



# PROJECT IDENTIFICATION FORM (PIF) PROJECT TYPE

Full-sized Project  
TYPE OF TRUST FUND: GEF Trust Fund

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## PART I: PROJECT INFORMATION

Project Title:	Regional Demonstration Project for Coordinated Management of ODS and POPs Disposal in the Russian Federation, Ukraine, Belarus, Kazakhstan and Armenia		
Country(ies):	The Russian Federation, Ukraine, Belarus, Kazakhstan and Armenia	GEF Project ID: <sup>1</sup>	5300
GEF Agency(ies):	UNIDO (select) (select)	GEF Agency Project ID:	SAP ID 120381
Other Executing Partner(s):	Ministry for Environment Protection in targeted countries	Submission Date	2013-01-28
		Re-Submission Date:	2013-04-12 2014-01-21
GEF Focal Area (s):	Multi-focal Areas	Project Duration (Months)	60
Name of parent program (if applicable):		Agency Fee (\$):	<b>1,620,000</b>
<ul style="list-style-type: none"> <li>• For SFM/REDD+ <input type="checkbox"/></li> <li>• For SGP <input type="checkbox"/></li> </ul>			

### A. INDICATIVE FOCAL AREA STRATEGY FRAMEWORK<sup>2</sup>:

Focal Area Objectives	Trust Fund	Indicative Grant Amount (\$)	Indicative Co-financing (\$)
(select) CHEM-1	GEFTF	<b>2,000,000</b>	9,620,000
(select) CHEM-2	GEFTF	<b>16,000,000</b>	71,940,000
Total Project Cost		<b>18,000,000</b>	81,560,000

### B. INDICATIVE PROJECT FRAMEWORK

Project Objective: **The project will demonstrate environmentally sound collection and destruction of Persistent Organic Pollutants (POPs) and Ozone Depleting Substances (ODS) in the Russian Federation, Ukraine, Belarus, Kazakhstan and Armenia. This demonstration project will assist the countries involved in meeting their obligations under the Stockholm Convention and the Montreal Protocol. This project is a regional integrated programme, the initial technical assistance will provide a destruction capacity of 150 MT of POPs (PCB) and 210 MT of ODS (3.0 MM of CO<sub>2</sub>e) as well as establishing an environmental sound mechanism (ESM) for PCB waste management in Armenia.**

**The initial technical assistance project will focus on a) non-investment activities in all countries involved, b) ODS destruction in Belarus, Ukraine and Russian Federation and c) POPs destruction in Armenia.**

**A subsequent scale-up project will be developed to complete investment activities for POPs destruction in Belarus, Ukraine, Kazakhstan and Russian Federation and ODS destruction in Kazakhstan.**

**The initial technical assistant project aims to destroy 630 MT of ODS and 450 MT of POPs in the first three years of operation of the destruction facilities.**

**Subsequent scale-up project will aim to increase the regional destruction capacity funded by this project to 280 MT of ODS per year and 750 MT of POPs. The target total destruction volume over the period of the initial and scale-up projects is 840 MT of ODS and 7,500 MT of POPs.**

<sup>1</sup> Project ID number will be assigned by GEFSEC.

<sup>2</sup> Refer to the reference attached on the [Focal Area Results Framework](#) when completing Table A.

Project Component	Grant Type <sup>3</sup>	Expected Outcomes	Expected Outputs	Trust Fund	Indicative Grant Amount (\$)	Indicative Co financing (\$)
1. Institutional capacity building and development	TA	1.1 Adequate institutional capacity at central government and provincial level in selected provinces for POPs and ODS identification and management	1.1.1 Technical and human resources capacity building 1.1.2 Extended inventory on ODS and POPs 1.1.3 ODS banks in selected provinces	GEFTF	550,000	1,700,000
2. Policy and regulatory frameworks	TA	2.1 Policy and regulatory framework strengthened to allow enforcement of POPs and ODS waste management to meet relevant obligations  2.2 Potential for coordinated management of ODS and POPs waste disposal between five countries and within the region	2.1.1 Revised policy and legislation  2.1.2 Policy enforcement strategy for each country  2.1.3 Economic and market based incentives, especially regarding involvement in private sector, for disposal of POPs and ODS containing equipment as well as of receiving NGOs support	GEFTF	700,000	2,770,000
3. Waste management and destruction systems for five CEIT countries including ODS and POPs waste collection, storage transportation and final destruction	TA	3.1 Most suitable approach to ODS and POPs waste management agreed for pilot implementation including the selection of appropriate destruction technology meeting requirements of the TEAP  3.2 National ODS and POPs destruction plans approved  3.3 Framework for cooperation discussed and elaborated by participating countries  3.4 Awareness of new technological and economic policies and enforcement mechanisms made  3.5 Incentives for	3.1.1 POPs and ODS co-destruction feasibility study, including assessment of feasibility of destruction in cement kilns (in one country) and opportunities for simultaneous energy efficiency enhancements  3.1.2 Selection of co-destruction technologies for ODS and POPs waste destruction in 4 countries  3.1.3 Analysis of barriers to the desirable cross-border shipment of ODS and POPs waste for destruction between the free custom zone	GEFTF	500,000	1,680,000

<sup>3</sup> TA includes capacity building, and research and development.

		collection of obsolete POPs and ODS (EOL refrigerators, freezers and ACs, ODS recovery) introduced	(RF, Ukraine and Belarus) and Kazakhstan and Armenia, identified and recommended solutions  3.1.4 Technical standards and guidelines for ODS and POPs waste disposal of based on EU directives developed			
4.National ODS and POPs collection, storage and transportation networks connected in one regional network	Inv	4.1 In country capability to identify collect and transport POPs and ODS waste (appliances) to specified recycling and destruction locations  4.2 Public – private partnerships for waste management	4.1.1 Four National ODS and POPs collection and transportation networks set up including infrastructure, control and reporting systems (plus one national PCB collection system in Armenia)  4.1.2 Local staff training on safe handling and processing of POPs and ODS waste  4.1.3 Provision of collection, storage and transportation cylinders for gaseous and liquid ODSs, obsolete POPs transportation, tanks, trucks and monitoring vehicles	GEFTF	1,700,000	6,700,000
5. ODS and POPs recycling and destruction facilities	Inv	<b>5.1 In country capacity to recycle appliances and recover and destroy ODS contained therein</b>  <b>5.2 Capacity for environmentally sound destruction of POPs and ODS</b>  <b>5.3 Demonstration pilot projects suitable</b>	5.1.1 Construction, installation and commission of recycling and destruction centres in 3 countries  5.1.2 Analytical laboratories for conduction of ODS and POPs sample analyses, including transportation and monitoring vehicles  5.1.3 Common waste	GEFTF	12,800,000	61,770,000

		<p><b>for replication across the project countries and the regions as a whole</b></p> <p>5.4 Destruction capacity of 210 MT per year of ODS and 150 MT of POPs per year established during the initial technical assistance phase. These capacities will be enhanced to 280 MT per year of ODS and 750MT of POPs per year during the subsequent scale up project. The overall destruction target for ODS and POPs is 840MT and 7,500 MT respectively.</p>	<p>management reporting system</p> <p>5.1.4 Destruction of POPs in Armenia.</p> <p>5.1.5 Destruction of 70 MT per year of ODS in participating countries under the initial technical assistance stage</p>			
6 Establishment of ESM for the recovery and treatment of PCB wastes in Armenia	Inv	<p>6.1 Legal framework and established ESM</p> <p>6.2 PCB Treatment facility established with sustainable treatment capacity</p> <p>6.3 Communication and transport infrastructure in place for handling PCB waste</p> <p>6.4 Public participation, awareness raising and education</p>	<p>6.1.1 Updated regulation on PCB management</p> <p>6.1.2 Phase out and disposal of PCB-containing equipment and waste. Laboratory capacity built</p> <p>6.1.3 Training of PCB owners and maintenance workers. Disposal / treatment code of practice issued. Interim storage upgraded and in operation</p> <p>6.1.4 Regular work with media and local NGOs. Training for NGOs on ESM of POPs/PCBs activities of local NGOs with public on POPs/PCBs.</p>	GEFTF	1,000,000	5,000,000
7. Monitoring and Evaluation	TA	7.1 Monitoring and evaluation reports and activities	7.1 Monitoring and evaluation reports	GEFTF	50,000	100,000

Subtotal			17,300,000	79,720,000
Project Management Cost (PMC) <sup>4</sup>			700,000	1,840,000
Total Project Cost			18,000,000	81,560,000

**C. INDICATIVE CO-FINANCING FOR THE PROJECT BY SOURCE AND BY NAME IF AVAILABLE, (\$)**

Sources of Co financing	Name of Co financier	Type of Co financing	Amount (\$)
GEF Agency	UNIDO for project implementation	Grant	300,000
GEF Agency	UNIDO for project implementation	In-kind	150,000
National Government	National Government of the RF	In-kind	1,000,000
National Government	National Government of Belarus	In-kind	500,000
National Government	Government of Ukraine	In-kind	500,000
National Government	Government of Kazakhstan	In-kind	500,000
National Government	Government of Armenia	In-kind	250,000
Private Sector	Counterparts in the target countries are to be selected for the project implementation serving as national project ODS/POPs disposal centers	Grant	31,000,000
Private Sector	Countreparts in the participating countries involved in the recycling, including PCB treatment in Armenia	Grant	17,500,000
Private Sector	Counterparts in the target countries are to be selected for the project implementation serving as national project ODS/POPs disposal centers	In-kind	29,860,000
<b>Total Cofinancing</b>			<b>81,560,000</b>

**D. INDICATIVE TRUST FUND RESOURCES (\$) REQUESTED BY AGENCY, FOCAL AREA AND COUNTRY<sup>1</sup>**

GEF Agency	Type of Trust Fund	Focal Area	Country Name/Global	Grant Amount (\$) (a)	Agency Fee (\$) (b) <sup>2</sup>	Total (\$) c=a+b
UNIDO	GEFTF	ODS	Russian Federation	8,000,000	720,000	8,720,000
UNIDO	GEFTF	POPs	Russian Federation	400,000	36,000	436,000
UNIDO	GEFTF	ODS	Ukraine	4,100,000	369,000	4,469,000
UNIDO	GEFTF	POPs	Ukraine	400,000	36,000	436,000
UNIDO	GEFTF	ODS	Belarus	3,050,000	274,500	3,324,500
UNIDO	GEFTF	POPs	Belarus	400,000	36,000	436,000
UNIDO	GEFTF	ODS	Kazakhstan	850,000	76,500	926,500
UNIDO	GEFTF	POPs	Kazakhstan	400,000	36,000	436,000
UNIDO	GEFTF	POPs	Armenia	400,000	36,000	436,000
<b>Total Grant Resources</b>				<b>18,000,000</b>	<b>1,620,000</b>	<b>19,620,000</b>

<sup>1</sup> In case of a single focal area, single country, single GEF Agency project, and single trust fund project, no need to provide information for this table. PMC amount from Table B should be included proportionately to the focal area amount in this table.

<sup>2</sup> Indicate fees related to this project.

**E. PROJECT PREPARATION GRANT (PPG)<sup>5</sup>**

<sup>4</sup> To be calculated as percent of subtotal.

<sup>5</sup> On an exceptional basis, PPG amount may differ upon detailed discussion and justification with the GEFSEC.

Please check on the appropriate box for PPG as needed for the project according to the GEF Project Grant:

	<u>Amount Requested (\$)</u>	<u>Agency Fee for PPG (\$) <sup>6</sup></u>
• No PPG required.	-- 0--	--0--
• (upto) \$50k for projects up to & including \$1 million	_____	_____
• (upto)\$100k for projects up to & including \$3 million	_____	_____
• (upto)\$150k for projects up to & including \$6 million	_____	_____
• (upto)\$200k for projects up to & including \$10 million	_____	_____
• (upto)\$300k for projects above \$10 million	275,000	24,750

**PPG AMOUNT REQUESTED BY AGENCY(IES), FOCAL AREA(S) AND COUNTRY(IES) FOR MFA AND/OR MTF PROJECT ONLY**

Trust Fund	GEF Agency	Focal Area	Country Name/ Global	(in \$)		
				PPG (a)	Agency Fee (b)	Total c = a + b
GEF TF	UNIDO	ODS	Russian Federation	50,000	4,500	54,500
GEFTF	UNIDO	POPs	Russian Federation	30,000	2,700	32,700
GEF TF	UNIDO	ODS	Belarus	25,000	2,250	27,250
GEFTF	UNIDO	POPs	Belarus	25,000	2,250	27,250
GEFTF	UNIDO	ODS	Ukraine	25,000	2,250	27,250
GEFTF	UNIDO	POPs	Ukraine	25,000	2,250	27,250
GEFTF	UNIDO	ODS	Kazakhstan	25,000	2,250	27,250
GEFTF	UNIDO	POPs	Kazakhstan	25,000	2,250	27,250
GEF TF	UNIDO	POPs	Armenia	45,000	4,050	49,050
<b>Total PPG Amount</b>				<b>275,000</b>	<b>24,750</b>	<b>299,750</b>

MFA: Multi-focal area projects; MTF: Multi-Trust Fund projects.

**PART II: PROJECT JUSTIFICATION<sup>7</sup>**

**Project Overview:**

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

**1) The global environmental problems:**

**The hazardous wastes generated by human activity as a result of economic development pose a risk to human health and to the environment. However the impact of these wastes can be minimised through sound management of waste from the point of generation to the point of disposal in a coordinated way.**

**1a) Root causes:**

<sup>6</sup> PPG fee percentage follows the percentage of the GEF Project Grant amount requested.

<sup>7</sup> Part II should not be longer than 5 pages.

The root causes of the environmental problems addressed by this project are three common types of waste: Persistent organic pollutants (POPs) are toxic chemicals that adversely affect human health and the environment around the world. Because they can be transported by wind and water, most POPs generated in one country can and do affect people and wildlife far from where they are used and released. They persist for long periods of time in the environment and can accumulate and pass from one species to the next through the food chain.

CFCs and HCFCs damage the ozone layer, which leads to higher levels of ultraviolet radiation on the planet's surface, which in turn leads to a greater incidence of skin cancer, cataracts, and impaired immune systems, and is expected also to reduce crop yields, diminish the productivity of the oceans, and possibly to contribute to the decline of amphibious populations. Although the Montreal Protocol has been very successful in phasing out the use of ozone depleting substances (ODS), CFCs and HCFCs are contained in millions of refrigeration and air-conditioning appliances throughout the world. When this equipment reaches the end of its life there is a high risk of the CFCs and HCFCs being released into the atmosphere.

PCBs belong to a broad family of man-made organic chemicals known as chlorinated hydrocarbons. They have a range of toxicity and vary in consistency from thin, light-coloured liquids to yellow or black waxy solids. Due to their non-flammability, chemical stability, high boiling point, and electrical insulating properties, PCBs were used in hundreds of industrial and commercial applications including electrical, heat transfer, and hydraulic equipment; as plasticizers in paints, plastics, and rubber products; in pigments, dyes, and carbonless copy paper; and many other industrial applications.

#### **1b) Barriers that need to be addressed:**

The main barriers facing the region in relation to the management of hazardous waste are; insufficient or inaccurate information about the location and volume of waste, a lack of coordinated institutional controls and incentives to manage waste and a lack of the technology and or technical know-how to treat or destroy wastes once they have been identified.

#### **2) The baseline Scenario:**

Several countries in the region used to produce PCBs and POPs pesticides and have many contaminated sites and equipment and large stockpiles of POPs pesticides stored in inappropriate conditions. There are many operational transformers, capacitors, switch gear and other electrical equipment contain PCBs and when this equipment is decommissioned it will add to the bank of PCB waste. Despite several common issues and technology barriers, there has been little or no cooperation or coordination between the countries, and no attempt has been made to take advantage of geographical proximity and the custom-free zone established between Russian Federation, Belarus and Kazakhstan. Country specific details relating to waste inventories and surveys are given in Annex 1.

All 5 countries are actively engaged in the phase out of CFCs, HCFCs in line with their obligation under the Montreal Protocol. However HPMP activities have not so far addressed the issue of ODS destruction or the recovery and recycling of obsolete refrigerators, freezers and air conditioning units. Large volumes of CFC-12, CFC-11, HCFC-22 and HCFC-141b are contained in the refrigeration circuits and insulation foams of domestic refrigerators and freezers, commercial cooling equipment and air-conditioning units. The amount of CFC or HCFC in an individual piece of equipment is relatively small but the abundance of these items creates a very large bank hazardous waste. Based on an average life expectancy of refrigerators, freezers and air conditioners of approximately 15 years it is estimated that current ODS bank in the countries covered by the project represents 12,300 ODP tonnes or 105.8 million tons of CO<sub>2</sub>. Furthermore

**the bank of equipment containing ODS is growing by approximately 5 million refrigerators and freezers and about 900,000 air conditioners per year.**

**The countries included in the project are in the process of updating their legislation on POPs and PCBs to bring it in line with European Union (EU) regulations, but for the time being landfill disposal is still being used, posing significant contamination risks. Institutional strengthening is therefore a priority for Initial technical assistance of the programme.**

**Refrigerators and other equipment containing ODS are often sent to landfill and POPs, are often simply abandoned in inappropriate storage conditions or burned in poorly controlled incinerators creating pollution and human health risks.**

**Unlike POPs which are generally stored in their original form. ODS are contained in refrigeration circuits and in the insulation foams of refrigerator and freezers. Given the very large numbers of obsolete and near end of life equipment the recovery and recycling/reclamation or destruction of ODS banks creates a very difficult technical and logistical challenge.**

**There is no infrastructure in place in the target countries for collection, storage, transportation and final disposal of ODS recovered from the end-of-life appliances (refrigerators, freezers and air-conditioners).**

**For both POPs and ODS there are currently no approved destruction facilities for pure chemicals and no efficient recycling facilities capable of dismantling refrigerators freezers and air-conditioners to remove and separate ODS and other waste material.**

**There are no market mechanisms in place to drive effective recycling schemes and no coordinated mechanisms for the collection transport and storage of the POPs identified in the NIPs. There is a general lack of technical understanding of suitable destruction technologies for POPs and ODS as well as uncertainty over the costs related to destruction and potential funding mechanisms by which destruction could be supported, including carbon finance mechanisms.**

**The 24 persistent organic pollutants currently within the scope of the Stockholm Convention include 14 pesticides and 10 industrial chemicals or by-products. The absence of adequate capacity and infrastructure for environmentally sound management and disposal of POPs poses significant risks to human health and the environment. There are no storage facilities specifically designed for obsolete pesticides and large amounts of obsolete POPs are stored in unsuitable conditions.**

**The project therefore aims to develop new approaches that overcome the difficulties faced by CEIT countries in the safe management of ODS banks and POPs waste.**

**For both POPs and ODS there are currently no approved destruction facilities for pure chemicals and no efficient recycling facilities capable of dismantling refrigerators freezers and air-conditioners to remove and separate ODS and other waste material in any of the countries covered by the project.**

**Baseline projects:**

**A number of projects and activities are under way to address these issues. Preliminary inventories of PCBs and POPs pesticides have been undertaken in all CEIT countries, and indicate that considerable activity is required to these inventories meet the requirements of Stockholm Convention.**

**The NIPs of the target countries were approved by the GEF and their ministries (National GEF Focal Points) have prepared internal action plans to adjust the national environmental legislation to the requirements of the Stockholm Convention on POPs and assigned staff responsible for monitoring the implementation of the Convention.**

**All participating countries are also actively engaged in activities to meet the agreed phase-out benchmarks of production and consumption of the CFCs and HCFCs under the Montreal Protocol. However to date these have been focussed on the phase out of consumption of ODS in manufacturing and service sectors. No activities currently address the ODS bank.**

**Considerable work has been done in establishing the extent of the problem to be addressed in each of the countries. However the countries have encountered problems in establishing models for environmentally sound collection and destruction or the most appropriate technical options for the destruction process. Country Specific details are given in Annex 1.**

**Whilst the countries have signed the international agreements and have in place high level legislation to control the use and movement of both POPs and ODS, currently focusing on streamlining and harmonizing legislative frameworks for chemicals, to be in compliance with the respective Convention's obligations, they lack the detailed regulatory framework required at a local / provincial level to drive the implementation of waste management plan and access to detailed technical analysis of the optimum waste management model for POPs and ODS. There are also no appropriate examples of private or public-private operating models.**

### **3) The proposed alternative scenario:**

**Since the environmentally sound management of POPs and ODS is a priority for the Ministries for Environment of the Governments concerned, it is recognized that the current weaknesses in legal frameworks and technical capacity must be addressed.**

**The proposed alternative scenario is to build on the baseline project to provide environmentally sound management of hazardous wastes and have in place the legal, institutional and technical infrastructure to identify, collect, store, transport and destroy waste in a sustainable manner.**

**This project is therefore considered essential to address the barriers currently being encountered. It addresses the global environmental problem of hazardous waste management and the controls and activities required to manage each of these three forms of waste, taking advantage of the similarities and synergies that are available. This unique and innovative approach is in line with one of priorities highlighted at the 42nd Meeting of GEF Council (Concept Paper: GEF-5 Ozone, Climate, and Chemicals Program, GEF/C.42/09, GEF 42nd Council, 5-7 June, 2012, Washington), as it aims to conduct a number of complementary activities in parallel, designed to generate a robust framework and methodology for dealing with POPs and ODS destruction on a regional basis and at the same time demonstrate the operation of pilot destruction facilities.**

**The currently proposed initial technical assistance stage of the project will focus on a) non-investment activities in all countries involved, b) ODS destruction in Belarus, Ukraine and Russian Federation and c) POPs destruction in Armenia.**

**A subsequent scale-up project will a) complete investment activities for POPs and ODS destruction in Kazakhstan and (b) POPs destruction in Belarus, Ukraine and Russian Federation.**

**Having reviewed the inputs and activities required for these programmes with a view to developing wherever possible innovative integrated mechanisms, it is clear that there are synergies**

**in dealing with the issues faced in the region and that there is a benefit in developing a combined programme. Since the waste management objectives must be achieved whether jointly or separately, any cost and logistical benefits that can be gained by combining activities will result in an overall a cost benefit improvement when considering the climate impact and costs associated with any objectives undertaken separately.**

### **3a) Outcomes:**

**The project will assist the region by determining the most cost effective way of establishing Environmentally Sound Management (including destruction) of POPs and ODS waste and developing both the institutional capacity and policy and regulatory frameworks to drive implementation of waste management at a local, provincial and regional level.**

**A key aspect of this will be to demonstrate appliance recycling technology integrated into a combined ODS and POPs management and destruction.**

**The project will facilitate the destruction of PCBs or targeted POPs pesticide waste and ODS recovered from recycled appliances . The pilot facilities will be based on sustainable and replicable operating models and will act as a template for further facilities in the countries concerned and in the region.**

**The total volume of ODS destroyed is estimated at 210 metric tonnes per year in the initial technical assistance stage. This is equivalent to of 3.0 MM CO<sub>2</sub> per year during the initial technical assistance phase.**

**The estimate of the volume of POPs destruction is based on the potential capacity of the selected destruction process. Initial analysis indicates that a plasma arc incineration plant would be capable of destroying around 150 metric tonnes of suitable pre-treated waste (POPs or PCBs) per year. The regional project would therefore destroy 750 metric tonnes per year after scale up activities.**

**During the initial technical assistance project of of 5 years it is anticipated that the destruction facilities provided will be fully operational during years 3-5. The expected destruction during this period is therefore 630 metric tonnes of ODS and 450 metric tonnes of POPs/PCBs.**

**The Initial technical assistance of the project will focus non-investment activities and ODS destruction in Belarus, Ukraine and Russian Federation and POPs destruction in Armenia.**

**The Scale-up of regional demonstration will continue the investment activities for POPs and ODS destruction in Kazakhstan and POPs destruction in Belarus, Ukraine and Russian Federation.**

**However the project is designed to create sustainable facilities which will continue to operate after the formal project completion. The total ODS and POPs destroyed by the facilities will therefore be higher than the target volumes for the project.**

**The project foresees the introduction of some incentives subject to negotiations with the Governments of five participating countries during the PPG stage and project implementation cycle. Please see the list provided in table below.**

Area	Incentive
POPs	Government desposal fee for national POP destruction centers to subsidise the destruction operations
POPs	Expenses covered by the Governments for POP storage, packing and transportation to the destruction centres
POPs	Transportation and destruction expenses supported by the Governments to transfer and destroy the POPs in other countries
ODS	Waste management and destruction local legislation in five project participating countries obliges manufacturers of home appliances to ensure the recovery and sound disposal - "producer pays" principal, a recycling fee is to be included in agreements with producers or distributors of electrical appliances including new refrigerators, freezers and air conditioners. This recycling fee is collected at point of sale.
ODS	Government collection fee for end users of EOL appliances to encourage them to transfer the EOL appliances for destruction
ODS	Government collection fee for quantity of recovered ODS collected by servicing operators (repair and servicing workshops)
ODS	Retailers' promotion sells of new appliances with reduction of their nominal price due to handover of EOL appliances by end users.

As to the public –private partnerships for waste management referred to in expected outcome 4.2 relates to the infrastructural and organisational mechanisms that will be used to implement waste management. The project will assist local governments in establishing the feasibility of providing services required through legislation using private companies. The "producer pays" principle whereby a levy, licensing fee, or percentage of sales revenue is retained for waste management generally relies on various public-private partnerships. Such systems can be run as voluntary (public private) programmes supported by national legislation, or as a public service where regulations simply impose a levy or license fee and Government pays for a service. Public–private partnerships have emerged as a way of improving waste management performance in many European countries where privately owned enterprises often outperform publicly owned ones. In the targeted countries, there are opportunities for private companies to profitably supply the required waste management services if appropriate legislation, start-up support and incentives are in place.

However, the regional concept is designed to provide the countries in the project to share many of the same issues and barriers to implementation. This approach aims to provide more efficient implementation for the GEF by grouping similar countries together where the same technical and logistical solutions are likely to work. This has two main advantages, a) it creates savings in the preparatory work, feasibility studies and systems design, that can be shared by each country rather than being done five times in different projects and it gives rise to potential economies of scale in the procurement of equipment and services; b) it creates a regional momentum that is more effective in incentivizing and demonstrating solutions to other countries in the region and at the same time creates a large enough regional network to be able to properly test the issues of cross-boundary waste movement and regional cooperation.

The countries in the project represent a good cross-section of the region in terms of size and industrial capacity, whilst sharing the same environmental issues and socio-economic backgrounds. The project therefore aims to develop new approaches that overcome the difficulties faced by CEIT countries in the safe management of ODS banks and POPs waste.

As well as the direct climate impact of the activities described above, the project team will look to apply best practice in terms of energy efficiency in all aspects of the project including installations

directly funded such as destruction facilities as well as peripheral areas such as transport, accommodation and provision of services from environmentally sound suppliers.

**3b) There are 6 main components of the project :**

**Institutional capacity building and development:** This component will develop adequate institutional capacity at the central government and provincial level in selected provinces for POPs and ODS identification and management, including the placement of suitably trained personnel required to complete and maintain accurate waste inventories.

**Policy and regulatory frameworks:** The policy and regulatory frameworks established in the baseline project will be strengthened to allow enforcement of POPs and ODS waste management to meet relevant obligations, including exploitation of potential for coordinated management of ODS and POPs waste disposal between five countries and within the region.

**Waste management and destruction systems;** the project will explore the feasibility of various management and destruction methodologies for the five countries. This component will also develop and facilitate the approval of national ODS and POPs destruction plans for each country covering regulations and incentives for collection of obsolete POPs and ODS (EOL refrigerators, freezers and ACs, ODS recovery) introduced.

**National ODS and POPs collection, storage and transportation networks;** will be established through the project to identify collect and transport POPs and ODS waste (appliances) to specified recycling and destruction locations. Such networks are essential for the sustainability of any waste management system and the project will focus on demonstrating the feasibility and economic viability of systems and the potential for public-private partnerships for waste management.

**ODS and POPs recycling and destruction facilities:** Under initial technical assistance for regional demonstration , pilot facilities will be established in each country based on the outcomes of detailed reviews and feasibility studies including the selection of appropriate destruction technology meeting requirements of the TEAP. This component will also develop in country capacity to recycle appliances and recover and destroy ODS contained therein through the construction of pilot facilities with a total capacity of 70 MT of ODS and 150 MT of POPs per year per centre,

**Establishment of ESM for the recovery and treatment of PCB wastes:** Armenia will not be involved in ODS destruction related activities; the project here will focus on the development of a Legal framework and Environmentally Sound Management System for PCB wastes. The component will establish a sustainable PCB Treatment facility and the required communication and transport infrastructure for engaging users and handling PCB waste.

**4. Incremental cost reasoning and expected contributions:**

The GEF Project is designed to exploit the synergies of POPs and ODS waste handling and destruction. Both issues will require a significant programme of activities in line with the relevant protocols and conventions governing the control of hazardous substances. The PCB destruction is included only in Armenia, as this is covered by other activities in the participating countries. More details on Regional approach, Feasibility of Co-Destruction Technologies and Expanding the POPs/ODS destruction Network, please see in Annex 1.

The benefits of the initial project will be 630 MT of ODS and 450 MT of POPs to be destroyed over the three years of operation during the GEF project.

Based on the grant investments proposed in the PIF this project the cost effectiveness analysis is shown in Annex 6.

The higher investment cost of ODS destruction is a result of the comparatively higher cost of the shredding plant; but without this, it is not possible to process the insulation foams in refrigerators and air-conditioners or to generate income from resale of recycled material.

It should also be noted that design life of the recycling and destruction facilities will be at least 10-15 years and given the very large banks of ODS equipment in the countries, the plants will continue to generate environmental benefits after the formal completion of the project.

Furthermore, it is envisioned that subsequent scale-up project will aim to increase the regional destruction capacity to 280 MT of ODS per year and 750 MT of POPs. The target total destruction volume over the period of the initial and scale-up projects is 840 MT of ODS and 7,500 MT of POPs.

#### 4a) Co-financing:

The indicative grant funding sought from GEF is associated with determining the technical feasibility and procurement of pilot demonstration plants for the recycling of appliance sand the destruction of POPs and ODS. Without this funding it is unlikely that the region will gain the critical momentum required to improve public awareness and engage public and private stakeholders to accelerate sound management and disposal of these substances.

This project has established good engagement and participation with private sector stakeholders focusing on the owners of POPs waste stocks, the refrigeration service sector and waste handling companies. Both public and private sector stakeholder are willing to take steps to address the issues detailed above, but this is only likely if a robust and coordinated programme is developed to provide appropriate technical guidance and support.

Private sector stakeholders in the five countries will provide co-financing for the GEF project. Co-financing will be used to develop the infrastructure and logistics, networks required for the transport of waste as well as the construction and or modification of buildings, provision of trucks for transportation of waste and laboratory measuring equipment and premises. It will also cover expenses and salaries for technical, managerial, engineering and manual staff for the project duration.

The national governments of the countries in the project will also provide in kind financing through provision of support with staff, office accommodation and coordination resources, as well as conducting analysis and barriers to the desirable cross border shipment (activity 3.1.3 the allocation for this activity has been reduced by US\$ 200,000).

The majority of project co-financing is from the private companies, assigned project beneficiary counterparts responsible for establishment of the ODS and POPs destruction centres in their countries.

UNIDO has had initial discussions with local private companies regarding their potential involvement in the project and their potential co-financing. If the project provides equipment and consultancy services, private companies will set up an organizational infrastructure for collection, storage, and processing of ODS and POPs. Since the capital cost of equipment is relatively high private companies will also need to provide additional funds for construction of buildings and

premises for plant and facilities.

Transport costs will be met by private companies including purchase of lorries to transport ODS in cylinders and POPs in bags. Private companies will also pay the salaries of local staff over 5 years, etc. Some funds will come from the Governments to cover expenditures associated with the improvement of local legislation and the set up of incentive mechanisms to support the private sector involvement.

The co-financing letters will be addressed during the PPG stage and presented with the Request for CEO endorsement. However, the several partners in the targeted countries have expressed their interest and consultations and discussions are currently ongoing.

Initial discussions indicate that private sector investors, like “AtlantInc” and Nord OJSC, who can provide technical assistance and advice on treating existing stocks of obsolete POPs pesticides and associated wastes, PCBs in Armenia and electrical appliances in the dumping places of landfills, agree in principle that the level of co-financing provided through GEF support would be sufficient to provide the incentive and support necessary to initiate the project as described. In addition, the private sector companies in participating countries, involved in the recycling activities, such as recycling of refrigeration appliances, expressed their interest to take part in this project within the existing co-financing scheme.

The type of activities that the private sector companies, involved in this project are planning to contribute, will be further elaborated and described with specific country-level and enterprise-level details during the preparation of FSP.

#### **5) Global Environmental Benefits:**

This project will directly provide for disposal in accordance with Stockholm Convention and Basel Convention of a minimum of 450 MT of PCB or targeted POPs pesticide waste and 630 MT of ODS (9.0 MM of CO<sub>2</sub>e) in the three years of operation of the destruction facilities. In addition, it enhances capturing mercury and PCB traces from the ODS containing appliances.

It will also consider the technical feasibility of using cement kilns for ODS and POPs destruction. As cement production is energy and carbon-intensive process there is an opportunity, subject to the feasibility of the destruction efficacy, to address potential energy efficiency improvements in the cement kiln at the same time as modifying the kiln for waste destruction. For example, coal fired kilns could be converted to natural gas firing, resulting in improved energy efficiency and reduced carbon emissions. The feasibility study will therefore include an Energy Efficiency study and carbon audit of potential cement kiln sites.

The estimate of ODS destruction (excluding Armenia) is calculated on the following basis:

Average number of pieces (refrigerator, freezer, air-conditioner) per facility per year is 150,000. This is a conservative estimate and takes into account the regional variations. The following values of recycled material have been used:

Material	Mass per unit	Recycling efficiency	Mass Recovered	units per year	Total recycled or destroyed MT
Metal	68.18	90%	61.36	150,000	9,204.55
Plastic	11.36	90%	10.23	150,000	1,534.09
Glass	1.36	85%	1.16	150,000	173.86
Refrigerant	0.23	80%	0.18	150,000	27.27
Foam Blowing agent	0.45	85%	0.39	150,000	57.95
Oil	0.23	75%	0.17	150,000	25.57
Mercury	0.0009	60%	0.00	150,000	0.08
<b>Total Foam blowing agent and refrigerant per facility</b>					<b>85.23</b>
<b>% of ODS</b>					<b>0.85</b>
<b>Total ODS destroyed</b>					<b>72.44</b>

The estimate of the volume of POPs destruction is based on the potential capacity of the selected destruction process. Initial analysis indicates that a plasma arc incineration plant would be capable of destroying around 150 metric tonnes of suitable pre-treated waste (POPs or PCB) per year on a single shift basis. The regional project could be scaled up to 750 MT per year on a single shift basis.

However the project is designed to create sustainable facilities which will continue to operate after the formal project completion.

It is quite difficult at this stage to estimate possible POP destruction quantities in cement kilns of vertical type available in the region. The FAO has recently conducted an initial review of cement kilns options in the former Soviet Union and has not identified any kilns which would be suitable for such an application.

A full recycling approach will be taken to appliances, whereby all metal components, cainf, motors, cables etc are extracted and recycled as a revenue stream, foam will be shredded and a minimum of 85% of the foam blowing agent will be recovered or destruction. The facilities will be equipped to carefully monitor volume of material in and out of the recycling plants.

It would also be possible to process obsolete construction foams from local landfill or other sources, as these foam panels can be processed in the same shredders.

Furthermore, as mentioned before it is envisioned that the target total destruction volume over the period of this initial project and the envisioned subsequent scale-up intervention is 840 MT of ODS and 7,500 MT of POPs.

#### 6) Innovation, sustainability and potential for scaling up:

This project seeks to improve value for money and maximise impact by combining activities with clear institutional and practical synergies. It also takes a regional approach with the aim of amplifying the replicability of pilot and activities and technology transfer as widely as possible

**within the region. Please see a description above in the “proposed alternative scenario” in item 3.**

The project concept is based on gaining maximum benefits from the available synergies and aims to use the benefits of public-private partnerships to achieve key Global Environmental Benefits. Stakeholder engagement will be important from the outset to establish mechanisms that will fulfill the regulatory objectives as well as provide business opportunities for private investors.

The types of recycling and destruction facilities proposed in this project are demonstrably sustainable (as seen in other EU states) once the appropriate regulatory and incentive mechanisms are in place. Recycling facilities once established can be profitable if there is a sufficient supply of waste to process.

The aim of the project is to assist the countries in establishing the regulatory framework, the incentive mechanisms (initially supported by subsidies) and the infrastructure and technology to handle waste. The facilities provided through the project should be commercially self-sustaining by the end of the project period (5 years) and should also act as a model for further private investment.

It will establish destruction facility and provide a good platform to be very sustainable. After project completion the ODS destruction will continue, that will strengthen the sustainability and cost effectiveness. More details are provided in the table on calculation of cost effectiveness in Annex 6.

The project sustainability is secured by the recovery of metal, copper, aluminum and plastic materials from the refrigerators and air conditioners processed in the shredder, which can be sold as feed stock to manufacturing processes and smelters. Components such as capacitors, containing PCB can also be processed in the same plant.

Another potential source of co-financing, which could strengthen the project sustainability, is carbon trading. As CFCs and HCFCs have high GWP, destruction is eligible for carbon credits in voluntary carbon markets (CAR and VCS), where destruction ODS is considered and *additional rather than* regulatory requirement. Partial funding for future plants could potentially be gained from the sale of carbon emission reduction credits.

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

Russia: Ministry of Natural Resources and Environment of the Russian Federation is the lead Ministry, and will be assisted by the Centre for Preparation and Implementation of International Projects on Technical Assistance and UNIDO centre for international Industrial co-operation in the Russian Federation will be the primary implementation partners for the programme in Russia.

In Ukraine the responsible Ministry is the Ministry of Ecology and Natural Resources. Nord OJSC is a major refrigeration manufacturer with a long standing reputation in the country, it produces equipment which is considered to be on par with European manufacturers.

Ministry of Natural Resources and Environmental Protection of Republic of Belarus and Atlant Inc, which is one of the leading manufacturers of domestic refrigeration and air-conditioning equipment in the CIS, it is recognised for high quality in the consumer market.

The responsible Ministry in Kazakhstan is the Ministry of Environment Protection of the Republic of Kazakhstan, the primary implementation institution will be the National Environmental Centre for Sustainable Development.

In Armenia the Ministry of Nature Protection of the Republic and the Waste Research Center (WCR) will approach all energy sector stakeholders in Armenia in both public and private supply and distribution as

well as major equipment owners in industrial and commercial premises will be engaged to identify and prioritise the treatment of PCB wastes.

A.3 Risk. Indicate risks, including climate change, potential social and environmental risks that might prevent the project objectives from being achieved, and, if possible, propose measures that address these risks to be further developed during the project design (table format acceptable):

A list of risks is presented in Annex 4.

A.4.Coordination. Outline the coordination with other relevant GEF financed and other initiatives:

The MOP requested the ExCom of the MLF in its decision XXI/2 to set a window for funding projects for disposal and destruction of ODS required for compliance with the Montreal Protocol Fund. ODS disposal was recognized as being an important issue for Article 5 countries lacking the necessary facilities to collect CFCs and destroy CFC stocks. Networks in Article 5 countries need to be established dealing with the recovery and recycling of CFCs from the banks, having the necessary equipment for CFC extraction and shredding operations and consequently with final CFC destruction at cement kilns or waste incineration plants.

The GEF has also re-structured its operational focus areas, following extensive discussions about fund replenishment (under GEF-5). GEF is aiming to bring together various chemical topics for increased coherence, including POPs (Stockholm convention), ODS (Montreal Protocol), sound chemicals management. Central American leaders coordinating destruction of ozone-depleting substances and persistent organic pollutants announced two national pilot projects to help addressing the challenge of collecting and destroying mounting stocks of chemicals and wastes in the region, on the closing day of the 10th meeting of the Conference of the Parties to the Basel Convention. This initiative will provide free-of-charge technical and financial support for the environmentally sound destruction of ODS and POPs to motivate holders of these substances to stop releasing them to the environment. This project concentrates on the technology transfer. Co-operation with the regional projects in Latin America has to be developed to share project results.

The Ministries of Environment of Armenia, Belarus, Russia and Ukraine and other East European countries are the executing partners in the Regional Waste Governance. Project financed by the EU within the framework of the European Neighbourhood and Partnership Programme. The project started in 2009 and will finish in 2014. The primary objective of the project is to develop a strategy to solve municipal waste management problems of the participating countries. Please see a table with an overview of status of projects in this Region in Annex 2.

#### **Description of the consistency of the project with:**

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

All the project target countries have ratified the Montreal Protocol Agreement and Stockholm Convention on POPs as shown in the table in Annex 3.

National Implementation Plans (NIPs) for the Stockholm Convention have identified phase-out and disposal of POPs and PCBs as a key priority requiring immediate action. More details of national legislation are given in section B1.

The countries have significant banks of ODS and would like to prevent further emissions from banks in tandem with the implementation of HPMPs and in line with best practice, including the F-gas

regulations in place in Europe.

The prevention of ODS emissions from banks is also in line with priorities to reduce GHG emissions. The project will aim to recycle 150,000 appliances per year by the end of the project benefiting in reducing emissions of CFCs in the value of 1,050.0 MT of ODS (1.36 million CO<sub>2</sub>e per annum from the banks in the region).

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

The project is consistent with GEF FA Objectives, Chem-1 and Chem-2.

CHEM 1 – POPs: waste destruction: Output 1.4 through the destruction of 300 MT of POPs per annum at the national centres proposed.

CHEM 2 “Phase out of Ozone Depleting Substances (ODS)”, and “Ozone Depleting Substances in the Banks”, Output 2.1, through the Destruction of 280 MT of ODSs per annum at the national centres proposed.

In order to meet these recommendations, this project aims to conduct a number of complementary activities in parallel which are designed to generate a robust framework and methodology for dealing with POPs and ODS destruction on a regional basis and at the same time demonstrate the operation of pilot destruction facilities.

It will also consider the technical feasibility of using cement kilns for ODS and POPs destruction. As cement production is energy and carbon-intensive process there is an opportunity, subject to the feasibility of the destruction efficacy, to address potential energy efficiency improvements in the cement kiln at the same time as modifying the kiln for waste destruction. For example, coal fired kilns could be converted to natural gas firing, resulting in improved energy efficiency and reduced carbon emissions. The feasibility study will therefore include an Energy Efficiency study and carbon audit of potential cement kiln sites.

The project will deliver annual emissions reductions of CFC-12 and CFC-11, extracted from end-of-life refrigerators and air-conditioners. The estimated annual GHG emission reduction is 1.36 million tons CO<sub>2</sub> equivalent.

As well as the direct climate impact of the activities described above, the project team will look to apply best practice in terms of energy efficiency in all aspects of the project including installations directly funded such as destruction facilities as well as peripheral areas such as transport, accommodation and provision of services from environmentally sound suppliers.

It will also introduce regulatory reforms in the five selected countries and strengthen national capacity in identifying, assessing, managing, and treating such wastes in an environmentally sustainable manner. It will also maximize opportunities for public-private partnership through development of conducive policies and regulations.

It is consistent with GEF-5 Linkages to other focal areas in Climate Change Mitigation. The outputs of the project will serve as a template and knowledge base for other programmes in the CEITs as well as providing insights into the development of global strategies.

It is in line with the Montreal Protocol that “international funding agencies including GEF to enable practical solutions for the purpose of gaining better knowledge on mitigating ODS emissions and destroying ODS banks”.

This project seeks to support a key aspect of the GEF's strategy to bring together various chemical topics for increased coherence. It deals specifically with the GEF priority for funding integrated waste management projects dealing with multiple chemicals, in this case POPs and ODS.

### B.3 The GEF Agency's comparative advantage for implementing this project:

UNIDO is within the comparative advantage matrix set out in GEF/C.31/5 rev.1. UNIDO's operation has been extensively carried out in the POPs focal area of GEF, in particular, UNIDO has implemented environmentally sound management of PCBs in Asia and other regions and has accumulated sufficient knowledge and experiences in implementing GEF projects. UNIDO is one of the leading implementation agencies of the Montreal Protocol and has established a number of ODS destruction programmes. The 63rd ExCom of the MLF approved the first project for Mexico on ODS destruction including a carbon trading offset programme based on Voluntary Carbon Market with the CAR and VCS and continued with formulation of national ODS destruction projects in Algeria, China, and Turkey.

UNIDO can involve the industrial sector in GEF projects in the following areas: industrial energy efficiency, renewable energy services, water management, chemicals management (including POPs and ODS), and biotechnology. UNIDO also has extensive knowledge of small and medium enterprises (SME's) in developing and transition economy countries.

UNIDO has significant experience with environmentally sound waste management projects in developing countries. The municipal solid waste management project that resulted in the formulation of a nationwide municipal solid waste management strategy was of particular significance. The accumulated lessons learned provided valuable knowledge base for the formulation of this project proposal.

Recently UNIDO took the lead in implementing BAT/BEP measures in several industrial source categories (iron and steel industry, medical waste incineration and production of pulp and paper) of the potential for comparatively high formation and release of OP-POPs to the environment. Based on the favorable experience gained, developing countries jointly with UNIDO formulated and submitted for GEF funding a full sized BAT/BEP project on environmentally sustainable medical waste management in China. This project was approved and its Inception Workshop was held in Beijing in March 2008. Please find more details in Annex 5.

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

**A. RECORD OF ENDORSEMENT OF GEF OPERATIONAL FOCAL POINT (S) ON BEHALF OF THE GOVERNMENT(S):** (Please attach the [Operational Focal Point endorsement letter\(s\)](#) with this template. For SGP, use this [OFP endorsement letter](#)).

<b>NAME</b>	<b>POSITION</b>	<b>MINISTRY</b>	<b>DATE (MM/dd/yyyy)</b>
Mr. Rinat Gizatulin	Deputy Minister National GEF Operational Focal Point	MINISTRY OF NATURAL RESOURCES AND ENVIRONMENT OF THE RUSSIAN FEDERATION	03/07/2013
Mr. Vadym Pozharskyi	Head of Department, International Cooperation and European Integration GEF Operational Focal Point	MINISTRY OF ENVIRONMENTAL PROTECTION OF UKRAINE STATE ENVIRONMENTAL INVESTMENT AGENCY OF UKRAINE	03/12/2013
Mr. Vitaly Kulik	First Deputy Minister GEF Political/Operational Focal Point	MINISTRY OF NATURAL RESOURCES AND ENVIRONMENT PROTECTION OF THE REPUBLIC OF BELARUS	06/28/2012
H.E. Nurlan Kapparov	Minister GEF Political Focal Point	MINISTRY OF ENVIRONMENT PROTECTION OF THE REPUBLIC OF KAZAKHSTAN	04/24/2013
H.E. Aram Harutyunyan	Minister GEF Political/Operational Focal Point	MINISTRY OF NATURE PROTECTION OF THE REPUBLIC OF ARMENIA	03/29/2013

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

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

Agency Coordinator, Agency name	Signature	DATE (MM/dd/yyyy)	Project Contact Person	Telephone	Email Address
Mr. Dmitri Piskounov, Managing Director PTC, UNIDO GEF Focal Point		25/01/2013	Mr. Yuri Sorokin, Industrial Development Officer 	+43126026-3624	y.sorokin@unido.org

## **Annex 1**

### **Baseline Situation and problems to be addressed**

The project definition takes into account the environmental priorities of the countries involved and the component design is based to a great extent to complement and supplement existing activities and programmes in each country. A key priority in all countries is waste management and waste treatment. Preliminary inventories of PCBs and POPs pesticides have been undertaken in all CEIT countries, and indicate that considerable activity is required to these inventories to meet the requirements of Stockholm Convention.

After ratification of the Montreal Protocol by the five participating countries, the control of ODS production and consumption was integrated into national environmental legislation. However, none of the countries developed policies to deal with the ODS banks and there is no legislation pertaining to ODS banks (as is the case in all CEITs). Since there are well developed mechanisms in the European Union for dealing with ODS banks contained in refrigeration and air-conditioning equipment through recycling processes, it is feasible to develop waste handling legislation for ODS banks in CEITs, using the European (and international) models. However the development of legislation also required the provision of capacity to implement legislation. The project therefore includes the development of pilot facilities for recycling materials and the environmentally sound destruction of ODS.

As well as the overall focus on the environmentally sound management of waste and hazardous materials, the countries involved have specific obligations for dealing with POPs and PCBs. These issues are starting to be addressed at the policy level through various programs and activities resulting from National Action Plans (NAPs) and National Implementation Plans (NIPs), including the assignment of staff to monitor the implementation of the Conventions and assess the extent of the problems in each country.

However the countries have encountered problems in establishing models for environmentally sound collection and destruction or the most appropriate technical options for the destruction processes.

Whilst the countries have signed the international agreements and have in place high level legislation to control the use and movement of both POPs and ODS, currently focusing on streamlining and harmonizing legislative frameworks for chemicals, to be in compliance with the respective Convention's obligations, they lack the detailed regulatory framework required at a local or provincial level to drive the implementation of waste management plan and access to detailed technical analysis of the optimum waste management model for POPs and ODS. There are also no appropriate examples of private or public-private operating models. For these reasons the project is entirely consistent with the countries' programmes.

Several countries in the region used to produce PCBs and POPs pesticides and have many contaminated sites and equipment and large stockpiles of POPs pesticides stored in inappropriate conditions. Many operational transformers, capacitors, switch gear and other electrical equipment still contain PCBs. When this equipment is decommissioned it will add to the bank of PCB waste.

The countries are updating their legislation on POPs and PCBs to be in line the European Union (EU) regulations. However at present landfill disposal is still being used posing significant contamination risks. Little cooperation or coordination has taken place to date between the countries despite shared issues, geographical proximity and the custom-free zone established between Russian Federation, Belarus and Kazakhstan.

In Kazakhstan only 20% of the territory has been surveyed to date, but this has identified 15 tons of obsolete toxaphene and 1,500 tons of obsolete pesticide (OP). The final inventory will be much higher when the rest of the country is surveyed. A GEF project initiated by the Government in 2009 planned to dispose of approximately 8,000 tons of OP. A new project was initiated in 2011 to update of NIP data. In 2006 Ukraine identified 31,689 tons of obsolete and non-identified pesticides. It estimated that there were 4,240 tons of PCBs contained in equipment and stored separately. The total amount of PCB-contaminated equipment has been estimated to be somewhere between 11,000 and 30,000 tons. The NIP is currently being updated.

In 2009/10 around 2,000 tons of obsolete pesticides were exported from Ukraine to Germany for destruction. In 2010 a single mining site was identified which contained more than 20,000 tons of HCB. To date 8,500 tons of HCB have been excavated repackaged and transported by ship to the United Kingdom for destruction. Approximately €35 million from the State Reserve Fund has been allocated for environmental management in the mining area.

Belarus has identified 7,360 tons of OP in storehouses and buried in landfills including 718 tons of DDT. The inventory shows that approximately 39% of OP is stored, 38% buried in underground tombs and 26% transported to landfill in the centralized hazardous waste facility in the Gomel region. It is assumed that there is much more OP stored in other regions. A project was submitted in 2008 to GEF for securing and repacking some of the stockpiles. In 2011, 950 tons of OP were repacked and transported to Germany for disposal at a specialized facility.

In the Russian Federation the current assessment is between 77,000 and 100,000 tons of obsolete pesticides and with the volume increasing year by year. In 2009 the storage of unserviceable pesticides was arranged in 2,756 warehouses. However only a third of these warehouses hold Hygiene Certificates and only two thirds have sanitary protection zones. In 2007 approximately 6,500 tons of obsolete pesticides were repackaged and secured as part of the Arctic Council Action Plan which aims to eliminate pollution around the Arctic region (ACAP).

The preliminary inventory identified 7,514 transformers and 329,026 capacitors containing 20,841 tons of pure PCB. The inventory covers only 300 large enterprises and 300 energy sub-stations. Many owners of this equipment were not included in the inventory. Approximately 35,000 tons per year of PCB (Sovtol and TCB) are still used in manufacturing in Russia. Approximately 21,000 tons of PCB and TCB/PCBs are used for the annual production of 10,000 transformers and 14,000 tons of TCB are in the manufacturing of 500,000 condensers.

According to the PCB inventory in the Republic of Armenia, total number of transformers is 9,867; the number of oil switches involved in the Inventory is 2,574. The Inventory involved about 18,000 L PCB-containing oils, of which more than 2,000 samples were randomly analyzed for PCB content. It was found that 18% of samples contained PCB levels of > 50ppm. The Strategy chosen by Armenia, taking into account the inventory contains a lot of operational equipment is to implement a treatment/recovery project for the these oils.

All 5 countries are actively engaged in the phase out of CFCs, HCFCs in line with their obligation under the Montreal Protocol. However HPMP activities have not so far addressed the issue of ODS destruction in 4 countries, as Armenia will not be involved in ODS destruction related activities. The regulations relating to recovery and recycling are inconsistent and or poorly enforced.

CFC-12, CFC-11, HCFC-22 and HCFC-141b are contained in the refrigeration circuits and insulation foams in domestic refrigerators and freezers, commercial cooling equipment and air-conditioning units. Whilst the amount of CFC or HCFC in an individual piece of equipment is relatively small, the abundance of these items creates a large bank of contained substances. Refrigerators and other equipment

containing ODS are often sent to landfill and POPs, are often simply abandoned in inappropriate storage conditions or burned in poorly controlled incinerators creating pollution and human health risks. Based on an average life expectancy of refrigerators, freezers and air conditioners of approximately 15 years it is estimated that current ODS bank in the countries covered by the project is as follows:

**Table 1: Current ODS banks**

Appliances	ODP tonnes	CO2eq, million tons
Domestic refrigerators	7,200	52.24
Stationary air conditioners	5,000	53.60
Total (estimate)	12,300	105.84

The bank of equipment containing ODS is growing by approximately 5 million refrigerators and freezers and about 900,000 air conditioners per year.

Unlike POPs which are generally stored in their original form. ODS are contained in refrigeration circuits and in the insulation foams of refrigerator and freezers. Given the very large numbers of obsolete and near end of life equipment the recovery and recycling/reclamation or destruction of ODS banks creates a very difficult technical and logistical challenge.

There is no infrastructure in place in the target countries for collection, storage, transportation and final disposal of ODS recovered from the end-of-life appliances (refrigerators, freezers and air-conditioners). For both POPs and ODS there are currently no approved destruction facilities for pure chemicals and no efficient recycling facilities capable of dismantling refrigerators freezers and air-conditioners to remove and separate ODS and other waste material.

There are no market mechanisms in place to drive effective recycling schemes and no coordinated mechanisms for the collection transport and storage of the POPs identified in the NIPs. There is a general lack of technical understanding of suitable destruction technologies for POPs and ODS as well as uncertainty over the costs related to destruction and potential funding mechanisms by which destruction could be supported, including carbon finance mechanisms.

The 24 persistent organic pollutants currently within the scope of the Stockholm Convention include 14 pesticides and 10 industrial chemicals or by-products. The absence of adequate capacity and infrastructure for environmentally sound management and disposal of POPs poses significant risks to human health and the environment. There are no storage facilities specifically designed for obsolete pesticides and large amounts of obsolete POPs pesticides are therefore often stored in unsuitable conditions.

The project therefore aims to develop new approaches that overcome the difficulties faced by CEIT countries in the safe management of ODS banks and POPs waste.

### **Baseline scenario and any associated baseline projects**

The NIPs of the target countries were approved by the GEF and their ministries (National GEF Focal Points) have prepared internal action plans to adjust the national environmental legislation to the requirements of the Stockholm Convention on POPs and assigned staff responsible for monitoring the implementation of the Convention.

All participating countries are also actively engaged to meet the agreed phase-out benchmarks of production and consumption of the CFCs and HCFCs under the Montreal Protocol.

Considerable work has been done in establishing the extent of the problem to be addressed in each of the countries. However the countries have encountered problems in establishing models for environmentally sound collection and destruction or the most appropriate technical options for the destruction process. In the Russian Federation waste management falls within the Environmental Doctrine of the Russian Federation. This legislation determines national policy for environment protection. The doctrine is implemented through the Operation Plan for Environment Protection and Management. This specifically refers to increasing efficiency of participation in international environment protection conventions and agreements. The current legislative framework for environmental protection consists of a set of federal laws and several by-laws, regulations and directives including: Federal Law on Environmental Protection (2002); Environmental Impact Assessment (Ecological Expertise) (1995); Atmospheric Air Protection (1998); Wastes of Production and Consumption” (1998).

The Federal Law of the Russian Federation “On safe handling of pesticides and agrochemicals” (No.109-FZ dated July 19, 1997 amended on December 30, 2008) establishes a legal platform for the safe handling of pesticides including handling in storage, neutralization, utilization, disposal, and burial. In accordance with the federal law, no pesticides and agrochemicals can be handled which are not on the State Register of Pesticide and Agrochemicals approved by Russian Federation Ministry of Agriculture.

The Government is currently actively participating in implementation of the legislative policies and provides strong support to the relevant stakeholders however institutional capacity at the regional and municipal levels varies considerably. Several administrations have set up environmental committees with responsibility for compliance. In other regions, the administrations tend to delegate energy, municipal services, and environment to one department where environmental issues are given lower priority. There is already existing cement kiln facility that could be used for conducted feasibility study.

In Ukraine the framework Law on Environmental Protection was adopted in 1991 before the collapse of the Soviet Union. It was updated in 2001 and the Water Code of 1995 and the Law on Waste (1998) were subsequently enacted to create regulatory frameworks for each area of environmental protection. In September 2003 Ukraine implemented a project called "Ensuring the Development of a National Action Plan for Implementation of the Stockholm Convention on POPs". The project was implemented by UNEP with GEF support.

The Ministry of Environmental Protection has overall responsibility for the legal framework, but local authorities have some responsibility for administration of environmental law. Law enforcement bodies, such as the Ministry of Internal Affairs and the General Prosecutor’s Office, which includes a specialized environmental prosecutor’s department, have significant authority to enforce actions against violations of environmental laws.

In Belarus POPs are controlled under the Law of the Republic of Belarus “On Environmental Protection” of 26 November 1992 (amended in 2002). This law is supported by more specific laws and regulations covering the basic aspects of POPs management including; hazardous waste management, environmental monitoring, transportation of dangerous goods, registration of chemicals and pesticides, specific bans on substances, control of soil, water and air degradation, and protection of health. The project has been developed for incineration of POPs with plasma arc technology that could be used as potential baseline project.

Jointly with research institutes the Government has developed a methodology and guidelines for compiling an inventory of the POPs, obsolete pesticides and equipment, PCBs waste. The Government strongly supports the legislation and the Ministry of Natural Resources and Environmental Protection has

been designated as the National Focal Point for the exchange of such information and the Specialized Inspectorate for Waste Management Control has been authorized to organize the work for the implementation of the Stockholm Convention. This will provide the opportunity for great cooperation and support during the project implementation.

Kazakhstan has strengthened and modernized the legal and policy framework for environmental protection management. In 2003 the Government adopted the “Concept of ecological safety for 2004–2015”. In 2006 Kazakhstan published “the Concept of transition to sustainable development for the period 2007–2024”, which shows an increased emphasis on sustainable development. Various legislative measures have also been adopted to reduce and phase out ODS, including a requirement for businesses to obtain the licenses to import or export ODS and ODS-containing products, and licenses to assemble or repair ODS-containing equipment. This included a ban on imports of most types of ODS and ODS-containing products.

A programme on POPs control, management and monitoring was developed in accordance with the “Concept on Environment Protection of the Republic of Kazakhstan for 2004-2015”. The POPs issue is reflected in “the Environment Code of the Republic of Kazakhstan”. Legislation adopted in 2005 banned the disposal of unwanted refrigerators in a landfill and required municipalities and companies to put in place procedures to manage the environmentally safe recovery of ODS. Some used refrigerators are sent to the metal recycling facility, however only the refrigerant is removed from the compressor circuit, CFCs/HCFCs are not recovered from the insulation foam. There is ongoing project on PCB oils and project on POPs that could be used as potential baseline project.

The Government is actively involved in implementing policies and is increasing number of additional MoE staff and budget, by creating of National Sustainable Development Council, Inspectorate and Inter-Agency body on ESD to provide support to develop strong cooperation with relevant stakeholders. One of the priorities is to address the sound management of ODS and POPs and waste.

In Armenia, all relevant regulations are in place. The implementation of the Stockholm Convention was planned and is progressing in close coordination with the “national strategies on development and environment”. Armenia has made significant progress in the development of a number of environmental strategies including: National Environmental Action Plan 2009–2012; as well as programmes for; updating a National Chemicals Management Profile and National SAICM capacity Assessment. A revision of the National Profile provided data for the period of 2003-2008 which was used to update the NIP. The Governmental Action Plan prioritizes issues related to sound management of PCB containing wastes. The NIP also identified existing policy and regulations regarding the production, use, import and export, environmental monitoring for pesticide POPs and PCBs, and addresses stockpiles of waste and contaminated sites in Armenia.

There are no specific policies or regulations regarding POPs management. Instead, stipulations related to POPs management are implied through different laws and regulations that are hard to coordinate. These regulations generally contain overlaps and gaps. It is recognized that the framework would benefit from increased incentive-based measures to promote self-regulation and monitoring rather than through local enforcement of complex regulations. At local levels, where capacity is weak, regulations are poorly understood, inconsistently applied and subject to varying interpretations.

The Waste Research Center (WRC), a state non-commercial organization at the Ministry of Nature Protection will be the national executing agency (NEA) in Armenia. WRC will be engaged in the development of scientifically based recommendations aimed at minimizing the risks of PCBs to human health and environment. The centre will also be responsible for the preparation of regulations for sound management of POPs-containing wastes and oils, including handling, transportation, disposal, etc. In Armenia, this project will be related only to PCB-containing waste. The inventory of equipment (capacitors, transformers, etc.) containing transformer oil, as well as reserve quantities of such oils was

taken in different sectors of the National Economy: in energy production and distribution companies of energy sector in the Republic of Armenia, as well as in industry sector of the country. However, the challenges relevant to PCB-containing waste were identified in the frames of GEF/UNIDO “Technical assistance for environmentally sustainable management of PCBs and other POPs waste in the Republic of Armenia” Project and need to be addressed.

In addition, a table that shows the ongoing and planned activities (Annex 2 of the PIF), indicates possible cooperation with the projects on POPs in the Russian Federation and Kazakhstan. Since this is a new concept with an innovative approach, there are potential linkages/possible cooperation that will be explored further during the formulation of FSP.

For both POPs and ODS there are currently no approved destruction facilities for pure chemicals and no efficient recycling facilities capable of dismantling refrigerators freezers and air-conditioners to remove and separate ODS and other waste material in any of the 4 countries covered by the project. Whilst the countries have signed the international agreements and have in place high level legislation to control the use and movement of both POPs and ODS, currently focusing on streamlining and harmonizing legislative frameworks for chemicals, to be in compliance with the respective Convention’s obligations, they lack a) the detailed regulatory framework required at a local / provincial level to drive the implementation of waste management plan, b) access to detailed technical analysis of the optimum waste management model for POPs and ODS and c) appropriate examples of private or public-private operating models.

Since the environmentally sound the management of POPs and ODS is a priority for the Ministries for Environment of the Governments concerned, it is recognized that the current weaknesses in legal frameworks and technical capacity must be addressed.

For this reason the GEF project proposed is considered essential to address the barriers currently being encountered.

### **Treatment of PCB in Armenia**

The project will assist Armenia to comply with the PCB-related obligations under the Stockholm Convention and reduce the releases of PCBs into the environment through enhanced national capacity in the management of PCBs-containing equipment and wastes.

The project will set up an environmentally sound management (ESM) system for treatment of PCBs and PCB-containing equipment, including legislation, institutional and technical capacity building, awareness raising and assisting in the phase-out process of PCBs-containing equipment from the selected demonstration areas.

The original project concept included POPs destruction facilities in Armenia; however the Ministry of Natural Protection of the Republic of Armenia strongly supports the project concept and believes that the regional and co-destruction benefits defined in the project would be extremely beneficial for Armenia if applied to PCBs rather than POPs in its case.

A huge quantity of PCBs has been identified in the country during the implementation of the GEF/UNIDO project entitled “Technical assistance for environmentally sustainable management of PCBs and other POPs waste in the Republic of Armenia”.

According to the latest data, there are 9,867 PCB transformers and 2,574 oil switches in the country. It is estimated that there are 18,000l of PCB-containing oils, of which above 2,000 samples were randomly analyzed for PCBs content.

The GEF project has already provided basis for the establishment of the PCB and POP management system in the country. The given project proposal provides a hydrogenation technology in combination with vacuum drying and filtration, which is the most complete and advanced process technology for recycling of waste transformer oils.

We expect that about 60 MT of PCBs contaminated transformer oil will be destroyed every year in Armenia using a suitably scaled treatment facility, this is equivalent to or 300 over the life of the project.

It is anticipated that various NGOs will be involved in the dissemination of information and the engagement of stakeholders, with the objectives of encouraging replication and further private sector investment. It will therefore be important to include NGOs in the group of stakeholders who will be enabled to promote by raising awareness and participate in campaigns to support the project activities. This will be done through inclusion in capacity building using both information and training.

### **Global environmental benefits and innovativeness and sustainability**

Ozone depleting substances (ODS) not only damage stratospheric ozone, but are also powerful greenhouse gases (GHGs,) with global warming potentials up to 11,000 times greater than carbon dioxide (CO<sub>2</sub>). ODS from banks are continuously released into the atmosphere until they are properly disposed of. By legislating for the removal and destruction of refrigerants and foam-blowing agents, and the provision of pilot facilities, which is not covered under existing national regulations, the GEF project will minimize the emissions of ODS and GHGs from ODS banks.

The Management of hazardous obsolete POPs pesticides and associated wastes has not yet been achieved in the CEITs. Most obsolete POPs pesticides are dumped untreated on pesticide manufacturer property or in the surrounding area, or mixed with municipal wastes. Many of sites are currently impacting soil and groundwater. The GEF project will reduce the risk to the health of Communities living and working close to obsolete pesticides stores and the wider community that is indirectly exposed to contamination through food and water.

The project may also contribute to crop protection and sustainable crop production. Where obsolete pesticides are destroyed in incinerators there are no effective pollution controls or emissions monitoring to minimize the potential for adverse environmental impacts.

The project envisages transfer of non-combustion technology to the region for the destruction of ODS and POPs. It is expected that releases of unintentionally produced POPs and other pollutants that give risks to human health and the environment will be reduced through the transfer of these technologies. Economic benefits through the generation of new field of technology in the country, generation of livelihood and gain of special expertise will result from the project, aside from the environmental and health benefits associated with disposal of POPs and ODS.

This is in line with the advocacy of the GEF in promoting the transfer of environmentally sound technologies.

As women and children are the most vulnerable group with regard to exposure to POPs, the project shall strive to involve women organizations to work on awareness raising campaigns on the health and environmental impacts of these chemicals.

In addition, the project saves landfill space; conserves energy through the premature removal of working appliances and the recycling of durable materials (e.g., metals, plastics, glass); and prevents the release of used oil.

All utilities, retailers, and municipalities are invited to join this project. This demonstration regional project will result in significant pollution prevention and avoidance of illegal refrigerator dumping.

## **Regional Approach**

The project will assist the region by determining the most cost effective way of establishing Environmentally Sound Management (including destruction) of POPs and ODS waste and developing both the institutional capacity and policy and regulatory frameworks to drive implementation of waste management at a local, provincial and regional level.

A key aspect of this will be to demonstrate appliance recycling technology integrated into a combined ODS and POPs management and destruction scheme.

The regional concept is designed to provide the countries in the project to share many of the same issues and barriers to implementation. This approach aims to provide more efficient implementation for the GEF by grouping similar countries together where the same technical and logistical solutions are likely to work. This has two main advantages, a) it creates savings in the preparatory work, feasibility studies and systems design, that can be shared by each country rather than being done five times in different projects and it gives rise to potential economies of scale in the procurement of equipment and services; b) it creates a regional momentum that is more effective in incentivizing and demonstrating solutions to other countries in the region and at the same time creates a large enough regional network to be able to properly test the issues of cross-boundary waste movement and regional cooperation.

The countries in the project represent a good cross-section of the region in terms of size and industrial capacity, whilst sharing the same environmental issues and socio-economic backgrounds. The project therefore aims to develop new approaches that overcome the difficulties faced by CEIT countries in the safe management of ODS banks and POPs waste.

Regarding the geographical coverage, this project will be implemented in Belarus and Armenia at the country level, Moscow region in the Russian Federation, Donetsk and Kiev regions in the Ukraine, as well as in Astana and Karaganda regions in Kazakhstan. Three countries out of five belong to the East European region. The Russian Federation, Belarus and Kazakhstan are members of a free custom zone of the Eurasian Community, established in 2011. The Russian Federation, Belarus and Ukraine are the biggest producers of refrigerators.

The regional project also allows the creation of mutually independent but linked waste destruction centres. This provides the opportunity for cooperation and load sharing. If a particular centre were overloaded, it would be possible to shift some of load to another centre, particularly within the free trade zone.

It is important to note that as well as recovering refrigerant from the appliances, the project aims to recover (for destruction) the majority of the blowing agent contained in the insulation foam. This is considered extremely important in the region due to the very large banks of equipment and the relatively large volume of ODS in the foam compared to the refrigerant.

The project framework is based on gaining maximum benefit from the available synergies. If the project is shown to be feasible, it creates a template for replication in other parts of the countries involved and other parts of the region. This should significantly streamline the process for future projects and increase the likelihood of early actions in other countries.

In addition to load sharing, knowledge sharing between centres will ensure that solutions to any problems encountered can quickly be shared to avoid similar issues in other centres. The regional concept will also provide efficiencies in staff training by organizing training programmes in one centre that will also support networking activities.

Expected results of the regional cooperation include: establishment of ODS and POPs disposal sub-centre in the participating countries linked into the network; improved cooperation amongst participating countries in the Eastern European countries; facilitation of information collection and exchange in order to achieve effective communication among national focal points; regular regional meetings and other related activities as a basis for strengthening cooperation amongst the participating countries; and sharing of experiences relating to implementation of ODS and POPs disposal activities by countries within the region. Figure 1 below shows the project network structure including a regional centre in Russia and 4 sub-centres.

**Fig. 1 Organizational structure of the regional demonstration project**



The project network includes five sub-centres with the leading centre in the RF (see fig. 1 above). Bearing in mind the size of the territory of the RF, the leading centre in the RF is to be equipped with a mobile shredder to dismantle collected refrigerators and ACs in different parts of the country. The other four sub-centres will be equipped with a CFC-12 recovery units and a stationary shredder. Four plasma arc incineration plants are envisaged for the four sub-centres except Armenia.

Armenia will have a single component to deal with PCB waste treatment and recovery, it will be provided a stationary recycling facility for treatment of PCB-containing oils, and the ODS component will not be included under the GEF project.

The project will be designed to be fully sustainable allowing the ongoing destruction of ODS and POPs after the GEF project has been completed. It will also provide an opportunity to involve more countries in the region at a later time.

### **Feasibility of Co-Destruction Technologies**

The main outcome of the project is the development of national disposal plans for ODS and POPs collection and destruction, linked into a regional destruction infrastructure. The ambition of the pilot destruction project is to demonstrate a co-destruction technology which is capable of handling both POPs and ODS in the volumes required to manage disposal of stockpiles and recovered waste over a reasonable time period.

Any co-destruction technology including Cement Kiln to be implemented should generally meet the following requirements:

- a) A high CFC /POP removal efficiency;

- b) Adequate disposal of chlorides, fluorides and traces of toxic by-products including dioxins and furans in exhaust gasses, effluent water, ash etc;
- c) Facilities with resistance against decomposition products such as chlorides and fluorides; and
- d) Reasonable costs of equipment and operation.

The technical feasibility study will include technological evaluation of destruction options as well as logistical and practical issues related to different technologies.

An initial review of the commercially available technologies suitable for ODS and POPs destructions undertaken for the PIF preparation shows a variety of combustion and non-combustion options exist. For example more than 10 technologies are currently used in Japan in 82 different destruction facilities. For different technical and practical reasons two technologies show the potential to offer co-destruction facilities on a regional basis, plasma arc (non-combustion) and cement kiln co-processing (High Temperature Treatment).

The nature of plasma arc destruction means that it is inherently capable of co-destruction of ODS and POPs albeit at different processing rates. Cement kiln co-processing is shown to be capable of destroying ODS and POPs but as yet no examples of co-destruction have been identified.

There has been some debate as to the relative effectiveness of these technologies, which depends to an extent on emissions are assessed. Some experts argue that cement kilns meet the same emissions standards as other technologies whilst others point out that the majority of standards are written in terms of concentrations of contaminants, rather than absolute quantities of contaminants per unit of waste processed.

For technologies such as plasma arc, where there are no emissions of combustion products, the absolute levels of contaminants must be very low for the low volume of emissions to meet the required standard. This brings into question the most appropriate standards to be applied to the project.

Initial data suggests that high temperature incinerators emit higher amounts of Dioxins and Furans per kg of ODS destroyed compared to a plasma arc plant, however these meet the required standards as the combustion gases dilute the emissions.

A relative advantage of plasma arc technology is the compact and potentially portable nature of the equipment needed to establish a destruction facility, on the other hand this type of destruction is expensive to run and currently available plants have a limited throughput of around 80kg/hr. The initial assessment of the technology for co-destruction for the regional project found that plasma arc technology would be most suitable, taking into account the required destruction and removal efficiency according the Technical and Economic Assessment Panel's (TEAP) recommendations. However the low destruction capacity offered by plasma technology warrants further investigation into the feasibility of cement kiln co-destruction and address the potential technical, financial and regulatory barriers including; potential of damage to the refractory lining; limited resistance to fluorine erosion; achievable throughputs, effects of product quality; emissions levels for required throughputs.

Data on the emissions of Dioxins and Furans from cement kilns is difficult to obtain but this matter will be investigated in the feasibility study. A typical plasma arc plant with the low feed of 80kg/h and annual ODS/POPs destruction capacity of up to 500 tons costs around US\$ 2.0 million. The relative cost of conversion of a cement kiln for co-destruction will also have to be assessed in the feasibility study to establish the relative cost effectiveness.

The feasibility study of co-destruction using cement kilns will be done in two countries. As cement production is energy and carbon-intensive process there is an opportunity, subject to the feasibility of the destruction efficacy, to address potential energy efficiency improvements in the cement kiln at the same

time as modifying the kiln for waste destruction. For example coal fired kilns could be converted to natural gas firing, resulting in improved energy efficiency and reduced carbon emissions. The feasibility study will therefore include an Energy Efficiency study and carbon audit of potential cement kiln sites. The use of this technology will be considered during the feasibility study to be conducted during the implementation of the project, taking into consideration level of technological development, size and other factors that determine the aims and expected achievements of this project, to demonstrate appliance recycling technology integrated into a combined POPs and ODS management and destruction scheme.

### **Expanding the POPs/ODS destruction Network**

Whilst the technology required to destroy POPs differs from that required to destroy ODS, investing in plant capable of destroying both has an overall positive impact on the cost-benefit ratio of the combined outputs. Furthermore many aspects of the preparatory design and implementation of the two objectives require very similar assessment, planning and logistics.

Moreover incremental investments in certain aspects of the programme such as the destruction plant will mean that both POPs and ODS can be handled at a single installation whereas separate projects would require two destruction plants and two supporting infrastructures at an overall higher cost and lower utilization.

Therefore, project concept is designed on gaining maximum benefit from the available synergies. For example, combing the planning and management activities of the assessment and transportation of POPs and ODS will create savings in consultancy and logistics costs and increase the reach and utilization of collection networks. Similarly the provision combined destruction facilities will reduce overheads and improve utilization. Further benefits will be gained from creating an overarching monitoring and reporting mechanism.

If the project is shown to be feasible it has the potential to become a pilot programme for replication in other CEITs, and ultimately a building block for a global strategy on disposal of ODS and POPs banks and stockpiles.

Under the baseline project some progress will be made however given the rate of increase in ODS banks and the very poor conditions in which large volume of POPs are stored, it is likely that preventable emissions will be incurred with a detrimental impact on the environment and human health.

## Annex 2

### Table 2: List of projects in the Region

Project number	Country	Project budget		GEF projects on POPs		
		GEF, US\$, m	Co-financing UD\$, m	Project objective (tons to be disposed of)	POPs stockpile to dispose of	Project status
4737	Armenia	4.70	19.40	management	POPs	Council approved
3571	Armenia	0.81	1.85	management	POPs	On-going
1479	Armenia	0.48	0.00	management	POPs	Completed 2006
4961	Armenia	0.13	0.41	NIP update	POPs	CEO approved
2519	Belarus	0.50	0.07	management	PCB	On-going
1586	Kazakhstan	0.50	0.05	management	POPs	IA approved
3982	Kazakhstan	10.35	59.05	8,000 + 28,000	OP/capacitors	PPG approved
2816	Kazakhstan	3.30	10.60	850	PCB	On-going
4442	Kazakhstan	3.40	16.01	NIP update	POPs	Council approved
4069	Russia	0.50	0.06	NIP	POPs	IA approved
4915	Russia	7.40	34.20	3,800	PCB	IA approved
1478	Ukraine	0.50	0.00	management	POPs	Closed
4386	Ukraine	5.25	21.00	3,000	PCB	Council approved

### Annex 3

**Table 3: Legal situation in the participating countries**

Country	Stockholm Convention on POP			NIP		National Legislation on POPs			
	Signed	Ratified	Entry into force	Approved	Submitted	Env. law entered into force	Law on chemicals	Law on waste	Law on POPs management
Armenia	23/05/01	26/11/03	17/5/04	18/1/05	29/4/06	2008	2002	2004	
Belarus	26/12/03	5/3/04	5/3/04	17/5/06	17/1/07	2002		1993	
Kazakhstan	22/5/01	7/6/07	2/7/08	8/12/09	2/8/10	2003		1998	2003
Russia	22/5/02	28/10/04	15/11/11		15/11/11	2002	1997	1998	2008
Ukraine	23/5/01	18/4/07	17/5/04	2006		1991	1995	1998	1996
Country	Stockholm Convention on POP			NIP		National Legislation on POPs			
	Signed	Ratified	Entry into force	Approved	Submitted	Env. law entered into force	Law on chemicals	Law on waste	Law on POP management
Armenia	23/05/01	26/11/03	17/5/04	18/1/05	29/4/06	2008	2002	2004	
Belarus	26/12/03	5/3/04	5/3/04	17/5/06	17/1/07	2002		1993	
Kazakhstan	22/5/01	7/6/07	2/7/08	8/12/09	2/8/10	2003		1998	2003
Russia	22/5/02	28/10/04	15/11/11		15/11/11	2002	1997	1998	2008
Ukraine	23/5/01	18/4/07	17/5/04	2006		1991	1995	1998	1996

## Annex 4

**Table 4: List of risks and mitigation measures**

Risk	Level	Mitigation Measures
Government at national, provincial, and local levels, as appropriate, would not endorse and adopt the required standards, guidelines and specifications according to the project timeline	Medium	Ensure laws, regulations, standards, guidelines and specifications are practical and enforceable and support with institutional capacity building and training
Co-financing will not reach the target level	Medium	Seeking additional funds/donors or lowering the targeted amount of PCB waste for its disposal. While there will be safe storage available, the final decisions will be met by the Project Steering Committee  Policy incentives to be provided for potential investors
Disposal technology not meeting performance requirements, resulting in unacceptably high emissions of dioxin/furan and other toxic chemicals	Low	Selection of proven technology and equipment from recognized suppliers, provision of adequate training, and active supervision of the operation of disposal facilities will mitigate this risk
Delays in project implementation and low quality performance	Low	Carefully selected success indicators and the adaptive monitoring practice will enable timely implementation and high quality results
Public opposition to the disposal project	Low	Public awareness raising and inclusion of all stakeholders in both project preparation and implementation will minimize the likelihood of this occurring
Owners of old refrigerators and air conditioners and POPs waste might not be willing to actively participate	Low	Focus on stakeholder awareness raising as a priority
Vendors, owners of old refrigerators and air conditioners and POPs waste and other parties might not be willing to cooperate	Medium	A policy for POPs disposal fee will be issued and a proper price mechanism will be introduced to allow suitable revenue for the contractors.
Engagement of PCB owners, complex or slow in Armenia or owners do not declare inventory	Low	Clear communications and open guidance with explanation of recovery and treatment process and benefits for users.

## **Annex 5**

### **The GEF Agency's comparative advantage:**

#### **Montreal Protocol (MP).**

Phasing out of ozone depleting substances (ODSs) based on CFC compounds (chlorofluorocarbons) is one of the major activities of UNIDO in the region. The projects are financed from the Montreal Protocol Fund (MLF). Technical assistance has been rendered to more than 100 countries. The following 10 CEITs benefit from the UNIDO MP programmes: Albania, Bosnia and Herzegovina, Croatia, Georgia, Kyrgyzstan, Montenegro, Romania, Serbia, Macedonia and Turkey. In total, UNIDO implements at present more than 28 ODS projects in the region. An ODS destruction projects for Mexico and Turkey have been approved by ExCom of the MLF.

#### **Persistent Organic Pollutants (POPs).**

UNIDO assists countries in the formulation of the National Implementation Plans (NIPs) to eliminate POPs and reduce the hazardous effect of the most toxic chemicals to the environment in line with the Stockholm Convention. UNIDO POPs projects are funded from GEF resources. Five CEIT countries benefit from UNIDO assistance: Azerbaijan, Croatia, Hungary and Turkey. UNIDO plans to initiate the POPs programmes in Armenia, Russian Federation, Ukraine and Tajikistan. UNIDO global demonstration programme co-funded by GEF and the Government of Slovakia (budget US\$ 20 million) focuses on non-combustion innovative technologies to destroy Persistent Organic Pollutants.

#### **Cleaner Production (CP).**

The Cleaner Production (CP) Programmes aim at building national CP capacities, fostering dialogue between industry and government and enhancing investments for the transfer and development of Environmentally Sound Technologies (EST). Since 1994, around 38 National Cleaner Production Centers and Programmes have been established. 14 of them are located in the Europe & NIS region: Armenia, Bulgaria, Czech Republic, Croatia, Hungary, FYR Macedonia, Montenegro, Romania, Russian Federation (Moscow and St. Petersburg), Serbia, Slovakia, Ukraine, and Uzbekistan. Project proposals are being developed for Azerbaijan and Kazakhstan.

#### **Climate Change: Industrial Energy Efficiency and Renewable Sources of Energy.**

The Europe & NIS Programme actively promotes UNIDO activities in the field of energy efficiency and renewable sources of energy exposing UNIDO's capacity as a GEF implementing agency. Several projects are under processing for Moldova, Romania, Russian Federation, Turkmenistan and Ukraine. Special emphasis is put on the development of the bio-energy related programmes in the region. UNIDO implemented the bio-fuels project in Croatia and formulated the project for Albania. The Bio-fuels Regional Workshop in Croatia (Dubrovnik, 12-13 November 2007) provided the new impetus for initiating the country oriented and regional bio-fuels programmes. UNIDO has initiated cooperation with the UNEP Vienna Interim Secretariat of the Carpathian Convention in this field.

The project implementation structure will be designed to optimized local implementation effectiveness in line with the Country National Ozone Offices and POPs NIPs. UNIDO will be the GEF Implementing Agency (IA) for the project. A project focal point will be established based on UNIDO structure at the Moscow Regional Office to assist with project execution, with possible extension if required. This focal point will consist of dedicated core staff, supplemented by support from professional and support staff colleagues on a part-time as needed basis, including in particular senior staff engaged in the management and coordination of UNIDO's POPs and ODS destruction programme. The Project

Management Unit (PMU) will be responsible for the day-to-day management and execution of the project, and will oversee local project management offices. UNIDO will make these services available as part of its in-kind contribution to the project and will work in close co-operation with the counterparts.

A project Steering Committee from related Ministries will be established to provide the project team with political guidance and inter-Ministerial coordination support. The project will be subject to GEF Monitoring and Evaluation rules and practices of the GEF and UNIDO.

## Annex 6

### Calculation of Cost Effectiveness

	1	2	3	4	5	6	7	8	9	10
ODS Facilities online	0	0	3	3	3	4	4	4	4	4
Total destruction capacity	0	0	212	212	212	283	283	283	283	283
<b>Cumulative total destroyed</b>	<b>0</b>	<b>0</b>	<b>212</b>	<b>424</b>	<b>637</b>	<b>920</b>	<b>1,203</b>	<b>1,486</b>	<b>1,768</b>	<b>2,051</b>
Grant US\$ Million	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8
<b>Cost Effectiveness \$/kg</b>			<b>60.3</b>	<b>30.2</b>	<b>20.1</b>	<b>13.9</b>	<b>10.6</b>	<b>8.6</b>	<b>7.2</b>	<b>6.2</b>
POPs facilities online	0	0	1	1	1	5	5	5	5	5
<b>Total destruction capacity</b>	0	0	150	150	150	1,500	1,500	1,500	1,500	1,500
<b>Cumulative total destroyed</b>	0	0	150	300	450	1,950	3,450	4,950	6,450	7,950
Grant US\$ Million	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
<b>Cost Effectiveness \$/kg</b>			<b>6.67</b>	<b>6.67</b>	<b>6.67</b>	<b>0.67</b>	<b>0.67</b>	<b>0.67</b>	<b>0.67</b>	<b>0.67</b>
<b>Combined Cost Eff \$/kg</b>			<b>33.5</b>	<b>18.4</b>	<b>13.4</b>	<b>7.3</b>	<b>5.7</b>	<b>4.6</b>	<b>4.0</b>	<b>3.5</b>