Inspectorate and Customs) involved in regulatory and import control of ODS.		

2.2.2. Component 2c - HPMP, National Level Capacity Strengthening and HCFC Phase Out Investment (GEF finance – US$ 2,860,000; National co-finance – US$ 9,160,000)

This Component constitutes the major component of the project for Ukraine and it is overall directed to assist the country to return into compliance through achieving the following goals:

- A finalized and adopted HCFC accelerated phase-out strategy;
- Implementation of national level training for Environmental and Customs enforcement authorities; and
- Targeted HCFC phase out investment projects in eligible enterprises in the manufacturing sector and information exchange on emerging HCFC substitute technologies for ineligible companies

The component is generally aligned with Outcome 2c of the PIF, further expanded based on work undertaken during PPG phase and related to detailed discussions with national level project partners. This excludes assistance for the servicing sector given the limited budget allocation, the latter sector being proposed for assistance in Stage II of international assistance to Ukraine to build longer term capacity to meet the obligations under the Montreal Protocol.

Output 2c.1: Formal HCFC Phase-out strategy and action plan fully developed and endorsed by the Government

During the previously completed regional MSP project on developing the outlines of HCFC phase-out strategies for several non Art 5 countries in the region, GEF/UNDP provided assistance to Ukraine with guidance on HCFC data collection, implemented field surveys on principal HCFC end-users in the manufacturing and servicing sectors, and formulation of an initial outline of HCFC phase-out guidance document.

Due to multiple institutional changes and the current issues associated with creditable compliance reporting, Ukraine urgently needs additional assistance in completing the initiated work, formulate the full-fledged HCFC phase-out strategy and then adopt it for onwards implementation to demonstrate its willingness to comply with the obligations as posed by the Montreal Protocol.

Among activities contemplated in the initial outline of the strategic document, the country would commit to having an integral regulatory control system for HCFCs and ODS in general using best examples from the region and European Union and ensure, on a high political level, its effective implementation to present a case for compliance with Montreal Protocol's provisions. The appropriate enforcement of the HCFC import quota system, along with improvements in the interdepartmental coordination, will form one of the main principal elements of the overall country's approach to address the current non-compliance situation. Activities to ensure monitoring the substances at import stage and reporting from end-users during storage, handling and recycling would be contemplated in the final draft strategy. The country would additionally plan to create a system to control, discourage and reduce imports of HCFC based equipment to avoid creation of a long-term HCFC consumption bubble.

The main assistance planned in this output therefore will mostly concentrate, on a priority basis, on collecting missing HCFC consumption related data from specifically servicing sector, completing the formulation of HCFC phase-out strategy, supporting continued awareness raising of Government stakeholders, HCFC importers, distributors and end-users on the Government plans to restrict the use of HCFCs in order to return to and sustain compliance regime with the Montreal Protocol, and adopt the HCFC action plan as a priority action of the Government in the current situation.

The cost estimate for this activity is provided the table below.

US$	GEF	Co-Financing	Total
Cost estimate for Output	**120,000**	**120,000**	**240,000**
TA (int/national)	80,000		
Workshops	20,000		
Printing, awareness, dissemination	20,000		

GEF financing will provide assistance for national level support to finalize, and most importantly, adopt, the HCFC strategy with updated information, such as accurate HCFC consumption data, inputs from the regional component on final legislative options to control HCFCs import and use (HCFC equipment import quotas, improvement of inter-departmental cooperation on HCFC control between NOU and Customs, update of Customs codes etc), regional cooperation on thematic areas (such as illegal trade, mislabeling of gas canisters etc), translate the documentation into local language, hold several stakeholder discussions on adopting the strategy and its implications for the country.

National co-financing will be based on the Governmental support to the adoption of the HCFC Phase out strategy through allocation of legal and regulatory staff personnel to draft required legislation and detailed consultations at line-Ministries' level as well as defense of the legislation at the decision-making level of authority (Cabinet of Ministers, Parliament). Overall institutional coordination role of the Government is provided to support this output.

Output 2c.2: Trained working level Environmental and Customs enforcement officials using resources (trainers and training materials) from Component 1 with respect to legislation, regulations, and customs controls

During previous CFC phase-out, no technical assistance was reported[25] as provided to equip the enforcement agencies, associated with implementing Montreal Protocol, with portable gas analytical tools to be utilized at the border points of HCFC entry into the country. As documented previously, this area, as a part of the overall HCFC phase-out approach to return the country into compliance, requires assistance to build such basic capabilities for the two prime authorities, Environmental Inspectorate and Customs Department. This is considered as an essential founding block to implement enforcing of the HCFC import quota system country-wide in parallel to the efforts of the Government to curtail the current dependence on HCFCs in the manufacturing and servicing sectors of the economy throughout 2012 and 2014 in a coherent manner with the future HCFC phase-out strategy.

The current system of permitting is considered as immature in its current state. It further lacks a mechanism for allocation of import permits on priority needs taking into account strategic economic interests of the country. On top, as it experienced a recent transfer from previously appointed coordination authorities to the current MENR agency, the relatively new technical level staff requires initial capacity building to improve knowledge and practical skills in implementing and further improving the system in line with international experience elsewhere, and particularly in more advanced non-Article 5 countries of the region, and EU. Interdepartmental cooperation with the Customs department should also be strengthened to avoid overlaps in functions and to ensure more efficient functioning of the HCFC import control system.

In order to build such capacities of enforcement authorities, the national component will provide for trainer-to-audience workshops and equipment supply in support of the practical implementation of such hands-on trainings to practice equipment application a real setting. This will be done using resources (trainers and training materials) from Component 1 with respect to:

[25] http://www.gefonline.org/ProjectDocs/Ozone%20Depletion/Ukraine%20-%20Ozone%20Depleting%20Substances%20Phaseout%20Project/Project%20document%20for%20WP.htm

- HCFC control measures related to import/export, HCFC and HCFC containing import quota system, distribution channels and monitoring of HCFC end-user categories, and types of HCFC application in the manufacturing, processing and equipment servicing industries;
- Associated enforcement issues: HCFC packaging, labeling (and mislabeling), identification and container sizes, inclusive of implementation of Prior Informed Consent (PIC) network for ODS import/transit/export in the region linked bilaterally with major producing countries;
- Regulatory measures to gradually reduce import of HCFC-containing refrigerated or A/C equipment either with help of equipment import quotas or fiscal instruments (economic incentives and disincentives) to discourage such imports.

Further, the project proposes to strengthen both the Environmental Inspectorate and the National Customs Department with analytical tools to support appropriate monitoring of HCFCs at their entry points to the country and for future cross-checks of HCFC presence on storage at end-user level to be implemented by the Inspectorate. Such technical capability will allow controlling the import of HCFCs (and HCFC based equipment) in quantities allowed by country-specific provisions of the Montreal Protocol and possess analytical, training and knowledge capacity to prevent illegal trade in HCFCs chemicals that may continue to take place in the region.

Environmental Inspectorate and Customs Department will both receive modern multi-gas identifiers to equip their staff. The distribution of equipment is demonstrated in the following table:

Equipment recipient party	**Quantity**	**Remarks**
Environmental Inspectorate	60 pieces	Inspectorate's function in the Customs process of clearing HCFCs and HCFC containing goods is to provide assessment whether goods can be cleared by Customs department and therefore requires more sophisticated analytical equipment able to determine a wide range HCFC and non-HCFC gases
Customs Department	25 pieces	Customs Department remains the first-line agency that detects HCFCs in incoming goods and basic mobile (portable) capability for HCFC gas analysis is required to improve the current HCFC import monitoring system.

The supply of this equipment will also be supported by some spares such as a limited number of back-up accumulators, filters, connecting hoses, sampling tips, piecing pliers in sufficient quantities so as to ensure their successful and continued use for the duration of the project.

In order to ensure that training of new and rotating staff in both Environmental Inspectorate and Customs is sustained in future, it is proposed to equip two training institutions (Environmental Academy and Customs' Training Academy) with training means (office equipment consisting of a laptop, projector and other ancillary tools along with advanced multi-gas identifiers). Additionally, contents of both training curricula will be updated to reflect currently available experience with HCFC import controls. This comprehensive approach will prepare the country to have trained staff beyond the project duration. The implementing partners committed to allocate such a space in the training centers, equip them with required furniture for trainings and assign trainers/teachers.

The Customs training component will feature three important elements:

- Training-of-trainers (teachers) by international Customs specialist;
- Immediate training (by trainers) for up to 300 of environmental inspectors and 100 working level Customs officers;

- Regular training of staff by the training centers of Environmental and Customs' Training Academies (mandatory for all new staff and regular qualification of existing staff).

The equipment supply will be preceded by the initial TOT trainings for 2 - to - 3 trainers as supported by the regional Component. The further training sessions, with help of the trainers, will be from 3 to 5 days long to ensure quality delivery and practical experience with use of all materials, tools and equipment. This will be supported using resources (trainers and training materials) from Component 1 with respect to legislation, regulations, and customs controls as described previously.

The cost estimate for the proposed GEF support is presented in the summary table below. Each of sub-items is discussed in the following sections.

US$	**GEF**	**Co-Financing**	**Total**
Cost estimate for Output	**490,000**	**490,000**	**980,000**
Training	120,000		
Equipment	350,000		
TA (int/national)	20,000		

GEF financing will provide assistance for capacity building and technical assistance to the Environmental Inspectorate, Environmental Academy, Customs Department and Customs' Training Academy to build more effective HCFC import monitoring capacity.

National co-financing will focus on allocating classrooms in the training academies (and utility fees), the inter-departmental coordination to improve HCFC import monitoring system and for adoption of updated training curricula, providing trainers from the training centers and their salaries during and beyond the project duration for the sustainable training of enforcement staff, investment co-finance on improving general incoming goods scanning capacity (through parallel Customs modernization programs on establishing scanners for selective identification of goods imported in bulk - in trucks - which may contain HCFC cylinders and equipment).

Output 2c.3 – Targeted Phase-Out Investment and Demonstration Projects

A principal component of the project that aims at a rapid HCFC phase-out in the manufacturing sector is the investment programme that was developed in support of:

- Information exchange platform on HCFC substitute technologies for ineligible foam manufacturers (PU and XPS);
- Implementation of blending operation conversion to methyl formate technology at Polyfoam System House (POLYFOAM LTD);
- Implementation of a PU foam conversion to c-pentane technology at Intertehnika (PSC "Intertekhnika");
- Implementation of an XPS foam conversion to CO2 technology at Sobraniye (LTD "Sobranie-PRO-UG);
- Implementation of solvent phase-out to trans-blends at Nord (Nord Group Holding).

The cost estimate for the proposed GEF support is presented in the summary table below. Each of sub-items is discussed in the following sections.

US$	**GEF**	**Co-Financing**	**Total**
Cost estimate for Output	**2,250,000**	**8,550,000**	**10,800,000**

Information **exchange platform on HCFC substitute technologies for ineligible foam manufacturers** (PU and XPS)	50,000	50,000	100,000
Implementation of a **PU foam conversion** to c-pentane (non-ODS/very low GWP blowing agent) at **Intertehnika (PSC "Intertekhnika")**	500,000	2,000,000	2,500,000
Implementation of an **XPS foam conversion** to CO2 (non-ODS/very low GWP blowing agent) at **Sobraniye (LTD "Sobranie-PRO-UG)**	1,200,000	4,500,000	5,700,000
Implementation of **solvent phase-out** at **Nord (Nord Group Holding)**	200,000	800,000	1,000,000
Implementation of **blending operation** conversion to non-ODS/very low GWP alternative (Methyl Formate) at **Polyfoam System House (POLYFOAM LTD)**	300,000	1,200,000	1,500,000

Information exchange platform on HCFC substitute technologies for ineligible foam manufacturers (PU and XPS)

As determined in line with the assistance cut-off date of September 21, 2007, the HCFC consumption in the manufacturing sector, which is ineligible for GEF's investment support, represents approximately around 33% (33.55 ODP tons) of the total estimated HCFC demand in Ukraine.

Given the country's compliance challenges and the need for a rapid return into compliance regime, it is fair to propose limited in scope technical assistance in terms of information awareness activities for such enterprises on new technological developments available for HCFCs replacement with technically and economically viable non-ODS substitutes. By implementing such "soft" type technical assistance approach, the project will attempt to facilitate the indirect phase-out of 33.55 ODP tons annually in ineligible enterprises.

Being a technology advisory type of assistance in terms of its design, the proposed support will mainly concentrate on information exchange with regard to technological innovations in the area of PU and XPS foam production. This will consist of engaging international expertise on newly piloted and emerging HCFC substitute technologies, including MLF/UNDP accumulated expertise in its range of technology demonstration projects such as:

- Use of methyl formate (MF) and methylal in selected PU foam applications;
- Low-cost hydrocarbon (HC) technologies for PU foam and system houses;
- HFO-1234ze in XPS foams;
- and others.

Further, it will involve organizational and information dissemination activities to provide for a series of small workshops or roundtables for ineligible manufacturing enterprises. The audience should include senior management of these companies along with engineering staff responsible for technology operation and production activities.

The cost estimate for the proposed sub-component is presented in the summary table below.

US$	**GEF**	**Co-Financing**	**Total**
Information exchange platform on HCFC substitute technologies for ineligible foam manufacturers (PU and XPS) companies	**50,000**	**50,000**	**100,000**
TA (int/national)	30,000		
Workshops	10,000		
Publications	10,000		

GEF finance will support the recruitment of qualified expertise for the provision of professional technical advice. Additionally, it will help finance a series of roundtables and materials printing for further dissemination to participating enterprises from the private sector.

National co-finance will focus on the organizational aspects and awareness raising on the HCFC phase-out policies and timetables.

Implementation of a PU foam conversion to c-pentane (non-ODS/very low GWP blowing agent) at Intertehnika (PSC "Intertekhnika")

The objective of this project is to phase-out the use of HCFC-141b pre-mixed in poliols in the manufacture of commercial refrigerators and freezers at PSC "Intertekhnika".

Intertehnika (PSC "Intertekhnika") is a 100% Ukrainian owned private shareholder company, which was founded 1997 and started manufacturing various commercial refrigerators and freezers in 1998. It produces a wide range of commercial refrigeration equipment. The lines of commercial equipment produced are:

- Various beverage display cases
- Various ice-cream freezers

The enterprise has grown steadily since inception and owners are currently planning to further develop and expand their production facilities. The main market for the company is Ukraine, but Intertehnika (PSC "Intertekhnika")also exports goods to neighboring countries Russia and Belarus.

The enterprise has 285 employees including technical and managerial staff for research and development, design, manufacturing, assembly, training, technical support, sales, marketing and after-sales services. Intertehnika (PSC "Intertekhnika") also has its own refrigeration service department.

The manufacturing plant is in Donetsk, Ukraine and has two detached facilities with two separate operations. The production area, apart from the above situation, is located close to residential area and this further complicates the implementation of technological substitution to c-pentane (flammable) technology and basically increases the investment costs by the company to co-finance the project.

The table below summarizes the annual HCFC-141b consumption at Intertehnika (PSC "Intertekhnika"):

Year	PU, MT	HCFC-141b, MT
2008	175	43.75
2009	70	17.5
2010	187	56.1
2011 (August)		34.8

The company purchases poliols on the local market as well as imports them. During the year 2010 Intertehnika (PSC "Intertekhnika") used 56.1 MT premixed polyol, inclusive of previous stocks and 12 MT HCFC-141b from the local system house Polyfoam (POLYFOAM LTD) , in order to meet its production and sales targets.

The project has been designed for the enterprise to replace the current use of HCFC-141b with c-pentane technology with very low GWP characteristics. The layout of the project is presented in Annex 3 to this document which has been prepared in line with applicable ExCom funding threshold standards. The ExCom's guidance on HC safety (UNEP/Ozl.pro/ExCom/25/54) will be adhered to during project implementation.

The overall cost estimate for the proposed sub-component is presented in the summary table below.

US$	GEF	Co-Financing	Total
Implementation of a PU foam conversion to c-pentane (non-ODS/very low GWP blowing agent) at Intertehnika (PSC "Intertekhnika")	500,000	2,000,000	2,500,000

GEF finance will cover technology replacement costs (capital) up to thresholds recommended by MLF cost-effectiveness policies, as well as technical assistance for the implementation of the project.

National co-finance will address local engineering works to prepare the enterprise for the new flammable technology: modifications of presses and assembly tables, electric grounding, anti-static flooring, exhaust ventilation system and back-up electricity supply system. Further, the enterprise will cover the costs of civil works (local clearances, land excavation, soil transportation, establishment of two pentane storages, ducting for polyol supply due to proximity of residential area, steel/mineral wool insulation, ventilation enclosures, and building modifications). It will invest in regular training of personnel in equipment use and safety procedures; monitoring of equipment performance and maintenance/repairs as required, PR campaigns on the use of ozone- and climate friendly technology in products after the conversion.

Implementation of an XPS foam conversion to CO2 (non-ODS/very low GWP blowing agent) at Sobraniye (LTD "Sobranie-PRO-UG)

The objective of this project is to phase-out the use of HCFC-22 in the manufacture of XPS insulation foam at LTD "Sobraniye-PRO-UG", Sobraniye group and in this way contribute to Ukraine's compliance with the Montreal protocol HCFC consumption reduction requirements, and to do so such that it also will facilitate step-by-step elimination the use of high GWP HCFC-22 blowing agent (with occasional application of HCFC-142b).

Sobranie Group (LTD "Sobraniye-PRO-UG") is a 100% Ukrainian private shareholder company, and which was founded in December 1997, and the XPS-foam manufacturing operation was established in February 2007 in three locations, Kiev, Donetsk and Dneprodzerzhinsk. Equipment installation commenced during 2006 and production started in February 2007.

All three continuous production lines were supplied by Chinese company Feininger (Nanjing) Plastic Extruder Manufacturing Co. in December 2006 and installed at the three factories simultaneously. The enterprise has presently 105 employees on staff on all three cities. The main market for their products is Ukraine and they do not have export license.

HCFC consumption by years in metric tons (MT) is presented in tabulated format below:

	2007	2008	2009	2010
HCFC-22	250	230	220	250
Polystyrene resin	2,000	1840	1760	2,000
Total	**2,250**	**2,070**	**1,980**	**2,250**

LTD "Sobraniye-PRO-UG", Sobraniye group intends to convert its foam operation from the current use of HCFC-22(142b) to CO2 technology. This project proposal is based on the technical needs for retrofit of the extruder units of the XPS production lines in Kiev, Donetsk and Dneprodzerzhinsk. The intention is, with help of this project, to finance the actual retrofit of the tandem extruder units of the Kiev and Dneprodzerjinsk factories. All other expenses arising from the conversion for all three factories will be financed by Sobraniye using its own resources.

The project has been designed for the enterprise to substitute the current use of HCFC-22 in the amount of 250 MT/year to a carbon dioxide (CO2) based technology (with low GWP characteristics due limited use of HFC-152a). The layout of the project is presented in Annex 4 to this document which has been prepared in line with applicable ExCom funding threshold standards. The ExCom's guidance on HC safety (UNEP/Ozl.pro/ExCom/25/54) will be adhered to during project implementation.

The overall cost estimate for the proposed sub-component is presented in the summary table below.

US$	GEF	Co-Financing	Total
Implementation of an XPS foam conversion to CO2 (non-ODS/very low GWP blowing agent) at Sobraniye	1,200,000	4,500,000	5,700,000

GEF finance will cover technology replacement costs (capital) below the thresholds recommended by MLF cost-effectiveness policies, as well as technical assistance for the implementation of the project.

National co-finance will address one extruder retrofit at one remaining factory, and all required local engineering works to prepare the enterprise for the new technology: industrial, occupational and fire safety, electric grounding, anti-static flooring, exhaust ventilation system and back-up electricity supply system. Enterprise will further cover the costs of civil works (local clearances, land excavation, soil transportation, building modifications and establishment of storages for new substances). It will invest in regular training of personnel in equipment use and safety procedures; monitoring of equipment performance and maintenance/ repairs as required, public relation campaigns on the use of ozone- and climate friendly technology in products after the conversion.

Implementation of solvent phase-out at Nord (Nord Group Holding)

The objective of this project is to eliminate the use of HCFC-141b in assembling/ manufacturing processes at the Nord enterprise (Nord Group Holding). Nord (Nord Group Holding) is the only consumer of HCFC-141b chemical as a solvent application in Ukraine. The annual HCFC consumption at Nord (Nord Group Holding) in 2010 amounted to 28.1 metric or to 3.08 ODP tons.

Located in Donetsk, Ukraine, NORD (Nord Group Holding) is 100% Ukrainian enterprise and has a status of manufacturer of national significance. It employs over 5,000 people and is the only producer of household refrigerators in the country.

The company was founded back in 1960s and peak production was recorded during 2006/07 when it produced 1.2 million units annually using 60 ODS tons of HCFC 141b, as a cold cleaning agent for many manufacturing processes. The current (2010) annual HCFC consumption at Nord (Nord Group Holding) is 28.1 ODS tons. Primarily manufacturing one product, however, the plant is totally self sufficient including manufacturing its own compressor unit, chiller unit, panels, and door hinges.

Historically, Nord (Nord Group Holding) was a consumer of CFC-113 and HCFC-141b chemicals used as a solvent. Table below summarizes such consumption information in ODS tons for years 2000 and 2008:

	2000	2001	2002	2003	2004	2005	2006	2007	2008
CFC-113	36.20	1.50	0	0	0	0	0	0	0
HCFC-141b	170.99	130.20	29.14	84.48	84.84	92,38	59.23	58.25	31.50

In response to the requirements for CFCs phase-out, GEF/IBRD investment assistance was prepared and approved in the past for Nord (Nord Group Holding) for shifting to water-based recirculation technology. The

target of that assistance was the elimination of 31 metric tons of annual use of CFC-113. As a part of that assistance, the factory received three (3) units of water cleaning systems which were installed in year 2000. Name of water cleaning equipment is provided below:

- MAC-DRY. IMPIANTO AUTOMATICO 498.600; 497.600; 496.600

In result, the project helped the enterprise in completely phasing out the use of CFC-113, and, in parallel, reducing, where technically possible, dependence on HCFC-141b.

After completion of project works, the company mainly continued to deploy the supplied water based technology and was partially dependent on the use of HCFC-141b (not subject to phase-out at that time) for joints cleaning and hermetic loops' tests. The latter need primarily resulted from:

- incompatibility of water-based washing solution with low-carbon steel made components due to increased corrosiveness critical to manufacturing processes; and
- low purification effectiveness as applied to joints cleaning before welding.

As a direct result of this and further due to certain expansion of manufacturing operations, the current application of HCFC-141b has increased in previous years.

HCFC-141b in its pure form is currently used throughout several cleaning sites – eight (8) in total. Three (3) of them are located outside the main facility.

The current use of HCFC-141b is highly emissive, and open-top trays with lids are utilized for metal parts cleaning. At two sites, three (3) self-manufactured ventilation hoods were detected while others are not equipped with such safety equipment. Currently, the solvent is applied to clean:

- corner braces attached to insulation panels for further assembly of refrigerators;
- compressor plates and other small spares; and
- copper and aluminum tubes for further use in condenser parts.

Replacement of HCFC-141b is planned with alternative chemical of a trans-blend group (see Annex 5). The project will be accomplished by (1) replacing the current cleaning methods with vapor degreasing units of closed cycle (to substantially minimize volatile emissions of newly selected solutions), with recycling capability and (2) using an alternative solvent. Annex 5 contains a separate project document for this project sub-component.

Given the scale of assistance to the company it is considered as a cost effective measure in line with the expressed company plans to expand and improve its industrial safety practices. The company is in the process of investing in expansion of its infrastructure to increase production processes.

US$	GEF	Co-Financing	Total
Implementation of solvent phase-out at Nord (Nord Group Holding)	200,000	800,000	1,000,000

GEF finance will support the procurement of closed-cycle vapour degreasing equipment for the company along with the technical advice on the use of new equipment and safety standards.

National co-financing will relate to the local engineering works to prepare platforms for the new equipment, procure remaining requirement cleaning machines, introduce safety standards (with procurement of PPE), install

double-stage ventilation systems and area access signs, cover utility fees, maintain the equipment by adequate use and procurement of spare parts and constantly train staff on the safe use of this equipment. Operating expenses will be covered by the company.

Implementation of blending operation conversion to non-ODS/very low GWP alternative (Methyl Formate) at Polyfoam System House (POLYFOAM LTD)

The objective of this project is to phase-out the use of HCFC-141b and its replacement with methyl formate technology at a local system house.

The system house has 100% Ukrainian ownership and serves approximately 64 small-to-medium scale enterprises using the Polyfoam's (POLYFOAM LTD) produced polyurethane (PU) systems. Polyfoam (POLYFOAM LTD), being owned and operated by industrial chemists, has built a trusted reputation for product quality and customer service. Company was established in 1993 and since that time has grown to become one of the largest of nationally owned systems houses in Ukraine.

In 1994 it had produced the first products – PU foam components for flexible molded PU foams for the car manufacturing plant at Zaporozhje City. Nowadays the company produces a wide range of components for rigid PU foams for applying by means of pouring (pre-insulated pipes, sandwich-panels, refrigerators, water heaters) and spraying (heat-cool insulation of storehouses, thermal insulation of industrial and residential buildings). In addition Polyfoam (POLYFOAM LTD) continues to produce PU components for the integral and flexible PU foam products. All products meet the requirements of Ukrainian technical standards.

The company does not export formulated PU systems, and has 57 employees on staff. Annual production of component A (polyol mixture) is 1,000 MT/year with the possible increase till up to 2,000 MT/year.

The consumption of HCFC-141b in metric tons has evolved as follows (in ODS tons):

2005	2006	2007	2008	2009	2010
13.5	23.0	49.8	71.7	46.7	62

The end-users of Polyfoam's (POLYFOAM LTD) products consume from 0.1 tons/year to 10-11 tons/year and mostly manufacture rigid foam for pouring and spraying applications as well as for integral skin foaming operations. The only large customer of Polyfoam (POLYFOAM LTD) identified is Intertehnika (PSC "Intertekhnika") enterprise (with supplies reaching 12 MT ODS) which is addressed in a separate investment project.

Since the vast majority of downstream users are small, the project approach is designed around the system house, which acts as an implementing partner of the project with technical assistance provided to the downstream users on the appropriate and safe application of the new replacement chemical.

The proposed project contributes to the elimination of HCFC-141b use at the company in the amount of 50 MT/year. The replacement technology selected for Polyfoam (POLYFOAM LTD) is methyl formate technology and such approach will result in reducing GWP impact to very low levels. Required safety guidance (as recommended in the technology report as reviewed by ExCom at its 62nd meeting and by supplier) will be adhered to during project implementation.

The overall cost estimate for the proposed sub-component is presented in the summary table below and the project document is attached in Annex 6.

US$	GEF	Co-Financing	Total

Implementation of blending operation conversion to non-ODS/very low GWP alternative (Methyl Formate) at Polyfoam System House (POLYFOAM LTD)	300,000	1,200,000	1,500,000

GEF finance will cover technology replacement costs (capital) up to thresholds recommended by MLF cost-effectiveness policies, as well as technical assistance for the implementation of the project.

National co-finance will address local engineering works to prepare the enterprise for the new technology: new facility and operational expenses, civil works, operation permitting, system optimization works for various PU applications. It will invest in regular training of personnel in equipment use and safety procedures; monitoring of equipment performance and maintenance/repairs as required, PR campaigns on the use of ozone- and climate friendly technology in products after the conversion.

2.2.3. Component 3 - Monitoring, learning, and adaptive feedback, outreach and evaluation (GEF US$ 40,000)

This component links to Outcome 3, namely that the project results are sustained and replicable with outputs being i) M&E and adaptive management applied to project in response to needs and extract lessons learned (Output 3.1) and ii) Lessons learned and best practices are replicated at the national level (Output 3.2). Details are provided in Part I Section H: Budgeted Monitoring and Evaluation plan.

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The table below provides a summary cost estimate covering the proposed GEF scenario by Component and Sub-Component described above:

		Cost (US$)		
Project Outcome	**Outputs**	**GEF**	**National**	**Total**
Component 1: Reducing the HCFC Servicing Demand - Regional Accelerated Phase-out Capacity Building (to be implemented by UNDP Bratislava Regional Center)				
Outcome 1a: Legislative and Policy Options for HCFC phase-out and control	Output 1a.1: Preparation of Russian language resource materials	**80,556**		
	Output 1a.2: Awareness training on legislative and regulatory actions			
	Output 1a.3: Regional networking			
Outcome 1b: Capacity Building for Enforcement of HCFC control measures by customs and environmental/ technical inspection authorities	Output 1b.1: Russian language resource documentation and Training of National Trainer	**80,556**		
	Output 1b.2: Awareness raising activities			
	Output 1b.3: Training of Trainers			
	Output 1b.4: PIC Network			
	Output 1b.5: Regional networking			
Outcome 1c: Capacity Building for the Refrigeration Sector, Incorporation of Energy-Efficiency and GHG reduction elements	Output 1c.1: Preparation of Russian language training manuals and information materials	**161,111**		
	Output 1c.2: ToT on Best Refrigeration Practices			
Outcome 1d - Support for the development of regional institutions, capacity, and cooperation	Output 1d.1: Preparation of Russian language information materials	**40,278**		
	Output 1d.2: Promotion of Information exchange mechanisms			
	Output 1d.3: Facilitation of regional dialogue			
	Project management for Regional component	45,000		
	Sub-total for Regional Component	**407,501**	**420,000**	**827,501**
Component 2(c): National HPMP, National Level Capacity Strengthening and HCFC Phase-out Investment -Ukraine				
Outcome 2(c): Finalized and adopted HCFC phase-out strategy and action plan,	Output 2c.1: Formal HCFC Phase-out strategy and action plan developed and endorsed	**120,000**	**120,000**	**240,000**
	Output 2c.2: Trained working level Customs and enforcement officials, and refrigeration technicians using resources (trainers and training materials) from Component 1 with respect to legislation, regulations, customs controls, refrigeration servicing techniques, and general best practices	**490,000**	**490,000**	**980,000**
	Customs training and equipment support to enhance Customs control capability	105,000	105,000	210,000

implementation of national level training for the servicing sector and customs/ enforcement authorities, and targeted phase-out investment demonstrations undertaken in priority areas	Refrigeration technicians training and equipment support to enhance refrigeration servicing practices	385,000	385,000	770,000
	Output 2c.3 - Targeted HCFC Phase-out Investment Program and Demonstration projects	**2,250,000**	**8,550,000**	**10,800,000**
	Information exchange platform on HCFC substitute technologies for ineligible foam manufacturers (PU and XPS) companies	50,000	50,000	100,000
	Implementation of a PU foam conversion to c-pentane (non-ODS/very low GWP blowing agent) at Intertehnika (PSC "Intertekhnika")	500,000	2,000,000	2,500,000
	Implementation of an XPS foam conversion to CO2 (non-ODS/very low GWP blowing agent) at Sobraniye	1,200,000	4,500,000	5,700,000
	Implementation of solvent phase-out at Nord (Nord Group Holding)	200,000	800,000	1,000,000
	Implementation of blending operation conversion to non-ODS/very low GWP alternative (Methyl Formate) at Polyfoam System House (POLYFOAM LTD)	300,000	1,200,000	1,500,000
	Sub-total	**2,860,000**	**9,160,000**	**12,020,000**
Component 3(c): Monitoring, learning, adaptive feedback, outreach and evaluation - Ukraine				
	Output 3c.1: M&E and adaptive management applied to project in response to needs and extract lessons learned	40,000	-	**40,000**
	Output 3c.2: Lessons learned and best practices are replicated at the national level			
	Sub-total	**40,000**	**-**	**40,000**
	Total for National Component (w/o PMC)	**2,900,000**	**9,160,000**	**12,060,000**
	Project Management for National Component	290,000	320,000	610,000
	Total for National Component (with PMC)	**3,190,000**	**9,480,000**	**12,670,000**
	Project Management for Regional Component	45,000		
	Total PMC (regional and national)	335,000		
	Total Project Costs	**3,597,501**	**9,900,000**	**13,497,501**

2.3. Incremental Reasoning and Incremental Cost Analysis

International institutional and capacity building assistance for Ukraine on ODS phase out began as early as in 1998 (detailed in previous sections); however, the phase-out of Annex A&B chemicals was only achieved later during next decade (2003-2006).

The ODS phased out in that period covered virtually all Annex A and B ODS consumption in the manufacturing sector as well as a substantial portion of residual consumption in the refrigeration servicing sector. Institutional strengthening support helped create a dedicated NOU for regulatory management of ODS phase-out and it resulted in the development of the necessary regulatory framework for ODS control, including licensing of ODS use and control of import and export, although some questions, as reported in the project evaluation report remained respecting the level of enforcement that existed to support these measures.

Upon completion of the projects and evaluation of their impacts and results, by December 2001 Ukraine returned in compliance with its obligations under the London Amendment which was the revised target set by the Parties to the Montreal Protocol for rectifying its previous non-compliance status.

Currently, the country, while – resulting from lack of accurate data - reported nominal compliance with HCFC obligations for 2010, is in fact dependant on a significantly larger amount and would unlikely achieve future reduction obligations. This situation mainly resulted from:

- weakened institutional capacity - due to multiple changes in the Government - that prevented the country from exercising effective controls over import and managing the HCFCs phase-out in a comprehensive manner; and
- high demand for HCFCs on the national market which is partly due to rapid development of the XPS manufacturing sector in the time during and after 2008 which is considered as ineligible for GEF assistance HCFC consumption.

The initial effort related to understanding HCFC consumption situation in the country took form of a regional MSP project to enable the collection of HCFC consumption data and prepare outline of HCFC phase-out strategies to amend the existing, outdated Country Programme on the Implementation of the Montreal Protocol. In Ukraine this has been partially achieved, compared to other participating countries, as data were largely collected for the manufacturing, and, to a certain degree, for the servicing sector. This important statistical information was received through field surveys with field visits to eligible enterprises and a series of HCFC workshops.

HCFC import data from the licensing system have been partially (fragmented) made available for some of previous years, and was partially reconstructed through field survey cross-checks with several HCFC importers who collaborated with project developers. The main barrier to collect creditable official data was rooted in multiple re-organizations in the Government during the regional MSP's implementation. This was further complicated by lack of cooperation on behalf of stakeholders - HCFC distributors and users - with the Government and project team.

The data obtained helped with identification of priority HCFC issues that required intervention, and, correspondingly, in the current project, or Stage I of HCFC phase-out programme for Ukraine, GEF funds have been designed to cover the achievement of the following main project outcomes:

- completion of the existing outline of HCFC phase-out action plan and its endorsement by the Government;
- re-building of institutional capacity of the Government in managing HCFC phase-out in a comprehensive manner; and
- a rapid HCFC phase-out in eligible enterprises in the manufacturing sector, with information exchange on new and emerging technologies for ineligible companies, to enable the country to return into compliance with 2010 HCFC use's reduction step.

In terms of the project's design, the outcomes and the resultant global environmental and national benefits match with the GEF goals, objectives and strategic programs for the ODS Focal Area during GEF-4 as described above.

In the absence of GEF assistance, the country would not creditably be able to address its compliance challenges and likely only see fragmented actions implemented by involved stakeholders to reduce dependence on HCFCs, partly associated with EU proximity. In this scenario, the institutional capacity to backstop the phase-out of HCFCs will remain inadequate, and will further prevent the Government from effective HCFC import monitoring and control, as well as forecasting HCFC demand for future interventions. Further, with lack of knowledge dissemination on HCFC phase-out strategy and capacity building, key stakeholders in the private sector would not achieve required momentum to facilitate the rapid HCFC phase-out. During the project formulation substantial co-finance resources were leveraged from eligible manufacturing enterprises, and in the absence of further GEF assistance, this achievement would not be further sustained. This said, without stronger Government's commitment towards meeting the MP's obligations and absence of technical assistance to back this position, it is hard to see realization of any consolidated and informed effort to reduce HCFC consumption.

The proposed GEF assistance will, on contrary, facilitate the maintenance of the country's compliance status with the Montreal Protocol during 2010-2014 periods. This will be the main global environmental benefit of Stage I.

It is also acknowledged that there are additional global and national benefits from the project overall and from the GEF's contribution. For instance, the initiation of the HCFC phase-out will be marked by introduction and demonstration of low GWP technology which is linked climate change mitigation benefits. Further, the eligible companies in the private sector, in proximity to EU, would remain in competitively advantageous situation in terms of keeping export markets as manufactured products would not contain any HCFCs.

Technical and regulatory strengthening co-financed by the GEF would bring additional benefits related to the capacity and knowledge to improve the general environmental protection system as it functions as of now in the country. It will engage close inter-departmental cooperation on solving complex environmental challenges such as sound chemical management.

The Incremental Cost Matrix below provides an overall summary of the incremental costs, both the GEF and co-financing estimated for the project, linked specifically to the project outcome from Annex A, the baseline, and global environmental benefits.

2.4. Country Ownership: Country Eligibility and Country Drivenness

Ukraine was among the first countries to sign the Vienna Convention and the Montreal Protocol in the region. By signing the Montreal Protocol in 1988, Ukraine undertook to reduce and phase out the consumption of ODSs. The information on acceptance and ratification of the Montreal protocol and its amendments is summarized in the table below.

Convention/Agreement	Signature	Ratification/ Acceptance (at) / Accession (ac)
Vienna Convention	22/03/1985	18/06/1986 (at)
Montreal Protocol	18/02/1988	20/09/1988
– London Amendment to the Montreal Protocol	n/a	06/02/1997
– Copenhagen Amendment to the Montreal Protocol	n/a	04/04/2002
– Montreal Amendment to the Montreal Protocol	n/a	04/05/2007
– Beijing Amendment to the Montreal Protocol	n/a	04/05/2007

In terms of specific, adopted national legislation, the Montreal Protocol's implementation is governed by a set of associated Government's enacted laws and resolutions listed in a more detailed manner below:

- The Council of Ministers of Ukrainian Socialistic Soviet Republic. Resolution of the Council dated September 13, 1988 # 269: "On adoption of Montreal Protocol on substances that deplete the ozone layer" which ratified the Montreal Protocol;
- The Law of Ukraine dated October 16, 1992 #2707-XII "On atmospheric air protection". The law defines the requirements of private sector enterprises, entrepreneurs and organizations to reduce production and consumption of chemicals that deplete the ozone layer;
- The Laws of Ukraine "On ratification of amendments to the Montreal Protocol on substances that deplete the ozone layer":
    - dated November 22, 1996 # 545/96-BP which ratified the London amendment;
    - dated November 2, 2000 # 2083-III which ratified Copenhagen amendment; and
    - dated October 18, 2006 # 255-V which ratified Montreal and Beijing amendments.

These overarching legislative elements are implemented through several normative acts which control the listings of approved ODSs for import and use, regulate imports/exports of ODSs (an import license system) and assign coordinating functions to various Government departments and support the functioning of Inter-departmental Coordinating Commission on Montreal Protocol. The overall guiding document, at coordination and technical levels, that supports the implementation of the Montreal Protocol is the ODS phase-out Country Programme for 2004-2030 which was adopted by a resolution of Cabinet of Ministers in March 2004 (# 256).

The table below provides additional information on ratification of other MEAs which demonstrates active position and interest of the country in implementation of international treaties related to environmental protection, and specifically chemical related conventions and protocols.

Convention/Agreement	Signature	Ratification/ Accession (a)
Stockholm Convention on Persistent Organic Pollutants	23/05/2001	25/09/2007
Basel Convention on the Trans-boundary Movement of Hazardous Waste and their Disposal		08/10/1999 (a)
Rotterdam Convention on Prior Informed Consent for Certain Chemicals and Pesticides in International Trade		06/12/2002 (a)
UNECE Convention on Long-Range Trans-boundary Air Pollution	14/11/1979	05/06/1980
– Gothenburg Protocol to Abate Acidification, Eutrophication, and Ground-Level Ozone	n/a	n/a
– Aarhus Protocol on Persistent Organic Pollutants	24/06/1998	
– Aarhus Protocol on Heavy Metals	24/06/1998	
Convention on Access to Information, Public Participation in Decision Making, and Access to Justice in Environmental Matters	25/06/1998	18/11/1999
– Protocol on Pollutant Release and Transfer Registers	21/05/2003	
ESPOO Convention on Environmental Impact Assessment in a Trans-boundary Context	26/02/1991	20/07/1999
– Protocol on Strategic Environmental Assessment	21/05/2003	
UN Framework Convention on Climate Change	11/06/1992	13/05/1997
– Kyoto Protocol	15/03/1999	12/04/2004

2.5. Type of Financing Support Provided

The project is designed to provide continuity with the initial GEF regional HCFC survey project.

The financing support provided will be in the form of a grant which will cover costs where foreign expenditures are required recognizing the limited government and enterprise resources available to address HCFC phase-out. However, the GEF grant will leverage significant cash co-financing for the project that would otherwise not be devoted to this global issue. This type of Grant funding is consistent with the GEF Focal Area Strategy as described above.

2.6. Sustainability

The principal sustainability intention of the project is to ensure a range of technological conversions in the manufacturing sector accompanied by awareness dissemination on new and emerging HCFC substitute technologies to further sustain the HCFC phase-out in this important economic sector. This process will further concentrate on low GWP technologies such as methyl formate, c-pentane and carbon dioxide based solutions. The rapid HCFC phase-out in the manufacturing sector with elements of capacity building for the Government to improve its institutional capability in managing HCFCs are all designed to help return the country into compliance with the Montreal Protocol's obligations for 2010-2014 period. Such approach, combined with the future 2nd stage of technical assistance needed for the servicing sector where the long-term demand for HCFCs is, would prepare the country for sustainable reduction of HCFCs at the national level and keep in line with the requirements of the Montreal Protocol beyond 2015.

By supplying new low GWP technologies to and building technical capacities of assistance recipients (individual enterprises) to safely handle such technologies, the project will ensure that a required level of ownership over technology is achieved to ensure sustainable results. Through regular capacity building the new technology's owners, the risk of rejecting new technological solutions and returning to HCFC use in manufacturing processes would be further substantially reduced. In addition, aggressive technical assistance and capacity building will be provided to non-eligible enterprises to ensure that best available technologies are used in their processes of self conversion.

The project will also re-establish the lost connections to the current regional, Montreal Protocol related information exchange platforms which involve a number of Art 5 countries from Europe/CIS, to help with adopting more effective HCFC control measures based on other country experiences.

2.7. Replicability

Through the implementation of this technical assistance project, the experience accumulated will be available to other countries in the region which operate both under non-Art 5 status as well as Art 5. The regional information exchange component will ensure all replicable results of the project are shared with interested countries on the regional basis.

3. PROJECT RESULTS FRAMEWORK

This project will contribute to achieving the following Country Programme Outcome as defined in CPAP or CPD: Government adopts policy frameworks and mechanisms to ensure reversal of environmental degradation; climate change mitigation and adaptation; and prevention of and response to natural and human-caused disasters.
Country Programme Outcome Indicators: Percent of national and subnational government bodies that integrate environment, DRR and climate change in development and management plans.
Primary applicable Key Environment and Sustainable Development Key Result Area (same as that on the cover page, circle one): Government adopts policy frameworks and mechanisms to ensure reversal of environmental degradation; climate change mitigation and adaptation; and prevention of and response to natural and human-caused disasters.
Applicable GEF Strategic Objective and Program: **Objectives:** To protect human health and the environment by assisting countries to phase out consumption and production and prevent releases of ODS according to their commitments to Montreal Protocol phase-out schedules, while enabling low-GHG (Greenhouse Gas) alternative technologies and practices. **Program:** For the period of GEF-4, the GEF will assist eligible countries in meeting their HCFC phase-out obligations under the Montreal Protocol, and strengthening capacities and institutions in those countries that still are faced with difficulties in meeting their reporting obligations.
Applicable GEF Expected Outcomes: (1) HCFCs are phased-out according to Montreal Protocol schedule, or faster, in GEF-eligible countries (2) GEF-eligible countries meet their reporting obligations under the Montreal Protocol
Applicable GEF Outcome Indicators: (1) Indicators for Outcome 1: (a) ODP adjusted tons of HCFCs phased-out from consumption (GEF-4 replenishment target: HCFCs: 50-70 ODP tons) (b) Percentage reduction in HCFC consumption in the participating countries (2) Indicators for Outcome 2: (a) Percentage of GEF-funded countries that meet their reporting obligations under the Montreal Protocol

• *Project Strategy*	• *Objectively verifiable indicators*	• *Baseline*	• *Target*	• *Sources of verification*	• *Assumptions*
• *<u>Objective</u>: To achieve compliance of Ukraine with the accelerated Montreal Protocol HCFC phase-out requirements through stabilization and progressive reduction of HCFC consumption.*	• Ukraine returns to compliance with the MP obligations and sustains the status for 2015 milestone	• Lack of approved HCFC phase-out strategy; • Continued institutional changes and weak institutional capacity to implement Montreal Protocol; • No current information products and programs on Montreal Protocol and HCFC phase-out obligations; • Lack of technical tools to test gas composition and quality as well as to limit emissions of HCFCs during equipment maintenance; • Limited exposure to alternative technologies in manufacturing sector; • Large number of GEF ineligible manufacturing enterprises (MLF cut-off date)	• HCFC phase-out strategy fully formulated and recommended for adoption and implementation; • Effective regulatory instruments to control HCFC use, and thus, import of HCFCs and HCFC containing equipment in place and effectively implemented; • Institutional capacity is substantially improved through regional cooperation and implementation of Stage I; • Current capacities of project stakeholders strengthened through capacity building, knowledge exchange platforms on new technological developments and investment support for eligible enterprises in manufacturing sector.	• Status of HCFC phase-out strategy as a formal government strategic document; • National legal and regulatory registers • Art 7 reporting to Ozone Secretariat on HCFC import and monitoring of HCFC import reduction; • Project Progress and M/E reports	• Overall government commitment and assumption of appropriate responsibility; • Regulatory enforcement resources and capacity available; • Project stakeholders actively participate in the project implementation and realization of HCFC phase-out strategy; • Accurate monitoring and reporting.

• *Project Strategy*	• *Objectively verifiable indicators*	• *Baseline*	• *Target*	• *Sources of verification*	• *Assumptions*
• *Outcome 1: Regional accelerated phase-out capacity building (containing four sub-components)*					
• *Outcome 1 (a): Legislative and Policy Options for HCFC phase-out and control*	• Russian language resource materials on HCFC control options prepared • Awareness training for decision-makers on legislative and regulatory actions accomplished • Regional networking on the country with Art 5 and other non Art 5 countries in the region is supported	• Key stakeholders generally have limited awareness of the issue or actions required on the higher or technical level to address HCFC phase-out; • Institutional capacity is weak after multiple Government's changes; • Decision-makers from enforcement department (MENR, Environmental Inspectorate, Customs) have limited knowledge and lack practical skills on the regulatory approaches to effectively control HCFC related challenges; • Limited number or lack of trained trainers on HCFC import enforcement aspects; • Required materials in Russian or local languages, on HCFC control options, Customs enforcement approaches and methodologies, refrigeration sector capacity building, energy-efficiency, alternative technologies and their application, illegal trade and PIC, technician certification and ODS waste management related issues are limited in availability or absent; • Regional networking with other partner countries in the region is	• Institutional capacity of the country is re-built through intense and regular regional networking with non Art 5 countries which are more advanced in terms of HCFC controls – the capacity supports the return into compliance; • High-level decision-makers of MENR, Environmental Inspectorate, Customs, territorial inspectorates, other Governmental agencies are well informed, and support the objectives of HCFC consumption phase-out and measures to address this process; • Availability of key guidance documentation in Russian, or local languages, where required, on HCFC control options, Customs enforcement approaches and methodologies, refrigeration sector capacity building, energy-efficiency, ODS destruction etc; • Training of a selected number of trainers on the technical level (Environmental Inspectorate, Customs controls) is complete on regional level to initiate trainings on national level • Regional networking with non Art	• Regularity and correctness of Art 7 reporting • National legal and regulatory registers • Equivalence of control measures comparison to international standards • Number of regional/sub-regional meetings attended by each country, and specific department (organized by MLF/UNEP-CAP team or by the current project) • Number of materials, in Russian, or local languages, prepared and used by the countries • Number of involved/trained decision makers and trainers trained in each country • Monitoring of press and media coverage • Project Progress and	• Overall government commitment and assumption of appropriate responsibility; • NOU is stable and does not experience institutional changes; • In-country interagency coordination is sustainable through high-level Government support and allows for timely participation of various departments in regional meetings • MLF/UNEP-CAP and other regional and sub-regional conferences and meetings are organized on HCFC phase-out subjects etc • Trainers are further deployed for the training at national level
• *Outcome 1 (b): Capacity Building for Enforcement of HCFC control measures by customs and environmental/technical inspection authorities*	• Russian language resource documentation • Awareness raising activities • Training of Trainers • PIC Network • Regional networking				
• *Outcome 1 (c): Capacity Building for the Refrigeration Sector, Incorporation of Energy-Efficiency and GHG reduction elements*[26]	• Preparation of Russian language training manuals and information materials • ToT on Best Refrigeration Practices				

[26] To be initiated in conjunction with Stage II

• *Project Strategy*	• *Objectively verifiable indicators*	• *Baseline*	• *Target*	• *Sources of verification*	• *Assumptions*
• *Outcome 1 (d): Support for the development of regional institutions, capacity, and cooperation* •	• Preparation of Russian language information materials • Promotion of Information exchange mechanisms • Facilitation of regional dialogue	lacking which prevents effective information and experience exchange [see topics above]; • Cooperation between non-Art 5 countries on effective action standards is minimal or absent.	5 and other Art 5 countries re-established, contacts re-engaged, and overall supports accelerated capacity building of the country as well as essential experience exchange on important HCFC phase-out related topics	M/E reports	
• *Outcome 2: National level phase-out capacity building*					
• *Outcome 2 (c – Ukraine): HPMP, National Level Capacity Strengthening and HCFC Phase Out Investment*	• Formal HCFC Phase-out strategy and action plan developed and endorsed	• Country is in non-compliance regime and is not able to respect its obligations without assistance of international community; • No formal HCFC strategy is adopted and enforced through regulatory measures; • No updated HCFC and HCFC equipment import quota and use system is in place; • Inter-agency coordination to address HCFC phase-out is limited; • Low level of awareness related to HCFC phase-out across stakeholders and general public; • No current information products and programs	• Country returns into compliance for the period of 2012-2015 and is able to sustain it; • HCFC phase-out strategy fully formulated, packaged as draft legislation for Government approval and cleared by line Ministries/departments for final endorsement; • Effective regulatory measures (quotas etc) are updated and enforced • Inter-agency coordination related to HCFC phase-out is improved • Main stakeholders are informed about HCFC phase-out strategy and regulatory measures related to HCFC import and use control • Widely accessible information on HCFC phase-out strategy and its elements;	• Art 7 reporting data; • National legal and regulatory registers; • Equivalence of control measures comparison to international standards • Confirmation correspondence from Government to Ozone Secretariat, UNDP • Monitoring of press and media coverage • Project Progress and M/E reports	• Government commitment to timely processing of required HCFC action plan and regulations • Art 7 compliance reporting to Ozone Secretariat • Interagency coordination is sustainable through high-level Government support • Stakeholders support updated regulations

• *Project Strategy*	• *Objectively verifiable indicators*	• *Baseline*	• *Target*	• *Sources of verification*	• *Assumptions*
	• Trained working level Environmental and Customs enforcement officials using resources (trainers and training materials) from Component 1 with respect to legislation, regulations, and customs controls	• Key Government stakeholders as well as working level officials have limited awareness of HCFC phase-out issue, challenges to address it and skills/tools to enforce HCFC control measures in practice; • Lack of portable HCFC analytical equipment; • Limited active educational efforts or tools are available; • No current information products and programs • Illegal trade in ODS continues unregistered and unnoticed;	• Inclusion of HCFC control issues into curricula of Environmental and Customs' training institutions; • Well informed enforcement stakeholder community engaged in addressing HCFC phase-out issue with required level of understanding and technical capacity; • Environmental Inspectorate and Customs are both equipped with basic portable analytical instrumentation; • HCFC and HCFC equipment import quota system(s) are enforced to return the country into compliance; • HCFC imports are appropriately registered and reported to NOU; • Illegal trade is registered and stopped at entry points.	• Prepared and registered educational curricula • Attendance at training information sessions and events • Customs reporting information • Procurement documents on supply of equipment • Project Progress and M/E reports	• Interagency coordination (Ministry of Education is supportive of changes to curricula) is sustainable through high-level Government support • Sustaining interest and capacity in educational institutions to maintain educational programs • Active participation and partnership with education institutions and large scale attendance of training events
	• Targeted HCFC Phase-out Investment Program and Demonstration projects				
	• *Information exchange platform on HCFC substitute technologies for ineligible foam manufacturers (PU and XPS) companies*	• Low level of awareness related to HCFC phase-out across stakeholders from manufacturing sector; • No current information products and programs on information dissemination related to alternative technologies in the manufacturing sector; • Nine (9) manufacturing enterprises continue to rely on HCFCs as the only technological solution in the absence of knowledge on a range of new and emerging alternatives which may minimize capital investments.	• Main stakeholders in the manufacturing sector are informed about new and emerging alternative technologies and various capital/operating investment aspects; • At least, four (4) of the ineligible enterprises self-convert to other than HCFC technological solutions without GEF assistance; • HCFC consumption is accordingly reduced by respective annual consumption amounts at a number of self-converted enterprises.	• Attendance at training information sessions and events; • Self-reports of the ineligible enterprises to NOU; • Aggregated reports from HCFC importers; • Art 7 reporting data.	• Manufacturing sector commitment to timely implementing HCFC use reduction measures; • HCFC substitute pilot projects in manufacturing sector, supported by MLF, are completed on time; • Available new non-HCFC alternatives reduce in capital/operating costs.

• *Project Strategy*	• *Objectively verifiable indicators*	• *Baseline*	• *Target*	• *Sources of verification*	• *Assumptions*
	• *Implementation of a system house conversion project at Polyfoam (POLYFOAM LTD)*	• Polyfoam (system house) and its downstream users continue to depend on HCFC-141b in polyol blending and consumption; • Alternative technologies are scarcely available to the company, and its downstream clients, for access and transfer, not tested at the facility and lack processing and safety instrumentation for practical introduction; • No current information products and programs on information dissemination related to the proposed alternative technologies in the manufacturing sector.	• Polyfoam (POLYFOAM LTD) and its downstream users are technologically converted to non-ODS/ low GWP technology (methyl formate) • HCFC use at Polyfoam (POLYFOAM LTD) stopped and company committed not to use HCFCs any longer • Technical staff is knowledgeable on correct use of new technology	• Procurement documents on supply of equipment • Mission and site visits reports of international and national consultants • Company's written commitments to stop usage of HCFCs in manufacturing processes • Project Progress and M/E reports	• UNDP requires regular reporting and conducts monitoring of equipment use • Supplied equipment is adequately maintained and used by company • Company continues to co-finance the project as specified in the co-finance commitments
	• *Implementation of a foam conversion project at Intertehnika (PSC "Intertekhnika")*	• Intertehnika (commercial refrigeration manufacturing) depends on HCFC-141b in its manufacturing processes (either of domestic manufacture or import); • Alternative technologies are scarcely available to the company for access and transfer, not tested at the facility and lack processing and safety instrumentation for practical introduction; • Commercial equipment manufactured by the company continues to be produced with HCFC-141b in foam insulation.	• Intertehnika (PSC "Intertekhnika") technologically converted to non-ODS/ low GWP technology (HCFC-141b based polyols to c-pentane) • HCFC use at Intertehnika (PSC "Intertekhnika")stopped and company committed not to use HCFCs any longer • Technical staff is knowledgeable on correct use of new technology	• Procurement documents on supply of equipment • Mission and site visits reports of international and national consultants • Company's written commitments to stop usage of HCFCs in manufacturing processes • Project Progress and M/E reports	• UNDP requires regular reporting and conducts monitoring of equipment use • Supplied equipment is adequately maintained and used by company • Company continues to co-finance the project as specified in the co-finance commitments

• *Project Strategy*	• *Objectively verifiable indicators*	• *Baseline*	• *Target*	• *Sources of verification*	• *Assumptions*
	• *Implementation of a foam conversion project at Sobraniye*	• Sobraniye (XPS foam product manufacturer) depends on HCFCs (R-22 and sporadically 141b) in its manufacturing processes; • Alternative technologies are scarcely available to the company for access and transfer, not tested at the facility and lack processing and safety instrumentation for practical introduction • Refrigerated trucks with foam insulation continue to be manufactured with the use of HCFCs	• Sobraniye technologically converted to non-ODS/ low GWP technology (to carbon dioxide technology); • HCFC use at Sobraniye stopped and company committed not to use HCFCs any longer; • Technical staff is knowledgeable on correct use of new technology.	• Procurement documents on supply of equipment; • Mission and site visits reports of international and national consultants; • Company's written commitments to stop usage of HCFCs in manufacturing processes; • Project Progress and M/E reports.	• UNDP requires regular reporting and conducts monitoring of equipment use; • Supplied equipment is adequately maintained and used by company; • Company continues to co-finance the project as specified in the co-finance commitments.
	• *Implementation of a solvent conversion project at Nord (Nord Group Holding)*	• Nord (solvent user) depends on HCFC-141b in manufacturing processes and this is a high emissive use of HCFCs; • Alternative technologies are scarcely available to the company for access and transfer, not tested at the facility and lack processing and safety instrumentation for practical introduction; • Spares (compressors and others) for refrigerators continue to be manufactured with the use of HCFC-141b as a degreasing agent.	• Nord (Nord Group Holding) technologically converted to non-ODS technology (HCFC-141b to transblends based on HFCs – closed loop cycle and minimization of agent use reduce emissions); • HCFC use at Nord (Nord Group Holding) stopped and company committed not to use HCFCs any longer; • Technical staff is knowledgeable on correct use of new technology.	• Procurement documents on supply of equipment; • Mission and site visits reports of international and national consultants • Company's written commitments to stop usage of HCFCs in manufacturing processes • Project Progress and M/E reports	• UNDP requires regular reporting and conducts monitoring of equipment use; • Supplied equipment is adequately maintained and used by company • Company continues to co-finance the project as specified in the co-finance commitments
• *Outcome 3: Monitoring, learning, adaptive feedback, outreach and evaluation*	• M&E and adaptive management applied to project in response to needs, mid-term evaluation findings with lessons learned extracted.	• No Monitoring and Evaluation system; • No evaluation of project output and outcomes.	• Monitoring and Evaluation system developed during year 1; • Mid-term-evaluation of project output and outcomes conducted with lessons learnt at 30 months of implementation; • Final evaluation report ready in the end of project	• Project document inception workshop report; • Independent mid-term evaluation report; • Final evaluation report	• Availability of reference material and progress reports; • Cooperation of stakeholder agencies and other organizations.

Outcome 1 (a): Legislative and Policy Options for HCFC phase-out and control Output 1a.1: Russian language resource materials on HCFC control options prepared Output 1a.2: Awareness training for decision-makers on legislative and regulatory actions accomplished Output 1a.3: Regional networking on the country with Art 5 and other non Art 5 countries in the region is supported
Outcome 1 (b): Capacity Building for Enforcement of HCFC control measures by customs and environmental/technical inspection authorities Output 1b.1: Russian language resource documentation

Output 1b.2: Awareness raising activities Output 1b.3: Training of Trainers Output 1b.4: PIC Network Output 1b.5: Regional networking
Outcome 1 (c): Capacity Building for the Refrigeration Sector, Incorporation of Energy-Efficiency and GHG reduction elements Output 1c.1: Preparation of Russian language training manuals and information materials Output 1c.2: ToT on Best Refrigeration Practices
Outcome 1 (d): Support for the development of regional institutions, capacity, and cooperation Output 1d.1: Preparation of Russian language information materials Output 1d.2: Promotion of Information exchange mechanisms Output 1d.3: Facilitation of regional dialogue
Outcome 2 (c – Ukraine): HPMP, National Level Capacity Strengthening and HCFC Phase Out Investment Output 2c.1: Formal HCFC Phase-out strategy and action plan developed and endorsed Output 2c.2: Trained working level Environmental and Customs enforcement officials using resources (trainers and training materials) from Component 1 with respect to legislation, regulations, and customs controls Output 2c.3: Targeted HCFC Phase-out Investment Program and Demonstration projects
Outcome 3c: Monitoring, learning, adaptive feedback, outreach and evaluation Output 3c.1: M&E and adaptive management applied to project in response to needs, mid-term evaluation findings with lessons learned extracted. Output 3c.2: Lessons learned and best practices are replicated at national level

4. TOTAL BUDGET AND WORKPLAN

Award ID:	*00066300*	Project ID(s):	*00082497*
Award Title:	***Ukraine: Initial Implementation of Accelerated HCFC Phase Out in the CEIT Regional***		
Business Unit:	*UKR10*		
Project Title:	***Ukraine: Initial Implementation of Accelerated HCFC Phase Out in the CEIT Regional***		
PIMS no.	*4903*		
Implementing Partner (Executing Agency)	UNDP Ukraine		

GEF Outcome/Atlas Activity	Responsible Party/ Implementing Agent	Fund ID	Donor Name	Atlas Budgetary Account Code	ATLAS Budget Description	Amount Year 1 (USD)	Amount Year 2 (USD)	Amount Year 3 (USD)	Total (USD)	See Budget Note:
OUTCOME 1: Regional accelerated phase-out capacity building (to be implemented by UNDP Regional Center in Slovakia)										
OUTCOME 2: HPMP, National Level Capacity Strengthening and HCFC Phase Out Investment										
Output 2.1: Formal HCFC Phase-out strategy and action plan developed and endorsed	**UNDP**	**62000**	**GEF**	71200	International Consultants	$20,000	$15,000	$0	$35,000	1
				71300	National consultant	$25,000	$20,000	$0	$45,000	2
				72100	Contractual services (workshops, rent, equipment, etc)	$10,000	$10,000	$0	$20,000	3
				72100	Contractual services (publications etc)	$10,000	$10,000	$0	$20,000	4
					Sub-total	**$65,000**	**$55,000**	**$0**	**$120,000**	
Output 2.2.: Trained and equipped working level Customs and enforcement officials, and refrigeration technicians using resources (trainers and training materials) from Component 1	**UNDP**	**62000**	**GEF**	72200	Equipment (enforcement officers)	$100,000	$220,000	$0	$320,000	5
				72100	Contractual services (workshops)	$40,000	$40,000	$40,000	$120,000	6
				72200	Office equipment (Training equipment for institutions)	$30,000	$0	$0	$30,000	7
				71200	International Consultants (to deliver trainings)	$10,000	$0	$0	$10,000	8
				71300	National consultant	$5,000	$5,000		$10,000	9
					Sub-total	**$185,000**	**$265,000**	**$40,000**	**$490,000**	

Output 2.3: Targeted HCFC Phase-out Investment Program and Demonstration projects										
Information exchange platform on HCFC substitute technologies for ineligible foam manufacturers (PU and XPS) companies	**UNDP**	**62000**	**GEF**	71200	International Consultant (TA)	$10,000	$10,000	$0	$20,000	10
				71300	National consultant	$5,000	$5,000	$0	$10,000	11
				72100	Contractual services (workshops, rent, equipment, etc)	$5,000	$5,000	$0	$10,000	12
				72100	Contractual services (publications etc)	$0	$10,000	$0	$10,000	13
					Sub-total	**$20,000**	**$30,000**	**$0**	**$50,000**	
Implementation of a PU foam conversion to c-pentane (non-ODS/very low GWP blowing agent) at Intertehnika (PSC "Intertekhnika")	**UNDP**	**62000**	**GEF**	71200	International Consultant (TA)	$20,000	$17,000	$0	$37,000	14
				71300	National consultant	$8,000	$0	$0	$8,000	15
				72200	Equipment	$0	$455,000	$0	$455,000	16
					Sub-total	**$28,000**	**$472,000**	**$0**	**$500,000**	
Implementation of an XPS foam conversion to CO2 (non-ODS/very low GWP blowing agent) at Sobraniye (LTD "SOBRANIE-PRO-UA")	**UNDP**	**62000**	**GEF**	71200	International Consultant (TA)	$20,000	$15,000	$0	$35,000	17
				71300	National consultant	$10,000	$0	$0	$10,000	18
				72200	Equipment	$577,500	$577,500	$0	$1,155,000	19
					Sub-total	**$607,500**	**$592,500**	**$0**	**$1,200,000**	
Implementation of solvent phase-out at Nord (Nord Group Holding)	**UNDP**	**62000**	**GEF**	72200	Equipment	$73,000	$100,000	$0	$173,000	20
				71200	International Consultant (TA)	$12,000	$10,000	$0	$22,000	21
				71300	National consultant	$5,000	$0	$0	$5,000	22
					Sub-total	**$90,000**	**$110,000**	**$0**	**$200,000**	
Implementation of blending operation conversion to non-ODS/very low GWP alternative (Methyl Formate) at Polyfoam System House (POLYFOAM LTD)	**UNDP**	**62000**	**GEF**	72200	Equipment	$126,500	$100,000	$0	$226,500	23
				71200	International Consultant (TA)	$15,000	$13,500	$0	$28,500	24
				72100	Contractual services (process optimization - international)	$20,000	$20,000	$0	$40,000	25

				71300	National consultant	$5,000	$0	$0	$5,000	26
					Sub-total	**$166,500**	**$133,500**	**$0**	**$300,000**	
					Total Outcome 2	**$1,162,000**	**$1,658,000**	**$40,000**	**$2,860,000**	
OUTCOME 3: Monitoring, learning, adaptive feedback, outreach and evaluation – Ukraine										
OUTCOME 3: Monitoring, learning, adaptive feedback, outreach and evaluation	**UNDP**	**62000**	**GEF**	71200	International Consultants	$0	$15,000	$25,000	$40,000	27
					Total M & E	**$0**	**$15,000**	**$25,000**	**$40,000**	
Project Management Budget (PMB)	**UNDP**	**62000**	**GEF**	71300	Local Consultants	$56,000	$56,000	$56,000	$168,000	28
				71600	Travel	$20,000	$30,000	$10,000	$60,000	29
				72200	Equipment	$30,000	$0	$0	$30,000	30
				74500	Miscellaneous (office supplies, communication)	$10,000	$10,000	$6,000	$26,000	31
				74500	Miscellaneous (audit)	$2,000	$2,000	$2,000	$6,000	32
					Total Management national	**$118,000**	**$98,000**	**$74,000**	**290,000**	
					PROJECT TOTAL national w/o PMC	**$1,162,000**	**$1,673,000**	**$65,000**	**$2,900,000**	
					PROJECT TOTAL national	**$1,280,000**	**$1,771,000**	**$139,000**	**$3,190,000**	

BUDGET NOTES:

1. International Consultants fee for development of HCFC Phase-out Strategy and action plan
2. Local consultants' fees
3. Training costs
4. Publications producing costs
5. Procurement of specialized equipment for Customs
6. Training costs
7. Procurement of training equipment for specialized institutions and refrigeration technicians
8. International Consultants fee to conduct specialized training for Customs Officers
9. Local consultants' fees
10. International Consultants fee (TA on HCFC substitute technologies)
11. Local consultants' fees
12. Training costs
13. Publications producing costs

14. International Consultant on c-pentan technologies implementation (Intertekhnika)
15. Local consultant's fees
16. Procurement of equipment for Intertechnika conversion on c-pentan technologies
17. International Consultants on XPS foam conversion to CO2 (Sobranie)
18. Local consultant's fees
19. Procurement of equipment for Sobranie conversion on CO2 technologies
20 Procurement of equipment for Nord
21. International Consultants on solvents phase-out technologies (Nord)
22. Local consultant's fees
24. International Consultant on Implementation of blending operation conversion to non-ODS/very low GWP alternative (Polyfoam)
26. Local consultant's fees
27. International Consultants fee to conduct mid-term and terminal evaluations
28. Local consultant's fees
29. Travel expenses related to monitoring visit and participation in international training events/meetings
30. Office and staff IT equipment as needed by the component over project life-time
31. Miscellaneous expenses (office supplies, communication)
32. Audit expenses

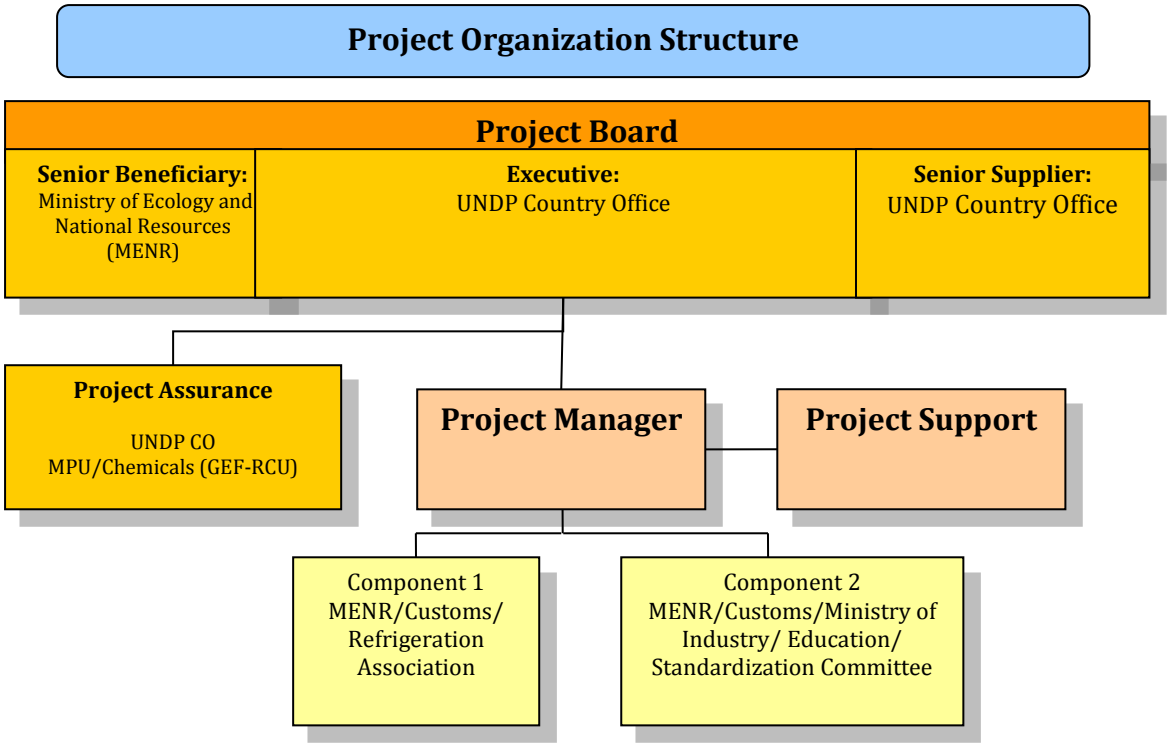
5. WORKPLAN IMPLEMENTATION SCHEDULE

		2012												2013												2014											
		Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
OUTCOME 1: Regional accelerated phase-out capacity building (containing four sub-components)																																					
OUTCOME 1a: Legislative and Policy Options for HCFC phase-out and control	International Consultants																																				
OUTCOME 1b: Capacity Building for Enforcement of HCFC control measures by customs and environmental/technical inspection authorities	Contractual services (workshops, rent, equipment,																																				
OUTCOME 1c: Capacity Building for the Refrigeration Sector, Incorporation of Energy-Efficiency and GHG reduction elements	Contractual services (publications etc)																																				
OUTCOME 1d: Support for the development of regional institutions, capacity, and cooperation	Travel (travel and DSA)																																				
OUTCOME 2: HPMP, National Level Capacity Strengthening and HCFC Phase Out Investment (containing four outputs)																																					
Output 2.1: Formal HCFC Phase-out strategy and action plan developed and endorsed	Contractual services (workshops, rent, equipment,																																				
	Contractual services																																				
Output 2.2.: Trained and equipped working level Customs and enforcement officials using resources (trainers and training materials) from Component 1	Equipment (Customs and technicians)																																				
	Contractual services (Training of Customs and technicians)																																				
	Office equipment (Training equipment for institutions)																																				
	International Consultants (to deliver trainings)																																				
	National consultant																																				
	Contractual services (publications etc)																																				
Output 2.3: Targeted HCFC Phase-out Investment Program and Demonstration projects (containing four sub-components)																																					
Information exchange platform on HCFC substitute technologies for ineligible foam manufacturers (PU and XPS) companies	International Consultant (TA)																																				
	National consultant																																				
	Workshops																																				
Implementation of a PU foam conversion to c-pentane (non-ODS/very low GWP blowing agent) at Intertehnika	International Consultant (TA)																																				
	National consultant																																				
	Equipment																																				
Implementation of an XPS foam conversion to CO2 (non-ODS/very low GWP blowing agent) at Sobraniye	International Consultant (TA)																																				
	National consultant																																				
	Equipment																																				
Implementation of solvent phase-out at Nord	International Consultant (TA)																																				
	National consultant																																				
	Equipment																																				
Implementation of blending operation conversion to non-ODS/very low GWP alternative (Methyl Formate) at Polyfoam System House	International Consultant (TA)																																				
	National consultant																																				
	Equipment																																				
OUTCOME 3: Monitoring, learning, adaptive feedback, outreach and evaluation																																					
Overall Management Components	International Consultants																																				
	Local Consultants																																				
	Travel																																				
	Equipment																																				
	Miscellaneous (office supplies, communication)																																				
	Miscellaneous (audit)																																				

6. MANAGEMENT ARRANGEMENTS

The project "Initial Implementation of Accelerated HCFC Phase Out in Ukraine" is a part of regional project "Initial Implementation of Accelerated HCFC Phase Out in the CEIT Region". In Ukraine, this project will be implemented under UNDP Country Programme Action Plan 2012-2016 in a Direct Execution Modality. UNDP Ukraine will implement the project in close partnership with the major project counterparts particularly Ministry of Ecology and Natural Resources of Ukraine.

Project implementation will be guided by the Project Board. The Project Board is the group responsible for making on a consensus basis management decisions for a project when guidance is required by the Project Coordinator, including recommendation for approval of project revisions. Project reviews by this group are made at designated decision points during the running of a project, or as necessary when raised by the Project Manager. This group is consulted by the Project Manager for decisions when tolerances (i.e. constraints normally in terms of time and budget) have been exceeded.



The Board contains three distinct roles, including:

1) An Executive: individual representing the project ownership to chair the group and will be represented by UNDP.
2) Senior Supplier: individual or group representing the interests of the parties concerned which provide funding for specific cost sharing projects and/or technical expertise to the project. The Senior Supplier's primary function within the Board is to provide guidance regarding the technical feasibility of the project and will be represented by UNDP.
3) Senior Beneficiary: individual or group of individuals representing the interests of those who will ultimately benefit from the project. The Senior Beneficiary's primary function within the Board is to ensure the realization of project results from the perspective of project beneficiaries and will be represented by the Ministry of Ecology and Natural Resources.
4) The Project Assurance role supports the Project Board Executive by carrying out objective and independent project oversight and monitoring functions. The Project Manager and Project Assurance roles should never be held by the same individual for the same project.

Project Manager: The Project Manager has the authority to run the project on a day-to-day basis on behalf of the Implementing Partner within the constraints laid down by the Board. The Project Manager's prime responsibility is to ensure that the project produces the results specified in the project document, to the required standard of quality and within the specified constraints of time and cost.

Project Support: The Project Support role provides project administration, management and technical support to the Project Manager as required by the needs of the individual project or Project Manager.

The Administrative and Financial Assistant will provide assistance to the Project Manager in the implementation of day-to-day project activities. She/he is responsible for all administrative (contractual, organizational and logistical) and accounting (disbursements, record-keeping, cash management) matters related to the project.

National and international consultancy services will be called in for specific tasks under the various project components. These services, either of individual consultants or under sub-contacts with consulting companies, will be procured in accordance with applicable UNDP guidelines.

The project will be implemented in close coordination and collaboration with all relevant government institutions, regional authorities, industries and NGOs, as well as with other related relevant projects in the region.

The Project Advisory Committee (PAC) will be established to provide strategic recommendations to project implementation. The PAC will consist of representatives of all key stakeholders and will ensure the inclusion of industries' interests, the UNDP Country Office (CO), as well as representatives of the private sector.

The PAC will play a critical role in project monitoring and evaluations by quality assuring these processes and products, and using evaluations for performance improvement, accountability and learning. It will ensure that required resources are committed and arbitrate on any conflicts within the project or negotiates a solution to any problems with external bodies. The participants will include but not limited to: MENR, Customs Department, Ministry of Industry, Standardization Committee, Building Material Association and others. This is anticipated to be based on Inter-Agency Working Group on Implementation of the Montreal Protocol.
In order to ensure UNDP's ultimate accountability for the project results, PAC recomendationsdecisions will be made in accordance to standards that shall ensure management for development results, best value for money, fairness, integrity, transparency and effective international competition.
The project will be implemented in close coordination and collaboration with all relevant government institutions, regional authorities, industries and NGOs, as well as with other related relevant projects in the region. The UNDP-CO will also monitor the project implementation and achievement of the project outcomes and outputs, and will ensure the proper use of UNDP/GEF funds. Financial transactions, reporting and auditing will be carried out in compliance with established UNDP rules and procedures for direct implementation modality

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

Audit Arrangements: The Audit will be conducted in accordance with the established UNDP procedures set out in the Programming and Finance manuals by the legally recognized auditor.

6.1. Monitoring and Evaluation

The project will be monitored through the following M& E activities. The M& E budget is provided in the table below. Further details are provided in the umbrella document.

Recruitments of M&E experts will be managed regionally through COA from UNDP Country Offices.

6.2. M&E Work Plan and budget

Type of M&E activity	Responsible Parties	Budget US$	Time frame
Inception Workshop and Report	▪ Project Manager ▪ UNDP CO, UNDP GEF ▪ International Technical Support/Safeguards Expert	Staff time	Within first two months of project start up
Measurement of Means of Verification of project results.	▪ UNDP GEF RTA/Project Manager will oversee the hiring of specific studies and institutions, and delegate responsibilities to relevant team members.	None	Start, mid and end of project (during evaluation cycle) and annually when required.
Measurement of Means of Verification for Project Progress on *output and implementation*	▪ Oversight by Project Manager ▪ Project team	None	Annually prior to ARR/PIR and to the definition of annual work plans
ARR/PIR	▪ Project manager and team ▪ UNDP CO ▪ UNDP RTA ▪ UNDP EEG	None	Annually
Periodic status/ progress reports	▪ Project manager and team	None	Quarterly
Mid-term Evaluation	▪ Project manager and team ▪ UNDP CO ▪ UNDP RCU ▪ External Consultants (i.e. evaluation team)	Indicative cost: 15,000	At the mid-point of project implementation.
Final Evaluation	▪ Project manager and team, ▪ UNDP CO ▪ UNDP RCU ▪ External Consultants (i.e. evaluation team)	Indicative cost: 25,000	At least three months before the end of project implementation
Project Terminal Report	▪ Project manager and team ▪ UNDP CO ▪ local consultant ▪ International Technical Support/Safeguards Expert	Staff time	At least three months before the end of the project

Type of M&E activity	Responsible Parties	Budget US$	Time frame
Audit	▪ UNDP CO ▪ Project manager and team	None (cost in PM Budget)	Yearly
Visits to field sites	▪ UNDP CO ▪ UNDP RCU (as appropriate) ▪ Government representatives ▪	For GEF supported projects, paid from IA fees and operational budget	Yearly
TOTAL indicative COST Excluding project team staff time and UNDP staff and travel expenses		US$ 40,000[27]	

[27] Costs only for International Consultant supporting M&E as part of Technical support/safeguards monitoring. It is estimated that additional US$15,000 from project management salaries will be devoted to M&E activities. Audit costs in the Project Management component are US$6,000.

7. LEGAL CONTEXT

This document together with the CPAP signed by the Government and UNDP which is incorporated by reference constitute together a Project Document as referred to in the SBAA and all CPAP provisions apply to this document.

Consistent with the Article III of the Standard Basic Assistance Agreement, the responsibility for the safety and security of the implementing partner and its personnel and property, and of UNDP's property in the implementing partner's custody, rests with the implementing partner.

The implementing partner shall:

a) put in place an appropriate security plan and maintain the security plan, taking into account the security situation in the country where the project is being carried;
b) assume all risks and liabilities related to the implementing partner's security, and the full implementation of the security plan.

UNDP reserves the right to verify whether such a plan is in place, and to suggest modifications to the plan when necessary. Failure to maintain and implement an appropriate security plan as required hereunder shall be deemed a breach of this agreement.

The implementing partner agrees to undertake all reasonable efforts to ensure that none of the UNDP funds received pursuant to the Project Document are used to provide support to individuals or entities associated with terrorism and that the recipients of any amounts provided by UNDP hereunder do not appear on the list maintained by the Security Council Committee established pursuant to resolution 1267 (1999). The list can be accessed via http://www.un.org/Docs/sc/committees/1267/1267ListEng.htm. This provision must be included in all sub-contracts or sub-agreements entered into under this Project Document.

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

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

a) Revision of, or addition to, any of the annexes to the Project Document;
b) Revisions which do not involve significant changes in the immediate objectives, outputs or activities of the project, but are caused by the rearrangement of the inputs already agreed to or by cost increases due to inflation;
c) Mandatory annual revisions which re-phase the delivery of agreed project inputs or increased expert or other costs due to inflation or take into account agency expenditure flexibility; and
d) Inclusion of additional annexes and attachments only as set out here in this Project Document.

8. ANNEXES

Risk Analysis. *Use the standard UNDP Atlas Risk Log template. For UNDP GEF projects in particular, please outline the risk management measures including improving resilience to climate change that the project proposes to undertake.*

The Project Indicators, Risks and Assumptions are fully represented in the Strategic Results Framework (Annex A) as well as the Risk Identification and Mitigation tables in the corresponding GEF CEO Endorsement Document (Section G). It is strongly advised to refer to these indicated annexes and sections of the CEO endorsement document.

Agreements. *Any additional agreements, such as cost sharing agreements, project cooperation agreements signed with NGOs[28] (where the NGO is designated as the "executing entity", letters of financial commitments, GEF OFP letter, GEF PIFs and other templates for all project types) should be attached.*

GEF OFP Endorsement letter is attached to the submission package

[28] For GEF projects, the agreement with any NGO pre-selected to be the main contractor should include the rationale for having pre-selected that NGO.

Terms of Reference:

Annex 1. Terms of Reference for Project Board and National Project Coordinator

PROJECT BOARD

Composition and organization: The Project Board contains three roles, including (1) **an executive**: individual representing the project ownership to chair the group; (2) **senior supplier**: individual or group representing the interests of the parties concerned which provide funding and/or technical expertise to the project; and (3) **senior beneficiary**: individual or group of individuals representing the interests of those who will ultimately benefit from the project.

I. Specific responsibilities

1. Initiating a project:
   - Agree on PM's responsibilities, as well as the responsibilities of the other members of the Project Management team;
   - Delegate any Project Assurance function as appropriate;
   - Review and appraise detailed Project Plan and AWP, including Atlas reports covering activity definition, quality criteria, issue log, updated risk log and the monitoring and communication plan.
2. Running a project:
   - Provide overall guidance and direction to the project, ensuring it remains within any specified constraints;
   - Address project issues as raised by the Project Manager;
   - Provide guidance and agree on possible countermeasures/management actions to address specific risks;
   - Agree on Project Manager's tolerances in the Annual Work Plan and quarterly plans when required;
   - Conduct regular meetings to review the Project Quarterly Progress Report and provide direction and recommendations to ensure that the agreed deliverables are produced satisfactorily according to plans.
   - Review Combined Delivery Reports (CDR) prior to certification by the Implementing Partner;
   - Appraise the Project Annual Review Report, make recommendations for the next AWP, and inform the Outcome Board about the results of the review.
   - Review and approve end project report, make recommendations for follow-on actions;
   - Provide ad-hoc direction and advice for exception situations when project manager's tolerances are exceeded;
   - Assess and decide on project changes through revisions;
3. Closing a project:
   - Assure that all Project deliverables have been produced satisfactorily;
   - Review and approve the Final Project Review Report, including Lessons-learned;
   - Make recommendations for follow-on actions to be submitted to the Outcome Board;
   - Commission project evaluation (only when required by partnership agreement)
   - Notify operational completion of the project to the Outcome Board.

II. Executive

The Executive is ultimately responsible for the project, supported by the Senior Beneficiary and Senior Supplier. The Executive's role is to ensure that the project is focused throughout its life cycle on achieving its objectives and delivering outputs that will contribute to higher level outcomes. The Executive has to ensure that the project gives value for money, ensuring a cost-conscious approach to the project, balancing the demands of beneficiary and supplier. Specific Responsibilities (as part of the above responsibilities for the Project Board) include:

- Ensure that there is a coherent project organisation structure and logical set of plans
- Set tolerances in the AWP and other plans as required for the Project Manager
- Monitor and control the progress of the project at a strategic level
- Ensure that risks are being tracked and mitigated as effectively as possible
- Brief Outcome Board and relevant stakeholders about project progress
- Organise and chair Project Board meetings

III. Senior Beneficiary

The Senior Beneficiary is responsible for validating the needs and for monitoring that the solution will meet those needs within the constraints of the project. This role represents the interests of all those who will benefit from the project, or those for whom the deliverables resulting from activities will achieve specific output targets. The Senior Beneficiary role monitors progress against targets and quality criteria. Specific Responsibilities (as part of the above responsibilities for the Project Board) include:

- Ensure the expected output(s) and related activities of the project are well defined
- Make sure that progress towards the outputs required by the beneficiaries remains consistent from the beneficiary perspective
- Promote and maintain focus on the expected project output(s)

- Prioritise and contribute beneficiaries' opinions on Project Board decisions on whether to implement recommendations on proposed changes
- Resolve priority conflicts

The assurance responsibilities of the Senior Beneficiary are to check that:

- Specification of the Beneficiary's needs is accurate, complete and unambiguous
- Implementation of activities at all stages is monitored to ensure that they will meet the beneficiary's needs and are progressing towards that target
- Impact of potential changes is evaluated from the beneficiary point of view
- Risks to the beneficiaries are frequently monitored

IV. Senior Supplier

The Senior Supplier represents the interests of the parties which provide funding and/or technical expertise to the project (designing, developing, facilitating, procuring, implementing). The Senior Supplier's primary function within the Board is to provide guidance regarding the technical feasibility of the project. The Senior Supplier role must have the authority to commit or acquire supplier resources required. Specific Responsibilities (as part of the above responsibilities for the Project Board) include:

- Make sure that progress towards the outputs remains consistent from the supplier perspective
- Promote and maintain focus on the expected project output(s) from the point of view of supplier management
- Ensure that the supplier resources required for the project are made available
- Contribute supplier opinions on Project Board decisions on whether to implement recommendations on proposed changes
- Arbitrate on, and ensure resolution of, any supplier priority or resource conflicts

The supplier assurance role responsibilities are to:

- Advise on the selection of strategy, design and methods to carry out project activities
- Ensure that any standards defined for the project are met and used to good effect
- Monitor potential changes and their impact on the quality of deliverables from a supplier perspective

Monitor any risks in the implementation aspects of the project

NATIONAL PROJECT COORDINATOR – EXECUTIVE

The National Project Coordinator (NPC) / Executive is ultimately responsible for the project, supported by the Senior Beneficiary and Senior Supplier. The Executive's role is to ensure that the project is focused throughout its life cycle on achieving its objectives and delivering outputs that will contribute to higher level outcomes. The Executive has to ensure that the project gives value for money, ensuring a cost-conscious approach to the project, balancing the demands of beneficiary and supplier.

Specific Responsibilities (as part of the above responsibilities for the Project Board)

- Ensure that there is a coherent project organisation structure and logical set of plans
- Approve and sign basic project and financial documents and other plans as required for the Project Manager
- Monitor and control the progress of the project at a strategic level
- Ensure that risks are being tracked and mitigated as effectively as possible
- Brief Outcome Board and relevant stakeholders about project progress
- Organize and chair Project Board meetings

The Executive is responsible for overall assurance of the project. If the project warrants it, the Executive may delegate some responsibility for the project assurance functions.

The following documents shall be signed by the NPC:

1. ***Administrative and financial documents:***

- Project revisions (if the project total budget or duration of the project is being changed)
- Combined Delivery Reports
- Transfer of Assets Form
- Delegation of signature for some day-to-day payments

2. ***Monitoring and evaluation of the project***

- Minutes of the Project Board meetings
- Annual reports
- Final review report

Annex 2. Terms of Reference for Key Project Personnel[29]

Project Manager

I. Position Information	
Position Title:	Project Manager
SC range:	SC-9
Project Title:	
Duration of the service:	1 year (with possible extension subject to satisfactory performance)
Work status	Full-time
Reports To:	Head of Environment and Energy Unit

II. Background

Under supervision of UNDP Ukraine, manages the project

III. Functions / Key Outputs Expected

- Responsible for day-to-day management, administration and decision-making for the project;
- Oversees strategic planning process for the project and ensures its implementation in accordance with the signed project document;
- Responsible for ensuring that the project produces the results specified in the project document, to the required standard of quality and within the specified constraints of time and cost;
- Manage the realization of project outputs through activities;
- Ensures that project contributes to the promotion of gender equality by reaching, involving and benefiting both women and men in its activities (gender mainstreaming);
- Provide direction and guidance to project team(s)/ responsible party (ies);
- Identifies partnership strategies with regard to providers of specialised expertise and possible co-financiers, and assists in resource mobilisation for project components;
- Identify and obtain any support and advice required for the management, planning and control of the project;
- Liaise with any suppliers;
- Perform other duties related to the scope of work of the PM as required

Running a project

- Plan the activities of the project and monitor progress against the initial quality criteria;
- Mobilize goods and services to initiative activities, including drafting TORs and work specifications;
- Manage requests for the provision of financial resources by UNDP, using advance of funds, direct payments, or reimbursement;
- Manage and monitor the project risks, submit new risks to the Project Board for consideration and decision on possible actions if required; update the status of these risks by maintaining the Project Risks Log;
- Be responsible for managing issues and requests for change by maintaining an Issues Log;
- Prepare the quarterly and annual financial and progress reports and submit the reports to the Project Board, UNDP and GEF;
- Monitors the implementation of project components, analyses problems that hamper their implementation and takes appropriate measures to ensure timely delivery of required inputs and achievement of project-wide results;
- Monitors and reports to UNDP on all financial and procurement matters of the project, including proper utilization of funds and delivery, budget revisions, availability of funds, reconciliation of accounts, establishment of internal control mechanisms. Acts as a focal point to liaise with auditors and ensures follow-up actions. Ensures the accuracy and reliability of financial information and reporting;
- Monitors and facilitates advocacy and mass media outreach activities, writing of success stories, newspapers coverage, PR campaigns;
- Organize workshops, seminars and round tables to introduce project outputs to all stakeholders involved. Render support to related UNDP thematic activities such as publications, sharing of knowledge and group discussions;
- Liaises with other UNDP and UNDP-GEF funded projects to implement possible synergies.

Closing a Project

- Ensure proper operational, financial and programmatic closure of the project;
- Prepare Final Project Review Reports to be submitted to the Project Board and the Outcome Board;
- Identify follow-on actions and submit them for consideration to the Project Board; Manage the transfer of project deliverables, documents, files, equipment and materials to national beneficiaries;
- Prepare final CDR for signature by UNDP and the Implementing Partner.

IV. Recruitment Qualifications

[29] TORs for technical experts will be formulated at a later stage

Education:	Masters degree in any of the following areas: Chemicals, Natural Resources Management, Business Administration, Management or a related field.
Experience:	At least 5-years relevant experience. Working experience in international organizations is an advantage.
Language Requirements:	Excellent command of spoken and written English, Ukrainian and Russian are essential
Others:	Understanding of development issues, national public institutional arrangements, knowledge of and experience in gender mainstreaming is an asset; Initiative and strong leadership skills; Result and client-orientations; Strong analytical, communication and management skills; Excellent interpersonal and cross cultural communication skills, ability to work in a team and to work under pressure and with tight deadlines, ethics and honesty; Ability to use information and communication technology as a tool and resource

Administrative and Finance Assistant

I. Position Information	
Position Title:	Administrative and Finance Assistant
SC range:	SC-6
Project Title:	
Duration of the service:	1 year (with possible extension subject to satisfactory performance)
Work status	Full-time
Reports To:	Project Manager

II. Background
Under direct supervision of Project Manager, AFA is fully responsible for operational and programmatic management of the project according to the project document, UNDP corporate rules and procedures and for fulfilling the following functions.

III. Functions / Key Outputs Expected
• Be responsible for logistics, procurement, finance and recruitment for the project, in accordance with corporate UNDP rules and regulations; • Prepare all financial and administrative documents related to the project implementation; • Develop quarterly and annual budget plans for recruitment of personnel; maintain financial records and monitoring systems to record and reconcile expenditures, balances, payments and other data for day-to-day transaction and reports; • Advise and assist Project staff, experts and consultants on all respects of allowances, salary advances, travel claims and other financial and administrative matters, and calculate and authorize payments due for claims and services; • Prepare detailed cost estimates and participates in budget analysis and projections as required to handle all financial operations of the project office and reconcile all accounts in required time frame; • Maintain, update and transmit inventory records of non-expendable equipment in accordance with UNDP rules; • Perform cash custodian's duties being primarily responsible for project's cash disbursements and maintain project's petty cash book and payrolls related to the regional offices; • Ensure leave monitoring of project staff, check the accuracy and proper completion of monthly leave reports; • Analyze the potential problems concerning administrative-financial issues and take respective measures to provide adequate project's resources in time for implementation of the project activities; • Define the cost-effective measures for optimal use of resources of the project; • Ensure full compliance of administrative and financial processes and financial records with UNDP rules, regulations, policies and strategies; • Encourage awareness of and promotion of gender equality among project staff and partners; • Perform other duties related to personnel, administrative and financial issues of project as required.

IV. Recruitment Qualifications	
Education:	Higher education in any of the following areas: Economics, Finance, Business administration, Management or a related field.
Experience:	At least 3-years relevant experience. Working experience in international organizations is an advantage.
Language Requirements:	Fluency in English, Ukrainian and Russian
Others:	Strong analytical, communication and management skills, result and client-orientation, ability to work in a team; Ability to work under pressure and with tight deadlines, ethics and honesty; Ability to use information and communication technology as a tool and resource; Experience in handling web-based management systems Ability to handle multiple tasks simultaneously and ability to prioritize

PR Specialist

I. Position Information	
Position Title:	PR Specialist
SC range:	SC-8
Project Title/Department:	
Duration of the service:	1 year (with possible extension subject to satisfactory performance)
Work status	Part-time
Reports To:	Project Manager

II. Background

II. Functions / Key Outputs Expected

- Design and undertake promotional campaign to disseminate results of the project among municipalities, building industry professionals, other decision-makers and building occupants.
- Develop and implement the project PR strategy and annual plan of PR activities;
- Develop and submit to the Project Manager consideration of scenarios for the annual video clips, TV and radio airing programs;
- Coordinate the PR activity in the area of development and dissemination of a wide range of information and promotional materials to inform all stakeholders and promote Project's activities;
- In consultation with the Project Manager organize various PR events including roundtable discussions, workshops, seminars and forums;
- Ensure that project PR activities contributes to the promotion of gender equality by reaching, involving and benefiting both women and men (gender mainstreaming);
- Maintain Project's web-portal to make sure that it is kept up-to-date and upload materials of the events according to set requirements;
- Liaise with UNDP Communication and Outreach Specialist to ensure regular and timely publicity of the Project's activities and outputs in the UNDP web-site;
- Develop and submit to the Project Manager recommendations on new feasible solutions and promotional materials for increasing overall visibility of the Project's activities;
- Report to the Project Manager on achieved results within PR and Outreach activities;
- Build and maintain close contact with representatives from print and broadcast mass media;
- Assist the Project Manager in organizing the workshops, seminars and round tables;
- Ensure wide coverage of the events in the media through involvement of representatives from print and broadcast mass media to these events;
- Prepare and publish the project newsletter, articles and press-releases on the Project's activities and accomplishments for national/international printed and electronic media;
- Ensure that all publications and promo-materials are designed in line with UNDP Style and Graphic Standards;
- Perform other duties as requested.

IV. Recruitment Qualifications	
Education:	University Degree in public relations/economics/journalism obtained at recognized institutions or other academic distinction related to above requirements.
Experience:	At least 3 years of progressive work experience relevant to the above requirements, including experience of arranging and providing media coverage of round-tables/seminars. Working experience in international organizations is advantage. Experience in web content development is an asset
Language Requirements:	Proficient in English, Ukrainian and Russian
Others:	Strong analytical, communication and management skills, client-orientation, ability to work in a team; Initiative, analytical judgment, ability to work under pressure and with tight deadlines, ethics and honesty; Ability to use information and communication technology as a tool and resource.

Driver with own vehicle

I. Job Information	
Job title:	Driver with own vehicle
SC range:	SC-2
Project Title:	
Duration of the service:	1 year (with possible extension subject to satisfactory performance)
Work status (full time / part time):	Full time
Reports To:	Project Manager

II. Background

II. Functions / Key Outputs Expected
Operational Functions: • Drive own vehicle for the transport of authorized personnel; • Deliver and collect mail, documents and other items, meet official personnel at the airport and facilitates immigration and custom formalities and make errands for the project as required; • Be responsible for the day-to-day maintenance of the assigned vehicle, checks oil, water, buttery, brakes, tires, etc; • Perform minor repairs and arranges for another repairs; • Ensure that the vehicle is kept clean; log official trips, daily mileage, gas consumption, oil changes, greasing; • Ensure that the steps required by rules and regulations are taken in case of involvement in accident; • Perform other duties, as required by Project Manager; • Perform other duties and responsibilities as required.

IV. Qualification Requirements	
Education:	Secondary education
Experience:	At least 5 years of relevant work experience. Working experience with governmental agencies and work in any international organization is an advantage.
Language Requirements:	Proficiency in Ukrainian and Russian. Basic knowledge of English.

Annex 3 PROJECT COVER SHEET

COUNTRY: Ukraine

Project title:	**Implementing agency:**
INTERTEHNIKA (PSC "Intertekhnika") - Conversion from HCFC-141b to c-pentane in the Manufacture of Commercial Refrigerator Equipment	UNDP

A: Article-7 data (ODP tonnes)

HCFCs			

B: HCFC consumption remaining eligible for funding: N/A

SUMMARY:

ODS USE AT ENTERPRISE	56.1	ODS t
ODS TO BE PHASED OUT:	56.1	ODS t
ODS TO BE PHASED IN:	0	ODP t
PROJECT DURATION:	36	Months
PROJECT COSTS:		
Incremental Capital Cost	US $	460,000
Contingency	US $	40,000
Incremental Operating Cost (not eligible for funding)	US $	93,662
Total Project Cost	US $	500,000
LOCAL OWNERSHIP:	100%	
EXPORT COMPONENT:	0%	
REQUESTED GRANT:	US $	500,000
COST- EFFECTIVENESS:	US$/kg ODP	8.9
	US$/kg ODS	N/A
STATUS OF COUNTERPART FUNDING:	Enterprise commitment enclosed	
PROJECT MONITORING MILESTONES INCLUDED:	Included	

PROJECT SUMMARY:

Under this project, Intertehnika (PSC "Intertekhnika") will phase out the use of HCFC-141b in its production of commercial refrigerators and freezers. The technology chosen is cyclo-pentane for the insulation foam. The company's aim is to accelerate the phase-out of HCFC-141b foaming agent.

IMPACT OF THE PROJECT ON COUNTRY'S MONTREAL PROTOCOL OBLIGATIONS:

This project eliminates 56.1 t ODS which will contribute to the Ukraine's efforts to fulfill its commitment under the Montreal Protocol.

Prepared by: Risto Ojala **Date:** 15.11.2011

1.0 PROJECT OBJECTIVE

The objective of this project is to phase-out the use of HCFC-141b in the manufacture of commercial refrigerators and freezers at Intehnika, and to do so in such a manner that it also will facilitate step-by-step elimination of the use of high GWP HCFC-141b blowing agent.

2.0 SECTOR BACKGROUND

Intertehnika is one of three manufacturers of domestic & commercial refrigerators / freezers in Ukraine. From the other manufactures, the company Nord Group Holding (located in Donetsk, Ukraine) has already phased-out CFCs from their production by means of use of c-pentane as their foam blowing agent and skipped the temporary conversion to HCFCs. The last company of this group, UBC (Ukrainian Beverage Company which is located in Krasnoperekopsk, Crimea), operates its production lines which are based on carbon dioxide/water technology, with small sporadic consumption of HCFC-141b. UBC reportedly currently moves with EBRD investment loan to c-pentane technology in its production facilities.

3.0 ENTERPRISE BACKGROUND

Intertehnika (PSC "Intertekhnika") is a 100% Ukrainian owned private shareholder company, which was founded 1997 and started manufacturing various commercial refrigerators and freezers in 1998. It produces a wide range of commercial refrigeration equipment. The lines of commercial equipment produced are:

- Various beverage display cases
- Various ice-cream freezers

The enterprise has grown steadily since inception and owners are currently planning to further develop and expand their production facilities. The main market for the company is domestic in Ukraine, but Intertehnika (PSC "Intertekhnika") also exports goods to neighbouring countries Russia and Belarus.

The enterprise has 285 employees including technical and managerial staff for research and development, design, manufacturing, assembly, training, technical support, sales, marketing and after-sales services. Intertehnika (PSC "Intertekhnika") also has its own refrigeration service department.

The manufacturing plant is located in Donetsk, Ukraine and has two detached facilities with two separate operations (freezers and displays). The production area, apart from the above situation, is located close to residential area and this further complicates the implementation of technological substitution to c-pentane (flammable) technology and basically increases the investment costs by the company to co-finance the project.

Address:
PSC "Intertekhnika"
Donetsk, Ukraine
83005, st. Kemerovskaya, 5
Director: Yuri Zhydkov
Phone: +38 062 345 97 31
Fax: +38 062 344 14 01
URL : www.intertexnika.com.ua

The density of the rigid PU foams produced depends on the exact product and ranges between 39 and 45 kg/m³. The production process is as follows:

Body Fabrication:
Steel Sheet in roll is cut to size in thickness of 0.45 mm is the basic raw-material for fabrication of outer and inner body of the Refrigerator. All metallic body parts are processed for notching / bending.
Insulation /Foaming:
Inner body and outer body is jointed and shifted to their respective foaming area in the factory. The insulation space varies for different models from 40 to 80 mm. The assembled body & jig are pre-heated. Later the frame is loaded into the jig. After selecting the desired program from the respective control panel, the required amount of material is injected into the body by using high pressure PU Foaming Machines.
Both the factories i.e. beverage display cases & ice-cream freezers have its own foaming areas. In the beverage display case factory, MDI and pre-blended polyol are directly fed to the two foaming machines. Line one having day tank of 250 liters capacity for Polyol as well as Isocyanate. This line is equipped with PU foaming machine of 200kg/min (Cannon Afros) design capacity with 1 mixing head. This head feeds 5 jigs for cabinets. The

second line has 200 liter day tanks for MDI & Poly. The foaming machine is 40kg/min (SAIP) with one mixing head and feeds 1 jig for cabinets.
Similarly, in the ice-cream freezers' factory, the polyol pre-blend and MDI are fed directly to the foaming machine's work tanks. This line is equipped with one PU foaming machine of 200 kg/min (Trusioma / DDR) having 2 mixing heads. Mixing heads are for 3.3kg/s. Both mixing heads serve two jigs for body at the time. Second Trusioma, capacity of 100 kg/min, is serving the doors' multiday-light press.
The present (year 2010) percentage composition of various chemicals is as under:

HCFC-141b as blowing agent	12.00%
Polyol	40.00%
Isocyanate	48.60%

The below table 1 summarizes the annual HCFC-141b consumption at Intertehnika (PSC "Intertekhnika"):

Table 1: Consumption of HCFC-141b

Year	PU, MT	HCFC-141b, MT
2006	216.5	54.1
2007	182.9	43.8
2008	175	43.75
2009	70	17.5
2010	187	56.1
2011 (AUG)		34.8

The company purchases poliols on the local market as well as imports them. During the year 2010 Intertehnika (PSC "Intertekhnika") used 56.1 MT premixed polyol, inclusive of previous stocks and 12 MT HCFC-141b from the local system house Polyfoam (POLYFOAM LTD) , in order to meet its production and sales targets.

Year	Production of refrigerators
2007	75,453
2008	54,187
2009	23,080
2010	53,877
2011 (8 months)	34,793

Basic production equipment:

Type of equipment	Model	Serial number	Design Capacity	Type	Date of manufacture
Cannon A-200, Italy	A CMPT 200 FC	280310	200kg/min	High pressure	2008 (order made 6/2007)
*1 x Trusioma, DDR	200kg/min	unknown	200kg/min	High pressure	1988
SAIP, Italy	SP 400	1368	40kg/min	High pressure	2002
1 x Trusioma, DDR	200kg/min	unknown	200 kg/min	High pressure	1988
1 x Trusioma, DDR	100 kg/min	unknown	100 kg/min	High pressure	1988
6 x Jigs and plugs for display cases	Crios and local	unknown			
3 x Jigs and plugs for ice-cream freezer production	Local and Trusioma	unknown			1988

* Cannon A-200 was purchased to replace the old Trusioma 200kg/min foaming machine, which was already difficult to keep serviced due to the fact that the foaming machine manufacturing factory in the former DDR (Deutsche Demokratische Republik) was long closed, and there is no operational service provider for this machinery. This foaming machine is now been used as a spare part source for the other Trusioma foaming machines, which are still operational at the ice-cream freezers' factory.

4.0 PROJECT DESCRIPTION

Intertehnika (PSC "Intertekhnika") intends to convert its foam operation from the current use of HCFC-141b to cyclo-pentane. The conversion plan includes:

Production area (see Annex 1 for costing and responsibility)[30]

- Installation of a pentane storage facility, 2 x 32 m3;
- Pentane feeding pipeline;
- Installation of a premixing station to serve freezer and display case production;
- Retrofit of one SAIP (40 kg/min) foaming machine;
- Replacement of the remaining Trusioma machines;
- Retrofit of Cannon (200 kg/min) machine;
- Retrofit / upgrading /modification of existing jigs and heating system in the freezer production area;
- Modification of door press.

Plant Safety[31]

- Modification of jigs and heating system in the display case production area;
- Exhaust ventilation system at the production area of cabinets for display case area (5 jigs);
- Exhaust ventilation at the production area of cabinets for Ice-cream freezers (3 jigs);
- Gas detection system for display case production area with 6 gas detectors;
- Gas detection system for freezer production area with 3 gas detectors;
- Safety management system and connection to the gas detection system;
- Fire protection;
- Antistatic floor;
- Electrical grounding and other electrical safeguarding of all relevant equipment;
- Nitrogen generator and feeding system;
- Back-up power generator;
- Development of adequate safety procedures;

General

- Technology transfer;
- Safety Audit; and
- Trials and commissioning;

The ExCom's guidance on HC safety (UNEP/Ozl.pro/ExCom/25/54) will be adhered to.

5.0 TECHNOLOGY OVERVIEW

5.1 INTRODUCTION

To replace HCFCs in the production of PU insulation foams, following criteria ideally would apply:

A suitable boiling point with 250C being the target,
Low thermal conductivity in the vapor phase,
Non flammable,
Low toxicity,
Zero ODP,
Low GWP,
Chemically/physically stable,
Soluble in the formulation,
Low diffusion rate,
Based on validated technology,
Commercially available,
Acceptable in processing,
Economically viable.

No current replacement technology meets all of these criteria and compromises will be necessary. The actual choice will be impacted under others, by application, technical proficiency, plant layout and—investment as well as operating—costs. In the case of domestic refrigerators, maintaining product density and insulation value are of crucial importance and limit the choice to the technologies discussed below.

5.2 ALTERNATIVES

[30] Retrofit of SAIP, replacement of two Trusioma machines, and installation of a pre-mixer is financed by the project. The rest is covered by company's co-finance.
[31] Gas detection and safety management systems are financed by the project.

Following is a list of the main alternatives—validated, under validation or still under development—to replace HCFCs in rigid insulation foams. The molecular weight is mentioned as an indication of blowing efficiency and the incremental GWP as an indication how the technology performs compared to HCFC-141b on this environmental parameter:

SUBSTANCE	GWP1	MOLECULAR WEIGHT	INCREMENTAL GWP2	COMMENTS
HCFC-141b	725	117	Baseline	
CO2	1	44	-725	Used direct/indirect (from water)
Cyclopentane	Negligible	72	-718	Extremely flammable
HFC-245fa	1,030	134	443	
HFC-365mfc	794	148	279	
HFC-134a	1,430	102	522	
Methyl formate	Negligible	60	-725	
Methylal	Negligible	76	-725	Reported for co-blowing only
Acetone	Negligible	58	-725	Used in flexible slabstock
FEA-1100	5	1644	-718	Under development
HFO-1234ze	6	114	-719	Recently introduced
HBA-2	<15	<134	>-708	Under development
AFA-L1	<15	<134	>-708	Under development

[1] Unless otherwise indicated, taken from IPCC's Fourth Assessment (2007)
[2] Derived from comparing GWPs compared to the baseline on an equimolar base. It should be noted that in practice formulators may make
changes such as increased water or ABA blends that impact the global warming effect
[4] Calculated from published formulations
Green = beneficial GWP effect; red = unfavorable GWP effect

These technologies are described in more detail below.

CARBON DIOXIDE - The use of carbon dioxide derived from the water/isocyanate chemical reaction is well researched. It is used as base blowing agent in almost all PU foam applications and as sole blowing agent in many foam applications that have no/ minor thermal insulation requirements. The relatively emissive nature of CO2 in closed-cell foam is, however, a challenge. To avoid shrinkage, densities need to be relatively high which has a detrimental effect on the operating costs up and above mitigating poor insulation values. Increased use of water/CO2 has been—and still is—an important tool in the HCFC phaseout. There is no technological barrier. However, the use of water/CO2 alone will at this time be limited to foams such as integral skin foams (with restrictions when friability is an issue), open cell rigid foams, and spray/in situ foams for non/low thermal insulation applications.

Some chemical manufacturers have proposed enhancing water based systems through the addition of formic acid under strictly controlled conditions (the reaction of MDI with formic acid creates equal amounts of CO2 and CO, with the latter being toxic).

Carbon dioxide can also be added directly as a physical blowing agent through the use of super-critical CO2. The reported finer cell structure would improve the otherwise poor insulation value. UNDP is in the process of assessing this option for MLF projects.

HYDROCARBONS (HCs) - There have been many HC-based/MLF-supported CFC-phaseout projects in refrigeration and in panel applications. The minimum economic size has been historically ~50 ODP t/y or US$ 400,000 US$ with (higher cost) exceptions for domestic refrigeration. Smaller projects were discouraged for reasons of cost and technological complexity. Consequently, there is hardly any use of HCs in SMEs. In addition, the technology was deemed unsafe for a multiple of applications such as spray and in situ foams. Generally, cyclopentane has been used for refrigeration and n-pentane for panels. Fine tuning through HC blends (cyclo/iso pentane or cyclopentane/isobutane) is are now standard in non-A5 countries is not widely spread in A5's. Consequently, the investment costs are the same as at the time of phasing out CFCs and the

technology will continue to be too expensive for SMEs and restricted to the same applications as before. There are, however, options to fine-tune project costs and investigate other applications:

- The introduction of HC blends that will allow lower densities (lower IOCs)
- Addition of methylal to decrease cell size/improve insulation value (better performance)
- Direct injection (lower investment)
- Low-pressure/direct injection (lower investment)
- Centralized preblending by system houses (lower investment)
- Application-specific dispensing equipment (lower investment)

UNDP has initiated a study of these options with the goal to decrease the minimum economic size to ~25 t/y or US$ 200,000. Although this goal has not yet been completely achieved, the study shows encouraging results for centralized preblending as well as direct injection. Substantive results are expected around for the 66th ExCom in April 2012.

Hydrofluorocarbons (HFCs) - Current HFC use in A5 countries is relatively insignificant. The low cost of HCFC-141b is just too compelling! These chemicals have, however, played a major role in the replacement of HCFCs in foam applications in non-A5 countries, despite their high GWP potentials. Formulations are frequently not straightforward molecular replacements. Generally, the use of water has been maximized and sometimes other co-blowing agents have been added. Therefore, an assessment of its environmental impact has to be based on actual, validated, commercial blends. There are currently three HFCs used in foam applications. Following table includes their main physical properties:

Parameter	**HFC-134a**	**HFC-245fa**	**HFC- 365mfc**
Chemical Formula	CH2FCF3	CF3CH2CHF2	CF3CH2CF2CH3
Molecular Weight	102	134	148
Boiling point (0C)	-26.2	15.3	40.2
Gas Conductivity (mWm0K at 10 0C)	12.4	12.0 (20 0C)	10.6 (25 0C)
Flammable limits in Air (vol. %)	None	None	3.6-13.3
TLV or OEL (ppm)	1,000	300	Not established
GWP (100 y)	1,410	1,020	782
ODP	0	0	0

METHYL FORMATE (MF) - also called methyl-methanoate, is a low molecular weight chemical substance that can be used as a blowing agent for foams. Following data on physical properties have been reported:

Property	**Methyl Formate**	**HCFC-141b**
Appearance	Clear liquid	Clear liquid
Boiling point	31.3 oC	32 oC
LEL/UEL	5-23 %	7.6-17.7
Vapor pressure	586 mm Hg @ 25 oC	593 mm Hg @ 25 oC
Lambda, gas	10.7 mW/m.k @ 25 oC	10.0 mW/m.k @ 25 oC
Auto ignition	>450 oC	>200 oC
Specific gravity	0.982	1.24
Molecular weight	60	117
GWP	0	630
TLV (USA)	100 ppm TWA/150 ppm STEL	500 ppm TWA/500 ppm STEL

In the USA, MF is not treated as a volatile organic component (not a smog generator) and is SNAP (USEPA's Significant Mew Alternatives Program) approved. In Europe it is compliant with the RoHS (Restriction on Hazardous Substances) and WEEE (Waste Electrical and Electronic Equipment) directives. Acute toxicity is reported low with no special hazards. The MSDS mentions R12 (extremely flammable but not explosive); R20/22 (harmful by inhalation and if swallowed) and R36/37 (irritating to eyes and respiratory system). UNDP reports show process emissions to be much lower than 100 ppm (which is the STEL and TWA). Therefore no special precautions for MF blends in the manufacturing area are required. MF is normally sold as a system, which would allow restricting flammability issues to the supplier. Shipping of systems in the USA is possible without red ("flammable") tags. The ExCom reviewed the outcome of two pilot projects to assess the use of

methyl formate in all potential applications and recommended that countries will include this technology in their choices of HCFC replacement technologies.

METHYLAL (ML) – Methylal's primary use is as a solvent. It is soluble in water and miscible with most common organic solvents. The use of Methylal as a co-blowing agent in conjunction with hydrocarbons and HFCs for rigid PU foam applications (domestic refrigeration, panels, pipe insulation and spray) has been described in the literature. It is claimed to improve the miscibility of pentane, promotes blending in the mixing head, foam uniformity, flow, adhesion to metal surfaces and insulation properties. The addition of a low percentage of Methylal to HFCs (245fa, 365mfc or 134a) makes it reportedly possible to prepare pre-blends with polyols of low flammability with no detrimental effect on the fire performance of the foam. Despite all literature references, public knowledge of Methylal's industrial performance as blowing agent is limited. To alleviate this, the ExCom approved in July 2009 a UNDP pilot project to assess its use as a possible replacement of HCFCs for MLF projects in developing countries. The report has been completed and communicated to the MLF Secretariat for consideration by 66th ExCom in April 2012.

Property	**Methylal**	**HCFC-141b**
Appearance	Clear liquid	Clear liquid
Boiling point	42 C	32 C
LEL/UEL	2.2-19.9 %	7.6-17.7
Vapor pressure	400 mm Hg @ 20 C	593 mm Hg @ 25 C
Lambda, gas	Non available	10.0 mW/m.k @ 25 C
Auto ignition	235 C	>200 C
Specific gravity	0.821 @ 20 C	1.24
Molecular weight	76.09	117
GWP	Negligible	630
TLV (USA)	1000 ppm TWA	500 ppm TWA/500 ppm STEL

EMERGING TECHNOLOGIES - Since early 2008, a flood of new blowing agents for PU foams have been proposed by major international manufacturers of halogenated compounds. Four of them are worth mentioning:

	HFO-1234ze	**HBA-2**	**FEA-1100**	**AFA-L1**
Chemical Formula	CHF=CHF3	n/k	n/k	n/k
Molecular Weight	114	<134	161-165	<134
Boiling point (0C)	-19	>15 <32	>25	>10 <30
Gas Conductivity (mWm0K at 10 0C)	13	n/k	10.7	10
Flammable limits in Air (vol. %)	None	None	None	None
TLV or OEL (ppm; USA)	1,000	n/k	n/k	n/k
GWP (100 y)	6	<15	5	Negligible
ODP	0	0	0	0
Manufacturer	Honeywell	Honeywell	DuPont	Arkema

These technologies are all geared towards replacement of HFCs and sometimes called "second generation" or "unsaturated" HFCs, although the name HFOs (hydrofluoroolefins) appears to be a more distinctive description. They share low/no flammability, zero ODP and insignificant GWPs:

Except HFO-1234ze, all these substances still are in the process of toxicity and application testing and will therefore not appear in the market in commercial quantities before around 2015.

5.3 SELECTION

Intertehnika (PSC "Intertekhnika") selected cyclo-pentane as potential HCFC replacement candidates as:

- Water-based technology does not perform well on cost, density and insulation value;
- HFCs are too expensive in operating costs and have high GWPs;
- Trials showed that methyl formate is not yet ready for their kind refrigeration applications.

6.0 PROJECT COSTS

6.1 CALCULATION OF INCREMENTAL CAPITAL COST

The total actual investment costs are **US$ 500,000.** This includes contingency. Details of incremental capital costs are provided in **Annex-1.**

6.2 CALCULATION OF INCREMENTAL OPERATING COST

Incremental Operating Costs are **US$ 93,662** for a 1-year operation. The calculation is detailed in **Annex-2.** Incremental operating costs are not eligible for funding, and thus, this expense will be borne by the beneficiary company, Intertehnika (PSC "Intertekhnika").

6.3 COST EFFECTIVENESS (CE) (Phased-out US$ / HCFC kgs/a)

Cost-effectiveness is calculated based on the actual capital cost of the proposed grant (see para 6.4). CE is US$ **500,000**/56,100 kgs HCFC 141b = **US$8.9/kg**

6.4 PROPOSED GEF FUND GRANT

The proposed grant request is calculated not exceeding the established C/E threshold (Decision 55/47) and totals **US$ 500,000**. This represents 25% of total investment cost US$ 2,000,000. For the latter amount, Intertehnika (PSC "Intertekhnika") has provided a formal co-finance commitment letter.

7.0 PROJECT IMPLEMENTATION AND MONITORING

The project will be implemented using UNDP's Direct Execution Modality. Implementation is targeted as follows:

Activity (per quarter)	1	2	3	4	5	6	7	8	9	10	11	12
MF Project approval	X											
Project document signature		X										
Equipment specification			X									
Equipment procurement				X	X	X	X					
Installation of equipment								X				
Training								X				
Testing and trials								X				
Production Start-up								X				
Phase-In									X	X		
Project completed											X	
HOP signature												X

MILESTONES FOR PROJECT MONITORING (measured from project approval)

TASK	MONTH
(a) Project document submitted to beneficiary	1
(b) Project document signature	1
(c) Bids prepared and requested	2
(d) Contracts Awarded	5
(e) Equipment Delivered	10
(f) Training Testing and Trial Runs	12
(g) Commissioning	32
(h) HOP signature	36

8.0 PROJECT IMPACT

Direct Benefits: This project will eliminate the use of 56.1 metric tonnes HCFC-141b, at baseline conditions. The project employs commercially available and environmentally superior technology effectively anticipating

future control measures and addressing issues related to climate change impacts. The project also provides a key element of Ukraine's HCFC phase out strategy.

Indirect Benefits: The new technology will allow Intertehnika (PSC "Intertekhnika") to retain and expand its competitive position and serve as a demonstration of accelerated adoption of low GWP technology in a smaller scale regional producer of commercial refrigeration equipment similar to that which exists in many Article 5 countries as well as Article 2 CEITs in the immediate region.

Furthermore, early conversion of this company will reduce the rate of increase in the banks of HCFC-141b based foams in the country thereby reducing future emissions of HCFCs into the atmosphere or "end of life" environmentally sound disposal costs.

9. CALCULATION OF INCREMENTAL CAPITAL COSTS

Pos	Production area	Budget USD	Co-finance USD
1	Retrofit of SAIP foaming machine	80,000	-
2	Replacement of two Trusiomas with one new HP 100 kg/min foaming machine with two mixing heads	165,000	-
3	Premixing unit	90,000	-
4	Modification of jigs and heating system in the freezer production area	-	20,000
5	Modification of the door press	-	5,000
6	Modification of jigs and heating system in the display case production area (6 jigs)	-	60,000
Plant Safety			
7	Exhaust ventilation at the production area of cabinets for display cases (5 jigs)	-	55,000
8	Exhaust ventilation at the production area of cabinets for Icecream freezers (3 jigs)	-	30,000
9	Gas detection system for display case production area with 4 gas detectors	15,000	-
10	Gas detection system for freezer production area with 4 gas detectors	15,000	-
11	Safety management system and connection to gas detection system	50,000	-
12	Antistatic floor	-	5,000
13	Electrical grounding and other electrical safeguarding of all relevant equipment	-	10,000
14	Nitrogen generator	-	40,000
General			
15	Technology transfer (international 17,000 and national 8,000)	25,000	-
16	Safety Audit	10,000	-
17	Trials and commissioning	10,000	-
Sub-total		**460,000**	
18	Contingency	40,000	-
Total		500,000	225,000

In-cash (PSC "Intertekhnika"): US$ 1,200,000 (complementary capital investment costs as shown above and in addition as described in the co-finance letter: civil works, technical clearances, double polyol tanks, ducting, duct insulation etc. Operational costs are also included)
In-kind (PSC "Intertekhnika"): US$ 300,000 (regular training of personnel in equipment use and safety procedures; monitoring of equipment performance and maintenance/repairs as required, PR campaigns on the use of ozone- and climate friendly technology in products after the conversion)
Add-on(PSC "Intertekhnika"): US$ 500,000 (general upgrade and improvements of the building and adjacent territory where the technology is located)

10. CALCULATION OF INCREMENTAL OPERATING COSTS

Foaming Technology	HCFC -141b USD	Cyclo-pentane USD	HFC USD	Water USD
Blowing agents	1.9	1.99	10	na
Polyols (without blowing agent)	2.14	2.45	2.45	2.22
MDI	2.96	2.96	2.96	2.96

Item	HCFC-141b system		Cyclo-pentane system		HFC-245fa system		Water system foam	
	Parts (kg)	Price (US$)	Parts (kg)	Price (US$)	Parts (kg)	Price (US$)	Parts (kg)	Price (US$)
Polyols (without blowing agent)	100	214	100	245	100	245	100	222
HCFC-141b	30	57						
Cyclo-pentane			12	23.88				
HFC-245fa					25	250		
MDI	121.5	359.64	135	399.6	132.5	392.2	155	458.8
Subtotal	251.5	630.64	247	668.48	257.5	887.2	255	680.8
Foam usage	1		1		1		1.1	
Foaming Price ($/kg)	2.51		2.71		3.45		2.94	
Ratio of HCFC-141b in the row material	0.119		0.049					
IOC (US$/kgHCFC-141b)			1.67		7.86		3.60	
Total IOC USD / 56,085 kg HCFC 141b			93,662					

10. ENVIRONMENTAL ASSESSMENT

Impact on the Environment based on CDM methodology

Name of Industry	**Substance**	**GWP**	**M tonnes/ year**	**CO_2-eq (M tonnes/year)**
Before Conversion				
Rigid PU Foam	HCFC 141b	630	56.1	35,334
Total CO_2 emission in MT				35,334
After conversion to c-pentane in the rigid PU insulation				
Rigid PU Foam	c-pentane	25	22.4	560
Total CO_2 emission in MT				560
Net Impact from conversion				**34,774**

Annex 4 PROJECT COVER SHEET

COUNTRY: Ukraine

Project title:	**Implementing agency:**
SOBRANIE - Conversion from HCFC-22/142b to CO2 in the Manufacture of XPS Foam	UNDP

Latest reported consumption data for ODS addressed in project

A: Article-7 data (ODP tonnes)

HCFCs			

B: HCFC consumption remaining eligible for funding: N/A

SUMMARY:

ODS USE AT ENTERPRISE	250	ODS t
ODS TO BE PHASED OUT:	250	ODS t
ODS TO BE PHASED IN:	0	ODP t
PROJECT DURATION:	36	Months
PROJECT COSTS:		
Incremental Capital Cost	US $	1,080,000
Contingency (10%)	US $	120,000
Incremental Operating Cost (not eligible for funding)	US $	617,500
Total Project Cost	US $	1,200,000
LOCAL OWNERSHIP:	100%	
EXPORT COMPONENT:	0%	
REQUESTED GRANT:	US $	1,200,000
COST- EFFECTIVENESS:	US$/kg ODP	4.8
	US$/kg ODS	N/A
STATUS OF COUNTERPART FUNDING:	Enterprise commitment enclosed	
PROJECT MONITORING MILESTONES INCLUDED:	Included	

PROJECT SUMMARY:

Under this project Sobranie group (LTD "Sobranie-PRO-UG") will phase out the use of HCFC-22 in its production of XPS foam at their XPS foam production facilities in Kiev, Donetsk and Dneprodzerzhinsk. The technology chosen is CO2 for the XPS insulation foam. The company's aim is to accelerate the phase-out of HCFC-22/142b foaming agent.

IMPACT OF THE PROJECT ON COUNTRY'S MONTREAL PROTOCOL OBLIGATIONS:

This project eliminates 250 t ODS which will contribute to the Ukraine's efforts to fulfill its commitment under the Montreal Protocol.

Prepared by: Risto Ojala **Date:** 21.03.2012

1.0 PROJECT OBJECTIVE

The objective of this project is to phase-out the use of HCFC-22 in the manufacture of XPS insulation foam at LTD "Sobraniye-PRO-UG", Sobraniye group and in this way contribute to Ukraine's compliance with the Montreal protocol HCFC consumption reduction requirements, and to do so such that it also will facilitate step-by-step elimination the use of high GWP HCFC-22 blowing agent (with occasional application of HCFC-142b).

2.0 SECTOR BACKGROUND

Based on the field survey data, the major sector that is responsible for a large portion of HCFC consumption with lower ODP index is the extruded polystyrene foam (XPS) sector responsible for at least 640 MT/year of varying, due to economic slowdown of past years, HCFC consumption. Out of this amount, at least 355 MT/year should correspond to 60 to 40% mixture of HCFC-22 and 142b, with the rest related to HCFC-22 standalone applications.
This sector has witnessed the establishment of enterprises in their vast majority in the middle of 2008, thus, creating an eligibility issues for the GEF, with only three (3) enterprises, one of which is a large-size company, having started their operations in 2007 and earlier. LTD "Sobranie-PRO-UG" is this company and consumes on average 250 MT (with irregular mixes with HCFC-142b) of HCFC-22 yearly. Eligible enterprises together are responsible for 290 MT of annual consumption, or approximately 45% of the total HCFC consumption in the XPS sector, entirely in the form of HCFC-22 in its pure form.

3.0 ENTERPRISE BACKGROUND

LTD "Sobraniye-PRO-UG" is a 100% Ukrainian private shareholder company, and was founded in December 1997. The XPS-foam manufacturing operation was established in February 2007 in three locations: Kiev (capital), Donetsk (east) and Dneprodzerzhinsk (central part). Equipment installation commenced during 2006 and production started in February 2007.
All three continuous production lines were supplied by Chinese company Feininger (Nanjing) Plastic Extruder Manufacturing Co. in December 2006 and installed at the three factories simultaneously. The enterprise has presently 105 employees on staff on all three plants. The main market for their products is Ukraine and they do not have an export license.
HCFC consumption by years in metric tons (MT) is presented in tabulated format below:

	2007	2008	2009	2010
HCFC-22	250	230	220	250
Polystyrene resin	2,000	1840	1760	2,000
Total	2,250	2,070	1,980	2,250

Contact details:

Owner: Mr. Gennady Proshenko
Phone: +380503111023
Fax: +380444625242
Email: gp@sobraniegroup.com.ua
Web: www.sobraniegroup.com.ua

Basic production equipment is following:

Equipment	Make/Model	S/N	Capacity	Date of Installation	Action Proposed	Disposal plan
Tandem extruder	Feninger P.R. China		200 kg/hr	2006-2007	Retrofit	

HCFC 22 consumption by years in metric tons (MT)

	2007	2008	2009	2010
HCFC-22/142b	250	230	220	250
Polystyrene resin	2,000	1840	1760	2,000
Total	2,250	2,070	1,980	2,250

The production process is as follows:

Item	Description
Type	FUVER FS 120-150 Tandem extrusion line
Primary extruder	Single screw extruder with the screw diameter 120 mm, length/diameter ratio 30, 7 heating zone, 300 kVA main motor, 3 component dosing unit.
Secondary extruder	Single screw extruder with the screw diameter 150 mm,
Blowing agent metering bump	Plunger pump
Take off and cutting system	600 mm width
Product	Width 600 mm, thickness 25-85 mm; foam density 35 – 40 kg/m^3
Output	300 – 400 kg/hr 0r 7 – 10 m3/hr kg/hour

4.0 PROJECT DESCRIPTION

LTD "Sobranie-PRO-UG" intends to convert its foam operation from the current use of HCFC-22 to CO2 technology. This project proposal is based on the technical need for the retrofit of the extruder units of the XPS production lines in Kiev, Donetsk and Dneprodzerzhinsk. The intention is, with help of this project, to finance the actual retrofit of the tandem extruder unit of the Kiev and Dnepropetrovsk factories. All other expenses arising from the conversion (inclusive of complete conversion of Donetsk plant) will be co-financed by LTD "Sobranie-PRO-UG" on its internal resources.
The project has been prepared in line with applicable ExCom funding threshold standards.
The conversion from HCFC-22 to CO_2, alcohol and small amount of HFC-152a as blowing agent consists of the following components:

- Facilities for storage and transportation of the blowing agents, such as storage tank and accessory i.e. down loading pump (for storage tank), steel cylinder, high-pressure metering pump, transfer pipeline, etc;
- Retrofit of extruder and die;
- Safety equipment, including ventilation system, flammable gas detector and warning system, explosion proof electrical components, fire-proof components and static prevention components, etc;
- Necessary civil work, such as foundation of storage tanks, warehouse for steel cylinder, fire-fighting pools, etc;
- Technical and safety training; and
- Technology transfer, trials, product testing and safety certification.

The ExCom's guidance on HC safety (UNEP/Ozl.pro/ExCom/25/54) will be adhered to.

5.0 TECHNOLOGY OVERVIEW AND SELECTION

5.1 INTRODUCTION

Selection of HCFC alternatives in the XPS foam sector shall be subject to the following principles:

- The alternatives shall be harmless to the ozone layer and have minimum climate impact;
- The alternatives shall be available on the Ukrainian market with a reasonable price;
- The alternatives shall have no harmful impact on human health and safety;
- Intentions to limit uses of HFC-based substitutes, where possible;
- The existing production capacity and quality of products should be maintained after conversion;
- Should be cost effective.

Technical issues to be considered in the selection of HCFC alternatives:

- To ensure a reasonable density of the foam products, the alternatives shall be compatible with PS resin or can be improved by adding auxiliary materials or retrofitting to equipment;
- When choosing flammable and explosive alternatives, fire and explosion proof technology and safe production management system shall be improved. Safety training shall be given to workers and

relevant management staff. The amount of fire retardant shall be increased to curb the negative influence on the flame retardant property of the products;

- The alternative technologies should adhere to using recycled PS resin as much as possible;
- Alternatives with low thermal conductivity are preferred because the thermal conductivity of blowing agent has a significant influence on the insulation performance of XPS foam products;
- Cost of conversion can be supported by the GEF while the long-term operation cost after conversion shall be affordable by the enterprises.

5.2 OVERVIEW OF ALTERNATIVES IN XPS BROADSTOCK FOAMS

The options for HCFC alternatives have been reviewed many times and their development has been chronicled in FTOC reports and their annual summary updates. The main HCFC replacements in XPS foam sector are CO2, hydrocarbon and HFCs. HCFCs have been completely replaced in A2 countries and this experience gives guidance to the HCFC phase-out being faced in A5 countries. Brief description of substitute technologies is provided below:

- Carbon dioxide (CO2) technology: CO2 is an environmental friendly gas with zero ODP and low GWP. The low price of CO2 will be helpful to sustainable replacement. To improve the foaming performance of CO2, the practice of mixing CO2 with other co-blowing agent has been commonly adopted.
- Hydrocarbon (HC) technology: HCs, used to replace HCFCs as blowing agent, mainly refer to butane and in a few cases, cyclo-pentane. HCs are friendly to the environment with zero ODP and low GWP and they are compatible with PS resin and high solubility in molten PS. However, HCs are flammable and explosive, relevant safety upgrades to workshops are needed when using HCs.
- Hydrofluorocarbon (HFCs) technology: The performance of HFCs as blowing agents is similar to HCFCs. The main HFCs used in the XPS foam sector are HFC-134a and HFC-152a. The ODP of both HFC-134a and HFC-152a are zero, but their application was limited because HFC-134a is a strong greenhouse gas and HFC-152a is flammable and explosive. Furthermore, HFC-134a has a softening effect on the PS and therefore requires special additives, while HFC-152a does not provide improvement of the insulation and will be emitted easily into the atmosphere.
- Mixed blowing agents: Since, if applied individually, blowing agents in most cases cannot fully meet the requirements of XPS processing and performance, mixing is normally a preferred option. Mixed blowing agents can meet the requirements for different blowing performance and improve solubility and product performance (such as size stability and thermal insulation performance). Among the common HCFC replacement technologies in the XPS foam sector, (excluding HCs used as single blowing agents), CO2 and HFCs are used as a mixture in order to improve performance. For example, CO2 is mixed with ethanol, methyl ether, methyl formate, or even a small amount of HFC- to produce thick products; while HFC-134a is used in mixture with HFC-152a.
- Emerging technologies: Since early 2008, a flood of new blowing agents for PU foams have been proposed by major international manufacturers of halogenated compounds. Four of them are worth mentioning:

	HFO-1234ze	**HBA-2**	**FEA-1100**	**AFA-L1**
Chemical Formula	CHF=CHF3	n/k	n/k	n/k
Molecular Weight	114	<134	161-165	<134
Boiling point (0C)	-19	>15 <32	>25	>10 <30
Gas Conductivity (mWm0K at 10 0C)	13	n/k	10.7	10
Flammable limits in Air (vol. %)	None	None	None	None
TLV or OEL (ppm; USA)	1,000	n/k	n/k	n/k
GWP (100 y)	6	<15	5	Negligible
ODP	0	0	0	0
Manufacturer	Honeywell	Honeywell	DuPont	Arkema

These technologies are all geared towards replacement of HFCs and sometimes called “second generation” or “unsaturated” HFCs, although the name HFOs (hydrofluoroolefins) appears to be a more distinctive description. They share low/no flammability, zero ODP and insignificant GWPs:

Except HFO-1234ze, all these substances still are in the process of toxicity and application testing and will therefore not appear in the market in commercial quantities before around 2015. It is worth noting that production tests with HFO-1234ze have been completed in January 2012, and currently a technology report is under preparation for submission to 67th ExCom.

Mixing blowing agents is difficult in process due to varying pressures, processing temperatures, fraction optimization. Some of them are patented technologies. It is therefore proposed that mixed blowing agents and new alternatives are tested, and if successful, are to be fully applied during consecutive phases of the conversion projects.

From the prospective of processing technology, producing XPS foam panels is almost the same as producing extruded polyethylene（PE)/polystyrene（PS）foam sheets. During the phase-out of CFCs, butane was typically used to replace CFC-12 in extruded PE/PS foam sheets production. The main conversion included fire and explosion proofing upgrades to the production environment, improvement to the transportation of the blowing agent (butane), relevant upgrades to the aging and transportation of products. Experiences on the conversion as well as the production safety have been accumulated with the conversion on PS foam sheets. As hydrocarbons are also one of the most important alternative technologies for the HCFC phase-out in XPS foam sector, and fire and explosion proofing are one of the core technological issues during conversion, the experiences accumulated in phase-out of CFC-12 in PE/PS foam are very helpful.

5.3 ADVANTAGES AND DISADVANTAGES OF ALTERNATIVE TECHNOLOGIES AND POTENTIAL TECHNOLOGICAL IMPROVEMENT MEASURES

Based on the above principles and technical concerns, an analysis regarding the advantages and disadvantages of the three presently identified alternative technologies are summarized in Table 5-1. Potential improvements to these technologies are also included.

Table 5-1: Advantages and disadvantages of alternative technologies and potential improvement measures

Alternative blowing agent	Advantages	Disadvantages	Improvement measures
Mixture of CO2 and ethanol (or other additives - HFC152a - small amount to improve resin's solubility)	1. Zero-ODP 2. Low GWP 3. Low cost of the blowing agent	1. Low solubility in PS resin; hard to control production and high product density.	1. Re-design and replacement of extruding system and blowing agent injection system to increase system pressure, ultimately increasing the solubility of blowing agent.
			2. Use new PS resin or recycled PS resin with good quality and high stability.
			3. For increased product density additional PS resin is needed.
		2. Flammable and explosive, causing risk to production safety.	1. Renovate factory and equipment to reach the standard of processing flammable and explosive materials.
			2. Use a membrane pump and upgrade blowing agent transportation pipeline to reduce the possibility of blowing agent leakage.
			3. Establish and implement safe production practices and management system as well as train workers and relevant management staffs.
		3. Flammable and explosive, leading to low product fire resistance performance.	Increase the use of fire retardant (the second highest among the three alternative technologies considered)
		4. It is hard to produce thick XPS foam.	Add small amount of HFC-152a to increase thickness.
		5. Thermal insulation performance of product is lowered.	Increase product thickness.
HCs blowing agent	1. Zero-ODP 2. Low GWP 3. Low cost 4. Good compatibility with resin	1. Flammable and explosive, causing risk to production safety.	Please refer to the improvement measures of CO2 mixing technology above.
		2. Leading to low product fire resistance performance.	Increase the use of fire retardant (HC requiring highest amount of fire retardant among three alternative technologies)
		3. The diffusion coefficient of HCs is much higher than that of air, making XPS foam easily contractible and collapsible	Add anti-diffusion agent; improve cooling system in XPS foam production line, accelerate XPS foam molding to prevent collapse.
		4. Thermal insulation performance of product is lowered.	Increase product thickness.
HFCs blowing agent (mixture of HFC-134a and HFC-152a)	1. Zero-ODP 2. Minimal equipment retrofitting	1. This blowing agent has low solubility in XPS resin and product density is high.	Increase system pressure of extruder system and blowing agent injection system, ultimately resulting in increased solubility of blowing agent.
		2. Flammable and explosive blowing agent is used, causing risk to production safety.	Please refer to the improvement measures of CO2 mixture technology above.
		3. Flammable and explosive blowing agent is used, and product fire resistance performance is low.	Increase the use of fire retardant (HFC required the lowest amount of fire retardants amount increase amount is the least among three technologies).
		4. Thermal insulation performance of product is lowered.	Increase product thickness.

5.2.3 TECHNOLOGY SELECTION FOR THE XPS FOAM SECTOR

The technology selection is based on the company's conversion plans and preferences. In case of Sobranie Company (LTD "Sobranie-PRO-UG") this is limited to CO2/alcohol/HFC-152a mixture which considers it as a commercially practical option. Hence, the calculation of incremental operation cost in is based on this technology.

5.2.4 SAFETY MEASURES FOR USING FLAMMABLE AND EXPLOSIVE ALTERNATIVES

Both CO2 and hydrocarbon technologies bring risk of fire and explosion. Enterprises shall at least do the following to minimize these risks:

- Blowing agent shall be stored at the appropriate area;
- The use of blowing agent shall be limited to certain areas and necessary measures shall be taken to prevent blowing agent from leaking;
- Manufacturing workshops and ambient environments shall meet relevant provisions concerning production of flammable and explosive objects;
- Manufacturing workshop and product warehouse shall increase necessary fire-fighting facilities;
- Equipment in manufacturing workshops shall be equipped with relevant anti-explosion facilities;
- Manufacturing areas shall be equipped with anti-static facilities;
- Manufacturing areas shall be equipped with flammable gas monitoring and warning facilities;
- Manufacturing areas shall be equipped with good ventilation and exhausting facilities;
- Safe production systems shall be established and completed. Unauthorized personnel will be prohibited from entering areas where blowing agents are used. Staff shall take part in safe production training in order to strictly follow safe operation practices and ensure safe production.

6.0 PROJECT COSTS

6.1 CALCULATION OF INCREMENTAL CAPITAL COST

The investment costs for extruder retrofit at two (2) plants are **US$ 1,200,000**. This includes 10% contingency costs. Details of incremental capital costs are provided in **Annex-1.**

6.2 CALCULATION OF INCREMENTAL OPERATING COST

Incremental Operating Costs are **US$ 617,500** for a 1-year operation. The calculation is detailed in **Annex-2.** Incremental operating costs are not eligible for funding, and thus, this expense will be borne by the beneficiary company Sobranie (LTD "Sobranie-PRO-UG").

6.3 COST EFFECTIVENESS (CE) (Phased-out US$ / HCFC kgs/a)

Cost-effectiveness is calculated based on the actual capital cost of the proposed grant (see para 6.4). CE is US$ 1,200,000/250,000 kgs HCFC 22/141b = US$4.8/kg

6.4 PROPOSED GEF FUND GRANT

The proposed grant totals **USD 1,200,000 (marked yellow in the cost calculation)**, and represents 50% of total required investment cost - US$ 2,404,270 for two (2) plants (Kiev and Dnepropetrovsk), or 34.6% of total investment cost of US$ 3,472,658 of all three production sites of LTD "Sobranie-PRO-UG", and thus corresponding to the 100% Ukrainian ownership of the company. LTD "Sobranie-PRO-UG" has provided a formal co-finance commitment letter and the support from the enterprise constitutes US$ 4,800,000.

7.0 PROJECT IMPLEMENTATION AND MONITORING

The project will be implemented using UNDP's Direct Execution Modality. Implementation is targeted as follows:

Activity (per quarter)	1	2	3	4	5	6	7	8	9	10	11	12
MF Project approval	X											
Project document signature		X										
Equipment specification			X									
Equipment procurement				X	X	X	X					
Installation of equipment								X				
Training								X				
Testing and trials								X				
Production Start-up								X				
Phase-In									X	X		
Project completed											X	
HOP signature												X

MILESTONES FOR PROJECT MONITORING (measured from project approval)

TASK	MONTH
(a) Project document submitted to beneficiary	1
(b) Project document signature	1
(c) Bids prepared and requested	2
(d) Contracts Awarded	5
(e) Equipment Delivered	10
(f) Training Testing and Trial Runs	12
(g) Commissioning	32
(h) HOP signature	36

8.0 PROJECT IMPACT

Direct Benefits: This project will eliminate the use of 250 metric tonnes HCFC-22, at baseline conditions. The project employs commercially available and environmentally superior technology effectively anticipating future control measures and addressing issues related to climate change impacts. The project also provides a key element of Ukraine's HCFC phase out strategy as being developed in its HPMP to meet HCFC reduction steps in 2015 and onwards.

Indirect Benefits: The new technology will allow Sobranye to retain and expand its competitive position and serve as a demonstration of accelerated adoption of low GWP technology in a smaller scale regional producer of commercial refrigeration equipment similar to that which exists in many Article 5 countries as well as Article 2 CEITs in the immediate region.

Furthermore, early conversion of this company will reduce the rate of increase in the banks of HCFC-22/ based foams in the country thereby reducing future emissions of HCFCs into the atmosphere or "end of life" environmentally sound disposal costs.

9.0 CALCULATION OF INCREMENTAL CAPITAL COSTS

No.	Item	Unit	Unit price, $	One production line (Kiev)		Two production lines (Kiev and Dnepropetrovsk)		Three production lines (Kiev, Dnepropetrovsk, Donetsk)	
				Number	Sub-total, $	Number	Sub-total, $	Number	Sub-total, $
1	Extruder retrofit								
1.1	Explosion-proof retrofit of Main motor	set	4,000	2	8,000	4	16,000	6	24,000
1.2	Explosion-proof retrofit of material mixing and transportation motor	set	3,800	2	7,600	4	15,200	6	22,800
1.3	Change of gear-box of main motor	set	18,000	2	36,000	4	72,000	6	108,000
1.4	Change of screw and barrel of extruder	set	220,000	2	440,000	4	880,000	6	1,320,000
1.5	Blowing agent injection nozzle	piece	400	3	1,200	6	2,400	9	3,600
1.6	Change of melt pressure meter of extruder	piece	400	2	800	4	1,600	6	2,400
1.7	Change heaters of extruder and die to explosion proof heaters	set	18,100	1	18,100	2	36,200	3	54,300
1.8	Change automatic high-pressure filter changing device	set	14,000	1	14,000	2	28,000	3	42,000
1.9	Static mixer	piece	23,000	1	23,000	2	46,000	3	69,000
1.1	Retrofit of die heating control system	set	4,000	1	4,000	2	8,000	3	12,000
1.11	Retrofit of die	set	9,000	1	9,000	2	18,000	3	27,000
1.12	Explosion-proof retrofit of motor of traction equipment	set	2,500	2	5,000	4	10,000	6	15,000
1.13	Explosion-proof retrofit of motor of cutting machine	set	2,500	1	2,500	2	5,000	3	7,500
1.14	Ionizing fan	set	1,800	6	10,800	12	21,600	18	32,400
1.15	Retrofit two sets of extruder control cabinet for new equipment, temperature control E-cabinets and extruders to ensure safety	set	20,000	1	20,000	2	40,000	3	60,000
	Sub-total Cost for Extruder retrofit				600,000		1,200,000[32]		1,800,000
2	Blowing agent supplying system								
2.1	CO2 storage tank and cooling device, 30-50m3	set	35,000	1	35,000	1	35,000	1.5	52,500
2.2	Ethanol storage tank, 30-50m3	set	20,000	0	0	1	20,000	1.5	30,000
2.3	HFC-152a storage tank, 20-40m3	set	20,000	0	0	1	20,000	1.5	30,000
2.4	Low-pressure system including accessory to storage tank	set	18,000	0	0	1	18,000	1	18,000
2.5	Ethanol steel cylinder, 500kg	piece	500	10	5,000	0	0	0	0

[32] Includes national and international experts

2.6	HFC-152a steel cylinder, 500kg	piece	500	10	5,000	0	0	0	0
2.7	Low-pressure system	set	15,000	1	15,000	0	0	0	0
2.8	Manual hydraulic cylinder lifting equipment	set	4,000	1	4,000	0	0	0	0
2.9	High-pressure metering system for blowing agent	set	50,000	3	150,000	6	300,000	9	450,000
2.1	Blowing agent transportation pipe (high and low pressure)	set	10,000	1	10,000	2	20,000	3	30,000
	Sub-total Cost for blowing agent supplying system				224,000		413,000		610,500
3	Retrofit related to safety								
3.1	Civil works like base of blowing agent storage tank, high-pressure room for steel cylinder and metering pumps	set	30,000	1	30,000	1.5	45,000	2	60,000
3.2	Production workshop retrofit, product ageing warehouse(civil work)	set	25,000	1	25,000	1.5	37,500	2	50,000
3.3	Production workshop electrical explosion-proof retrofit, illumination system retrofit, audible /visual alarm system	set	30,000	1	30,000	1.5	45,000	2	60,000
3.4	Explosion-proof fresh air fan (two sets for ethanol and HFC-152a high-pressure pump room, one for every extrusion production line, 4-6 sets for one workshop and 6-10 sets for product ageing warehouse)	set	800	13	10,400	16	12,800	19	15,200
3.5	Exhaust fan (10piece for one workshop), exhaust pipe and air supply pipe（including fan covers and wind guides beside or above electrical equipment）	set	15,000	1	15,000	1.5	22,500	2	30,000
3.6	Ventilation warning device	set	8,000	1	8,000	1.5	12,000	2	16,000
3.7	Flammable gas concentration monitoring system, including detector（6 pieces for every production line, 4-8 pieces for every production workshop, 2 pieces for high-pressure pump room, 4－8 pieces for ageing warehouse）, cable and monitoring and warning device, 1 to 2 pieces of hand-hold detector	set	30,000	1	30,000	1.5	45,000	2	60,000
3.8	Water spraying system in production ageing warehouse	set	30,000	1	30,000	1.5	45,000	2	60,000
3.9	Wheeled fire extinguisher and hand-hold fire extinguisher（30 pieces, 15 pieces of hand-hold fire extinguisher and 15 piece of wheeled fire extinguisher, which are placed in production workshop, steel cylinder room, high-pressure pump room and ageing warehouse）	set	2,400	1	2,400	1.5	3,600	2	4,800

3.1	Fire-fighting pool of 300m3, Fire-fighting control system, water supply pipe, automatic sprinkler system.	set	55,000	1	55,000	1.5	82,500	2	110,000
3.11	Emergency power (100kw) for ventilation, warning, illumination and fire-fighting system	set	15,000	1	15,000	1	15,000	1	15,000
3.12	Automatic CO2fire-fighting device above XPS foam	set	100	8	800	18	1,800	24	2,400
3.13	New electric system control cabinet	set	20,000	1	20,000	1.5	30,000	2	40,000
3.14	Design of mechanical, electronic, civil work and safety system	set	35,000	1	35,000	1	35,000	1	35,000
3.15	Humidification system in production workshop and ageing warehouse	set	10,000	1	10,000	1.5	15,000	2	20,000
3.16	Electrostatic floor, improved equipment and lighting system in production workshop and warehouse	set	20,000	1	20,000	1.5	30,000	2	40,000
3.17	Working clothing and shoes anti-electrostatic for 20people / suit	set	2,500	1	2,500	2	5,000	3	7,500
	Sub-total Cost for retrofit related to safety				339,100		482,700		625,900
4	Others								
4.1	Technical and safety training	set	10,000	1	10,000	1.5	15,000	2	20,000
4.2	Technology transfer, trials, and safety certification	set	50,000	1	50,000	1.5	75,000	2	100,000
	Sub-total cost for others		60,000		60,000		90,000		120,000
	Total				1,223,100		2,185,700		3,156,400
5	Contingency 10%				122,310		218,570		315,640
	Grand total				**1,345,410**		**2,404,270**		**3,472,040**

In-cash (LTD “Sobranie-PRO-UG”): US$ 4,200,000 (complementary capital investment costs to complete retrofits at Kiev and Dnepropetrovsk plants; and 100% conversion at Donetsk plant. Also included is operational costs.)
In-kind (LTD “Sobranie-PRO-UG”): US$ 600,000 (regular training of personnel in equipment use and safety procedures; monitoring of equipment performance and maintenance/repairs as required, PR campaigns on the use of ozone- and climate friendly technology in products after the conversion)

10.0 CALCULATION OF INCREMENTAL OPERATING COSTS

Calculation of incremental operating cost (IOC) for CO_2 technology

Calculation of IOC using CO_2 to replace HCFCs

	Unit	Before conversion			After conversion		
		Unit price US$	**Formula /amount**	**Total US$**	**Unit price US$**	**Formula /amount**	**Total US$**
New PS resin	kg	1.46	-	-	1.46	30.0	43.80
Recycled PS resin	kg	1.00	100	100.00	1.00	70.0	70.00
HCFC-22	kg	1.34	4	5.36			
HCFC-142b	kg	1.98	6	11.88			
Fire retardant	kg	4.34	1	4.34	4.34	2.5	10.85
CO_2	kg			-	0.07	3.0	0.21
Ethanol	kg				0.81	2.0	1.62
Sub-total			111	121.58		107.5	126.48
Adjustment factor for the thickness of the panel to reach the same thermal resistance.				1.00			1.12
Price of foam	US$/kg			1.10			1.32
Percentage of HCFCs in all raw materials				9.01%			
IOC（US$/kg HCFCs）							2.47
Phase-out target under Phase I	MT						250,000 kg
Amount of HCFCs to be converted to CO_2 technology	MT						250,000 kg
IOC occurred because of changing materials	**US$**						**617,500**

11.0 ENVIRONMENTAL ASSESSMENT

Impact on the Environment based on CDM methodology

Name of Industry	**Substance**	**GWP**	**M tonnes/ year**	**CO_2-eq (M tonnes/year)**
Before Conversion				
XPS Foam	HCFC 22/142b (40%/60%)	2,120	250	530,000
Total CO_2 emission in MT				530,000
After conversion to c-pentane in the rigid PU insulation				
XPS Foam	CO2	1	73.2	73.2
	Ethanol	~1	48,8	48.8
	HFC-152a	145	5	725
Total CO_2 emission in MT				847
Net Impact from conversion				**529,153**

Annex 5 PROJECT COVER SHEET

COUNTRY:	Ukraine	
PROJECT TITLE:	Elimination of ODS (HCFC 141b) used in the Production Line at NORD (Nord Group Holding)	
SECTOR COVERED:	Solvent	
ODS USE IN SECTOR:	28.1t (ODS) of HCFC 141b solvent in 2010 ODP-weighted consumption of ODS=3.08t	
PROJECT IMPACT:	Eliminate 28.1 ODS t/y of HCFC-141b (3.08 t ODP)	
PROJECT DURATION:	2 years	
TOTAL PROJECT COST:	Capital Cost: Incremental Operating Cost: Contingency: Total Cost:	**US$ 182,000** **US$ 144,010** [33] **US$ 18,000** **US$ 200,000**
COST EFFECTIVENESS:	US$ 7.1/kg of HCFC-141b	
IMPLEMENTING AGENCY:	UNDP	

PROJECT SUMMARY

This project will phase out HCFC-141b used to clean metal parts and assemblies at NORD (Nord Group Holding) domestic refrigeration manufacturing enterprise.

Replacement of ODS cleaning positions in the production processes will be accomplished by replacing the current cleaning methods with four vapor degreasing units and maintaining one brush cleaning system process using an alternative solvent.

Prepared by: Steve Cook Date: August 2011

[33] Covered by enterprise

1. PROJECT OBJECTIVE

The objective of this project is to eliminate the use of HCFC-141b in assembling/ manufacturing processes at the Nord (Nord Group Holding) enterprise.

2. SECTOR BACKGROUND

Nord (Nord Group Holding) is the only comparatively large consumer of HCFC-141b chemical as a solvent application in Ukraine. The annual HCFC consumption at Nord (Nord Group Holding) in 2010 amounted to 28.1 ODS or to 3.08 ODP tons with a potential to growth (as compared to historical production data).

Historically, Nord (Nord Group Holding) was a consumer of CFC-113 and HCFC-141b chemicals used as a solvent. Table below summarizes such consumption information in ODS tons for years 2000 and 2008:

	2000	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
CFC-113	36.20	1.50	0	0	0	0	0	0	0
HCFC-141b	170.99	130.20	29.14	84.48	84.84	92,38	59.23	58.25	31.50

In response to the requirements for CFCs phase-out, GEF/IBRD investment assistance was prepared and approved in the past for Nord (Nord Group Holding) for shifting to water-based recirculation technology. The target of that assistance was the elimination of 31 metric tons of annual use of CFC-113. As a part of that assistance, the factory received three (3) units of water cleaning systems which were installed in year 2000. Name of water cleaning equipment is provided below:

- MAC-DRY. IMPIANTO AUTOMATICO 498.600; 497.600; 496.600

In result, the project helped the enterprise in completely phasing out the use of CFC-113, and, in parallel, reducing, where technically possible, dependence on HCFC-141b.

After completion of project works, the company mainly continued to deploy the supplied water based technology and was partially dependent on the use of HCFC-141b (not subject to phase-out at that time) for joints cleaning and hermetic loops' tests. The latter need primarily resulted from:

- incompatibility of water-based washing solution with low-carbon steel made components due to increased corrosiveness critical to manufacturing processes; and
- low purification effectiveness as applied to joints cleaning before welding.

As a direct result of this and further due to certain expansion of manufacturing operations, the current application of HCFC-141b has increased in previous years. HCFC-141b in its pure form is currently used throughout several cleaning sites – eight (8) in total. Three (3) of them are located outside the main facility.

The current use of HCFC-141b is highly emissive, and open-top trays with lids are utilized for metal parts cleaning. At two sites, three (3) self-manufactured ventilation hoods were detected while others are not equipped with such safety equipment. Currently, the solvent is applied to clean:

- corner braces attached to insulation panels for further assembly of refrigerators;
- compressor plates and other small spares; and
- copper and aluminum tubes for further use in condenser parts.

3. ENTERPRISE BACKGROUND

Located in Donetsk, Ukraine, NORD (Nord Group Holding) is 100% Ukrainian enterprise and has a status of manufacturer of national significance. It employs over 5,000 people and is the only producer of household refrigerators in the country.

The company was founded back in 1960s and peak production was recorded during 2006/07 when it

produced 1.2 million units annually using 60 ODS tons of HCFC 141b, as a cold cleaning agent for many manufacturing processes. The current (2010) annual HCFC consumption at Nord (Nord Group Holding) is 28.1 ODS tons.

Primarily manufacturing one product, however, the plant is totally self sufficient including manufacturing its own compressor unit, chiller unit, panels, and door hinges.

Main data of the factory is as follows:

The production output in 2010 was 727,487 units.
The projected production output in 2011 is 726,463 units.

4. PROJECT DESCRIPTION

4.1 Process Soils

The cleaning processes used by Nord (Nord Group Holding) are designed to clean all metal parts used in the manufacturing of refrigeration units: including:

- corner braces attached to insulation panels for further assembly of refrigerators;
- compressor plates and other small spares; and
- copper and aluminum tubes for further use in condenser parts (to remove light industrial oil and debris resulting from metal works which is critically essential for effective system functioning after assembly).

The main soils removed are primarily the coolant used for metal cutting, steel chip and dirt, and from the heat exchanger are coolant, copper chip and dirt.

4.2 Present Process

Number one cell

Cell number one is used to clean "plates". Six (6) different plates are used. The plates are used as corner braces for the refrigeration panels. Each plate is taped in place prior to filling the panel with insulating foam. The plates are cleaned so that tape will adhere to the plates. If the tape does not adhere the insulating foam will leak around the panel corners.

In this operation, the parts are washed by multiple dipping and then the surface is checked for any visual contamination. The current cleaning process uses physical agitation in which the cleaning vessel must be open. They are using a shop made vat as a holding vessels, the lid loosely fits. The violent agitation and the open top container increase the emission through the vapor phase due to the volatility of 141b.

All parts being cleaned are soft steel metal. Each part is contaminated with a light oil cutting fluid. These parts are cleaned at the manufacturing cell for increased efficiency. The metal must be clean of any residue such as a corrosion inhibitor that is often left from water cleaning so the parts do not oxidize.

The volume of HCFC 141b used in number one cleaning cell is outlined in the table below.

Part Number	Consumption Per Part kg	Number of Parts	Actual Usage in kg
1	0.000290	2,4920	7.23
2	0.000411	7,948	3.27
3	0.000338	1,223	0.41
4	0.000290	103,450	30.00
5	0.000290	7,251	2.10
6	0.000072	26,368	1.90
		TOTAL HCFC used in April 2011: 44.91	

Number two cell

Cell number two is used to clean copper tubing. The compressor tubing is soldered to the compressor unit. The parts must be cleaned to ensure a clean joint for soldering. Contamination could lead to a poorly soldered joint allowing the unit to leak as well as friction of internal parts with remained metal debris from cutting. The tube must be cleaned both internally and externally to ensure a clean solder joint.

In this cell the copper tubing is manually cleaned on both the compressor and the evaporation coils using a brush cleaning system. This process is performed on the assembly line as the copper tubing is physically attached to the compressor. The copper tubing is then soldered to the evaporation coils.

All parts being cleaned are soft copper. Each part is contaminated with a light oil cutting fluid. These parts are cleaned at the manufacturing cell for increased efficiency.

The volume of HCFC 141b used in cleaning cell 2 is outlined in the table below.

Part	Consumption Per Part kg	Number of Parts	Actual Usage in kg
1	0.012	42,109	507.90
			TOTAL HCFC used in April 2011: 507.90

Numbers three and four cell

Two different parts are being cleaned (compressor parts) at these sites and, therefore, the parts must be critically clean. The number three cleaning site is at the manufacturing cell for increased efficiency. The number four process is an isolated cleaning cell located on the fifth floor of adjacent manufacturing site across the street from main production site; the process was originally placed there due to vapor emission concerns prior to improved ventilation.

In this operation the parts are washed by immersion. The current cleaning process uses physical agitation in which the cleaning vessel must be open. The violent agitation and the open top container will increase the emission through the vapor phase due to the volatility of 141b. They use shop made vats as holding vessels and the lids loosely fit. The surface is checked for any visual contamination. Using this process the lid is removed multiple times to check for cleanliness allowing for large vapor releases.

All parts being cleaned are soft metals. Each part is contaminated with a light oil cutting fluid. The metal must be clean of any residue such as a corrosion inhibitor that is often left from water cleaning so the parts do not oxidize.

The volume of HCFC 141b used in cleaning cells 3 & 4 is outlined in the table below.

Part	Consumption Per Part kg	Number of Parts	Actual Usage in kg
1	0.0065	53185	345.70
2	0.0012	26000	31.2
			TOTAL HCFC used in April 2011: 376.9

Number five cell

Cell number five is used to clean copper, aluminum, and stainless steel rods that are used for the condenser or the evaporation system. The various tubes are then soldered together to create the circulation system. The parts must be cleaned to ensure a clean joint for soldering. Contamination could lead to a poorly soldered joint allowing the unit to leak; therefore, the parts must be critically clean.

In this operation the parts are washed by immersion. The current cleaning process uses an open ended 30 gallon drum. During this cleaning process each end is dipped for the removal of cutting fluid or shavings left from cutting the tubing to desired lengths. Due to the long lengths of the tubes the cleaning vessel is left open for ease of access. The violent agitation and the open top container will increase the emission through the vapor phase due to the volatility of HCFC-141b.

All of parts being cleaned, stainless steel, aluminum or copper are contaminated with a light oil cutting fluid. The metal must be critically clean, leaving no residue, such as a corrosion inhibitor that is often left from water cleaning so the parts do not oxidize.

The volume of HCFC 141b used in cleaning cell 5 is outlined in the table below.

Part	Consumption Per Part kg	Number of Parts	Actual Usage in kg
1	0.0048	98,014	488.78
			TOTAL HCFC used in April 2011: 488.78

Number six cell

Cell number six is used to clean metal turned parts for larger pieces such as pin hinges. A variety of different parts are being cleaned.

In this operation the parts are washed by immersion. The current cleaning process uses physical agitation in which the cleaning vessel is a light weight plastic container. The parts are manually placed into the container, the solvent is then added, and the lid is placed onto the container, followed by violent agitation. The lid is then removed from the washing vessel and the parts are transferred to a second holding vessel. A funnel with a filtering screen is used in this transfer process. With this equipment the parts are captured as the solvent is being decanted. The transfer process is being done in an open atmosphere with inadequate equipment allowing for large liquid losses during transfer.

These parts are being cleaned on location at the manufacturing cell without ventilation.

All parts being cleaned are soft steel metal. Each part is contaminated with a heavy oil cutting fluid. The metal must be clean of any residue such as a corrosion inhibitor that is often left from water cleaning so the parts do not oxidize.

The volume of HCFC 141b used in cleaning cell 6 is outlined in the table below.

Part	Consumption Per Part kg	Number of Parts	Actual Usage in kg
1	0.002	40,000	80.0
2	0.002	63,000	126.0
3	0.002	2,200	4.4
4	0.002	3,700	7.4
5	0.002	4,800	9.6
6	0.002	6,696	13.4
7	0.002	3,700	7.4
8	0.002	72,400	144.8
9	0.0048	34,412	147.4
			TOTAL HCFC used in April 2011: 540.4

Number seven and eight cells

Cells number seven and eight are used to clean copper tubes. All components are made of soft copper and contaminated with light production cooler oil. After cleaning, copper tubes are welded to the compressor blocks and this requires high degree of purification to ensure quality welding works. Any residual contamination leads to refrigerant leakages at the operation moment.

Copper tubes are cleaned both inside and outside: at junction points with compressor and evaporator. This is achieved manually with brushes. The cleaning operations are carried out at conveyer belts immediately before welding works. Due to latter set-up, the process cannot be relocated for further optimization.

The volume of HCFC 141b used in cleaning cells 7 is outlined in the table below.

Part Number	Consumption Per Part kg	Number of Parts	Actual Usage in kg
1	0.0052	10056	52.30
			TOTAL HCFC used in April 2011: 52.3

The volume of HCFC 141b used in cleaning cells 8 is outlined in the table below.

Part Number	Consumption Per Part kg	Number of Parts	Actual Usage in kg
1	0.0050	540	2.73
			TOTAL HCFC used in April 2011: 2,73

4.3 Proposed Alternative Process

The GEF financing will cover technology replacement at the cells 2, 5 and 6 being larger consumers of HCFC-141b. The company will further cover the optimization of its process to merge cells 1, 3 and 4 into one processing area with one standard approach. Recycled solvents will be used at required locations.

Number 2, 5 and 6 cells

Number 2 cell

The recommended change to this process is to:

- Continue using the current brush cleaning system.
- Change the solvents to lower vapor pressure solvent reducing overall emissions from this site, designed for cleaning lighter soils.
- Install "elephant trunk tubing" ventilation to limit the chemical exposure that the workers are being subjected to.
- Install a fixed bed adsorbing unit in-line with the ventilation exhaust system.
- Due to the in-line brush cleaning process at this site the solvent cannot be recovered for reclamation.

Number 5 and 6 cells

The recommended process changes for these processes would be:

- The equipment will be changed to vapor degreasing low emission machines. The parts can go through a process of dip into hot ultrasonic solvent --- raise and hold in vapor space surrounded by cooling coils where the vapor condenses on the piece(s) to be cleaned -- move into vapor free zone where the piece dries, and finally exits with little carry-out.
- Install proper ventilation systems, vent hoods, for the cleaning process to limit the chemical exposure that the workers are being subjected to.
- Install a fixed bed adsorbing unit in-line with the ventilation system.
- Recycle, via distillation, the solvent once it no longer cleans sufficiently.
- One distillation unit can serve the entire facility. The unit can be centrally located for increased efficiency. As this is a closed loop system no excess ventilating systems are required.
    - The solvent can be decanted into an appropriate vessel and transferred to the distillation unit.
    - Upon distillation and reclamation the recycled solvent may be used.

Number 1, 3 and 4 cells

The recommended process change for these processes would be:

- The equipment will be changed to vapor degreasing low emission machines. The parts can go through a process of dip into hot ultrasonic solvent --- raise and hold in vapor space surrounded by cooling coils where the vapor condenses on the piece(s) to be cleaned--move into vapor free zone where the piece dries, and finally exits with little carry-out.
- Install proper ventilation systems, vent hoods, for the cleaning process to limit the chemical exposure that the workers are being subjected to.
- Install a fixed bed adsorbing unit in-line with the ventilation system.
- Recycle, via distillation, the solvent once it no longer cleans sufficiently.
- One distillation unit can serve the entire facility. The unit can be centrally located for increased efficiency. As this is a closed loop system no excess ventilating systems are required.

    - The solvent can be decanted into an appropriate vessel and transferred to the distillation unit.
    - Upon distillation and reclamation the recycled solvent may be used.
- Use either virgin or recycled solvent; these parts don't have to be critically clean.

5 TECHNOLOGY PROPOSAL

Globally, the primary solvent that has been used to replace HCFC 141b for general cleaning is Trans-1, 2-Dichloroethylene (Trans). The VOC and GWP values for Trans blends are slightly higher than HCFC 141b. Control measures can be put into place to offset these differences. Other solvents exist that have the same cleaning efficiency; however, all are suspected carcinogens. Therefore, the latter will not be a recommended replacement.

Other solvents exist for light soils. Some solvents that could be tested for removal of lighter soils would be DuPont Vertrel XF, XM, and XE, 3M Novec Engineered Fluids, 71IPA, and 8200. The recommended solvent replacement for general cleaning will be a Tran's blend. Solvents that could be tested for general cleaning are DuPont blends containing Trans; Vertrel SFR, SDG, SMT, MCA and MCA plus. 3M blends containing Trans are Novec Engineered Fluids 71DA, and 71DE.

One hundred (100%) percent Trans-1, 2-Dichloroethylene is flammable; however, all recommended Trans blends are not. Nor will they become flammable with extended use.

The permissible exposure level of 1, 2-Transdichloroethylene is lower than that of HCFC 141b; however, the volatility of Trans is less than that HCFC 141b.

In terms of equipment, low emission vapor degreasing units will be used. These systems are designed with cooling coils in the upper side walls and ends to depress any escaping vapor. Secondly the lids fit tightly on the machines allowing no vapor release when the machine is not in use. A third safety control will be to place ventilation systems, vent hoods, above the units. Each ventilation system will eventually exhaust into the atmosphere. These additional control measures will offset the lower permissible exposure level of Trans based products.

The VOC and GWP values for Trans blends are slightly higher than HCFC 141b. Operational controls such as the fixed bed adsorbing units (activated charcoal beds) can be put in-line with the exhaust ducts to capture any vapor emissions preventing any chemical vapor release prior to venting into the atmosphere. The current trays will be changed to low emission machines.

In some cells the parts can go through a process of dip into hot ultrasonic solvent---raise and hold in vapor space surrounded by cooling coils where the vapor condenses on the piece(s) to be cleaned--move into vapor free zone where the piece dries, and finally exits with little carry-out. This will compensate for the increased VOC and GWP values of the Trans blends.

In addition to the training of the operators, the site should also be prepared and modified. At each cleaning cell extra space will be needed for the vapor degreasing unit, and the ventilation systems.

6 PROJECT COSTS

6.1 Total Project Costs

As described below and presented in detail in the relevant annexes, the total project cost is **US$ 200,000** and has been calculated as the financial capital cost.

6.1a Capital Costs:

As detailed in ANNEX 1, total investment cost is **US$ 200,000** including contingencies.

6.1b Incremental Operating costs:

A net incremental operating cost is **US$ 144,010** (as detailed in ANNEX 2). Company will cover these costs of new materials as a contribution to the project to leverage additional co-finance.

6.1c Contingencies

Contingencies are estimated at 10% of the subtotal cost for all goods and services and represent **US$ 18,000**. This amount is included to ensure that the project receives the necessary funding due to escalation, and in case unforeseen costs arise.

7. PROJECT IMPACT

This project will eliminate 28.1 metric tons of HCFC-141b, (3.08t ODS)/year at NORD (Nord Group Holding) in Ukraine.

8. ENVIRONMENTAL IMPACT

Under the current proposal Nord (Nord Group Holding) will use non-ODS depleting processes including a vapor degreasing cleaning process to replace their current ODS emitting process. The cleaning process will include low emission machines where parts can go through a process of dip into hot ultrasonic solvent---raise and hold in vapor space surrounded by cooling coils where the vapor condenses on the piece(s) to be cleaned--move into vapor free zone where the piece dries, and finally exits with little carry-out. The factory will provide proper provisions of exhaust, and will have to obtain the applicable permits required by the Government authorities to ensure that the operation of the new equipment conforms to regulations.

9. IMPLEMENTATION SCHEDULE

The project will be implemented using UNDP's Direct Execution Modality. Implementation is targeted as follows:

Activity (per quarter)	1	2	3	4	5	6	7	8	9	10	11	12
Project approval	X											
Submit Project doc. for signature	X											
Project document signature	X											
Testing of Alternatives		X	X									
Equipment and process specification			X									
Equipment procurement				X	X							
Installation of equipment						X						
Training							X					
Testing and trials							X					
Production Start-up							X	X				
Phase-In									X	X		
Project completed											X	
HOP signature												X

10. MILESTONES FOR PROJECT MONITORING **(**measured from project approval)

TASK	MONTH
(a) Project document submitted to beneficiary	2
(b) Project document signature	3
(c) Testing of alternatives	5
(d) Bids prepared and requested	7
(e) Contracts Awarded	10
(f) Equipment Delivered	16
(g) Training Testing and Trial Runs	18
(h) Commissioning	19
(i) HOP signature	21

11. CALCULATION OF INCREMENTAL CAPITAL COSTS

Pos	**Item**	In US$	Counterpart co-funding (In US$)
	Equipment		
1	3 Vapor Degreasing Units	105,000	35,000
2	1 Distillation Unit for Reclamation	40,000	
3	3 Fixed Bed Adsorbing Units	15,000	15,000
	Plant Safety		
4	3 Ventilation Hoods and Ducting		100,000
7	Plant safety		25,990
9	Safety Audit	8,000	
	General		
10	Development and approval of civil works and project documentation in accordance with national industrial and safety standards		100,000
11	Civil works (local preparations, upgrade of storage area for new chemical, safety signs and trainings for personnel, PPE, installation of ducting, building/site modifications, other outside infrastructure, equipment maintenance)		220,000
12	Technology transfer	14,000	
13	Trials and commissioning		10,000
	Sub-total	182,000	
14	Contingency ~ 10%	18,000	
	Total capital	**200,000**	**505,990**
	Operating costs		**144,010**
	Total	**200,000**	**650,000**

In-cash (GEF grant): US$ 200,000
In-cash (Nord (Nord Group Holding) for internal modernization as described and for the new chemical): US$ 650,000

BREAKDOWN OF INCREMENTAL OPERATING COSTS

ESTIMATED COSTS IN US DOLLARS

ITEM	**Pre-project Costs**	**Post Project Costs**
Solvent Costs		
28,100 kg/yr 141b ($1.9/kg)	$53,390	
9,870 kg/yr Trans ($20/kg)		$197,400
TOTAL PRE-PROJECT COSTS PER YEAR:		$53,390
TOTAL POST PROJECT COSTS PER YEAR:		$197,400
TOTAL ANNUAL INCREMENTAL COST:	**$144,010**	

Annex 6

PROJECT COVER SHEET

COUNTRY: Ukraine

Project title:	**Implementing agency:**
POLYFOAM LTD.- Conversion from HCFC-141b to Methyl Formate in the Systems House operations	UNDP

Latest reported consumption data for ODS addressed in project

A: Article-7 data (ODP tonnes)

HCFCs			

B: HCFC consumption remaining eligible for funding: N/A

SUMMARY:

ODS USE AT ENTERPRISE	50	ODS t
ODS TO BE PHASED OUT:	50	ODS t
ODS TO BE PHASED IN:	0	ODP t
PROJECT DURATION:	36	Months
PROJECT COSTS:		
Incremental Capital Cost	US $	272,800
Contingency (10%)	US $	27,200
Incremental Operating Cost (not eligible for funding)	US $	63,000
Total Project Cost	US $	300,000
LOCAL OWNERSHIP:	100%	
EXPORT COMPONENT:	0%	
REQUESTED GRANT:	US $	300,000
COST- EFFECTIVENESS:	US$/kg ODP	6
	US$/kg ODS	N/A
STATUS OF COUNTERPART FUNDING:	Enterprise commitment enclosed	
PROJECT MONITORING MILESTONES INCLUDED:	Included	

PROJECT SUMMARY:

Under this project, Polyfoam LTD will phase out the use of HCFC-141b in its Systems House operations. The technology chosen is methyl formate. The company's aim is to accelerate the phase-out of HCFC-141b foaming agent.

IMPACT OF THE PROJECT ON COUNTRY'S MONTREAL PROTOCOL OBLIGATIONS:

This project eliminates 50 t ODS which will contribute to the Ukraine's efforts to fulfill its commitment under the Montreal Protocol.

Prepared by: Risto Ojala **Date:** 21.03.2012

1.0 PROJECT OBJECTIVE

The objective of this project is to phase-out the use of HCFC-141b and its replacement with methyl formate technology at a local system house which supports a range of small to medium sized consumers. The foam manufacturing that takes place downstream of the system house involves pouring, spraying and integral skin foam operations. The expected phase-out of HCFC-141b currently used in preparing polyol formulations is 50 MT ODS, while total manufacture of polyols reaches 62 MT ODS at the current stage.

Since the downstream users have small to medium operations, the project will be designed around the system house with technical assistance provided to the users on the new replacement chemical. This will ensure the most cost-effective approach.

The proposed replacement technology is methyl formate (MF) technology.

2.0 SECTOR BACKGROUND

There are altogether 64 small scale enterprises using Polyfoam's (POLYFOAM LTD) polyurethane systems. The list of customers is provided in the Annex 4. The users of Polyfoam products are small (consumption varies from 0.1 tons/year to an exceptionally maximum recorded of 11-13 tons/year). Majority of users consume between 0.1 to 1.0 tons of blends annually.

3.0 ENTERPRISE BACKGROUND

This project is designed around Polyfoam Ltd., which acts as an implementing partner of the project. Contact information is as follows:

Company	Limited Liability Company "Polyfoam" (POLYFOAM LTD)
Contact	Mr. Viktor Chupilko – Managing Director
Address	51909, Ukraine, Dneprodzerzhinsk, Dnepropetrovskaya St. 155
Phone	0038 (05692) 7-42-46, 7 -42-66, 7-42-77
Fax	0038 (05692) 7-42-46
Email	Pf1991@mail.ru and polyfoam1991@yandex.ru

The system house has 100% Ukrainian ownership and serves approximately 64 small-to-medium scale enterprises using the Polyfoam's (POLYFOAM LTD) produced polyurethane (PU) systems. Polyfoam (POLYFOAM LTD), being owned and operated by industrial chemists, has built a trusted reputation for product quality and customer service. Company was established in 1993 and since that time has grown to become one of the largest of nationally owned systems houses in Ukraine.

In 1994 it had produced the first products – PU foam components for flexible molded PU foams for the car manufacturing plant at Zaporozhje City. Nowadays the company produces a wide range of components for rigid PU foams for applying by means of pouring (pre-insulated pipes, sandwich-panels, refrigerators, water heaters) and spraying (heat-cool insulation of storehouses, thermal insulation of industrial and residential buildings). In addition Polyfoam (POLYFOAM LTD) continues to produce PU components for the integral and flexible PU foam products. All products meet the requirements of Ukrainian technical standards.

The company does not export formulated PU systems, and has 57 employees on staff. Annual production of component A (polyol mixture) is 1,000 MT/year with the possible increase till up to 2,000 MT/year.

The consumption of HCFC-141b in metric tons has evolved as follows (in ODS tons):

2005	2006	2007	2008	2009	2010
13.5	23.0	49.8	71.7	46.7	62

The end-users of Polyfoam's (POLYFOAM LTD) products consume from 0.1 tons/year to 10-11 tons/year and mostly manufacture rigid foam for pouring and spraying applications as well as for integral skin foaming operations. The only large customer of Polyfoam (POLYFOAM LTD) identified is Intertehnika

(PSC "Intertekhnika") enterprise (with supplies reaching 12 MT ODS) which is addressed in a separate investment project.

Since the vast majority of downstream users are small, the project approach is designed around the system house, which acts as an implementing partner of the project with technical assistance provided to the downstream users on the appropriate and safe application of the new replacement chemical.

The proposed project contributes to the elimination of HCFC-141b use at the company in the amount of 50 MT/year. The replacement technology selected for Polyfoam (POLYFOAM LTD) is methyl formate technology and such approach will result in reducing GWP impact to very low levels. Required safety guidance (as recommended in the technology report as reviewed by ExCom at its 62nd meeting and by supplier) will be adhered to during project implementation.

Base chemicals are purchased from:

Polyols	SC Oltchim SA, Romania Sehotec. Inc, South-Korea SKC Co. Ltd., South-Korea Kumho Petrochemical Co. Ltd., Korea Vladipur Ltd, Russia
Isocyante	Mitsubishi Shoji Kaisha, Ltd, Japan Yantai Wanhua Polyurethanes Co. Ltd., China Borsodchem ZRT, Hungary
HCFC-141b	Zhejiang Sanmei Chemical IND. Co., Ltd., China

4.0 PROJECT DESCRIPTION

Polyfoam (POLYFOAM LTD) intends to convert its foam operation from the current use of HCFC-141b to methyl formate. The use of methyl formate is patented and marketed under the name "ecomate®". Polyfoam (POLYFOAM LTD) will be granted a non-exclusive sub-license for its operations. The development, optimization and validation of methyl formate as replacement technology for the use of HCFC-141b in rigid pouring, spraying and integral skin manufacturing will involve actions in the system house and will consist of:

- acquisition of an "ecomate®" license and the necessary testing and prototyping equipment;
- development of the systems (there are different ones, depending on customer requirements);
- optimization and validation of formulations;
- dissemination of the information through a workshop for the Polyfoam's (POLYFOAM LTD) customers.

The conversion plan require following adaptations to the existing facility:

- Explosion protected unloading station for methyl formate from drum's unloading
- Explosion proofing of the blending units
- Drum filling system
- Nitrogen generator for drum head space inertization
- Laboratory equipment for testing viscosity of new foam systems
- Safety Management and Gas detection system
- Electrical grounding
- Antistatic floor
- MF detection and air ventilation system
- Development of adequate safety procedure and safety audit
- Trials and testing at the system house
- Trials and testing at the customer sites

5.0 TECHNOLOGY OVERVIEW

5.1 INTRODUCTION

To replace HCFCs in the production of PU insulation foams, following criteria ideally would apply:

A suitable boiling point with 250C being the target,
Low thermal conductivity in the vapor phase,
Non flammable,
Low toxicity,
Zero ODP,
Low GWP,
Chemically/physically stable,
Soluble in the formulation,
Low diffusion rate,
Based on validated technology,
Commercially available,
Acceptable in processing,
Economically viable.

No current replacement technology meets all of these criteria and compromises will be necessary. The actual choice will be impacted under others, by application, technical proficiency, plant layout and—investment as well as operating—costs. In the case of domestic refrigerators, maintaining product density and insulation value are of crucial importance and limit the choice to the technologies discussed below.

5.2 ALTERNATIVES

Following is a list of the main alternatives—validated, under validation or still under development—to replace HCFCs in rigid insulation foams. The molecular weight is mentioned as an indication of blowing efficiency and the incremental GWP as an indication how the technology performs compared to HCFC-141b on this environmental parameter:

SUBSTANCE	GWP1	MOLECULAR WEIGHT	INCREMENTAL GWP2	COMMENTS
HCFC-141b	725	117	Baseline	
CO2	1	44	-725	Used direct/indirect (from water)
Cyclopentane	Negligible	72	-718	Extremely flammable
HFC-245fa	1,030	134	443	
HFC-365mfc	794	148	279	
HFC-134a	1,430	102	522	
Methyl formate	Negligible	60	-725	
Methylal	Negligible	76	-725	Reported for co-blowing only
Acetone	Negligible	58	-725	Used in flexible slabstock
FEA-1100	5	1644	-718	Under development
HFO-1234ze	6	114	-719	Recently introduced
HBA-2	<15	<134	>-708	Under development
AFA-L1	<15	<134	>-708	Under development

[1] Unless otherwise indicated, taken from IPCC's Fourth Assessment (2007)
[2] Derived from comparing GWPs compared to the baseline on an equimolar base. It should be noted that in practice formulators may make
changes such as increased water or ABA blends that impact the global warming effect
[4] Calculated from published formulations
Green = beneficial GWP effect; red = unfavorable GWP effect

These technologies are described in more detail below.

CARBON DIOXIDE - The use of carbon dioxide derived from the water/isocyanate chemical reaction is well researched. It is used as base blowing agent in almost all PU foam applications and as sole blowing agent in many foam applications that have no/ minor thermal insulation requirements. The relatively emissive nature of CO2 in closed-cell foam is, however, a challenge. To avoid shrinkage, densities need to be relatively high which has a detrimental effect on the operating costs up and above mitigating poor insulation values. Increased use of water/CO2 has been—and still is—an important tool in the HCFC phaseout. There is no technological barrier. However, the use of water/CO2 alone will at this time be limited to foams such as integral skin foams (with restrictions when friability is an issue), open cell rigid foams, and spray/in situ foams for non/low thermal insulation applications.

Some chemical manufacturers have proposed enhancing water based systems through the addition of formic acid under strictly controlled conditions (the reaction of MDI with formic acid creates equal amounts of CO2 and CO, with the latter being toxic).

Carbon dioxide can also be added directly as a physical blowing agent through the use of super-critical CO2. The reported finer cell structure would improve the otherwise poor insulation value. UNDP is in the process of assessing this option for MLF projects.

HYDROCARBONS (HCs) - There have been many HC-based/MLF-supported CFC-phaseout projects in refrigeration and in panel applications. The minimum economic size has been historically ~50 ODP t/y or US$ 400,000 US$ with (higher cost) exceptions for domestic refrigeration. Smaller projects were discouraged for reasons of cost and technological complexity. Consequently, there is hardly any use of HCs in SMEs. In addition, the technology was deemed unsafe for a multiple of applications such as spray and in situ foams. Generally, cyclopentane has been used for refrigeration and n-pentane for panels. Fine tuning through HC blends (cyclo/iso pentane or cyclopentane/isobutane) is are now standard in non-A5 countries is not widely spread in A5's. Consequently, the investment costs are the same as at the time of phasing out CFCs and the technology will continue to be too expensive for SMEs and restricted to the same applications as before. There are, however, options to fine-tune project costs and investigate other applications:

- The introduction of HC blends that will allow lower densities (lower IOCs)
- Addition of methylal to decrease cell size/improve insulation value (better performance)
- Direct injection (lower investment)
- Low-pressure/direct injection (lower investment)
- Centralized preblending by system houses (lower investment)
- Application-specific dispensing equipment (lower investment)

UNDP has initiated a study of these options with the goal to decrease the minimum economic size to ~25 t/y or US$ 200,000. Although this goal has not yet been completely achieved, the study shows encouraging results for centralized preblending as well as direct injection. Complete results are expected around for the 66th ExCom in April 2012.

Hydrofluorocarbons (HFCs) - Current HFC use in A5 countries is relatively insignificant. The low cost of HCFC-141b is just too compelling! These chemicals have, however, played a major role in the replacement of HCFCs in foam applications in non-A5 countries, despite their high GWP potentials. Formulations are frequently not straightforward molecular replacements. Generally, the use of water has been maximized and sometimes other co-blowing agents have been added. Therefore, an assessment of its environmental impact has to be based on actual, validated, commercial blends. There are currently three HFCs used in foam applications. Following table includes their main physical properties:

Parameter	**HFC-134a**	**HFC-245fa**	**HFC- 365mfc**
Chemical Formula	CH2FCF3	CF3CH2CHF2	CF3CH2CF2CH3
Molecular Weight	102	134	148
Boiling point (0C)	-26.2	15.3	40.2
Gas Conductivity (mWm0K at 10 0C)	12.4	12.0 (20 0C)	10.6 (25 0C)
Flammable limits in Air (vol. %)	None	None	3.6-13.3
TLV or OEL (ppm)	1,000	300	Not established
GWP (100 y)	1,410	1,020	782
ODP	0	0	0

METHYL FORMATE (MF) - also called methyl-methanoate, is a low molecular weight chemical substance that can be used as a blowing agent for foams. Following data on physical properties have been reported:

Property	**Methyl Formate**	**HCFC-141b**
Appearance	Clear liquid	Clear liquid
Boiling point	31.3 oC	32 oC

LEL/UEL	5-23 %	7.6-17.7
Vapor pressure	586 mm Hg @ 25 oC	593 mm Hg @ 25 oC
Lambda, gas	10.7 mW/m.k @ 25 oC	10.0 mW/m.k @ 25 oC
Auto ignition	>450 oC	>200 oC
Specific gravity	0.982	1.24
Molecular weight	60	117
GWP	0	630
TLV (USA)	100 ppm TWA/150 ppm STEL	500 ppm TWA/500 ppm STEL

In the USA, MF is not treated as a volatile organic component (not a smog generator) and is SNAP (USEPA's Significant Mew Alternatives Program) approved. In Europe it is compliant with the RoHS (Restriction on Hazardous Substances) and WEEE (Waste Electrical and Electronic Equipment) directives. Acute toxicity is reported low with no special hazards. The MSDS mentions R12 (extremely flammable but not explosive); R20/22 (harmful by inhalation and if swallowed) and R36/37 (irritating to eyes and respiratory system). UNDP reports show process emissions to be much lower than 100 ppm (which is the STEL and TWA). Therefore no special precautions for MF blends in the manufacturing area are required. MF is normally sold as a system, which would allow restricting flammability issues to the supplier. Shipping of systems in the USA is possible without red ("flammable") tags. The ExCom reviewed the outcome of two pilot projects to assess the use of methyl formate in all potential applications and recommended that countries will include this technology in their choices of HCFC replacement technologies.

METHYLAL (ML) – Methylal's primary use is as a solvent. It is soluble in water and miscible with most common organic solvents. The use of Methylal as a co-blowing agent in conjunction with hydrocarbons and HFCs for rigid PU foam applications (domestic refrigeration, panels, pipe insulation and spray) has been described in the literature. It is claimed to improve the miscibility of pentane, promotes blending in the mixing head, foam uniformity, flow, adhesion to metal surfaces and insulation properties. The addition of a low percentage of Methylal to HFCs (245fa, 365mfc or 134a) makes it reportedly possible to prepare pre-blends with polyols of low flammability with no detrimental effect on the fire performance of the foam. Despite all literature references, public knowledge of Methylal's industrial performance as blowing agent is limited. To alleviate this, the ExCom approved in July 2009 a UNDP pilot project to assess its use as a possible replacement of HCFCs for MLF projects in developing countries. The report has been completed and communicated to the MLF Secretariat for consideration by 66th ExCom in April 2012.

Property	**Methylal**	**HCFC-141b**
Appearance	Clear liquid	Clear liquid
Boiling point	42 C	32 C
LEL/UEL	2.2-19.9 %	7.6-17.7
Vapor pressure	400 mm Hg @ 20 C	593 mm Hg @ 25 C
Lambda, gas	Non available	10.0 mW/m.k @ 25 C
Auto ignition	235 C	>200 C
Specific gravity	0.821 @ 20 C	1.24
Molecular weight	76.09	117
GWP	Negligible	630
TLV (USA)	1000 ppm TWA	500 ppm TWA/500 ppm STEL

EMERGING TECHNOLOGIES - Since early 2008, a flood of new blowing agents for PU foams have been proposed by major international manufacturers of halogenated compounds. Four of them are worth mentioning:

	HFO-1234ze	**HBA-2**	**FEA-1100**	**AFA-L1**
Chemical Formula	CHF=CHF3	n/k	n/k	n/k
Molecular Weight	114	<134	161-165	<134
Boiling point (0C)	-19	>15 <32	>25	>10 <30
Gas Conductivity (mWm0K at 10 0C)	13	n/k	10.7	10
Flammable limits in Air (vol. %)	None	None	None	None
TLV or OEL (ppm; USA)	1,000	n/k	n/k	n/k

GWP (100 y)	6	<15	5	Negligible
ODP	0	0	0	0
Manufacturer	Honeywell	Honeywell	DuPont	Arkema

These technologies are all geared towards replacement of HFCs and sometimes called "second generation" or "unsaturated" HFCs, although the name HFOs (hydrofluoroolefins) appears to be a more distinctive description. They share low/no flammability, zero ODP and insignificant GWPs:

Except HFO-1234ze, all these substances still are in the process of toxicity and application testing and will therefore not appear in the market in commercial quantities before around 2015.

5.3 SELECTION

The acceptability of the alternative pre-blended systems by the end-users would be a decisive factor. This would be dependent upon suitability in processing, economy, minimal changes to the production equipment, availability of technical support, and most importantly, availability of the widest possible range of systems, to cater to all types of end-use.

The pre-blending operation of the enterprise primarily caters to rigid polyurethane foam for insulation and integral skin applications. The enterprise has opted for Methyl Formate - ecomate® blended systems in place of the earlier HCFC-141b blended systems based on the above criteria.

The application has been patented in several countries. Ecomate®, as patent owner Foam Supplies, Inc. (FCI) calls the product, is exclusively licensed to Purcom for Latin America, to BOC Specialty Gases for United Kingdom and Ireland and to Australian Urethane Systems (AUS) for Australia, New Zealand and the Pacific Rim. Reportedly, AUS has also acquired the license for other countries such as India, China and several countries in the Middle-east / north Africa.

6.0 PROJECT COSTS

6.1 CALCULATION OF INCREMENTAL CAPITAL COST

The total actual investment costs are US$ 300,000. This includes a 10% contingency. Details of incremental capital costs are provided in Annex-1.

6.2 CALCULATION OF INCREMENTAL OPERATING COST

Incremental Operating Costs are US$ 63,000 for a 1-year operation. The calculation is detailed in Annex-2. Incremental operating costs will be borne by the beneficiary company Polyfoam (POLYFOAM LTD) and downstream enterprises.

6.3 COST EFFECTIVENESS (CE) (Phased-out US$ / HCFC kgs/a)

Cost-effectiveness is calculated based on the actual capital cost, from which the safety related investments are deducted. CE is US$ 300,000/50,000 kgs HCFC 141b = US$ 6/kg

6.4 PROPOSED MULTILATERAL FUND GRANT

The proposed grant request is US$ 300,000, representing 100% of US$ 300,000, and thus corresponding to the 100% Ukrainian ownership of the company. The company will provide a co-finance letter for complementary capital investment costs at the production area.

7.0 PROJECT IMPLEMENTATION AND MONITORING

The project will be implemented using UNDP's Direct Modality. Implementation is targeted as follows:

Activity (per quarter)	1	2	3	4	5	6	7	8	9	10	11	12
MF Project approval	X											

Project document signature		X										
Equipment specification			X									
Equipment procurement				X	X	X	X					
Installation of equipment								X				
Training								X				
Testing and trials								X				
Production Start-up								X				
Phase-In									X	X		
Project completed											X	
HOP signature												X

MILESTONES FOR PROJECT MONITORING (measured from project approval)

TASK	MONTH
(a) Project document submitted to beneficiary	1
(b) Project document signature	1
(c) Bids prepared and requested	2
(d) Contracts Awarded	5
(e) Equipment Delivered	10
(f) Training Testing and Trial Runs	12
(g) Commissioning	32
(h) HOP signature	36

8.0 PROJECT IMPACT

Direct Benefits: This project will eliminate the use of 50 metric tonnes HCFC-141b, at baseline conditions. The project employs commercially available and environmentally superior technology effectively anticipating future control measures and addressing issues related to climate change impacts. The project also provides a key element of Ukraine's HCFC phase out strategy.

Indirect Benefits: The new technology will allow Polyfoam (POLYFOAM LTD) to retain and expand its competitive position and serve as a demonstration of accelerated adoption of low GWP technology in a smaller scale regional producer of polyurethane foam systems similar to that which exists in many Article 5 countries as well as Article 2 CEITs in the immediate region.

Furthermore, early conversion of this company will reduce the rate of increase in the banks of HCFC-141b based foams in the country thereby reducing future emissions of HCFCs into the atmosphere or "end of life" environmentally sound disposal costs.

CALCULATION OF INCREMENTAL CAPITAL COSTS

Pos	Production area	USD
1	**Methyl Formate Drum Unloading Station**	**18,000**
2	**Ex-proofed blending unit to process different polyols including following**	**44,000**
	Safety through	
	Blending tank with agitator and valves, volume 1m3	
	Transfer pump for emptying the blender to the intermediary storage tanks (capacity 80 l/min)	
	Dosing valves (2 for polyol and 1 for preblend)	
	Load cells for weighing chemicals	
	Overfilling protection	
	Pressure and temperature indication	
3	**Ex-proofed blending unit for formulating an additive package based on own recipes including following**	**22,000**
	Blending tank with agitator and valves, volume 0.1m3	
	Automatic dosing valve for additives and water	
	Funnel for filling of additives	
	Membrane transfer pump for additives, 10 liters/min	
	Load cells for weighing chemicals	
	Overfilling protection	
4	**Process and formulation control unit for controlling entire plant including the weighing of chemicals**	**25,000**
	Plant Safety	
5	Exhaust ventilation at the formulation and drums handling area area	**4,500**
6	Gas detection system for the drum unloading and chemical mixing area	**9,000**
7	Fire protection & sprinklers	**6,000**
8	Antistatic floor	**2,800**
9	Electrical grounding, lightning protection and other electrical safeguarding of all relevant equipment	**9,000**
10	Nitrogen system	**4,000**
	General	
14	Safety Audit	**8,500**
15	Technology transfer and training	**20,000**
16	System Development and optimization at 10 companies	**40,000**
	Laboratory equipment	
17	Refractometer	**5,000**
18	Brett mold	**5,000**
19	pH tester	**5,000**

20	Abrasion tester	**15,000**
21	Cell gas analyser	**20,000**
22	Safety	**10,000**
23	**Sub-total**	**272,800**
	Contingency 10%	**27,200**
	Total	**300,000**

CALCULATION OF INCREMENTAL OPERATING COSTS

Foaming Technology	HCFC-141b	Methyl Formate	HFC	Water
Blowing agents	1.9	3.5	10	na
Polyols (without blowing agent)	2.14	2.2	2.45	2.22
MDI	2.96	2.96	2.96	2.96

	HCFC-141b system		Methyl formate system		HFC-245fa system		Water system foam	
Item	Parts (kg)	Price (US$)	Parts (kg)	Price (US$)	Parts (kg)	Price (US$)	Parts (kg)	Price (US$)
Polyols (without blowing agent)	100	214	100	220	100	245	100	222
HCFC-141b	30	57						
Cyclo-pentane			6	21				
HFC-245fa					25	250		
MDI	121.5	359.64	135	399.6	132.5	392.2	155	458.8
Subtotal	251.5	630.64	241	640.6	257.5	887.2	255	680.8
Foam usage	1		1		1		1.1	
Foaming Price ($/kg)	2.51		2.66		3.45		2.94	
Ratio of HCFC-141b in the row material	0.119		0.025					
IOC (US$/kgHCFC-141b)			1.26		7.86		3.60	

ENVIRONMENTAL ASSESSMENT

Impact on the Environment based on CDM methodolgy

Name of Industry	Substance	GWP	Tonnes/ year	CO2-eq (M tonnes/year)
Before Conversion				
Rigid PU Foam	HCFC 141b	713	50	35,650
Total CO2 emission in MT				35,650
After conversion to c-pentane in the rigid PU insulation				
Rigid PU Foam	ecomate®	1	10.3	10
Total CO2 emission in MT				10
Net Impact from conversion				44,196

ANNEX 4
POLYFOAM (POLYFOAM LTD) CUSTOMERS

CLIENT BASELINE INFORMATION TEMPLATE

Company: (system house) Limited liability company «Polyfoam» (POLYFOAM LTD)
Date: (of collection/year of consumption) 23 March 1993
Categories: (sprayfoam, injection, etc.) PU foam systems production

#	Customer Name	Date of Founding	HCFC (t/y) consumption			Category	Baseline Equipment			
			2008	2009	2010		Manufac-turer	Name	Capacity, l/min	Date of issue
1	Join-stock company "Avtozapchast'		0.34	0.29	0.3	Cars filters production	Ukraine	OSV-600	6	
2	Limited liability company «Car's filter systems»		-	0.44	2.36	Cars filters production				
3	Limited liability company «Agrogidromash»		-	0.06	0.2	Cars filters production	Ukraine	OSV-400	2	
4	Limited liability company «Ajsberg»		0.5	1.44	1.04	Refrigeration equipment	Italy		100	
5	Private enterprise "Zapara"	2008	-	0.135	0.296	Spraying	Graco	E-10	2-6	
6	Limited liability company «Bars»		0.1	0.144	0.12	Equipment and boats by pouring				
7	Limited liability company «Bisabi»		5.44	1.52	4.46	PIP	Polimer, Russia		150-250	
8	«Belocerkov teploset»		0.288	0.384	-	PIP				
9	Private enterprise "Borchev"		0.048	0.258	0.172	Spraying	Russia, Ufa	Pena-9m	2-6	
10	Private enterprise "Bublenko"		1.02	0.116	0.48	PIP				
11	Limited liability company «Technoholod»		6.2	3.6	2.08	Refrigeration equipment				

12	Private enterprise "Timofejchuk"		0.08	0.24	0.32	Mannequins manufacturing				
13	Private join-stock company "Transprogress"		0.44	0.28	0.44	PIP				
14	Limited liability company «Ukratlantic»		-	1.56	-	Water heaters/boilers production				
15	Ukrainian Building Company «BMV»		1.54	0.56	-	Sandwich panels				
16	«Ukrteplostroy»		2.4	0.33	0.08	Spraying				
17	Private enterprise "Urethane Service"		1.97	0.82	1.94	Spraying, PIP				
19	Private join-stock company "Falcon"		-	0.46	0.38	Equipment and PIP				
20	Limited liability company «Ukrchimplast»		-	0.57	0.74	Buoys production				
21	Private enterprise "Cherkashin"		0.31	0.18	0.24	Spraying	Russia, Ufa	Pena-9m	2-4	
22	Limited liability company «Energozapad»		2.2	0.12	0.36	Equipment and PIP				
23	Limited liability company «Energoresurs- Invest»		-	12	0.4	Equipment and PIP				
24	Limited liability company «EOS»		1.16	0.66	1.27	PIP				
25	Limited liability company «EM-Holding»		1.25	1.33	1.02	Car filters				
26	Limited liability company «Yuka-Invest»		0.7	0.49	-	Refrigeration equipment				
27	Private enterprise «Sevozhatskiy»		0.1	0.05	0.1	Spraying				
28	Open join-stock company "Vinter"	1995	-	0.01	0.14	Spraying	Ukraine	Foam-generator	2-4	2005
29	Limited liability company «Vladimir»	1992	1.22	0.22	0.64	Spraying	Ukraine	Foam-generator	2-4	1993

30	Private enterprise «Semenov»		-	0.3	1.1	Spraying				
31	Limited liability company «Gidrofilter»		0.18	0.22	0.18	Cars filters production				
32	Private enterprise «Samoylov»		0.14	0.1	0.12	Spraying				
33	Limited liability company «Dneprotech»	1992	0.47	0.2	0.9	Spraying	Ukraine	Foam-generator	2-4	1997
34	Limited liability company «Don Trade»		1.17	0.4	0.1	Spraying, pipe half-shell production				
35	Limited liability company «Zavod santehnicheskih zagotovok»		-	-	2.1	Pipe insulation	Germany	Puromat	150	1992
36	Limited liability company «Zhekon»	2001	0.86	0.94	2.6	Spraying	Graco	E-10	15	2009
37	Limited liability company «Izopen»	2001	0.63	-	0.14	Spraying	Graco	E-10	15	2008
38	Limited liability company «Interpromtech»	1996	0.74	0.24	0.23	Equipment insulation by pouring	Poland	Izoler	10	2007
39	Limited liability company «ViS»		0.75	0.56	1.1	Spraying				
40	Limited liability company «Linsk group»	2004	0.22	0.04	0.36	Pipe half-shell production	Ukraine	Foam-generator	2-4	2006
41	«Makarov»		0.38	0.19	0.53	Spraying	Ukraine	Foam-generator	2-4	2000
42	«Mariupol teploset»	1991	4.8	1.4	1.34	Pipe insulation	Graco	E-30	15	2008
43	Matek	2001	-	-	0.77	Spraying	Graco	E-10	2-6	2009
44	Private join-stock company «Mikroclimat»	2008	-	-	0.3	Sandwich-panels				
45	Limited liability company «Monohim»		0.68	0.16	0.34	Rocks fortification				
46	Limited liability company «Nikos Center»		1.66	0.54	0.47	PIP				

47	Private join-stock company «Nord» (Nord Group Holding)		0.16	0.04	11.76	Refrigeration equipment				
48	Limited liability company «Polystar»	2005	5.1	5.2	11.5	Sandwich-panels	Cannon	Maxfoam	100	2007
49	ПК «Promavtomatik»		0.3	0.2	0.24	PIP				
50	Limited liability company «Prommontazh- 04»		0.58	0.3	0.1	Spraying				
51	«Ripor»		0.154	-	0.45	Spraying				
52	«ROSS»	1991	-	2.2	4.4	Refrigeration equipment	Cannon	Maxfoam		2009
53	«Saltov Meatcombine»		-	0.3	0.3	Spraying				
54	«Santechmontaz»		4.7	2.3	0.14	PIP				
55	«Samara techno»		0.74	0.57	0.1	Refrigeration equipment				
56	«SVP»		-	-	0.366	Spraying				
57	Private enterprise «Sezam»		0.3	0.24	0.28	Spraying				
58	Limited liability company «Ariadna Plus»		0.48	-	0.04	PIP				
59	Limited liability company «Atos Invest-Group»		1.1	-	-	Spraying				
60	Limited liability company «Lugpromholod»		13.5	1.4	-	Sandwich-panels				
61	«Priazov Avto»		1.12	-	-	Pipes insulation				
62	Limited liability company «Estet»		1.28	-	-	PIP				
63	«Penoflot»		3.1	-	0.4	PIP				
64	Limited liability company «Efes»		0.6	-	-	Sandwich-panels				
	TOTAL		73.2	46.3	62.3					