



**United Nations  
Environment  
Programme**

Distr.  
GENERAL

UNEP/OzL.Pro/ExCom/72/23  
14 April 2014



ORIGINAL: ENGLISH

EXECUTIVE COMMITTEE OF  
THE MULTILATERAL FUND FOR THE  
IMPLEMENTATION OF THE MONTREAL PROTOCOL  
Seventy-second Meeting  
Montreal, 12-16 May 2014

**PROJECT PROPOSAL: BRAZIL**

This document consists of the comments and recommendation of the Fund Secretariat on the following project proposal:

Destruction

- Pilot demonstration project on ODS waste management and disposal

UNDP

**PROJECT EVALUATION SHEET – NON-MULTI-YEAR PROJECT****BRAZIL****PROJECT TITLE****IMPLEMENTING AGENCY**

Pilot demonstration project on ODS waste management and disposal

UNDP

**NATIONAL COORDINATING AGENCY:** Ministry of Environment of Brazil

**LATEST REPORTED CONSUMPTION DATA FOR ODS ADDRESSED IN PROJECT****A: ARTICLE-7 DATA (ODP TONNES in 2012)**

Annex I, CFC	0		

**B: COUNTRY PROGRAMME SECTORAL DATA (ODP TONNES, 2011)**

ODS	Subsector/quantity	Subsector/quantity	Totals
CFC			0

**CURRENT YEAR BUSINESS PLAN:** Total funding US \$672,253    Total phase-out 75 ODP tonnes

**PROJECT TITLE**

ODS use at enterprise			n/a
ODS to be phase-out			n/a
Project in current business plan			Yes
Sector			ODS destruction
Sub-sector			n/a
Project impact			120 metric tonnes
Project duration			36 months
Local ownership			100%
Export component			0%
Original requested amount			1,578,000*
Requested MLF grant			
	UNDP	US \$	1,490,600
Implementing agency support cost			
	UNDP (7%)	US \$	104,342
Total cost of project to Multilateral Fund		<b>US \$</b>	<b>1,594,942</b>
Cost-effectiveness		US \$/kg	12.42 kg (metric)
Project monitoring milestones			Included

\*Excluding agency support costs

<b>SECRETARIAT'S RECOMMENDATION:</b>	Individual consideration
--------------------------------------	--------------------------

## PROJECT DESCRIPTION

1. UNDP, on behalf of the Government of Brazil, submitted to the 72<sup>nd</sup> meeting a proposal for a pilot demonstration project on ozone depleting substances (ODS) waste management and disposal at the amount of US \$1,578,000, plus agency support costs of US \$110,460, as originally submitted<sup>1</sup>.

### Project description

2. This pilot project seeks to demonstrate an environmentally sound, efficient and cost effective management and disposal of ODS waste refrigerants through the establishment of a complex nationwide ODS waste management system in Brazil. It will provide opportunities to integrate ODS waste management and destruction into broader national hazardous waste management programmes and energy efficiency initiatives. These efforts will be complemented by activities initiated during the implementation of the national CFC phase-out plan (NPP) which promoted the creation of a national structure for the recollection of CFCs from old equipment. The NPP established five large scale reclaim centers and 120 de-centralized recycling centers, supported by the distribution of recovery machines to companies and technicians in the country. The project will also find synergies with HCFC phase-out activities in particular, recovery operations for the servicing of existing refrigeration equipment, which is expected to generate ODS waste that can no longer be re-used. These efforts are further supported by a national law on solid waste management in Brazil approved in 2010. This law will enforce an Extended Producer Responsibility (EPR) programme that has the potential to generate large quantities of waste including waste ODS from refrigeration and air-conditioning equipment. A detailed project proposal is attached to this document.

3. The project comprised the following four components:

- (a) Component 1: Establishing a comprehensive ODS waste management system including the capacity building on handling, transportation and characterization of ODS waste, as well as improving the ODS waste storage capacity;
- (b) Component 2: Undertaking test burns at two incineration facilities in order to qualify national capacities for ODS waste disposal as per international standards, and analyzing its logistics and cost;
- (c) Component 3: Technical assistance and related development work associated with evaluation and standardization of the ODS waste management and disposal demonstration project; and
- (d) Component 4: Project management associated with implementation and oversight of the project.

4. The comprehensive ODS waste management system will be developed by using the country's national refrigeration servicing sector operated by a network of well-equipped technicians and private sector service companies across the country. This programme is vital to the demonstration project as transportation, consolidation and storage pose great challenges to Brazil since the ODS wastes collected are located in several companies and reclamation centers, spread over a large territory of more than 3,800 km. The project intends to create an integrated coordination mechanism between the reclaim centers, ODS waste holders, waste consolidators and managers of the centres to assure proper handling, transportation and disposal of ODS waste that may be replicated to other countries

5. Destruction of ODS waste in Brazil will be through domestic destruction using two of the seven existing hazardous and industrial waste management facilities. Brazil has established commercially

---

<sup>1</sup> At the 57<sup>th</sup> meeting, the Executive Committee provided funds for UNDP to prepare a pilot ODS disposal demonstration for Brazil

available, hazardous chemical waste management capability including the treatment and destruction of chlorinated materials in solid and liquid form. To meet international standards, two of these facilities will undertake comprehensive test burns of available waste stream in the country. The two incineration facilities will be identified through public bidding as required by Government regulations.

6. A monitoring protocol will be followed covering operating conditions (i.e. combustion chamber temperatures, estimated resident times, stack outlet temperatures), the standard requirements of regulated emissions including polychlorinated dibenzo-p-dioxin and polychlorinated dibenzofuran (PCDD/PCFD) as well as mass balance inputs covering all residual release paths (solid, liquid and gaseous), and analysis for key contaminants (including PCDD/F in solid bottom ash, scrubber residuals) and any liquid residual streams. The intention is to determine both destruction removal efficiency (DRE) and destruction efficiency (DE). The ODS waste destruction demonstration project is envisaged to be implemented in three years.

#### Estimation of the ODS to be disposed

7. This pilot project will initially address the disposal of 120 tonnes of waste ODS for destruction. These quantities are from an existing national collection system and are available in reclaim and recycling centres in Brazil, as shown in Table 1.

**Table 1: Estimated quantities of ODS-waste that will be used in the project**

Company		Profile	City	ODS	Kg
1	Capital Refrig	Reclaim Center	Porto Alegre	CFC-11	11,250
				CFC-12 Contaminated	4,900
2	Bandeirantes Refrig	Reclaim Center	Sao Paulo	CFC-12 Contaminated	4,419
3	Bom Clima Refrig	Reclaim Center	Recife	CFC-11	1,190
				CFC-12 Contaminated	1,057
4	Revert Brasil	De-manufacturer	Careaçú	CFC-12 Contaminated	5,000
				CFC-12 Contaminated	4,000
5	Frigelar	Reclaim Center	Sao Paulo	CFC-12 Contaminated	300
6	Tecnitest	End-user	Rio de Janeiro	CFC-12 Contaminated	120
7	Ref. Marechal	Recovery company	Sao Paulo	CFC-11	4,000
8	Carrier do Brasil	End-user	Canoas	CFC-12 Contaminated	11,500
9	ClimaSul	Recycle Center	Curitiba	CFC-12 Contaminated	500
10	Recigases	Recycle Center	Rio de Janeiro	CFC-12 Contaminated	13,540
<b>Subtotal ODS waste collected and aggregated, to be consolidated</b>					<b>61,776</b>
North Reg. 13	3 companies	Recycle Center	Amazonas Province	CFC-12 Contaminated	730
	1 company	Recycle Center	Acre Province	CFC-12 Contaminated	100
	1 company	Recycle Center	Roraima Province	CFC-12 Contaminated	150
	1 company	Recycle Center	Macapá Province	CFC-12 Contaminated	170
	2 companies	Recycle Center	Rondônia Province	CFC-12 Contaminated	200
	3 companies	Recycle Center	Pará Province	CFC-12 Contaminated	290
	2 companies	Recycle Center	Tocantins Province	CFC-12 Contaminated	120
Center Reg. 16	3 companies	Recycle Center	Mato Grosso Province	CFC-12 Contaminated	550
	4 companies	Recycle Center	Mato Gr. do Sul Province	CFC-12 Contaminated	1,100
	6 companies	Recycle Center	Goiás Province	CFC-12 Contaminated	2,500
	3 companies	Recycle Center	Federal District (DF)	CFC-12 Contaminated	900
North East Reg. 30	3 companies	Recycle Center	Maranhão Province	CFC-12 Contaminated	500
	2 companies	Recycle Center	Piauí Province	CFC-12 Contaminated	90
	5 companies	Recycle Center	Ceará Province	CFC-12 Contaminated	2,900
	3 companies	Recycle Center	Rio Grande Nor. Province	CFC-12 Contaminated	950
	3 companies	Recycle Center	Paraíba Province	CFC-12 Contaminated	1,350
	2 companies	Recycle Center	Alagoas Province	CFC-12 Contaminated	800
	2 companies	Recycle Center	Pernambuco Province	CFC-12 Contaminated	5,200
	2 companies	Recycle Center	Sergipe Province	CFC-12 Contaminated	320

Company		Profile	City		ODS	Kg
	8 companies	Recycle Center	Bahia Province		CFC-12 Contaminated	6,480
South East Reg. 36	8 companies	Recycle Center	São Paulo Province		CFC-12 Contaminated	5,500
	3 companies	Recycle Center	Rio de Janeiro Province		CFC-12 Contaminated	8,200
South Reg. 25	19 companies	Recycle Center	Minas Gerais Province		CFC-12 Contaminated	7,034
	6 companies	Recycle Center	Espírito Santo Province		CFC-12 Contaminated	1,780
	4 companies	Recycle Center	Rio Grande Sul Province		CFC-12 Contaminated	2,320
	14 companies	Recycle Center	Paraná Province		CFC-12 Contaminated	4,090
	7 companies	Recycle Center	Sta Catarina Province		CFC-12 Contaminated	3,900
<b>Subtotal ODS waste collected, to be aggregated and consolidated</b>						<b>58,224</b>
<b>Total ODS waste to be destroyed under the project</b>						<b>120,000</b>
11	IBAMA	Controlling Entity	São Paulo	SP	to be identified*	734,400
<b>Subtotal ODS waste collected and aggregated, to be identified</b>						<b>734,400</b>
<b>Total ODS waste inventoried in Brazil</b>						<b>854,400</b>

\* The Brazil Institute of Environmental and Renewable Natural Resources (IBAMA) has confiscated a large container with still unidentified ODS. Verification is currently ongoing.

### Financial management of the project

8. Funding from the Multilateral Fund will cover the costs required for undertaking the test burns in the selected incineration facilities, and certifying them to meet international standards to enable the destruction of ODS waste. It will also cover the costs for establishing the ODS waste management system that will oversee the EPR/Waste Electrical and Electronic Equipment Programme, where it is expected that other materials collected from old equipment will generate sufficient revenues to allow the sustained destruction of future ODS waste. The project will also analyse the possibility of using the carbon markets in future; however, this is not foreseen in the current project design.

### Selection of destruction technology/approach

9. Three options were considered for destroying ODS waste: (i) exporting the ODS waste to qualified hazardous waste management facilities; (ii) developing new destruction facilities using imported technologies; and (iii) utilizing an existing national hazardous and industrial waste management facility that could potentially be upgraded to international standards. The first option was not feasible because of cost and the lack of experience in the country for these types of transactions. The option of developing specialized facilities for destruction of waste ODS was not further considered as there were attempts to establish refrigerator de-manufacturing facilities inclusive of destruction facilities in the country which have not been completely successful.

10. The last option involved examining the potential for using existing domestic incineration facilities on the condition that they comply with international standards particularly those linked to both the Basel Convention<sup>2</sup> and the Global Environment Facility (GEF) Scientific and Technical Assessment Panel (STAP)<sup>3</sup>. Both entities have issued guidance documents on the selection of destruction technology for persistent organic pollutants (POPs) which also provide relevant information given the similarities in requirements for environmentally sound destruction of chlorinated chemical wastes. The requirements of the UNEP Technology and Economic Assessment Panel (TEAP) with regard to destruction standards were also taken into account. The seven facilities that were identified as potentially capable of destroying ODS waste will be subject to technical validation through testing protocols. The Government of Brazil believes that utilization of domestic destruction facilities will be more cost effective than the other options proposed. The proposal submitted is therefore designed around this option.

<sup>2</sup> <http://www.basel.int/Portals/4/Basel%20Convention/docs/pub/techguid/tg-POPs.pdf>

<sup>3</sup> [http://www.unep.org/stap/Portals/61/pubs/POPs\\_Disposal\\_Final\\_low.pdf](http://www.unep.org/stap/Portals/61/pubs/POPs_Disposal_Final_low.pdf)

Monitoring and verification of the destruction

11. In order to ensure that all ODS waste is properly accounted for, the destruction process will be closely monitored and data will be recorded through an electronic database system to be set up for this purpose. The origin of all ODS waste recovered for destruction is easily determined given that the currently available stocks are held by the original sources and are collected from well defined activities (i.e. customs seizures, refrigeration servicing activities and phase-out initiatives). In both cases the tracking of these materials through subsequent consolidation, characterization, storage, transportation and destruction is explicitly provided for within the project including detailed documentation and use of electronic database monitoring system, which is part of the project output.

Cost of the project

12. The total cost of the project, as originally submitted, has been estimated at US \$2,153,000. The amount requested from the Multilateral Fund is US \$1,578,000 and shown in Table 2 below:

**Table 2: Proposed cost of the project**

Component and activities		MLF Funding (US \$)	Co-funding (US \$)	TOTAL (US \$)
<b>Component 1: Management System Pilot Project</b>	Collection oversight of CFCs and CFC-based ODS	25,000	-	25,000
	Consolidation and characterization of CFCs	95,000	55,000	150,000
	Temporary storage of CFCs	30,000	15,000	45,000
	Transportation to destruction facility	20,000	10,000	30,000
	Integrated management system pilot structure	400,000	120,000	520,000
	Documentation and reporting	10,000	-	10,000
	<b>Subtotal Component 1</b>	<b>580,000</b>	<b>200,000</b>	<b>780,000</b>
<b>Component 2: Test Burn / Destruction Demonstration</b>	Detailed test burn design and selection of facilities	25,000	37,000	62,000
	Incineration infrastructure adaptation of facilities	35,000	20,000	55,000
	Settlement of procedures and baseline feed	10,000	10,000	20,000
	Baseline test burn feed mix	55,000	25,000	80,000
	Demonstration test burn feed CFC-11 (5 mt)	75,000	45,000	120,000
	Demonstration test burn feed CFC-12 (5 mt)	75,000	45,000	120,000
	Destruction of CFC-11 and CFC-12 (110 mt)*	418,000	-	418,000
	Test burn supervision	10,000	5,000	15,000
<b>Subtotal Component 2</b>	<b>703,000</b>	<b>187,000</b>	<b>890,000</b>	
<b>Component 3: Technical Assistance</b>	Support for technical enabling activities	50,000	35,000	85,000
	Support for stakeholder and public awareness	50,000	25,000	75,000
	<b>Subtotal Component 3</b>	<b>100,000</b>	<b>60,000</b>	<b>160,000</b>
<b>Component 4: Monitoring and Evaluation</b>	International expert	80,000	-	80,000
	National consultant	60,000	60,000	120,000
	Travel / Mission costs	45,000	45,000	90,000
	Administrative office	-	15,000	15,000
	Sundry	10,000	8,000	18,000
	<b>Subtotal Component 4</b>	<b>195,000</b>	<b>128,000</b>	<b>323,000</b>
<b>Total (US \$)</b>		<b>1,578,000</b>	<b>575,000</b>	<b>2,153,000</b>

## SECRETARIAT'S COMMENTS AND RECOMMENDATION

### COMMENTS

13. The Secretariat provided UNDP with a number of comments and observations based on the review following the criteria set out in decision 58/19. It noted that Brazil has a well institutionalized ODS waste collection system supported by national legislation, and it appears that there will be an available waste stream for the facilities which ensures project sustainability.

14. In explaining the amounts of ODS waste currently available in the country as summarized in Table 1, particularly the amounts associated with IBAMA, UNDP clarified that the Government has recently seized a large shipment of as yet unidentified chemicals which, they are certain, contain illegal ODS (i.e. CFCs). The process of identifying the contents of this shipment is underway. It is included in the inventoried amounts to show that there are additional potential volumes for destruction.

15. The Secretariat sought clarification on the situation of the two private refrigerant de-manufacturing entities established in the country which were not operating at full capacity because of lack of waste material available. According to information gathered by UNDP, surveys indicate that there is a large stock of CFC-based EOL equipment in the country; however, the location of these two facilities and the high cost associated with their operation appear to be the reasons why they have not been entirely successful. In addition, mechanized and automated de-manufacturing processes also charge for their services unlike manual operators (linked with the recovery and recycling centres) who are able to cover their costs of collecting the ODS waste by selling other recyclable materials extracted from the equipment.

16. With regard to the selection of the two incinerators that will be certified by doing test burns, the Secretariat was informed that UNDP had undertaken a broad exercise to identify the technical and environmental performance requirements applicable to ODS waste destruction. In doing so, it had initially identified ten facilities that use high temperature incineration based on liquid injection and/or rotary kiln technology, with one using plasma arc combustion. They were further reviewed and narrowed down to seven facilities that met the criteria set by UNDP which included, *inter alia*, capacity, ability to adapt facilities to handle liquefied gases, waste tracking and destruction certification process, and environmental performance particularly DE and DRE, as well as PCDD/PCFD emission levels. All seven facilities have indicated interest in participating in the project. Out of these, two will be selected based on a public bidding process required both by the Government of Brazil and UNDP. UNDP also emphasized that no capital investment is being sought by these facilities in the pilot project from the Multilateral Fund. The technical modifications will be done at each facility at its own cost, as part of co-financing.

17. In further discussions, the Secretariat proposed changes to some of the project components, in order to group similar activities and rationalize cost. It also suggested options for the requested high rate recovery machines for aggregating ODS waste stock, to reduce the number and cost. The Secretariat also confirmed with UNDP that one output of the project would be a report that would document the steps and results achieved from the testing protocol, how the test burns were conducted, how the technical validation was undertaken, how the facilities were upgraded as well as the costs involved. This report could then be used for similar testing procedures in similar incineration facilities not only in Brazil but also in other Article 5 countries, and will become a vital output of the demonstration project. UNDP agreed and further indicated that the global results of the project and the payback analysis (i.e. future carbon trading associated with these) will provide an incentive to other facilities in the country in deciding whether to invest in such an activity. UNDP agreed with the above changes and made the necessary adjustments to the proposal.

18. The final cost of the project was agreed at the level of US \$1,490,600 plus agency support costs, calculated at US \$12.42/kg, which is lower than the threshold (US \$13.2/kg) provided for in decision 58/19. Modifications were made to the outputs and costs to include suggestions by the Secretariat as summarized in Table 3 below:

**Table 3: Agreed costs of the project**

Component and Activities		MLF Funding (US \$)	Co-funding (US \$)	TOTAL (US \$)
<b>Component 1: Management System Pilot Project</b>	Collection oversight of CFCs and CFC-based ODS	25,000	-	25,000
	Consolidation and characterization of CFCs	95,000	55,000	150,000
	Temporary storage of CFCs	150,000	67,000	217,000
	Transportation to destruction facility	20,000	10,000	30,000
	Integrated management system pilot structure	182,600	68,000	250,600
	Documentation and reporting	10,000	-	10,000
	<b>Subtotal Component 1</b>	<b>482,600</b>	<b>200,000</b>	<b>682,600</b>
<b>Component 2: Test Burn /Destruction Demonstration</b>	Detailed test burn design and selection of facilities	25,000	37,000	62,000
	Incineration infrastructure adaptation of facilities	35,000	20,000	55,000
	Settlement of procedures and baseline feed	10,000	10,000	20,000
	Baseline test burn feed mix	55,000	25,000	80,000
	Demonstration test burn feed CFC-11 (5mt)	75,000	45,000	120,000
	Demonstration test burn feed CFC-12 (5mt)	75,000	45,000	120,000
	Destruction of CFCs 11&12 (110mt)*	418,000	-	418,000
	Test burn supervision	10,000	5,000	15,000
<b>Subtotal Component 2</b>	<b>703,000</b>	<b>187,000</b>	<b>890,000</b>	
<b>Component 3: Technical Assistance</b>	Support for technical enabling activities	50,000	35,000	85,000
	Support for stakeholder and public awareness	50,000	25,000	75,000
	<b>Subtotal Component 3</b>	<b>100,000</b>	<b>60,000</b>	<b>160,000</b>
<b>Component 4: Monitoring and Evaluation</b>	International expert	80,000	-	80,000
	National consultant	60,000	60,000	120,000
	Travel / mission costs	45,000	45,000	90,000
	Administrative office	-	15,000	15,000
	Sundry	20,000	8,000	28,000
	<b>Subtotal Component 4</b>	<b>205,000</b>	<b>128,000</b>	<b>333,000</b>
<b>Total (US \$)</b>		<b>1,490,600</b>	<b>575,000</b>	<b>2,065,600</b>

## RECOMMENDATION

19. The Executive Committee may wish to consider:

- (a) Noting with appreciation the submission of the Government of Brazil for a pilot ODS waste management and disposal project to destroy a total of 120 metric tonnes of ODS waste; and
- (b) Approving the implementation of a pilot demonstration project for ODS waste disposal management and disposal in Brazil at the amount of US \$1,490,600, plus agency support cost of US \$104,342 for UNDP, on the understanding that no further funds would be available for Brazil for any ODS disposal projects in future.

----



# Project Document

## **PILOT DEMONSTRATION PROJECT ON ODS-WASTE MANAGEMENT AND DISPOSAL**

---

FEDERATIVE REPUBLIC OF BRAZIL

*Prepared by*

MINISTRY OF ENVIRONMENT - MMA  
**National Coordinator**

*In Cooperation with*

UNITED NATIONS DEVELOPMENT PROGRAMME - UNDP  
**Implementing Agency**

*Brasília - DF. Brazil. March, 2014*

**COUNTRY:** Brazil **IMPLEMENTING AGENCY:** UNDP  
**PROJECT TITLE:** Pilot Demonstration Project on ODS-Waste Management and Disposal

**PROJECT IN CURRENT BUSINESS PLAN:** Yes  
**SECTOR:** ODS-Waste  
**Sub-Sector:** Refrigeration Servicing Sector

**PROJECT IMPACT (ODP targeted):** 120 Metric Tons of CFC-11 and CFC-12

**PROJECT DURATION:** 24 months  
**PROJECT COSTS:** US\$ 1,490,600

**LOCAL OWNERSHIP:** 100 %  
**EXPORT COMPONENT:** 0 %

**REQUESTED MLF GRANT:** US\$ 1,490,600  
**IMPLEMENTING AGENCY SUPPORT COST:** US\$ 104,342 (7.0 %)  
**TOTAL COST OF PROJECT TO MLF:** US\$ 1,594,942

**COST-EFFECTIVENESS:** US\$ **12.42** /kg ODS (metric) based on complete destruction of recovered ODS Waste in Brazil.

**PROJECT MONITORING MILESTONES:** Included  
**NATIONAL COORDINATING AGENCY:** Ministry of Environment of Brazil

---

---

### **Brief Description.**

The Ministry of Environment of Brazil, in collaboration with UNDP, has developed a project to demonstrate the environmentally sound, efficient and cost effective management and disposal of ODS waste refrigerants through the establishment of a complex nationwide ODS Waste Management System with MLF investment, as part of broader national programs related to energy efficiency and the sustainable management of hazardous wastes and WEEE.

The project utilizes an existing stocks of “end of life” ODS to qualify two domestic, modern, high temperature hazardous waste temperature incineration facilities to international standards. The project covers both the destruction of CFC-12 and CFC-11 refrigerants. Under the project, these facilities, as qualified, will destroy a more substantial quantity of ODS already generated as seized cargo resulted from illicit trade. The option of demonstrating destruction capability on such domestic facilities has been selected on the basis of it being the most cost effective route for Brazil relative other options available.

In terms of overall global demonstration value, the project offers an effective demonstration of what a middle income, industrializing Article 5 country can practically achieve in relation to EOL ODS waste management and destruction as integrating it into broader hazardous waste management programs and energy efficiency initiatives while capitalizing on emerging domestic environmental management capability.

It will also serves to demonstrate synergy with national stakeholders for the management of ODS stocks and wastes, and contributes to the knowledge base on current issues under discussion by TEAP. As result, it is expected that the lessons learnt under this project may be beneficial to other A5 countries.

---

---

## **Table of Contents**

List of Annexes .....	3
List of Abbreviations.....	4
Executive Summary .....	5
<b>A.</b> Introduction and Background .....	7
<b>B.</b> Objective .....	8
<b>C.</b> Project Context & Justification.....	8
C.1. ODS Waste Management System .....	10
C.1.1. Collection.....	10
C.1.2. Transport Consolidation and Storage.....	11
C.2. ODS Disposal Strategy .....	15
<b>D.</b> Project Description.....	17
D.1. Synergies with other Chemical related Conventions .....	21
D.2. Financial Sustainability and expected Business Model .....	21
D.3. Budget & Related Costs .....	22
D.5. Monitoring, Implementation & Dissemination .....	22
<b>E.</b> Project Implementation Schedule & Milestones .....	23
Annex I – Transmittal Letter .....	24
Annex II – Reference Incinerator EPL Standards for Relevant Air Emissions .....	25
Annex III – Destruction Facilities Surveyed under the Preparation Project .....	26
Annex IV – Project Framework .....	30

## **LIST OF ANNEXES**

- Annex I** Transmittal Letter
- Annex II** Reference Incinerator Environmental Performance Limit Standards for Relevant Air Emissions
- Annex III** Destruction Facilities Surveyed under the Preparation Project
- Annex IV** Project Framework

## **LIST OF ABBREVIATIONS**

<b>ABNT</b>	National Association for Technical Standards
<b>Alice-Web</b>	System for Foreign Trade Data Analysis
<b>CFC</b>	Chlorofluorocarbon
<b>CONAMA</b>	National Council on Environment
<b>CO<sub>2</sub> eq</b>	Carbon Dioxide Equivalent
<b>CTF</b>	Federal Technical Registry
<b>EE</b>	Energy Efficiency
<b>EPR</b>	Extended Producer Responsibility
<b>EOL</b>	End of Life
<b>ExCom</b>	Executive Committee
<b>GHG</b>	Greenhouse Gas
<b>GWP</b>	Global Warming Potential
<b>HCFC</b>	Hydrochlorofluorocarbon
<b>HC</b>	Hydrocarbon
<b>HFC</b>	Hydrofluorocarbon
<b>HPMP</b>	HCFCs Phase Out Management Plan
<b>HVAC-R</b>	Refrigeration, Air Conditioners, Ventilation and Heating Sectors
<b>IBAMA</b>	National Institute of Environment and Natural Renewable Resources
<b>MLF</b>	Multilateral Fund for the Implementation of the Montreal Protocol
<b>MMA</b>	Ministry of Environment
<b>MOP</b>	Meeting of the Parties to the Montreal Protocol
<b>N.A.</b>	not available
<b>NPP</b>	National Phase-Out Management Plan
<b>ODP</b>	Ozone-Depletion Potential
<b>ODS</b>	Ozone-Depletion Substance
<b>PBCO</b>	National Program for the Protection of the Ozone Layer
<b>PROZON</b>	Inter-Ministries Executive Committee for Ozone Layer Protection
<b>PU</b>	Polyurethane Foam
<b>RAC</b>	Refrigerating and Air Conditioning
<b>R&amp;R</b>	Recovery and Recycle
<b>SMEs</b>	Small and Medium Enterprises
<b>UNDP</b>	United Nations Development Programme
<b>WEEE</b>	Waste Electrical and Electronic Equipment

## **EXECUTIVE SUMMARY**

1. UNDP, on behalf of The Government of Brazil, is submitting to the 72<sup>nd</sup> ExCom this request for funding for a pilot project that will evaluate and demonstrate the management and environmentally sound disposal and destruction of ODS waste, at a cost, as originally submitted, of US \$1,490,600. This project is submitted in line with decision 58/19 and will address the destruction of 120 metric tonnes (mt) of waste ODS in the country.

2. At the 57th meeting, the Executive Committee approved the preparation project BRA/DES/57/PRP/288 for UNDP to prepare a pilot ODS demonstration project for Brazil. At that meeting, the decision was taken to look at pilot ODS disposal projects that would respond to decision XX/7 of the Twentieth Meeting of the Parties, which provided that pilot projects could cover the collection, transportation, storage and destruction of ODS, with a focus on assembled stocks with high net global warming potential (GWP), and in a representative sample of regionally diverse Article 5 countries. Members also stressed that ODS disposal demonstration projects should be feasible, and should include methods of leveraging co-funding. Brazil was one of the countries selected based on this criteria.

3. Brazil has already advanced significantly as regards of some aspects included in Decision 58/19, namely recollection and de-manufacturing of ODS. Transport and storage, and this final component of management of collected stocks, transport (logistics) and destruction would ensure that the full circle is completed. The project complies with the criteria established by Decision 58/19 including focus on specific aspects not addressed by other pilot projects.

4. The National CFC Phase-out Plan (NPP) promoted the creation a national structure for the recollection of CFCs from old equipment. Also, the national Council on Environment (CONAMA) has enacted the Resolution 267/2000 prohibiting the emissions of CFCs in the country. The Government of Brazil has approved, in 2010, the Law 12.305/10, that established the National Law on Solid Waste, which will enforce an Extender Producer Responsibility (EPR) programme, fact that will generate large quantities of waste of RAC equipment, including ODS.

5. In one hand, the establishment of regional energy-efficiency programmes promoted the early retirement of more than 500,000 units of domestic refrigerators. In the other hand, the country is implementing a project which seeks to transform the market by promoting the replacement of old and inefficient chillers, mainly CFC-based ones, through a complex nationwide finance-warranty scheme.

6. The above developments have resulted in the collection of ODS in an amount of 61,776 kg pure and contaminated CFCs (CFC-12, CFC-11), that has been accumulated mostly in the Reclaim Centers. Larger quantities might also been held in small scale decentralized recycling centers that will needed to be inventoried and inserted in the ODS Waste Management System. Additionally, an estimated 734,400 kg of ODS materials is anticipated to become available from June, 2014 due to a large cargo seized by IBAMA.

7. It is anticipated that transportation, consolidation and storage will pose great challenges to the project, since the CFCs collected are located in several companies and reclamation centers, in tanks and cylinders of different sizes and shapes, are spread over a large territory that comprises more than 3,800 km. Besides the large distances to be covered in this ODS Waste Management System proposal, there is a need to strengthen the entities and transportation companies involved in such process.

8. The various strategic and technology options for destruction of waste ODS have been reviewed as a basis for developing the project design Overall the strategic options considered were: i) *export to qualified facilities in countries party to the Basel Convention*; ii) *the development of new national facilities using imported technologies*; and iii) *utilization of existing national hazardous and industrial waste management capacity that could potentially be qualified to international standards*. After careful evaluation the Government of Brazil has decided to pursue the path (iii).

9. In this sense, this project is design around 4 Components, as follows:

- a. Component 1: Establish a comprehensive ODS Waste Management System including the ccapacity building on handling, transportation and characterization of ODS waste, as well as improve the ODS waste storage capacity;
- b. Component 2: Undertake test burns at the two incineration facilities in order to qualify national capacities for ODS waste disposal as per international standards, analyzing its logistics and cost;
- c. Component 3: Technical assistance and related development work associated with evaluation and standardization of the ODS waste Management & Disposal Demonstration Project;
- d. Component 4: Project management associated with implementation and oversight of project

10. In order to ensure that all ODS waste is properly accounted for, the process will be closely monitored and data will be recorded through an electronic database system to be set up for this purpose. The origin of all EOL ODS recovered for destruction is easily determined given that the currently available stocks are held by the original sources and are collected from well-defined activities.

11. The total cost of the project, as originally submitted and including co-finance, has been estimated at US \$2,065,600, the amount requested from the Multilateral Fund Secretariat is US \$1,490,600.

12. As result, it is expected that this project will demonstrate the management and safe and environmentally sound management and disposal of “end of life” (EOL) ODS waste through an innovative approach that could be replied to other A5 countries.

## **A. Introduction and Background**

13. In recent years it has become generally recognized that a significant bank of ODS remains in use, mainly as refrigerant fluids and as blowing agent for PU foams, and it is likely that this ODS will be subject to atmospheric release at some point at the end of its useful life. As a consequence, the Parties to the Montreal Protocol have directed attention to the issue, particularly in developing countries where the major remaining banks of high ODP ODS (i.e. CFCs) remain. Under Decision XX/7<sup>1</sup>, the Parties requested ExCom to consider supporting demonstration initiatives in Article 5 countries as well as requesting TEAP to update its earlier guidance on ODS destruction<sup>2</sup> as adopted by the Parties<sup>3</sup>.

14. In recognition of this, ExCom Decision 58/19<sup>4</sup> approved a set of interim guidelines for the funding of demonstration projects for the disposal of ODS and agreed that the Multi-lateral Fund (MLF) will fund demonstration projects. Preparation funding for a number of such projects, including the current project proposed in Brazil were subsequently approved at ExCom 59. TEAP has also updated its guidance on destruction requirements and approved technologies for ODS destruction with inclusion of a current Task Force Report in its most recent Progress Report<sup>5</sup>.

15. In this sense, a number of ODS Waste & Disposal demonstration projects funded by the Multilateral Fund are being implemented worldwide based on the most varied premises. Overall it is apparent that experience gathered through those projects with a variety of ODS destruction technologies, programs and business models will be accumulated over the next years that can serve as a basis for future decision making and action on the issue by both countries and collectively by the Parties.

16. In the national context, although the production and consumption of CFCs in Brazil have been successfully phased-out under the Montreal Protocol, there is a significant residual amount of CFCs still found in equipment currently in operation, such as domestic refrigerators and Chillers. Due to their high Global Warming Potential, the CFCs contained in such equipment threaten to leak into the atmosphere if appropriate management and disposal measures are not taken into consideration.

17. Also, there is an evident need for an environmentally sound management and disposal of ODS that are being accumulated in the country originated at its operational recovery, recycling and reclaim system, also due to regional programmes on early retirement of Chillers and Domestic Refrigerators under the energy efficiency targeted initiatives and expected to be expanded to national levels due to the approval of the National Law on Solid Waste (Política Nacional de Resíduos Sólidos).

---

<sup>1</sup> Montreal Protocol Handbook (8<sup>th</sup> Edition, 2009), Page 90 - [http://ozone.unep.org/Publications/MP\\_Handbook/MP-Handbook-2009.pdf](http://ozone.unep.org/Publications/MP_Handbook/MP-Handbook-2009.pdf)

<sup>2</sup> TEAP Task Force on Destruction Technologies Report – 2002 (Volume 3b of 2002 TEAP Report) - [http://ozone.unep.org/Assessment\\_Panels/TEAP/Reports/Other\\_Task\\_Force/TEAP02V3b.pdf](http://ozone.unep.org/Assessment_Panels/TEAP/Reports/Other_Task_Force/TEAP02V3b.pdf)

<sup>3</sup> Montreal Protocol Handbook (8<sup>th</sup> Edition, 2009), Page 457-464 - [http://ozone.unep.org/Publications/MP\\_Handbook/MP-Handbook-2009.pdf](http://ozone.unep.org/Publications/MP_Handbook/MP-Handbook-2009.pdf)  
<sup>4</sup> <http://www.multilateralfund.org/sites/58th/Document%20Library2/1/5853.pdf>

<sup>5</sup> May 2011 TEAP Progress Report – P65,  
[http://ozone.unep.org/Assessment\\_Panels/TEAP/Reports/TEAP\\_Reports/TEAP\\_Progress\\_Report\\_May\\_2011.pdf](http://ozone.unep.org/Assessment_Panels/TEAP/Reports/TEAP_Reports/TEAP_Progress_Report_May_2011.pdf)



## B. Objective

18. In this proposal, the Government of Brazil is requesting funding for a project to demonstrate and evaluate the management and safe and environmentally sound disposal of “end of life” (EOL) ODS. The country’s aggressive legislation and efforts to prevent the release of this material resulted in the accumulation of stocks of CFCs and CFCs-contaminated materials. Such stocks are also in significant risk of dramatic growth due the anticipation - in the mid to long term - of the impacts of national programs related to energy efficiency and the Extended Producer’s Responsibility under the National Law on Solid Waste. The absence of cost effective demonstrated destruction scheme represents a significant gap in that process and a barrier to its implementation.

19. From the perspective of the MLF, ExCom and the Parties generally, the proposed project provides an opportunity within the overall global ODS destruction demonstration program to support the practical implementation of ODS destruction using existing domestic capacity as an integrated part of broader national environmental and sustainable development programs utilizing various instruments such as energy efficiency incentives and potentially carbon financing. The project will also serve to address several technical issues that have been raised in recent TEAP discussions and add to the technical knowledge base related to environmental performance requirements applied to ODS destruction.

## C. Project Context and Justification

20. Brazil has ratified and implemented the Vienna Convention and Montreal Protocol by Decree no. 99.280 of June the 6th in 1990. All amendments of the Protocol were ratified and implemented by Brazil, according to the following table, and since 1988 Brazil has been implementing activities addressed to comply with the targets set by the Montreal Protocol through legislative measures, public policies and through investment and non-investment projects.

Table 1. Vienna Convention, Montreal Protocol and respective Amendments

Convention, Protocol & Amendments	Ratification	Date
Vienna Convention – 1985	19 March 1990	Decree 99.280 – 06 June 1990
Montreal Protocol – 1987	19 March 1990	Decree 99.280 – 06 June 1990
London Amendment – 1990	1 October 1992	Decree 181 – 24 July 1991
Copenhagen Amendment – 1992	25 June 1997	Decree 2.679 – 17 July 1998
Montreal Amendment – 1997	30 June 2004	Decree 5.280 – 22 November 2004
Beijing Amendment – 1999	30 June 2004	Decree 5.280 – 22 November 2004

21. To support the coordination of activities and to mainframe the actions under the Montreal Protocol, the Ozone Layer Protection Coordination (CPCO) was created, which is subordinated to the Climate Change Department of the Ministry of Environment. The CPCO works on policies related to the phase out of the Ozone-Depleting Substances and acts as National Ozone Unit for the MP, also coordinating the formulation and implementation of all projects funded by the MLF, and acts as executive secretariat for the Inter-Ministries Executive Committee for Ozone Layer Protection (Prozon).

22. In 2002, the MLF approved for Brazil the National CFC Phase out Plan (NPP) aiming to phase out the consumption of 9,276 ODP tonnes of ODS from the Annex A, Group I (CFCs), during the period of 2002-2010. In this sense several investment, non-investment, technical assistance and training activities have been carried out, specifically the ones related to Recovery & Recycling structure.

23. The NPP promoted the creation of 5 large scale Reclaim Centers and 120 decentralized Recycling Centers, supported by the distribution of 5,000 recovery bags and machines to companies and technicians in the country, which created a unique environment for the recovery of CFCs from old equipment in the country through operations of maintenance and/or disposal. Also, CONAMA has enacted the Resolution 267/2000 prohibiting the emissions of CFCs in the country.

24. The Government of Brazil has approved, in 2010, the Law 12.305/10, that established the National Law on Solid Waste. This regulation has come to establish national and subnational Directives on solid waste matters (including WEEE). Between such Directives, there is the creation of a sector Extender Producer Responsibility (EPR) programmes, setting obligations for the establishment of a wide reverse manufacturing system to recover, dismantle, recycle and disposal equipment, including RAC ones.

25. In this sense, the subsector regulation of National Law on Solid Waste is being discussed and is expected to be enforced in the next couple of years, fact that will generate large quantities of waste of RAC equipment, including ODS, that will need to be recovered and disposed properly, in line with the CONAMA Resolution.

26. In one hand, as advanced programme, public and private sectors in Brazil joined forces through the establishment of regional energy-efficiency programmes that promoted the early retirement of more than 500,000 units of domestic refrigerators.

27. In the other hand, the country is implementing the project BRA/REF/47/DEM/275 - co-funded by the MLF, the GEF and the IADB – which seeks to transform the market by promoting the replacement of old and inefficient chillers, mainly CFC-based ones, through a complex nationwide finance-warranty scheme.

28. The above developments have resulted in the collection of ODS in an amount of 61,776 kg pure and contaminated CFCs (CFC-12, CFC-11), that has been accumulated mostly in the Reclaim Centers, and was verified as being available for destruction as listed in Table 2 below. Larger quantities might also been held in small scale de-centralized recycling centers that will need to be inventoried and inserted in the ODS Waste Management System. Additionally, estimated 734,400 kg of ODS materials is anticipated to become available from June, 2014 due to a large cargo seized by IBAMA.

29. Finally, larger quantities of CFC-contained waste will be generated in the mid to long term, result of the enforcement of the National Law on Solid Waste and its related EPR programme. The universe of those stocks must still need to be inventoried.

Table 2. ODS Inventory Brazil, as of 28<sup>th</sup> February 2013

Company		Profile	City	Prov.	ODS	Kg
1	Capital Refrig	Reclaim Center	Porto Alegre	RS	CFC-11	11,250
					CFC-12 Contaminated	4,900
2	Bandeirantes Refrig	Reclaim Center	Sao Paulo	SP	CFC-12 Contaminated	4,419
3	Bom Clima Refrig	Reclaim Center	Recife	PE	CFC-11	1,190
					CFC-12 Contaminated	1,057
4	Revert Brasil	De-manufacturer	Careaçú	MG	CFC-12 Contaminated	5,000
					CFC-12 Contaminated	4,000
5	Frigelar	Reclaim Center	Sao Paulo	SP	CFC-12 Contaminated	300
6	Tecnitest	End-user	Rio de Janeiro	RJ	CFC-12 Contaminated	120
7	Ref. Marechal	Recovery company	Sao Paulo	SP	CFC-11	4,000
8	Carrier do Brasil	End-user	Canoas	RS	CFC-12 Contaminated	11,500
9	ClimaSul	Recycle Center	Curitiba	PR	CFC-12 Contaminated	500
10	Recigases	Recycle Center	Rio de Janeiro	RJ	CFC-12 Contaminated	13,540
<b>SUBTOTAL ODS WASTE COLLETED AND AGGREGATED, to be consolidated</b>						<b>61,776</b>
North Reg. 13	3 companies	Recycle Center	Amazonas Province		CFC-12 Contaminated	730
	1 company	Recycle Center	Acre Province		CFC-12 Contaminated	100
	1 company	Recycle Center	Roraima Province		CFC-12 Contaminated	150
	1 company	Recycle Center	Macapá Province		CFC-12 Contaminated	170
	2 companies	Recycle Center	Rondônia Province		CFC-12 Contaminated	200
	3 companies	Recycle Center	Pará Province		CFC-12 Contaminated	290
	2 companies	Recycle Center	Tocantins Province		CFC-12 Contaminated	120
Center Rg. 16	3 companies	Recycle Center	Mato Grosso Province		CFC-12 Contaminated	550
	4 companies	Recycle Center	Mato Gr. do Sul Province		CFC-12 Contaminated	1,100
	6 companies	Recycle Center	Goiás Province		CFC-12 Contaminated	2,500
	3 companies	Recycle Center	Federal District (DF)		CFC-12 Contaminated	900
North East Reg. 30	3 companies	Recycle Center	Maranhão Province		CFC-12 Contaminated	500
	2 companies	Recycle Center	Piauí Province		CFC-12 Contaminated	90
	5 companies	Recycle Center	Ceará Province		CFC-12 Contaminated	2,900
	3 companies	Recycle Center	Rio Grande Nor. Province		CFC-12 Contaminated	950
	3 companies	Recycle Center	Paraíba Province		CFC-12 Contaminated	1,350
	2 companies	Recycle Center	Alagoas Province		CFC-12 Contaminated	800
	2 companies	Recycle Center	Pernambuco Province		CFC-12 Contaminated	5,200
	2 companies	Recycle Center	Sergipe Province		CFC-12 Contaminated	320
	8 companies	Recycle Center	Bahia Province		CFC-12 Contaminated	6,480
South East Reg. 36	8 companies	Recycle Center	São Paulo Province		CFC-12 Contaminated	5,500
	3 companies	Recycle Center	Rio de Janeiro Province		CFC-12 Contaminated	8,200
	19 companies	Recycle Center	Minas Gerais Province		CFC-12 Contaminated	7,034
	6 companies	Recycle Center	Espirito Santo Province		CFC-12 Contaminated	1,780
South Reg. 25	4 companies	Recycle Center	Rio Grande Sul Province		CFC-12 Contaminated	2,320
	14 companies	Recycle Center	Paraná Province		CFC-12 Contaminated	4,090
	7 companies	Recycle Center	Sta Catarina Province		CFC-12 Contaminated	3,900
<b>SUBTOTAL ODS WASTE COLLETED, TO BE AGGREGATED and to be consolidate**</b>						<b>58,224</b>
<b>TOTAL ODS WASTE TO BE ELIMINATED UNDER THE PROJECT</b>						<b>120,000</b>
11	IBAMA	Controlling Entity	São Paulo	SP	to be identified*	734,400
<b>SUBTOTAL ODS WASTE COLLETED AND AGGREGATED, to be characterized</b>						<b>734,400</b>
<b>TOTAL UNVERSE OF ODS WASTE inventoried in Brazil</b>						<b>854,400</b>

\*ODS originated from a large cargo seized by IBAMA

\*\*indicative inventory.

## **C.1. ODS Waste Management System**

30. As can be seen in the above, the quantities of CFCs recollected are located in several companies and reclamation centers in tanks and cylinders of diverse sizes and shapes and spread over a large territory that comprises the states of São Paulo (SP), Rio de Janeiro (RJ), Minas Gerais (MG), Pernambuco (PE), Rio Grande do Sul (RS) and Paraná (PR).

31. Due to the large distances of Brazil, it is foreseen that a major administrative/operational challenge in a sustainable solution to accumulating ODS will lay in the logistics of management system, mainly those related to the consolidation, transport and storage capacity in the country.

32. In this sense, to meet the requirements of the interim guidelines for the funding of demonstration projects for the disposal of ODS, as approved by Executive Committee, at its 58th Meeting, in accordance with paragraph 2 of decision XX/7 of the Meeting of the Parties. This project proposes to comply with all of the requirements as set out by the above mentioned Decision 58/19, as follows:

### **C.1.1. Collection**

33. In recent years, through a series of activities driven by the MLF funded projects, Brazil has established a nationwide Recovery, Recycling and Reclaiming (RRR) System composed by 5 (five) Reclaim Centers and 120 (one hundred and twenty) de-centralized Recycling Centers, backed up by the distribution of 5,000 (five thousand) tools, recovery bags and recovery machines, reaching all states in the country.

34. Also, Brazil has successfully created a stable energy efficiency program, driven by the Law 9991/00, that by working in close cooperation with Utilities, have promoted a wide equipment replacement programme. Since 2005, this programme successfully retired and replaced more than 500,000 inefficient domestic refrigerators, mostly owned by low income families.

35. In the same spirit, Brazil is implementing the project BRA/REF/47/DEM/275, which is co-funded by the MLF, the GEF and the IADB. This project overlooks the chillers owners and tries to create a new market, mostly driven by ESCOs and Utilities energy efficient programmes, by creating technical and financial mechanisms which companies can accede to accelerate the replacement of old and inefficient chillers. Indeed, replacement of high impact CFC-based chillers is a priority under the programme that, directly or indirectly, is promoting such replacements.

36. Supported by the National Resolution CONAMA 267/2000 – that prohibited CFC emissions in the country – great efforts were made to strengthen the collection system in the country, grouping all these sources of ODS contained equipment. As owners of state-of-

art recovery equipment, Reclaim and Recycling Centers had become the priority consolidation centers for these ODS, generating a real demand for the environmentally sound disposal.

37. However, selecting and consolidating such ODS (at the end-user level) is not a straightforward activity, since those Centers deal with a large and diverse source of equipment (and ODS), this situation generated a large quantity of CFC-based contaminated ODS collected. Also, it was identified that pure CFC-11 has virtually no commercial value due to the extreme low demand of this refrigerant for Chillers (that are being replaced), resulting in the inventory collected and surveyed in the Table 2 of this document that has no market value or technical condition to be recycled and reused.

38. In this sense, a major objective of this project is monitor the source of the collected ODS held by those Centers and strength their capacities in receiving, separating transferring and temporarily store it (in small quantities) with proper equipment to accomplish the further steps of the logistic process, avoiding, in this ways, the risk of venting and the loss of materials.

39. Private companies (Reclaim and Recycle Centers) will finance the cost of personnel and daily operational costs involved in the collection process. Therefore, no funds are being requested to collection of ODS waste.

### **C.1.2. Transport, Consolidation and Storage**

40. It is anticipated that transportation and consolidation will pose great challenges to the project, since the CFCs collected are located in several companies and reclamation centers, in tanks and cylinders of different sizes and shapes, are spread over a large territory that comprises the states of São Paulo (SP), Rio de Janeiro (RJ), Minas Gerais (MG), Pernambuco (PE), Rio Grande do Sul (RS) and Paraná (PR), needing to overcome distances of more than 3,800 km (From Porto Alegre to Recife). The Figure 1, below, indicate the map of distribution of the ODS collected through the partial inventory.

41. The inventory in Table 2 is based on collected ODS originated from a limited number of Recycling Centers and from all Reclaim Centers, including additional independent owners of CFCs. Due to the large basis of the country it is expected that more quantities of CFCs and contaminated CFCs collected may be inventoried during the implementation of the project.

42. Besides the large distances to be covered in this ODS Waste Management System proposal, there is a need to strengthen the entities and transportation companies involved in such process. It was identified that transportation of virgin/new ODS is quite a simple process due to the large normative basis and due to the fact that great part of consumption is through labelled non-refillable cylinders. However, managing the transport of collected (included recycled/reclaimed) ODS is still a challenge for these actors.



Fig. 1 – Map of the partial inventory of ODS Collected

43. In this sense, transport of ODS waste in Brazil has been done in an *ad hoc* manner and with no structured approach so far. The gaps already identified are:
- a. Lack of a hegemonic understanding (voluntary standardization) on how to treat and categorize ODS waste (subnational permit systems and documentation), it means: which class of waste/hazardous waste ODS should be marked and labelled, as well its issued documents at state environmental agencies. Such categorization is being done *ad hoc* by state governments. Different interpretation of class of the materials is given, meaning that each time that a ODS waste cargo cross a state border new regulations must be obeyed, resulting in more time and cost in the process.
  - b. Lack of proper vehicles for transport of ODS waste, and lack of refillable cylinders for transport of collected ODS waste, since great part of the refrigerant market in Brazil is supplied by non-refillable cylinders;
  - c. Lack of expertise on handling and labelling refillable cylinders/tanks containing ODS waste;
  - d. Lack of technical standards for handling, labelling and transporting ODS waste; and
  - e. Lack of consolidation of ODS waste coming from different owners and recycling centers that could allow economies of scale, improve efficiency and minimize venting.

44. This proposal includes a component that will create a tangible and coordinated structure for transport of collected ODS waste at all levels in Brazil. This includes capacity building activities for state governments and private companies involved in the licensing and transport operations of ODS waste from the recollection centers to storage and destruction facilities. Private companies (Reclaim Centers) will co-finance the cost of personnel involved in transport of ODS waste in the country.
45. Brazil is also using its Reclaim and Recycle centers as advanced locals for consolidation and storage facilities, taking advantage of the very limited capacity storage with proper tanks and cylinders.
46. Since the main area of business of such centers is recovering, recycling/reclaiming and re-using ODS, it was also identified that there is a certain lack of expertise of handling, transferring and lack proper storage equipment at the Centers.
47. It was identified the current system has its limitations, since ODS waste use the same tanks and cylinders that are to be used for tradable recycled/reclaimed ODS. It is urgent the need to undertake improvements in order to have a fully operational system that would complement the general ODS Waste Management System.
48. The proposal includes that recycle centers become advanced points of receipt of ODS waste and that the Reclaim Centers become also Regional Storage Centers to facilitate the consolidation and the transport of the waste to the destruction facility, taking advantage of the physical structure and capacities already in place.
49. In this sense, as part of the collection process, Recycling Centers placed at 120 cities in Brazil will be responsible to act as advanced collections centers for ODS waste and will be able to support ODS waste owners on how to collect and direct their waste. As determined by ExCom decision, this **collection** activity **will not** be funded by this proposed project.
50. As further step, Reclaim Centers placed at the 4 main cities of Brazil (*Refrigeração Bandeirantes and Sudeste Refrigeração, in São Paulo; Frigorio Climatização, in Rio de Janeiro; Bom Clima Refrigeração, in Recife; and Refrigeração Capital, in Porto Alegre*) will be the main responsible (and co-funders) partners in the consolidations of ODS Waste . Their activities will include: receipt collected ODS waste; identification and characterization of the ODS waste streams and tonnage; transfer to high capacity cylinders and tanks and labeling of the consolidated ODS waste cargo.
51. Ultimately, this proposal intends to create a coordination mechanism between the Reclaim Centers, ODS waste holders, consolidators and managers to assure proper handling, transportation and disposal of ODS waste through an integrated Management System that could be replicated to other countries.
52. Therefore, the government of Brazil is requesting funds to cover the costs of procuring recovery equipment and associated multi-refrigerant ODS identifiers, materials/large

capacity storage cylinders and ancillary equipment that would allow transfer of ODS waste from smaller to larger cylinders in a higher rate.

53. The proposal includes the procurement of 5 high rate recovery machines that can be moved in the units at the advanced receipt points. It would be important to note that the recovery machines would need to have a high capacity in order to be able to transfer ODS waste between cylinders of different sizes.
54. It is also foreseen the procurement of 15 large capacity tanks (1,000kg each) to each Reclaim & Storage Center, increasing the storage capacity of the country from current from 4.4 metric tonnes to 20 metric tonnes, facilitating the handling and disposal of waste (since current inventory is being stored in private owned cylinders, and the centers are being demanded to return the empty cylinders to end users, creating a negative incentive for the system).
55. This also includes capacity building activities for the private companies involved in the handling and storing operations of ODS waste from the recollection centers to storage and destruction facilities, as well as further quantification of stocks (associated costs for gas-chromatographic analysis, labelling, issuance of documents and certificates for final disposal, supervision and monitoring).
56. This proposal will co-finance a consolidation pilot project in each Reclaim Center. These Storage Centers will co-finance the cost of personnel and day-to-day operational costs involved in consolidation, transfer and storage of ODS waste in the country.

## **C.2. ODS Disposal Strategy**

57. The various strategic and technology options for destruction of waste ODS have been reviewed as a basis for developing the project design and its detailed scope. In general, the menu of available technological options that would meet the destruction performance requirements set out by the Montreal Protocol is well known.
58. These have been reviewed in the previous referenced TEAP documentation adopted by the Parties, including the most recent update in 2010 where a number of new innovative but as yet fully commercialized technologies were considered. Similarly, both the Basel Convention<sup>6</sup> and the GEF Scientific and Technical Assessment Panel (STAP)<sup>7</sup> have issued guidance documents on the selection of destruction technology for POPs which also provide relevant information given the similarities in requirements for environmentally sound destruction of chlorinated chemical wastes, including differential between so-called combustion and non-combustion technologies.
59. Overall the strategic options considered were: i) export to qualified facilities in countries party to the Basel Convention; ii) the development of new national facilities

---

<sup>6</sup> <http://www.basel.int/Portals/4/Basel%20Convention/docs/pub/techguid/tg-POPs.pdf>

<sup>7</sup> [http://www.unep.org/stap/Portals/61/pubs/POPs\\_Disposal\\_Final\\_low.pdf](http://www.unep.org/stap/Portals/61/pubs/POPs_Disposal_Final_low.pdf)



using imported technologies; and iii) utilization of existing national hazardous and industrial waste management capacity that could potentially be qualified to international standards. Each of these is discussed below:

60. Export to qualified hazardous waste management facilities: This option would essentially be applicable to the actual chemicals under the assumption that the cost of bulk export of any significant quantities of CFC-11 and contaminated CFC. The export options considered available to Brazil are North America and Europe, noting that the United States status as a non-party to the Basel convention limits consideration of that destination directly. Facilities qualified and experienced in destroying EOL ODS exist in Mexico, the United States and Canada. These primarily employ high temperature incineration (HTI) although commercial plasma arc facilities employing PLASCON technology were to start operation in Mexico and the United States. In Europe, to date HTI is the main available commercial option with a number of facilities existing that have destroyed EOL ODS. In general, facility gate market prices for EOL ODS destruction with HTI in North America range from approximately US\$1.5/kg to US\$3.0/kg and essentially mirror the market pricing for non-flammable halogenated waste. Destruction with plasma arc technology is reported to be somewhat higher, An overall unit cost range of US\$10.3-18.5/kg is estimated for this technology, noting that a cost of US\$6.5/kg in Australia would apply at an operating commercial facility there. The European market has recently become similar in pricing to that in North America for chlorinated waste streams. Current pricing for POPs shipped from Eastern Europe is in the range of US\$1.5-2.0/kg. It should be noted that all of these costs exclude Basel Convention transaction, local administration/supervision, local handling and sea container transportation. Based on quotations from the UNDP demonstration project in Ghana (overall destruction cost of US\$12.3/kg) , reasonable estimates of these would be US\$6/kg including US\$3/kg for transportation and US\$1/kg transaction costs for Basel documentation into the EU. There is no recent previous experience for export of ODS from Brazil that could be used as reference to calculate such costs.
61. Development of new national facilities using imported technologies: The option of developing specialized facilities for destruction of EOL ODS has not been further considered noting that two attempts to establish refrigerator de-manufacturing facilities inclusive of destruction facilities have not been completely successful. In any event it was determined through a preliminary qualification process that permit national commercial HTI incineration facilities have the required capability subject to demonstration. Additionally, a pilot Plasma Arc facility exists in the country and could be considered subject to economic viability.. In general it is felt that development of any new technology in Brazil exclusively for EOL ODS destruction would not be viable due to the relatively high initial cost and oversized for the national requirement. This generally mirrors the experience of other more advanced MLF projects, notably that approved and now being implemented in Colombia<sup>8</sup>

---

<sup>8</sup> <http://www.multilateralfund.org/66/English/1/6633.pdf>

62. *Utilization of existing national hazardous and industrial waste management capacity:* This option involved examining the potential for existing domestic incineration facilities to be qualified to international standards, specifically those that could potentially be qualified to international standards as reference to both the Basel Convention<sup>9</sup> and the GEF Scientific and Technical Assessment Panel (STAP)<sup>10</sup> have issued guidance documents on the selection of destruction technology for POPs which also provide relevant information given the similarities in requirements for environmentally sound destruction of chlorinated chemical wastes, including differential between so-called combustion and non-combustion technologies. This involved review of the present permitting and qualification protocols and standards in force in Brazil as applied to hazardous waste thermal treatment/incineration facilities as well as identify these facilities subject to this legislation and permitting process, as can be found in the Annex III.
63. In summary, Brazil has a well-established mature legal and regulatory system for the management of hazardous waste. The requirements and procedures in place and enforced by institutions and technical capability are generally aligned with those in developed countries. Similarly, the country has a rapidly developing and capable waste management service provider base that is investing in modern capability, both in the collection and handling of hazardous waste and in its environmental sound processing, treatment and disposal. In particular, it now has several thermal treatment and destruction facilities that should be capable of undertaking the destruction of waste ODS. Subject to demonstration of this capability in accordance with international standards, utilization of domestic destruction capability should be more cost effective than alternatives of export to qualified facilities elsewhere, or developing new purpose built facilities with alternative technologies.

*Table 3 – Summary table of surveyed hazardous and industrial waste management facilities*

Company	City	State	Technology	Remarks
Cetrel	Salvador	BA	Liquid Injection	Solid waste
HazTec-Tribel	Belford Roxo	RJ	Rotary and Static Kilns	Hazardous waste
Essencis	Taboão da Serra	SP	Rotary Kiln	De-manufacturing ref.
BASF	Guaratinguetá	SP	Rotary Kiln	Chemicals waste
ABL	Cosmópolis	SP	Rotary Kiln	Pharmaceutical waste
Ecochamas	Rezende	RJ	Plasma Arc	Industrial waste class II
Fox Reciclagem	Cabreúva	SP	Chemical-Thermal Treat.	Refrigerator de-manufacturer

64. In this sense, Brazil has decided to implement its disposal project based on the destruction strategy described in the paragraph 43 above, namely to “*Use the existing national hazardous and industrial waste management capacity*”.
65. The rationale behind qualifying destruction capability for both for CFC-11 and contaminated CFC-12 is so that options are covered given the overall incremental approach adopted for developing waste ODS destruction capability. The pre-qualification of CFCs serves to remove a possible barrier to the eventual investment in such high efficiency capability when economies of scale and financing mechanisms are

<sup>9</sup> <http://www.basel.int/Portals/4/Base%20Convention/docs/pub/techguid/tg-POPs.pdf>

<sup>10</sup> [http://www.unep.org/stap/Portals/61/pubs/POPs\\_Disposal\\_Final\\_low.pdf](http://www.unep.org/stap/Portals/61/pubs/POPs_Disposal_Final_low.pdf)

in place. This incremental project design strategy should serve as useful and practical demonstration for broader replication elsewhere.

66. The qualification of the existing domestic incineration facilities will be accomplished through undertaking test burns of these waste streams at least in one facility (preferred two due to the geographic distribution of Storage Centers in the country, to be determined during the implementation). This will involve the destruction of an estimated 120 metric tonnes of CFC contaminated refrigerant, being 61,776 kg of collected CFC-11 and 12 and additional 58,224 kg to be consolidated from diverse sources at Recycling Centers and from the seized stock from IBAMA . The project will also support the incremental development of key institutional and technical capacity through technical assistance related to regulatory measures and appropriate economies of scale.
67. The project complies with the criteria established by Decision 58/19 and involves aspects that are not necessarily addressed by other pilot projects approved by ExCom.

#### **D. Project Description**

68. The proposed project described below has been structured into four components: Component 1 (ODS Waste Management System through Transport, Consolidation and Storage coordination and structure enhancement); Component 2 (Test Burn/Destruction Demonstration); Component 3 (Technical Assistance); and Component 4 (Monitoring and Evaluation). The activities to be undertaken in each component are summarized in the Table 4. The following provides a detailed project description by Component:

##### **Component 1:**

69. The activities in this component cover the oversight/monitoring of collected CFC and the proper consolidating the material into larger containers (for compatibility with onward transport and incineration feed infrastructure) at the Regional Storage Centers, and transportation to the destruction facility, its characterization as to CFC content and contaminants, secure storage, and ultimately transportation to the test burn sites. **The initial collection stage up to the consolidation and storage sites will not be MLF funded,** but paid for by the current holders.
70. MLF grant funding is proposed for 5 sets of high speed refrigerant recover equipment (inclusive of tools, accessories and portable analyzers) and a quantity of larger multiple use cylinders with appropriate vapour locks and purging capability. Capacity building on handling, transportation and characterization is also envisaged with MLF funds. Finally, a specific activity is identified to document and report on the origin, tracking, and verification of all the waste ODS in accordance with procedures suitable for use under an international carbon crediting system if that were to apply and to enhance the coordination system through the creation of an Integrated Management System as pilot activity. The detailed activities include:

- Consolidate collected ODS waste into centralized storage sites, consolidating the material into larger containers (sizing anticipated to be at least 500 kg containers, preferably 1,000kg ones, selected for compatibility with onward transport and incineration feed infrastructure);
- Proper characterization (identification) of large containers as to CFC content and contaminants through gas chromatograph analysis;
- Establish a secure storage at 5 strategically located places (cities São Paulo, Osasco, Rio de Janeiro, Porto Alegre and Recife), with proper stocks control;
- Transportation to the test burn sites and the transport documentation/licensing.
- A specific activity is to document and report on the origin (collection sites, profile of equipment, etc), tracking (labelling), and verification of all the EOL ODS in accordance with procedures suitable for use under an international carbon crediting system if that were to apply;
- Review of Licensing demands for all operations;

### **Component 2:**

71. It is proposed to undertake test burns at the two incineration facilities that will be further selected under a public process – taking as reference the short list provided in Table 3 above. The test burn process will utilize the national regulatory requirements and protocols described above, supplemented by an international standard, likely as issued by USEPA<sup>11,12</sup>.
72. The initial activity will be technical assessment work undertaken jointly by an MLF funded consultant and the incinerator operator that will include a base line environmental audit of the facilities and current environmental management plan required under national regulations, development of a detailed test burn protocol and specification, and design for any modifications required for the test burn. A key part of this will be determination of an appropriate ODS feed rate (allowable chlorine content) and the waste stream to be co-disposed with ODS along with its compositional characterization.
73. In terms of modifications required, these are anticipated to be relatively minor. It will involve installation of a new feed port in the front end of the kiln and setting up the feeding cylinder system with appropriate metering and automated record tabulation as well as a switching and purging capability for cylinders. For CFC-11, modifications may involve either a dedicated feed system but more likely simply a connection into the existing liquid feed system and burner nozzle, although for purposes of the test burn and integrity of input measurement a dedicated feed tank, pump, metering system and flow controls will likely be required.
74. On each facility/ODS chemical combination, there will be a baseline test burn with the normal waste stream to be co-disposed, and then a test burn with the ODS. In each case, the monitoring protocol will be followed covering operating conditions (i.e. combustion chamber temperatures, estimated resident times, stack outlet temperatures),

---

<sup>11</sup> <http://www.epa.gov/osw/hazard/testmethods/sw846/pdfs/chap13.pdf>

<sup>12</sup> <http://www.epa.gov/osw/hazard/tsd/td/combust/pdfs/burn.pdf>

the standard menu of regulated emissions including PCDD/F as well as mass balance inputs covering all residual release paths (solid, liquid and gaseous), analysis for key contaminants (including PCDD/F) in solid bottom ash, scrubber residuals) and any liquid residual streams. The intention is to determine both Destruction Removal Efficiency (DRE) and Destruction Efficiency (DE). This would serve to inform current discussions reflected in the most recent TEAP ODS Destruction Task Force report referenced above regarding the equivalency of these two parameters used in assessing environmental performance of organic waste destruction facilities generally. DE is generally considered more comprehensive since it covers all releases though DRE which only assesses releases to air is more generally used including in the TEAP guidelines. It is generally felt that gaseous or high vapor pressure CFCs would only be subject to air release but this should be validated. Likewise, analysis for PCDD/F and any recombinant CFC residuals in all release medium would likewise be useful contributions to the technical knowledge base.

**Component 3:**

75. This component covers technical assistance and related development work associated with evaluation, regulation and implementation of the ODS disposal demonstration project and in ensuring the legal, regulatory, technical and public acceptance tools are in place to sustain capacity so qualified. This sub-component provides limited MLF support, co-financed by the MMA for regulatory enabling measures. This would include:
- i) legislation/regulation guidance in support of collection, storage, analysis, tracking, certified destruction and reporting requirements applicable to the management of waste ODS;
  - ii) Standardization of the technical criteria and specifications for the facilities managing waste ODS; and
  - ii) legislation/regulation guidance for the ODS waste management under the EPR system regulation under the National Policy on Solid Waste.

**Component 4:**

76. This component covers the project management costs associated with this kind of project. MLF funding would be associated with partial funding of incremental staffing costs in the form of a full time project manager, project documentation printing/translation costs and local project related travel. This component also provides for normal M&E costs also on a cost shared basis between the MLF and the Government.
77. Formal Monitoring and Evaluation activities responsible to gather all documents at all level, establishment of digital archives, tables and controls. Systematization of storage data (quantity of cylinders, composition of ODS contained in it and labelling). Transportation system related to profile of transport company and insurance. Systematization of transport and handling Licensing protocols with the various state agencies involved in the process. Monitoring and evaluation of test Burn protocols.

## D.1. Synergies with other Chemical related Conventions

75. In principle, there are no direct synergies related to this project proposal that can be implemented *vis-à-vis* with other chemicals projects. However, it was identified that the destruction qualification for ODS waste (particularly the upgrade of incineration facilities and the establishment of protocols and verification of efficiency of destruction) that can be beneficial for the disposal of other types of hazardous waste like PCBs, since Brazil is implemented, under the GEF-V, a “Integrated Project on PCBs Management”. In this sense, some institutional cooperation might be promoted between the Ozone National Unit and other Chemicals Directories, in order to exchange good practices on the overall waste management principles (although the stakeholders involved in each project are different, but general lessons learned can be exchanged).

## D.2. Financial Sustainability and expected Business Model

78. Initially, the project will analyze the possibility of using carbon finance scheme for the short term; In the medium to long term, the Extended Producer’s Responsibility (EPR) programme will fund the ODS waste system through the establishment of a financial mechanism (or fund), funded by RAC equipment producers, that will be responsible for the disposal of ODS contained equipment (cradle-to-grave / life cycle approach).

## D.3. Budget & Related Costs

Component and Activities			MLF Funding USD	Co-funding USD	TOTAL USD
1.1	<b>Component 1: Management System Pilot Project:</b>	Collection oversight of CFCs and CFC-based ODS	25,000	-	25,000
1.2		Consolidation and Characterization of CFCs	95,000	55,000	150,000
1.3		Temporary storage of CFCs	150,000	67,000	217,000
1.4		Transportation to destruction facility	20,000	10,000	30,000
1.5		Transport, Integrated Management System Pilot Structure	182,600	68,000	199,600
1.6		Consolidation and Storage, Documentation and Reporting	10,000	-	10,000
<b>1</b>			<b>Subtotal Component 1</b>	<b>482,600</b>	<b>200,000</b>
2.1	<b>Component 2: Test Burn / Destruction Demonstration</b>	Detailed test burn design and selection of facilities	25,000	37,000	62,000
2.2		Incineration infrastructure adaptation of facilities	35,000	20,000	55,000
2.3		Settlement of procedures and baseline feed	10,000	10,000	20,000
2.4		Baseline test burn feed mix	55,000	25,000	80,000
2.5		Demonstration test burn feed CFC-11 (5mt)	75,000	45,000	120,000
2.6		Demonstration test burn feed CFC-12 (5mt)	75,000	45,000	120,000
2.7		Destruction of CFCs 11&12 (110mt)*	418,000	-	418,000
2.8		Test burn supervisión	10,000	5,000	15,000
<b>2</b>		<b>Subtotal Component 2</b>	<b>703,000</b>	<b>187,000</b>	<b>890,000</b>
3.1	<b>Component 3: Technical Assistance</b>	Support for technical enabling activities	50,000	35,000	85,000
3.2		Support for stakeholder and public awareness	50,000	25,000	75,000
<b>3</b>			<b>Subtotal Component 3</b>	<b>100,000</b>	<b>60,000</b>
4.1	<b>Component 4: Monitoring and Evaluation</b>	International Expert	80,000	-	80,000
4.2		National Consultant	60,000	60,000	120,000
4.3		Travel / Mission Costs	45,000	45,000	90,000
4.4		Administrative Office	-	15,000	30,000
4.5		Sundry	20,000	8,000	22,000
<b>4</b>		<b>Subtotal Component 4</b>	<b>205,000</b>	<b>128,000</b>	<b>333,000</b>
<b>Total USD</b>			<b>1,490,600</b>	<b>575,000</b>	<b>2,065,600</b>

*\*remaining 676,176 kg of ODS contaminated materials seized by IBAMA shall be destructed by own costs, as co-financed provided by the Government/fined company responsible for the illegal trade. Destruction is dependent on positive results of the burns undertaken under this demonstration project.*

#### D.4. Monitoring, Implementation & Dissemination

76. A national team of experts will be set up to implement and monitor project implementation and progress under the direct coordination of MMA and UNDP. This includes the monitoring of transport, storage and final disposal of ODS, as per ExCom Guidelines 58/19 and other national/international legislation.

77. Lessons learned will be documented and shared nationally as well as internationally. The project will generate valuable information about how to develop a full system of ODS Disposal Management System covering collection, transport, storage and destruction in place. A Closure Seminar is intended to be promoted to share the experiences learned.

#### E. Implementation Schedule & Milestones

Activity	2014			2015				2016				2017	
	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
<b>Project Start-up</b>													
Excom Project Approval	■												
Receipt of Funds		■											
Project/Grant Signature			■										
<b>Management activities</b>													
Progress Reports to Excom					■				■				
<b>Project Implementation</b>													
Component 1: Collection/Transport/Consolidation/Storage			■	■	■	■	■	■	■	■	■		
Component 2: ODS Destruction Demonstration		■	■	■	■	■	■	■	■	■	■		
Selection Process of Incineration Facility		■	■										
Test burn design			■	■									
Adaptation of feeding mechanism, baseline feed mix pre-determination process, settlement of test burn evaluation			■	■									
Test burn of 10mt of CFC						■							
Effective incineration of 110mt of ODS waste recollected							■	■	■	■			
Supervisory/audit and data analysis								■	■	■	■		
Component 3: Technical Assistance				■	■	■	■	■	■	■	■		
Component 4: Management/Monitoring/Evaluation			■	■	■	■	■	■	■	■	■		
<b>Project Closure</b>													
Final Report											■	■	
Certificate of Technical Completion											■	■	
Operational and Financial Closure											■	■	

## ANNEX I

### Transmittal Letter



**MINISTÉRIO DO MEIO AMBIENTE**  
**SECRETARIA DE MUDANÇAS CLIMÁTICAS E QUALIDADE AMBIENTAL**  
**DEPARTAMENTO DE MUDANÇAS CLIMÁTICAS**  
SEPN 505 - Lote 02 - Bloco B - Edifício Marie Prendi Cruz - Sala 307, CEP: 70.730-542, Brasília DF  
Tel.: (61) 2028-2272 e Fax.: (61) 2028-2272

Ofício nº 16/2014/SMCQ/DEMC

Brasília, March 18 2014.

**Mr. JACQUES VAN ENGELS**  
Officer-in-Charge, Montreal Protocol Unit/Chemicals  
UNDP  
New York, NY  
USA

Subject: Pilot Demonstration Project on ODS-Waste Management and Disposal.

Dear Mr. Jacques Van Engels,

Please find enclosed original copy of the Pilot Demonstration Project on ODS-Waste Management and Disposal to be submitted for the consideration of the 72nd Executive Committee Meeting of the Multilateral Fund.

Yours sincerely,

A handwritten signature in black ink, consisting of stylized initials and a surname.

**ADRIANO SANTHIAGO DE OLIVEIRA**  
Director of the Department of Climate Change



## ANNEX II

Reference Incinerator Environmental Performance Limit Standards for Relevant Air Emissions<sup>13</sup>

Performance Parameter	Brazil CONAMA 316 de 2002 <sup>14</sup>	TEAP Task Force Report (2002) <sup>15</sup> Decision XV/9 <sup>16</sup>	Basel Convention G/L (POPs) <sup>17</sup>	EC Incineration Directive <sup>18</sup>	EC IPPC BREF <sup>19</sup>
Particulates (mg/Nm <sup>3</sup> )	70	50	NR	10	0.1 – 2
SO <sub>x</sub> (mg/Nm <sup>3</sup> )	280	n/a	NR	50	0.1 – 50
HCl (mg/Nm <sup>3</sup> )	80	100	NR	60	0.1 – 10
HF (mg/Nm <sup>3</sup> )	5	5	NR	1	0.04 – 1
HBr/Br <sub>2</sub> (mg/Nm <sup>3</sup> )	n/a	5	NR	n/a	n/a
NO <sub>x</sub> (mg/Nm <sup>3</sup> )	560	n/a	NR	200	40 – 200
CO (mg/Nm <sup>3</sup> )	100	100	NR	n/a	5 -50
Dioxin/Furan (ng-ITEQ/Nm <sup>3</sup> )	0.5	0.2 0.5 (Foam)	0.1	0.1	0.002 – 0.1
Total Organic Carbon	n/a	n/a	NR	10	0.1 – 10
DE (%)	n/a	n/a	99.99	n/a	n/a
DRE (%)	99.99 (POPs) 99.9999(PCB)	99.99	99.9999	99.9999	n/a

NR – National Regulations

n/a – not applied

<sup>13</sup> Limits are also applied to other pollutants, particularly heavy metals but are not listed.

<sup>14</sup> CONAMA Resolution no. 316 from 2002 - <http://www.mma.gov.br/port/conama/legiabre.cfm?codlegi=338>

<sup>15</sup> TEAP Task Force Report on ODS Destruction Technologies (2002) -

[http://ozone.unep.org/Assessment\\_Panels/TEAP/Reports/Other\\_Task\\_Force/TEAP02V3b.pdf](http://ozone.unep.org/Assessment_Panels/TEAP/Reports/Other_Task_Force/TEAP02V3b.pdf)

<sup>16</sup> Handbook of the Montreal Protocol, 8<sup>th</sup> Edition (2009), Section 3.1, Page 457,

[http://www.unep.ch/ozone/Publications/MP\\_Handbook/MP-Handbook-2009.pdf](http://www.unep.ch/ozone/Publications/MP_Handbook/MP-Handbook-2009.pdf)

<sup>17</sup> <http://www.basel.int/pub/techguid/tg-POPs.pdf>

<sup>18</sup> Directive 2000/76/EC on Incineration of Waste – Hazardous waste incineration daily averages:

[http://www.central2013.eu/fileadmin/user\\_upload/Downloads/Document\\_Centre/OP\\_Resources/Incineration\\_Directive\\_2000\\_76.pdf](http://www.central2013.eu/fileadmin/user_upload/Downloads/Document_Centre/OP_Resources/Incineration_Directive_2000_76.pdf)

<sup>19</sup> EC IPPC BREF, August 2006- – Hazardous waste incineration daily averages.:

[ftp://ftp.jrc.es/pub/eippcb/doc/wi\\_bref\\_0806.pdf](ftp://ftp.jrc.es/pub/eippcb/doc/wi_bref_0806.pdf)

### ANNEX III

#### Destruction Facilities Surveyed under the Preparation Project

Comparative Factors	Cetrel	HazTec-Tribel	Essencis	BASF	Serviatis	ABL	Ecochamas
<b>Location</b>	Salvador, BA	Belford Roxo, R.J.	Taboao da Serra, SP	Guaratingueta, SP	Resende/RJ	Cosmopolis, SP	Resende, RJ
<b>General Business Scope</b>	Operating environmental services – Waste Mgt., WWT, monitoring	Hazardous/ Industrial WM. services	Waste Mgt. Reverse manufacturing Consulting	Major international chemicals producer	Formulating agrochemicals and waste management	Pharmaceutical manufacture	Industrial waste destruction
<b>Ownership/Financial Depth</b>	100% national. State (20%) and large industrial firm (80%)	100% national ownership involving two banks. Recent merger with larger firm.	100% national ownership.	10% foreign (German)	100% national ownership (workers and ex-workers)	100% foreign (Italian, US)	100% national, local entrepreneur, state research institute technical support
<b>Waste Management Business Scope</b>	Incineration, landfill, land farm, biological treatment	Integrated Organic/Inorganic Hazardous/ Industrial waste	Solid, industrial and Haz. Waste, plus resource recovery	Accepts third party hazardous waste for incineration in captive facility	Liquid industrial and Haz. Waste	High temperature incineration	Galvanic waste, with plan to process domestic, agrochemicals and pharmaceutical waste
<b>Destruction Technology Proposed</b>	Liquid injection & rotary kiln incineration	Rotary kiln Static kiln	Rotary kiln	Rotary kiln	Vertical static kiln	Rotary Kiln	Plasma Arc combustion
<b>Age/History of Facility</b>	Liquid injection - 1992, Rotary kiln- 1998	Initially 1992 WWTP/Phys-Chem - 2000 Upgrade, capacity increase, add static kiln – 2001 Relocating – 2010	Operation since 1993 Operational upgrades 2003-2010 including bag filters in 2009	Constructed 1994 Upgraded 2007.2008	Constructed 1977	Constructed 1996	Funded in 1999. Licence from 2006. Upgrade operation in process
<b>Nominal Annual Capacity (t/year unless noted)</b>	Liquid injection - 10,000 t/year (5.6 Gcal/hr) Rotary kiln- 5,000 t/year (4.4 Gcal/hr)	7,000 t/year (2.2 Gcal/hr)	7,000 t/year (6.5 Gcal/hr)	3,600 t/yr	20,000 t/year (6.0 Gcal/hr)	8,000 t/year	300 kg/hour

<b>Comparative Factors</b>	<b>Cetrel</b>	<b>HazTec-Tribel</b>	<b>Essencis</b>	<b>BASF</b>	<b>Serviatis</b>	<b>ABL</b>	<b>Ecochamas</b>
<b>Capacity Availability (t/year)</b>	Operating at 85% capacity	Operating at full capacity	Operating at full capacity	N/A	N/A	Approximately 4,000 t/yr	N/A - full capacity not in use
<b>Waste Currently Processed</b>	Wide range of chlorinated wastes	Wide range of industrial wastes (solids liquids gasses)	Limited chlorinated wastes but wide range of other HW, primarily pesticide containers and solids	Wide range of chlorinated by products, principally from agro-chemical production	Organic solvents, waste water	Wide range of chlorinated and non-chlorinated solids and liquids.	Galvanic residues, with Fe, Zn, Cr, Cd, Ni
<b>Other Waste Qualified For</b>	PCBs	PCBs	No PCBs	No PCBs	No PCBs	No PCBs	No PCBs, due to rules of the condominium
<b>Technical/ Environmental Waste Type Limitations</b>	800 kg/hr. Chlorinated waste	Not Significant	Potential limitations on Cl and F feed. Fluorine impact monitored. Not qualified for PCBs	Potential limitations on Cl and F feed.	No chlorinated/ fluorinated waste	Subject to feed rate restrictions on chlorinated solid and liquids generally, as well as chlorine and fluorine content	None declared except PCBs and declared that are able to process waste with Cl and F
<b>Combustion Chamber Temperature Range</b>	Liquid Injection - >1,000°C(1,200 +/- °C 100 °C) Rotary Kiln ->800 °C Secondary - >900 °C 1,100 +/- °C 100 °C)	Rotary Kiln -800 to 1100 °C Secondary - 1100-1250 °C	Rotary Kiln - 900 °C Secondary -1,160 °C	Rotary Kiln - 686 °C Secondary -1,200 °C	950-1,100 °C	Kiln temperature 1,100 °C	Average temperature: 1500°C Temperature inside the torch: 5000 to 15 000°C Combustion chamber 1000 to 1800°C
<b>Residence Time (liquid)</b>	Liquid Injection - 2.5 sec. Rotary Kiln - 2 Sec.	Rotary kiln 2-3 sec Secondary 2-3 sec	Rotary kiln N/A Secondary >2 sec	N/A	N/A	45-60 min. for solids 2-3 sec for liquids	N/A

<b>Comparative Factors</b>	<b>Cetrel</b>	<b>HazTec-Tribel</b>	<b>Essencis</b>	<b>BASF</b>	<b>Serviatis</b>	<b>ABL</b>	<b>Ecochamas</b>
<b>Overall Environmental Performance Parameters</b>	DRE >99.99 on general waste, >99.9999 on PCBs. PCDD/PCDF <0.1 Ng/Nm <sup>3</sup> Generally meet international air emissions/significantly better than national standards.	DRE >99.99 on general waste, >99.9999 on PCBs. PCDD?PCDF <0.5 Ng/Nm <sup>3</sup> Air emissions to national regulations.	DRE >99.99 on PCDD?PCDF <0.5 Ng/Nm <sup>3</sup> Air emissions to national regulations.	DRE >99.99 on PCDD?PCDF <0.5 Ng/Nm <sup>3</sup> Actual 0.35-0.40 Ng/Nm <sup>3</sup> Air emissions to national regulations.	N/A	DRE.99,9999 DE>99.9999 PCDD/PCDF 0.06 NG/Nm <sup>3</sup> on test burns. Other air parameters substantially better than national regulations and meet international	N/A
<b>Residuals Handling/Disposal</b>	No pre-treatment of solid residuals, sent to on-site landfill. Liquids residuals to on site WWTP	No pre-treatment of solid residuals. Liquids residuals to on site WWTP Solid residuals sent to off-site LF	No pre-treatment of solid residuals. Liquids residuals to on-site WWTP Solid residuals sent to on-site LF	No pre-treatment of solid residuals. Liquids residuals to on-site WWTP Solid residuals sent to off-site LF (SASSA landfill)	No pre-treatment of solid residuals. Liquids residuals to on-site WWTP Solid residuals sent to off-site LF	Solid residuals immobilized in cement production Liquid effluents to WWTP and reuse on-site	Residues sent to the condominium landfill
<b>Waste Tracking/ Destruction Documentation</b>	Reception analysis/formal tracking thru to destruction certificate	N/A	N/A	N/A	N/A	Reception analysis/formal tracking thru to destruction certificate	Reception analysis/formal tracking thru to destruction certificate
<b>Facility Land Use Setting</b>	Located adjacent to the ocean with main industrial complex providing buffer with other land uses.	Located in an industrial park, immediately adjacent to a small river. Residential development on river's opposite bank	Relatively good separation from other development but surround by urban development	Excellent location with substantial buffer under enterprise control.	Located in Dutra Via, in industrial area, without adjacent population	Location remote from residential or conflicting land use.	Inside Clariant's condominium, about 1 km from a urban center
<b>Environmental Monitoring</b>	Continuous – O <sub>2</sub> , CO, CO <sub>2</sub> , SO <sub>x</sub> , NO <sub>x</sub>	Continuous stack monitoring of basic parameters – CO, O <sub>2</sub> ). Well equipped on-site lab Compliance stack monitoring quarterly. PCDD/PCDF – 2y.	Continuous stack monitoring of CO, NO <sub>x</sub> , SO <sub>x</sub> , MP and O <sub>2</sub> Ground water monitoring	Continuous stack monitoring of basic parameters - CO, NO <sub>x</sub> , SO <sub>x</sub> , O <sub>2</sub> .	Continuous stack monitoring of CO, NO <sub>x</sub> , SO <sub>2</sub> , and O <sub>2</sub>	Continuous stack monitoring of CO, NO <sub>x</sub> and SO <sub>2</sub>	CO and CO <sub>2</sub> . New equipments, in installation will monitor SO <sub>x</sub> , NO <sub>x</sub>

<b>Comparative Factors</b>	<b>Cetrel</b>	<b>HazTec-Tribel</b>	<b>Essencis</b>	<b>BASF</b>	<b>Serviatis</b>	<b>ABL</b>	<b>Ecochamas</b>
<b>Public Consultation Program</b>	N/A	N/A	No formal program. Publications	Active public consultation and information program	N/A	Active public consultation and information program	None
<b>Laboratory/QA/EMS Standards Certification</b>	ISO 14.001:2004 ISO 9.001:2000 OHSAS 18.001:2007 SA 8.000:2001	ISO 14001	ISO17025 ISO14001	N/A	None	ISO14001	None
<b>Required Facility Modifications for ODS</b>	Minor if liquid injection unit used	Addition of kiln injection port.	\$1 million upgrade investment planned (proposed)	Addition of kiln and/or secondary chamber injection port.	N/A	Minor Addition of kiln injection port or off gas return piping	Minor modifications anticipate by enterprise
<b>Feasibility of Onsite ODS Bulk Storage</b>	Yes	Yes	Yes	Yes	N/A	Yes	Area available to expand for storage
<b>Feasibility of ODS Specific Tracking/Monitoring Protocols</b>	Yes	Yes	Yes	Yes	N/A	Yes	Yes upon evaluation
<b>Provision of Collection/Transportation Services</b>	Yes, although capacity limited	Yes	Yes	No	No	No	No
<b>Raw Estimate Pricing Range for ODS (FOB Site), not included collection, transport, consolidation and storage</b>	R\$5-16/kg	R\$2 – 15/kg	R\$9/kg	N/A	N/A	R\$1-12/kg	R\$3-13,50/kg
<b>Confirmation of Interest in Pursuing ODS Destruction</b>	Yes	Yes, subject to availability of facility after relocation	Yes, but may be constrained by 18 months to upgrade facility.	Yes	No	Yes	Yes

N/A – Information not provided

## **ANNEX IV**

### **Project Framework**

Activity		Product	Funding - USD			Remarks on Co-funders
			MLF	Co-finance	Total	
<b>1</b>	<b>Component 1: Collection oversight, Transport, Consolidation and Storage Management System</b>		<b>482,600</b>	<b>200,000</b>	<b>682,600</b>	
1.1	Technical assistance on collection oversight of CFCs and CFC-contaminated ODS	Bulk quantities of CFC/CFC-contaminated ODS already collected at Storage Center / Incineration Facility level, are verified and monitored, in order to check if best available practices were undertaken to avoid leakages and environmental contamination.	25,000	0	<b>25,000</b>	No co-financing
1.2	Technical assistance on consolidation and characterization of CFCs	Bulk quantities of CFC/CFC-contaminated ODS screened, consolidated into optimized cylinders for destruction and monitored.	95,000	65,000	<b>150,000</b>	Co-funded by Recycling Centers and ODS Waster owners/holders as operational costs (staff, energy, cleaning of tanks, licensing costs)
1.3	Technical assistance on Temporary storage of CFCs	Bulk quantities of CFC/CFC-contaminated ODS securely storage at the project sites.	150,000	67,000	<b>217,000</b>	Co-funded by Reclaim Centers (staff, energy, licensing costs)
1.4	Technical assistance on transportation to destruction facility	Bulk quantities of CFC/CFC-contaminated ODS, transported from Storage Center to Incineration Facilities as required by test burn/burning schedules.	20,000	10,000	<b>30,000</b>	Co-funded by Reclaim Centers (staff, licensing costs, insurance)
1.5	Integrated Management System Pilot Structure	Integrated consolidation and ODS waste management system in place at each of the 5 Regional Storage Centers, included staff capacitated and logistic system developed	100,000	50,000	<b>150,000</b>	Co-funded by Reclaim Centers as operational costs (staff, energy, water, handling, inspection and cleaning of tanks, licensing costs)
1.5.1	5 (five) High capacity transfer machinery for recovered ODS waste	Bulk quantities of CFC/CFC-contaminated ODS collected by 120 companies transferred to larger size cylinders.	10,000	50,000	<b>60,000</b>	
1.5.2	15 (fifteen) High capacity storage cylinders	High capacity cylinders, that match incineration facilities feeding systems, made available to 5 Storage Centers for temporary storage of waste.	22,100	0	<b>22,100</b>	
1.5.3	5 (five) Multi-refrigerant identifiers	Refrigerant blends identifier delivered to Storage Centers and characterization costs minimized over the medium to long term.	22,500	0	<b>22,500</b>	

Activity		Product	Funding - USD			Remarks on Co-funders
			MLF	Co-finance	Total	
1.5.4	Revision of Processes, Documents and Lessons Learnt	Internal revision of ODS waste aggregation process and consolidation of lessons learnt focused on compliance with national regulations on waste.	10,000	0	<b>10,000</b>	
1.5.5	Integrate System Coordinator	Part time Coordinator financed for 6 months by the project in order to start-up the Integrated System hired.	18,000	18,000	<b>36,000</b>	6 additional months to be co-financed by the Storage Centers = total period 12 months
1.6	Documentation and Reporting	Auditable documentation on the origin, tracking and certified analysis of EOL ODS for test burns stocks assembled in suitable format for accreditation under an international carbon crediting mechanism model.	10,000	0	<b>10,000</b>	No co-financing
<b>2</b>	<b>Component 2: Test Burn / Destruction Demonstration</b>		<b>703,000</b>	<b>187,000</b>	<b>890,000</b>	
2.1	Detailed test burn design and selection of facilities	Detailed test burn design, specification and proposal documents delivered with baseline environmental audit for each test burn facility	25,000	37,000	<b>62,000</b>	Co-funded by Incineration Operator: staff, opportunity cost for not incineration other streams, internal auditing costs)
2.2	Incineration infrastructure adaptation of facilities	Material feed, control and measurement infrastructure at HW incineration facility improved, included but not limited to: - Primary combustion chamber port modifications for high vapor pressure liquid and/or compressed gas feed; - Dedicated liquid feed from barrels or containers inclusive of weight scale, pump, fugitive emission containment, flow controls and flow metering; - Dedicated gaseous feed from pressurized containers inclusive of weight scale, pump, fugitive emission containment, flow controls and flow metering; - Container purging capability.	35,000	20,000	<b>55,000</b>	Co-funded by Incineration Operator: staff, opportunity cost for not incineration other streams while civil and retrofit works are being done, equipment adaptation, licensing costs)
2.3	Settlement of procedures and baseline feed	Representative baseline feed to be co-disposed with ODS selected and implemented	10,000	10,000	<b>20,000</b>	Co-funded by Incineration Operator: staff, internal auditing costs)



Activity		Product	Funding - USD			Remarks on Co-funders
			MLF	Co-finance	Total	
2.4	Baseline test burn feed mix	General baseline test burn on representative normal feed mix established: - Incineration facility operating conditions; - Stack analysis for regulated emissions including HF and PCCD/F; - Bottom ash analysis; - Scrubber waste water (as applicable) analysis.	55,000	25,000	<b>80,000</b>	Co-funded by Incineration Operator: staff, equipment review protocols, licensing costs)
2.5	Demonstration test burn feed CFC-11 (5 metric tonnes)	Continuous metered injection of 5 metric tonnes of CFC-11, at pre determined rates, with monitoring and documentation of items 2.3 and 2.4 above	75,000	45,000	<b>120,000</b>	Co-funded by Incineration Operator: staff, opportunity cost for not incineration other streams while test burns are running).
2.6	Demonstration test burn feed CFC-12 (5 metric tonnes)	Continuous metered injection of 5 metric tonnes of CFC-12, at pre determined rates, with monitoring and documentation of items 2.3 and 2.4 above.	75,000	45,000	<b>120,000</b>	
2.7	Destruction of of CFC (11&12) (110 metric tonnes)	110 mt of CFC-11 and CFC-12 destructed at commercial rate of <b>USD 3.80/kg</b> , established after the test burns.	418,000	0	<b>418,000</b>	No co-financing
2.9	Test burn supervision	Independent supervisory/audit consultant(s) undertaken for the test burn oversight, data analysis and reporting	10,000	5,000	<b>15,000</b>	Co-funded by Incineration Operator: staff, internal auditing and Env. Licensing costs)
<b>3</b>	<b>Technical Assistance</b>		<b>100,000</b>	<b>60,000</b>	<b>160,000</b>	
3.1	Support for technical enabling activities	Support for enabling measures delivered for the facilitation development and implementation of the ODS Management System - Verification/Update of Environmental Performance Limit Standards for Relevant Air Emissions. - Technical guidance in support of collection, storage, analysis, tracking, certified destruction and reporting requirements applicable to the management of EOL ODS. - Regulation of the technical criteria and specifications for the selection of facilities to incinerate ODS. - Technical guidance for the regulation of EPR system	50,000	35,000	<b>85,000</b>	Co-funded by Ministry of Environment of Brazil: staff, legal advisory of the Ministry, mission and day to day operational costs.

Activity		Product	Funding - USD			Remarks on Co-funders
			MLF	Co-finance	Total	
3.2	Support for stakeholder and public awareness	Stakeholder and public consultations effective support and awareness developed and delivered related to the national ODS Waste Management System: - Information products/public promotion; - Stakeholder workshops; - Consultation meetings; - Capacitation/Information Materials.	50,000	25,000	<b>75,000</b>	Co-funded by Ministry of Environment of Brazil: staff, legal advisory of the Ministry, mission and day to day operational costs.
<b>4</b>	<b>Monitoring and Evaluation</b>		<b>205,000</b>	<b>128,000</b>	<b>333,000</b>	
4.1	International Expert	International expert (part-time) on hazardous waste management/incineration that delivered high level advisory, guidance and oversight to National Expert, to NOU and UNDP on the project implementation cycle	80,000	0	<b>80,000</b>	Co-funded by Ministry of Environment of Brazil: staff, mission and day to day operational costs.
4.2	National Consultant	National expert on ODS, hazardous waste and WEEE management (full time) delivered overall project coordination, reporting to NOU/UNDP, and provided close cooperation with private sector	60,000	60,000	<b>120,000</b>	
4.3	Travel / Mission Costs	Projected related travel/mission costs.	45,000	45,000	<b>90,000</b>	
4.4	Administrative Office	Projected related day-to-day operational issues.	0	15,000	<b>15,000</b>	
4.5	Sundry	Not foreseen extraordinary costs contingences.	20,000	8,000	<b>28,000</b>	
<b>GRAND TOTAL</b>			<b>1,490,600</b>	<b>575,000</b>	<b>2,065,600</b>	

