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EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Sixty-seventh Meeting
Bangkok, 16-20 July 2012

PROJECT PROPOSALS: CHINA

This document consists of the comments and recommendations of the Fund Secretariat on the following project proposals:

Destruction

- Pilot demonstration project on ODS waste management and disposal — UNIDO/Japan

Methyl Bromide

- National phase-out of methyl bromide (phase II, seventh tranche) — UNIDO/Italy

Phase-out

- HCFC phase-out management plan (stage I) (revised agreement) — UNDP

PROJECT EVALUATION SHEET – NON-MULTI-YEAR PROJECT

CHINA

PROJECT TITLE	IMPLEMENTING AGENCY
Pilot demonstration project on ODS waste management and disposal	UNIDO (lead) Japan

NATIONAL COORDINATING AGENCY: Foreign Economic Cooperation Office, Ministry of Environmental Protection of the People's Republic of China (FECO / MEP)

LATEST REPORTED CONSUMPTION DATA FOR ODS ADDRESSED IN PROJECT

A: ARTICLE-7 DATA (ODP TONNES in 2010)

Annex I, CFC	968.6		

B: COUNTRY PROGRAMME SECTORAL DATA (ODP TONNES, 2010)

ODS	Subsector/quantity	Subsector/quantity	Totals
CFC			968.59

CURRENT YEAR BUSINESS PLAN: Total funding US $876,377 Total phase-out 91.8 ODP tonnes

PROJECT TITLE

ODS USE AT ENTERPRISE		n/a
ODS TO BE PHASE-OUT		n/a
ODS PHASED IN		n/a
PROJECT IN CURRENT BUSINESS PLAN		Yes
SECTOR		ODS destruction
SUB-SECTOR		Refrigeration and Air Conditioning sub-sector
PROJECT IMPACT		192 tonnes
PROJECT DURATION		30 months
LOCAL OWNERSHIP		100%
EXPORT COMPONENT		%
REQUESTED MLF GRANT	US $	2,197,885
IMPLEMENTING AGENCY SUPPORT COST	US $	206,341
TOTAL COST OF PROJECT TO MLF	US $	2,404,226
COST-EFFECTIVENESS	US $/kg	11.45 ODS(metric)
PROJECT MONITORING MILESTONES		Included

SECRETARIAT'S RECOMMENDATION:	Individual Consideration

PROJECT DESCRIPTION

Introduction

1. On behalf of the Government of China UNIDO, as the lead implementing agency, has submitted to the 67th meeting a proposal for a pilot demonstration project on ozone depleting substances (ODS) waste management and disposal at a cost, as originally submitted, of US $2,197,885. This project is submitted in line with decision 58/19 and will address the destruction of 192 metric tonnes (mt) of waste ODS in the country. It will be implemented jointly with the Government of Japan as bilateral agency.

2. At the 57th meeting, a 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. At the 58th meeting of the Executive Committee, criteria and guidelines for the selection of ODS disposal projects were discussed, and led to decision 58/19. This decision established the basis for the review and approval of ODS disposal demonstration projects.

Background

3. At the 59th meeting, the Executive Committee provided funds for UNIDO to prepare a pilot ODS demonstration project for China. The Secretariat carried out a review of this proposal based on the principles established through decision 58/19. The Secretariat also applied sub paragraph (a)(ii)a of the decision, which specified that no funding would be available for the collection of waste ODS in the pilot project. The definition for the collection of ODS was included in an annex to the report of the 58th meeting, called “definitions of activities included in the interim guidelines for the funding of demonstration projects for the disposal of ODS”.

4. The pilot project for China will cover already collected ODS waste as well as additional amounts of CFCs that will be available on an annual basis during the project period, as a result of the on-going collection initiatives in the participating provinces. This activity seeks to set up and demonstrate a sustainable model for ODS destruction in the country by providing key information and lessons learned relevant to the various aspects of ODS destruction (technical, financial, regulatory and operational) through the implementation of three components. The project will be implemented in parallel with on-going ODS waste collection activities in China targeting household appliances as embodied in national legislation approved in 2008 (Implementation Measures for the Used Household Appliances Trading Policy). This law provides a system which allows consumers who buy new appliances to enjoy subsidies by returning the replaced waste appliance to appointed recycling enterprises where they will be dismantled. This is further linked to a Waste Electrical and Electronic Equipment (WEEE) recovery and disposal programme, which came into effect in January 2011, to promote the comprehensive utilization of resources and development of a circular economy in China. Both legislation and other related ones have been implemented at provincial level by the corresponding Environmental Protection Bureaus (EPBs). A detailed project proposal is attached to this document.

Project description

5. The pilot project will initially address the disposal of 192 tonnes of waste ODS for destruction. It will be implemented in three provinces and one municipality in China (Guangdong, Jiangsu, Tianjin and Shandong) and is designed around three strategic components described briefly below:

(a) Component 1: Will focus on the destruction of CFC-12 refrigerant collected from the disassembly of domestic refrigerators, and have been stored in cylinders. It is envisaged that this will take place in two local destruction facilities using two different technologies, plasma and rotary kiln. This component will be demonstrated in Guangdong and Tianjin, where these two facilities are located.

(b) Component 2: Will focus on the destruction of CFC-11 used as blowing agent in foams obtained from disassembled domestic refrigerators applying two different foam management strategies. The first one will look at the destruction of CFC-11 extracted from foam using already available extraction facilities in China. The second approach will demonstrate the destruction of solid foam containing CFC-11 using two different facilities, a local municipal waste facility and a local hazardous waste facility (both rotary kilns). Component 2 will be done in the provinces of Jiangsu, Shandong and Tianjin. Each province will manage CFC-11 contained in foams stored in their own recycling and recovery centres, with the destruction taking place in the destruction facilities located in each province.

(c) Component 3: Will focus on synergies between ODS and persistent organic pollutants (POPs) destruction, and examine the technical barriers for the destruction of these substances in one facility. It will demonstrate how CFC-12 refrigerants and foams containing CFC-11 can be disposed/destroyed in a facility with on-going POPs destruction activities. Implementation of component 3 will be undertaken in the province of Tianjin where such a facility exists.

6. The overall approach being taken to destroy waste ODS in China will be through domestic destruction, using existing national hazardous and industrial waste management capacity in the country. The objective of the pilot project will therefore be to demonstrate how a large developing country with a potential large waste stream of unwanted ODS can develop a strategic approach for environmentally-sound management of ODS waste for broader replication in the different provinces in China. Measures will also be put in place to support the sustainability of the project by taking into account the available ODS waste that will be collected through the country's strong network of technicians and private sector recycling companies as well as those with existing incineration facilities across the country. This will be supported by the current legislative framework in the country which includes provisions for the recycling and destruction of ODS waste in the regulation addressing the management of ODS under the Montreal Protocol.

7. The most relevant on-going ODS waste collection activities in China are those targeting household appliances. As mentioned in paragraph 4 above, the Implementation Measures for the Used Household Appliances Trading Policy have allowed for the set-up of a collection, transportation and dismantling system targeting used household electric appliances in provinces and cities, including domestic refrigerators and air conditioning equipment. In addition to the household appliance sector, the CFC phase-out plan for China's refrigeration servicing sector also initiated refrigerant recycling and reclamation in the automobile, industrial and commercial refrigeration and ship disassembling sub-sectors.

8. The three provinces and one municipality were selected to participate in this pilot demonstration project because of their high level of economic development with a large refrigerator market and a high turnover ratio of refrigerators; each province has an established collection system for household appliances which showed high recycling rates; and there are locally available destruction facilities in these provinces. Based on the current collection system in place in these areas, 27.8 tonnes of CFC-12 and 848.4 tonnes of CFC-11 will be available for destruction, taking into account the amounts already collected and that to be collected during the implementation of the project. The pilot project will cover only 192 tonnes of the amounts indicated above.

9. Table 1 provides an overall summary of the three project components of the pilot project:

Table 1: Summary of project components

	Component 1	**Component 2**	**Component 3**
Title	Destruction of CFC-12 refrigerant	Destruction of CFC-11 contained in foams	Synergies with POPs destruction
Description	Destruction of CFC-12 refrigerant obtained from the disassembling of domestic refrigerators, and stored in cylinders	Destruction of CFC-11 used as blowing agent in foams obtained from disassembled domestic refrigerators through two different strategies: • Strategy 1: extraction of CFC-11 with available equipment, and transportation of the CFC-11 stored in cylinders to a local hazardous waste treatment facility operating with a rotary kiln • Strategy 2: direct destruction of foam containing CFC-11 in two types of destruction facility	Destruction of both CFC-12 refrigerant and of foams containing CFC-11 in a facility with on-going POPs destruction activities
ODS to be Destroyed - **Amount** - **Type**	 8.37 tonnes CFC-12	 183.67 tonnes CFC-11	 • 27.05 tonnes (already considered under components 1 and 2) • CFC-12 (1.35 tonnes) and CFC-11 (25.7 tonnes)
Provinces/municipality	Guangdong and Tianjin	Shangdong, Jiangsu and Tianjin	Tianjin
Destruction Facilities	• Hazardous waste treatment station with plasma facility (Shenzen Hazardous Waste Treatment Station, Guangdong) • Tianjin: hazardous waste destruction facility with rotary kilns (Tianjin Hejia Velia, Tianjin)	• Hazardous waste treatment station working with a rotary kiln (Qingdao New World, Shangdong) • Municipal solid waste destruction facility with a rotary kiln (Jiangsu) • Hazardous waste destruction facility with rotary kilns (Tianjin Hejia Velia, Tianjin)	• Hazardous waste destruction facility with rotary kilns (Tianjin Hejia Velia, Tianjin)

	Component 1	Component 2	Component 3
Demonstration Value	• For each technology: a) Definition of a destruction testing protocol b) Resolution of technical issues concerning operating conditions at the facilities c) Monitoring requirements (continuous end-of-pipe emission monitoring, process operation monitoring) • Comparison between the two tested technologies based on logistic aspects and cost-efficiency considerations	• Draw conclusions on cost-effectiveness issues for both strategies dealing with destruction of CFC-11 contained in foam (definition of a "distance threshold" indicator) • Draw conclusions relevant to various aspects of the practical implementation of extracted CFC-11 disposal a) Definition of a destruction testing protocol b) Resolution of technical issues c) Monitoring requirements (continuous end-of-pipe emission monitoring, process operation monitoring) • Development of a sampling and laboratory testing protocol as a means of verification in order to ensure that accurate estimates of the amounts of CFC-11 destroyed are available	• Implementation of synergies related to cost-optimization of the logistic aspects of POPs and ODS destruction (transportation, on-site storage, etc.) • Collaboration with on-going POPs destruction projects in the definition of procedures for the handling of the stored ODS waste, labelling, etc. • Collaboration with on-going POPs destruction projects in the definition of a comprehensive set of criteria for environmentally sound disposal of ODS waste • Definition of common aspects related to the technical validation of facilities undertaking both POPs and ODS destruction activities

10. The pilot project also identified the need for activities that will provide institutional support aimed at facilitating the integration of this pilot demonstration project into an overall strategy to ensure long-term sustainability of ODS destruction efforts in China. These supporting activities will address the development of an appropriate policy framework to support the environmentally-sound management of ODS waste, training activities and supervision, verification and the development of a management information system (MIS).

11. The ODS destruction demonstration project is envisaged to be implemented in two and a half years.

Estimation of the ODS to be disposed

12. As indicated above, the amount of ODS to be handled by the pilot project will be 192 tonnes. Out of these, 78.7 tonnes are already collected and stored in cylinders for CFC-12 and in collected bagged foam containing CFC-11. These quantities are ready for destruction. The amounts of ODS waste that are estimated in the project duration will come from the disposal of electric household appliances undertaken under the collection scheme described above, while some quantities are from decommissioned vehicles and ships and refrigeration servicing, as shown in Table 2 below:

Table 2: Estimated quantities of ODS-waste that will be collected and used in the project

Substance	**Amount already collected (MT)**	**ODS waste to be collected during implementation of the project (MT)**			**TOTAL to be destroyed during project implementation**
		2012 (2nd half)	**2013**	**2014 (1st half)**	
CFC-12	7.28	5.14	10.28	5.14	8.37
CFC-11	71.42	194.25	388.50	194.25	183.63
Amount to be destroyed for the pilot project	78.70	37.76	37.76	37.76	192.00

Financial management of the project

13. Funds from the Multilateral Fund are envisaged to cover the costs for the destruction of the amounts of ODS waste identified above in the selected facilities, as well as the supporting activities required for the sustainability of the pilot project. Collection activities are funded entirely through the local EPBs and the recycling facilities. The future operation of these incineration facilities and other potential ones that may be retrofitted to enable ODS destruction based on the results of this pilot will be funded through the nationally-designated recovery and recycling facilities in China. Based on an estimated forecast, and the current collection efforts in place, the number of end-of-life (EOL) refrigerators that may be potentially decommissioned in the 30 provinces after the pilot project is completed will be more than 100 million units, which is expected to yield around 1 million tonnes of waste ODS using a conservative estimate.

Selection of destruction technology/approach

14. UNIDO and China considered the various options for destroying ODS waste in the country. The most important consideration for the technology selection was to find one that would allow for the comparison among various destruction methods and validate the technological, economic and environmental effectiveness of these. The project did not consider the development of new national facilities, nor the export of ODS waste for destruction as there were a number of facilities already existing in China and the waste generated could be destroyed locally. What was essential was the validation of these facilities, and linking them institutionally to the collection systems that was already currently in practice. The proposal submitted is therefore designed around this option.

Monitoring and verification of the destruction

15. In order to ensure that all ODS waste is properly accounted for, the process will be closely monitored and data will be recorded through a system that will be established for this purpose. This system will link to an information centre which is already in place to ensure traceability of dismantled household appliances in China. Depending on the province, the information system is monitored and managed by either the commercial department of the local government or the local EPB. The sales department, the collection enterprises and the dismantling stations are requested to submit detailed data to ensure an adequate chain of custody so that the number and type of the appliances collected from the collection enterprises to the dismantling stations can be traced. Given the information that is required by the system, the traceability of the ODS waste can be set up in the same way as for the appliances to allow for EOL ODS recovered during the dismantling programme to be closely monitored as it is generated at source. The current information system had already been used to collect information on existing CFC stocks at each of the recovery and recycling centers participating in the implementation of the project. This level of detail and the corresponding verification activities undertaken in the field by the local EPBs prevent the inclusion of virgin ODS as used ODS, given the established requirement for the recycling and recovery centers to provide “cradle to grave” information on collected ODS.

Cost of the project

16. The total cost of the project has been estimated at US $2,399,295, and the amount requested from the Multilateral Fund is US $2,197,885 as shown in the table below. US $201,410 will be covered by other funding sources and will cover the costs for foam transportation, the technical validation of the plasma destruction facility, and some of the project contingency costs.

Table 3: Proposed cost of the project

Category	Items	Cost per unit (US $)	Number of units	Amount (US $)
Main project activities	CFC-12 destruction by rotary kiln and plasma	11.02	1,352.57	14,902
	CFC-12 by plasma	14.70	7,016.57	103,144
	Pure CFC-11	9.27	59,862.20	554,923
	CFC-11 in foam	9.25	123,774.68	1,144,916
	Technical validation	50,000	2	100,000
	Sub-total			**1,917,885**
Supporting project activities	Policy research	20,000	1	20,000
	Training materials	10,000	1	10,000
	Training	150	100	15,000
	Information system	10,000	1	10,000
	Consultant fee	10,000	5	50,000
	Technical documentation	25,000	1	25,000
	Implementation and management	150,000	1	150,000
	Sub-total			**280,000**
TOTAL (US $)				**2,197,885**
Cost-efficiency (US $/kg)				**11.45**

SECRETARIAT'S COMMENTS AND RECOMMENDATION

COMMENTS

17. The Secretariat sent UNIDO a number of comments and observations based on the review following the criteria set out in decision 58/19. In particular, it noted that the pilot demonstration project would cover three provinces and one municipality, when the initial project preparation approved had envisaged the project to be implemented only in one province in a specific facility. UNIDO explained that during the project preparation process it was revealed that in China, there are significant differences among provinces in terms of legislation, recycling and disposal capabilities and other considerations. UNIDO and China therefore discussed and viewed that a representative sample of provinces covering specific facilities and incineration methods would allow for drawing a set of conclusions that will be applicable to many provinces with different backgrounds. This cannot be done through a single province alone. It was also considered that implementing the project in only one province could not provide enough significant demonstration value for a big country like China. UNIDO further indicated that the selected provinces already have an established system for the collection, transportation and dismantling of the used household electric appliances as well as the incineration facilities and are therefore fully capable to participate in the pilot project.

18. The Secretariat also raised observations and queries on the approach taken in the three components proposed as part of the disposal project. It noted that, in component 1, it appeared that some capital investment was required to purchase a plasma machine and sought clarification on this, particularly in view of concerns associated with the use of plasma technology and the high cost of its operation. With regard to component 2, the Secretariat drew UNIDO's attention to the proposed strategy that would include the extraction of CFC-11 from foam. Extraction had been considered in previous ODS disposal projects and subsequently dropped because it had been found to be very expensive and not an easy process. For component 3, the Secretariat requested further details on the approach including consideration of technical barriers to using facilities that are already used for POPs destruction, which

may result in higher negative emissions (i.e. fluorine and chlorine) and how these were to be resolved. Queries regarding the validation standards to be used and how emissions would be measured were also raised for the overall project.

19. UNIDO clarified that, for component 1, the plasma destruction facility to be installed in the hazardous waste treatment station is independent from the ODS destruction project and will not be funded by the Multilateral Fund. The plasma equipment will be available for use by the time project implementation starts at Guangdong. For component 2, UNIDO explained that the project would like to test the destruction of extracted CFC-11 from foam but that the extraction operations will be done in the facility in Shandong through existing and adequate extraction equipment already in operation. Therefore, using this equipment does not involve any additional cost to the project, as its operation is part of the current collection scheme currently in place in Shangdong. It further clarified that the project will look at the cost of extraction, whether it is feasible to do on a long term basis and compare it with the technology and the costs associated with destroying CFC-11 containing solid foam to see which would work best for China.

20. In responding to the concerns raised by the Secretariat about component 3, which is to show synergy between POPs and ODS destruction, UNIDO responded that the following will be examined:

(a) Implementation of synergies related to cost-optimization of the logistic aspects of POPs and ODS destruction (transportation, on-site storage, etc.);

(b) Collaboration with on-going POPs destruction projects in the definition of procedures for the handling of the stored ODS waste, labeling, etc.;

(c) Collaboration with on-going POPs destruction projects in the definition of a comprehensive set of criteria for environmentally sound disposal of ODS waste; and

(d) Definition of common aspects related to the technical validation of facilities undertaking both POPs and ODS destruction activities.

21. With regards to emissions monitoring, the selected destruction facilities have an on-line system to monitor the concentration of most of the pollutants in the waste gas flue. The information generated by the system will be provided to the local EPBs, which will monitor the situation and can apply corrective measures. UNIDO also indicated that all facilities used for chemicals destruction which operate in China are required to meet the national emission standards and are being closely monitored. UNIDO further explained that the technical validation through the development and implementation of a trial destruction protocol will make sure that each destruction facility involved in the project will meet the TEAP-accepted destruction removal efficiency of 99.99 percent, as well as to meet the requirement of environmental protection as regulated by national and local policies and standards in China. The trial destruction protocol will consist of the processing of a quantity of the received ODS waste of not less than 5 tonnes in each of the facilities participating in the implementation of the project where strict monitoring will be applied to the key operating parameters as well as to the characterization of the resulting emissions. The destruction facility shall require verification on these criteria by an accredited independent auditor carrying out the inspection, verification, testing and certification services.

22. In further discussions with UNIDO, the Secretariat also proposed that one important demonstration output of the project would be to produce a technical report/manual that would document the steps and results achieved of each of the components, how the technical validation was undertaken, how the facilities were upgraded as well as the costs involved. It suggested that this report could then be used in China and would provide an approach to a broader adoption of destruction strategies that could be tailored specifically to each province with similar facilities and characteristics. This is expected to be a key result of the demonstration project that would then be integrated into the collection system and could

be self-sustaining in future. UNIDO took this into account, and indicated that this will be one of the outputs of the technical documentation under the supporting activities identified in the project.

23. UNIDO also provided further information required by the Secretariat to ensure that the proposal fully met the requirements of the guidelines in decision 58/19. The final cost of the project was agreed as submitted at the level of US $2,197,885 plus support costs, calculated at US $11.45/kg, which is lower than the threshold (US $13.2/kg) provided for in decision 58/19, as summarized in Table 3 under paragraph 16 above. Of these funds, US $1,297,885 will be for UNIDO and US $900,000 will be for the Government of Japan as part of its bilateral contribution.

RECOMMENDATION

24. The Executive Committee may wish to consider:

(a) Noting with appreciation the submission by the Government of China for a pilot ODS waste management and disposal project to destroy a total of 192 metric tonnes of ODS waste; and

(b) Approving the implementation of a pilot project for ODS waste management and destruction in China at the total amount of US $2,404,226, consisting of US $1,297,885 plus agency support costs of US $97,341 for UNIDO, and US $900,000 plus agency support costs of US $109,000 for the Government of Japan, on the understanding that no further funds would be available for China for any ODS disposal projects in future.

PROJECT EVALUATION SHEET – MULTI-YEAR PROJECTS

China

(I) PROJECT TITLE	AGENCY
Methyl bromide	Italy, UNIDO

(II) LATEST ARTICLE 7 DATA (ODP Tonnes)			Year: 2010	
CFC: 968.6	CTC: 282.6	Halons: 0.0	MB: 201.7	TCA: 0.0

(III) LATEST COUNTRY PROGRAMME SECTORAL DATA (ODP Tonnes)						Year: 2010							
Substances	Aerosol	Foam	Halon	Refrigeration		Solvent	Process Agent	MDI	Lab Use	Methyl Bromide		Tobacco fluffing	Total Sector Consumption
				Manufacturing	Servicing					QPS	Non QPS		
CFC								968.6					968.6
CTC							179.3		256.9				436.2
Halons													0
Methyl Bromide										1,206.9	336.2		1,543.1
Others													0
TCA													0

(IV) PROJECT DATA			2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
Montreal Protocol Consumption Limits		MB	1,102.1	1,102.1	1,102.1	881.7	881.7	881.7	881.7	881.7	881.7	881.7	881.7	881.7	881.7	0.	
Maximum Allowable Consumption (ODP Tonnes)		MB	1,087.8	1,087.8	1,087.8	880.	723.8	570.6	390.	250.	209.	176.	150.	100.	50.	0.	
Project Costs (US$)	UNIDO	Project Costs		4,086,600.				1,200,000.	1,800,000.	1,300,000.	600,000.	500,000.	500,000.	500,000.	302,742.		10,789,342.
		Support Costs		306,495.				90,000.	135,000.	97,500.	45,000.	37,500.	37,500.	37,500.	22,706.		809,201.
	Italy	Project Costs				4,000,000.											4,000,000.
		Support Costs				470,000.											470,000.
Total Funds Approved in Principle (US$)		Project Costs		4,086,600.		4,000,000.		1,200,000.	1,800,000.	1,300,000.	600,000.	500,000.	500,000.	500,000.	302,742.		14,789,342.
		Support Costs		306,495.		470,000.		90,000.	135,000.	97,500.	45,000.	37,500.	37,500.	37,500.	22,706.		1,279,201.
Total Funds Released by the ExCom (US$)		Project Costs		4,086,600.		4,000,000.		1,200,000.	1,800,000.	1,300,000.	600,000.	500,000.	0.	0.	0.		13,486,600.
		Support Costs		306,495.		470,000.		90,000.	135,000.	97,500.	45,000.	37,500.	0.	0.	0.		1,181,495.
Total Funds Requested for Current Year (US$)		Project Costs											500,000.				
		Support Costs											37,500.				

(V) SECRETARIAT'S RECOMMENDATION:	Blanket Approval

PROJECT DESCRIPTION

25. On behalf of the Government of China, UNIDO, as the lead implementing agency, has submitted to the 67th meeting of the Executive Committee a request for funding for the implementation of the seventh tranche (2012 work programme) of phase II of the national plan for the phase-out of methyl bromide (MB), at a total cost of US $500,000 plus agency support costs of US $37,500 for UNIDO. The submission also includes a progress report on the implementation of the MB phase-out plan during 2011 and the implementation programme for 2012. The project is being implemented with assistance from the Government of Italy.

Background

26. At its 44th meeting, the Executive Committee approved in principle phase II of the national plan for the phase-out of MB in the consumption sector in China at a total funding level of US $14,789,342 (including the amount previously approved for UNIDO at the 41st meeting to phase out 389 ODP tonnes of MB). It also approved an Agreement between the Government of China and the Executive Committee (decision 44/30). Since then, the Executive Committee has approved the first six tranches of the project at a total value of US $9,400,000 plus support costs of US $875,000 (US $470,000 for the Government of Italy and US $405,000 for UNIDO).

Progress report

27. Since 2007, MB has not been used for commodity fumigation. The technical assistance programme, initiated in 2006, has been completed, and has provided training to all grain storage facilities in China. The State Administration of Grain (SAG) provided training and monitoring, and updated the storage facilities with its own financial resources. MB has not been used for the fumigation of tobacco seedlings since 2008. The Foreign Economic Cooperation Office of the Ministry of Environmental Protection (FECO/MEP) and the State Tobacco Monopoly Administration (STMA) provided technical assistance activities, including the introduction of integrated pest management in tobacco nurseries, to ensure permanent MB phase-out, and regular monitoring and verification to ensure the long-term sustainability of alternative technologies.

28. The phase-out of MB in the agricultural sector has been achieved through the introduction of alternative chemicals and grafting for cucumber and eggplant crops, and alternative chemicals for ginger. Training materials, alternative chemicals and farm materials have been distributed; and 1,436 farmers were trained in 2011.

29. The import and export licensing system has been in effect since 1 January 2004. Since 2008, the Government of China has enforced the established monitoring and management system for MB production. The coordination mechanism between MB consumption and production programmes is in place. Export quotas for controlled uses of MB were set at 57 ODP tonnes for 2008; 30 ODP tonnes for 2009; and zero in 2010 and 2011. Import quotas for future years will be reduced according to the annual reduction target for controlled uses of MB. Also, relevant authorities in the Government of China cancelled the registration of MB for use in strawberry and cucumber sectors in June 2011; since then MB can only be used in ginger crops.

30. As of March 2012, of the US $9,400,000 approved for the first six tranches, US $8,689,971 had been disbursed. The balance of US $710,029 will be used in 2012-2013 for the procurement of machines, farm materials, additional training and improvement of grafting technology.

2012 work programme

31. Alternative technologies in the production of ginger will be introduced over 107.5 ha to phase out 43.0 ODP tonnes of MB through 16 model farms. The work programme also involves further improving and consolidating grafting technology for cucumber, tomato, eggplant and watermelon crops; developing machine prototypes for the application of alternative chemicals; and completing the assessment of the phase-out of MB in the agricultural sector in China, particularly in the ginger industry. Training programmes will continue to be implemented for 45 project managers, 80 technicians, 30 monitoring staff and 900 farmers, along with awareness activities. Four international conferences will be conducted on grafting technologies, integrated pest management for ginger, and assessment of the results of the phase-out programme.

SECRETARIAT'S COMMENTS AND RECOMMENDATION

COMMENTS

32. The 2010 MB consumption reported by the Government of China under Article 7 of the Montreal Protocol of 201.7 ODP tonnes was already 680.0 ODP tonnes below that of the 881.7 ODP tonnes allowed under the Protocol, and 7.3 ODP tonnes below that of the 209.0 ODP tonnes allowed under the Agreement between the Government and the Executive Committee. MB consumption in 2011 has been estimated at 176.0 ODP tonnes, similar to the level allowed under the Agreement. Since the approval of the phase-out plan, with assistance from the Government of Italy and UNIDO, the Government of China has achieved greater reductions in MB consumption than those stipulated in the Agreement, as shown in Table 1 below:

Table 1: MB consumption in China

	MB consumption (ODP tonnes)							
Sector/Year	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011***
Allowable consumption under the Agreement								
Commodity	126.0	46.0	25.2	-	-			
Tobacco	427.8	300.0	164.6	124.6	-			
Agriculture	534.0	534.0	534.0	446.0	390.0	250.0	209.0	176.0
Total	1,087.8	880.0	723.8	570.6	390.0	250.0	209.0	176.0
Actual consumption								
Commodity	52.2	32.1	7.0	-	-	-		
Tobacco	227.8	54.0	21.0	32.4	-	-		
Agriculture	534.0	534.0	282.1	351.7	371.3	241.9	201.7	176.0
Total	814.0	620.1	310.1	384.1	371.3	241.9	201.7	176.0

(*) Estimated.

33. The Secretariat raised several technical and cost-related issues that were satisfactorily addressed by UNIDO. On that of the long-term sustainability of chloropicrin for soil-borne pest control, UNIDO explained that the higher operating costs linked to the mandatory application of fumigants by licensed fumigators were offset by the fact that the skills, know-how and specialized equipment used by fumigation companies would result in lower dosage rates of fumigants.

34. With regard to the registration of 1,3-dichloropropene (1,3D) in China, UNIDO explained that although the process started two years ago it has not concluded in view of the de-registration of the fumigant in several countries in Europe. While this fumigant has proven to be effective in ginger crops, it is a very persistent chemical that has caused contamination of groundwater. Crop management protocols together with integrated pest management are currently under development.

35. In explaining the activities linked to the training programmes, UNIDO indicated that local Government institution staff will be responsible for providing technical assistance to farmers, and monitoring and assessing the MB alternatives beyond the implementation of the project. The training programmes will also link the project with academia (as the Hebei University of Agriculture is responsible for monitoring and evaluation of the overall project) and the scientific community (as the Academy of Agricultural Sciences of China is responsible for implementing technical assistance programmes). The training of trainers for the staff of fumigation companies will ensure broad dissemination of the alternative technologies.

36. As reported by UNIDO, since the implementation of the first tranche of the MB phase-out plan, over 23,400 trainers and farmers have been trained, as shown in Table 2.

Table 2: Number of trainers and farmers trained in China

Crop	2008	2009	2010	2011	Total
Trainers					
Strawberry	233	185	60	-	478
Cucumber/tomato	57	678	-	-	735
Ginger	27	475	-	-	502
Eggplant	-	-	-	-	0
Total	317	1,338	60	0	1,715
Farmers					
Strawberry	10,851	6,902	500	172	18,425
Cucumber/tomato	120			200	320
Ginger	50	1,554	308	879	2,791
Eggplant				185	185
Total	11,021	8,456	808	1,436	21,721
Grand total	11,338	9,794	868	1,436	23,436

RECOMMENDATION

37. The Fund Secretariat recommends that the Executive Committee:

(a) Takes note of the progress report on the implementation of the sixth tranche of phase II of the national phase-out of methyl bromide (MB) plan for China; and

(b) Approves the 2012 annual implementation programme associated with the seventh tranche.

38. The Secretariat further recommends blanket approval of the seventh tranche associated with the 2012 annual implementation programme of phase II of the national phase-out of MB plan at the funding level shown in the table below.

	Project Title	Project Funding (US $)	Support Costs (US $)	Implementing Agency
(a)	National phase-out of methyl bromide (phase II, seventh tranche)	500,000	37,500	UNIDO

China: HCFC phase-out management plan (stage I) (revised agreement) (UNDP)

39. At the 64th meeting of the Executive Committee, the HCFC phase-out management plan (HPMP) for China, as well as the associated "Agreement between the Government of China and the Executive Committee of the Multilateral Fund for the reduction in consumption of hydrochlorofluorocarbons", was approved through decision 64/49. At the following meeting, the Agreement was amended by the provisions of a sector plan for the solvent sector, and a new version was approved. At the 66th meeting, the Executive Committee approved Appendix 5-A containing the monitoring roles and institutions which had not been previously established.

40. As of writing this document, three more changes remain necessary:

(a) At the 66th meeting, the Government of Germany had informed that it was seeking to reduce its role as a bilateral agency in the implementation of the extruded polystyrene (XPS) foam sector. The Government of Germany has submitted a request for an associated reduction of their contribution in the XPS foam sector implementation, and a corresponding increase of the funding for UNIDO. The Government of Germany has also proposed, with consent by UNIDO and the Government of China, to transfer the role of a sector lead agency for the XPS foam sector from the Government of Germany to UNIDO;

(b) The Government of China has provided Article 7 data for 2010 to the Ozone Secretariat, leading, *inter alia*, to the establishment of a HCFC consumption baseline for China. Based on decisions 64/49(f) and 65/36(d), the Secretariat has been authorized to update the Agreement accordingly. UNDP on behalf of the Government of China had provided a related draft;

(c) For all agencies involved in the implementation of the HPMP for China, no agency fees have been determined beyond those of the first tranche, since currently no administrative cost regime for the current triennium has been agreed. The funding request for the second tranche is scheduled for the 68th meeting, and its approval would require specific arrangements should no agreement on the administrative cost regime and the support cost for the HPMP for China have been reached.

SECRETARIAT'S COMMENTS AND RECOMMENDATION

COMMENTS

41. The Secretariat has reviewed the changes proposed by the Government of Germany to its role and contribution. It has drafted a number of changes beyond those requested by the Government of Germany, to reflect the changed roles and responsibilities in a new version of Appendices 6-C and 6-E of the Agreement relating to the roles of these two implementing agencies. Through UNDP as lead agency, it ensured that the Government of China is in agreement with the proposed change in the role of the Government of Germany and UNIDO, as well as with its reflection in the Agreement, contained in paragraph 9 and Appendix 6 of Annex I to the document.

42. The Government of China has provided information pertaining to its now-established baseline and its reflection in the Agreement. This includes baseline data consistent with Article 7 reflected in row 1.1 "The Targets, and Funding" of Appendix 2-A of the Agreement, as well as a revised maximum allowable consumption of HCFCs under this Agreement, as per row 1.2 of the same appendix, and corresponding figures for the starting point for all HCFCs, as shown in Appendix 1-A "The Substances". The figures in Appendix 1-A as well as those for maximum allowable consumption in row 1.2 of

Appendix 2-A reflect the current practice of Multilateral Fund consumption phase-out agreements for China to verify customs records and license data of the Government of China to determine imports and exports of ODS, as well as to verify production of the same ODS in the country, and to combine these data to arrive at the consumption figure relevant for compliance with the Agreement as defined in its paragraphs 2 and 5 (a) (i). With the revised baseline, the figures in row 1.3 of Appendix 2-A, "The Targets, and Funding" were also updated.

43. At the 66th meeting, the Government of China had raised with the Secretariat and several members of the Executive Committee questions related to the calculation of the total phase-out under the Agreement; these questions could not be satisfactorily resolved during the meeting. The Secretariat revisited its records and re-calculated all figures. As a result, the Secretariat is of the opinion that the existing Agreement reflects exactly the discussions and the intent of the decision at the 64th and 65th meetings. After consultations with UNDP and the Government of China, both confirmed the view of the Secretariat. Recognizing inconsistencies in the previous versions of the Agreement in relation to the use of one and two decimal places, having received communication by the Ozone Secretariat pertaining to the future use of two decimal places for consumption figures in ODP tonnes, and understanding that the baseline figures for China have been calculated and will continue to be provided with one decimal place, the Secretariat has provided the figures in the Agreement accordingly with one decimal place for baseline information and two decimal places for all information related to the remaining eligible consumption. The related proposed changes were communicated to the lead agency for discussion with the Government of China, which in turn confirmed through UNDP that this proposal by the Secretariat has been accepted.

Revision to the Agreement of the HPMP

44. Since the HPMP for China was approved prior to the establishment of the HCFC baseline for compliance, in approving the HPMP the Executive Committee requested the Secretariat to update the Agreement accordingly (decision 64/49). A new paragraph has been added to the Agreement to indicate that the updated Agreement supersedes that reached at the 65th meeting. Annex I to this document provides a new draft Agreement for consideration of the Executive Committee.

RECOMMENDATION

45. The Executive Committee may wish to:

(a) Note that the Government of China had revised its starting point for sustained aggregate reduction in HCFC consumption from 19,408.8 ODP tonnes to 18,865.44 ODP tonnes;

(b) Consider the proposed draft for a revised Agreement between the Government of China and the Executive Committee for the reduction in consumption of hydrochlorofluorocarbons submitted by UNDP, on behalf of the Government of China, in light of the comments provided above; and

(c) Note that the Fund Secretariat has updated paragraphs 1, 6 and 9 and Appendices 1-A, 2-A and 6 of the Agreement between the Government of China and the Executive Committee to reflect the newly established HCFC baseline for compliance, and that a new paragraph 15 has been added to indicate that the updated Agreement supersedes the Agreement reached at the 65th meeting with its amendment approved at the 66th meeting, as contained in Annex I to the present document.

Annex I

DRAFT AGREEMENT BETWEEN THE GOVERNMENT OF CHINA AND THE EXECUTIVE COMMITTEE OF THE MULTILATERAL FUND FOR THE REDUCTION IN CONSUMPTION OF HYDROCHLOROFLUOROCARBONS

1. This Agreement represents the understanding of the Government of China (the "Country") and the Executive Committee with respect to the reduction of controlled use of the ozone-depleting substances (ODS) set out in Appendix 1-A ("The Substances") to a sustained level of 16,978.9 ODP tonnes by 1 January 2015 in compliance with Montreal Protocol schedules.

2. The Country agrees to meet the annual consumption limits of the Substances as set out in row 1.2 ("Maximum allowable total consumption of Annex C, Group I substances") of Appendix 2-A ("The Targets, and Funding") in this Agreement as well as in the Montreal Protocol reduction schedule for all Substances mentioned in Appendix 1-A. The Country accepts that, by its acceptance of this Agreement and performance by the Executive Committee of its funding obligations described in paragraph 3, it is precluded from applying for or receiving further funding from the Multilateral Fund in respect to any consumption of the Substances that exceeds the level defined in row 1.2 of Appendix 2-A as the final reduction step under this Agreement for all of the Substances specified in Appendix 1-A, and in respect to any consumption of each of the Substances that exceeds the level defined in rows 4.1.3, 4.2.3, 4.3.3, 4.4.3. 4.5.3, and 4.6.3 (remaining eligible consumption).

3. Subject to compliance by the Country with its obligations set out in this Agreement, the Executive Committee agrees, in principle, to provide the funding set out in row 3.1 of Appendix 2-A ("The Targets, and Funding") to the Country. The Executive Committee will, in principle, provide this funding at the Executive Committee meetings specified in Appendix 3-A ("Funding Approval Schedule").

4. The Country agrees to implement this Agreement in accordance with the HCFC phase-out sector plans submitted and the commitments specified in Appendix 8-A. In accordance with sub-paragraphs 5(a)(ii) and 5(b)(i) of this Agreement, the Country will accept independent verification of completion of the conversion of manufacturing capacity as well as achievement of the annual consumption limits of the Substances as set out in row 1.2 of Appendix 2-A of this Agreement.

5. The Executive Committee will not provide the Funding in accordance with the Funding Approval Schedule unless the Country satisfies the following conditions at least eight weeks[1] in advance of the applicable Executive Committee meeting set out in the Funding Approval Schedule:

(a) For the release of any tranche:

(i) That the Country had met the Targets set out in row 1.2 of Appendix 2-A for all relevant years. Relevant years are all years since the year in which this Agreement was approved. Years for which no obligation for reporting of country programme data exists at the date of the Executive Committee meeting at which the funding request is being presented are exempted;

(ii) That the meeting of these Targets has been independently verified, unless the Executive Committee decided that such verification would not be required; and

(iii) That, for all submissions from the 68th Meeting onwards, confirmation has been

[1] Tranches with requested level of funding of more than US $5 million should be submitted in full 12 weeks in advance to the applicable Executive Committee meeting in line with decision 20/7.

received from the Government that an enforceable national system of licensing and quotas for HCFC imports and, where applicable, production and exports is in place and that the system is capable of ensuring the Country's compliance with the Montreal Protocol HCFC phase-out schedule for the duration of this Agreement;

(b) Conditions to be met as a precondition for the release of tranches for a sector plan:

(i) For sector plans with activities that include the conversion of manufacturing capacity, the Country has submitted a verification report of a random sample of at least 5 per cent of the manufacturing lines which had completed their conversion in the year to be verified, on the understanding that the total aggregated HCFC consumption of the random sample of the manufacturing lines represents at least 10 per cent of the sector consumption phased out in that year;

(ii) That the Country had submitted annual implementation reports in the form of Appendix 4-A ("Format of Implementation Reports and Plans") covering each previous calendar year; that it had achieved a significant level of implementation of activities initiated with previously approved tranches; and that the rate of disbursement of funding available from the previously approved tranche was more than 20 per cent; and

(iii) That the Country has submitted an annual implementation plan for the respective sector in the form of Appendix 4-A ("Format of Implementation Reports and Plans") covering each calendar year until and including the year for which the funding schedule foresees the submission of the next tranche or, in case of the final tranche, until completion of all activities foreseen.

6. The Country will ensure that it conducts accurate monitoring of its activities under this Agreement, and will also establish and maintain a system to monitor the consumption in the different sectors, to ensure compliance with the sector consumption limits set out in rows 1.3.1, 1.3.2, 1.3.3, 1.3.4 and 1.3.5 of Appendix 2-A. The institutions set out in Appendix 5-A ("Monitoring Institutions and Roles") will monitor and report on implementation of the activities in the previous annual implementation plans in accordance with their roles and responsibilities set out in Appendix 5-A. This monitoring will also be subject to independent verification as described in paragraph 4 above.

7. The Executive Committee agrees that the Country may have the flexibility to reallocate the approved funds, or part of the funds, within the funding foreseen for each sector according to the evolving circumstances to achieve the smoothest reduction of consumption and phase-out of the Substances specified in Appendix 1-A:

(a) Should the Country decide during implementation of this Agreement to introduce alternative technologies other than those proposed in the sector plans submitted, or implement differently as proposed in those sector plans, this would require approval of those changes as part of an annual implementation plan. The documentation can also be provided as part of a revision to an existing annual implementation plan, to be submitted eight weeks prior to any meeting of the Executive Committee. Such a request would include a description of the changes in activities to implement the new alternative technology, the calculation of the associated incremental costs and the impact on the climate. The Country agrees that potential savings in incremental costs related to the change of technology would decrease the overall funding level under this Agreement accordingly;

(b) Reallocations categorized as major changes must be documented in advance in an Annual Implementation Plan and approved by the Executive Committee as described in sub-paragraph 5(b)(iii) above. The documentation can also be provided as part of a revision to an existing annual implementation plan, to be submitted eight weeks prior to any meeting of the Executive Committee. Major changes would relate to:

(i) Issues potentially concerning the rules and policies of the Multilateral Fund;

(ii) Modifications to any clause in this Agreement;

(iii) Changes in the annual levels of funding allocated to individual bilateral or implementing agencies for the different tranches on a sector level;

(iv) Provision of funding for programmes or activities not included in the current endorsed annual implementation plan with a cost greater than 20 per cent of the total cost of the last approved tranche or US $2.5 million, whichever is lower; and

(v) Removal of activities in the annual implementation plan with a cost greater than 20 per cent of the total cost of the last approved tranche or US $2.5 million, whichever is lower;

(c) Reallocations not categorized as major changes may be incorporated in the approved annual implementation plan, under implementation at the time, and reported to the Executive Committee in the subsequent annual implementation report; and

(d) Any remaining funds will be returned to the Multilateral Fund upon completion of the last tranche of the Agreement.

8. The Country agrees to assume overall responsibility for the management and implementation of this Agreement and of all activities undertaken by it or on its behalf to fulfil the obligations under this Agreement. UNDP has agreed to be the lead implementing agency (the "Lead IA"), and the Government of Germany, the Government of Japan, UNIDO, UNEP and the World Bank have agreed to be cooperating agencies ("Cooperating IAs) in respect of the Country's activities under this Agreement. The Country agrees to evaluations, which might be carried out under the monitoring and evaluation work programmes of the Multilateral Fund or under the evaluation programme of any of the agencies taking part in this Agreement.

9. The Lead IA will be responsible for ensuring co-ordinated planning, implementation and reporting of all activities under this Agreement across all relevant sectors, including but not limited to independent verification as per sub-paragraph 5(b)(i), and implementing the activities related to the role as the Lead IA described in Appendix 6-A and the activities as a sector Lead IA described in Appendix 6-B. UNIDO and UNEP will be responsible for carrying out the activities in the respective Sector Plans described in Appendices 6-C and 6-F, respectively, and their subsequent revisions as per sub-paragraph 5(b)(iii) and paragraph 7. The World Bank will be responsible for carrying out the independent verification as per sub-paragraph 5(a)(ii), and implementing additional activities regarding its role as a sector Lead IA described in Appendix 6-E. The Governments of Germany and Japan as the "Cooperating IAs" will be responsible for carrying out the activities described in Appendices 6-D and 6-G. The Executive Committee agrees, in principle, to provide the Lead IA and the Cooperating IAs with the fees set out in rows 2.1.2, 2.2.2, 2.2.4, 2.3.2, 2.4.2, 2.5.2, 2.5.4, 2.6.2 and 2.7.2 of Appendix 2-A.

10. Should the Country, for any reason, not meet the Targets for the elimination of the Substances set out in row 1.2 of Appendix 2-A or otherwise does not comply with this Agreement, then the Country agrees that it will not be entitled to the Funding in accordance with the Funding Approval Schedule. At the discretion of the Executive Committee, funding will be reinstated according to a revised Funding Approval Schedule determined by the Executive Committee after the Country has demonstrated that it has satisfied all of its obligations that were due to be met prior to receipt of the next tranche of funding under the Funding Approval Schedule. The Country acknowledges that the Executive Committee may reduce the amount of the Funding by the amount set out in Appendix 7-A in respect of each ODP kg of reductions in consumption not achieved in any one year. The Executive Committee will discuss each specific case in which the Country did not comply with this Agreement, and take related decisions. Once these decisions are taken, this specific case will not be an impediment for future tranches as per paragraph 5 above.

11. The Funding of this Agreement will not be modified on the basis of any future Executive Committee decision that may affect the funding of any other consumption sector projects or any other related activities in the Country.

12. The Country will comply with any reasonable request of the Executive Committee, the Lead IA, the sector Lead IAs and the Cooperating IAs to facilitate implementation of this Agreement. In particular, it will provide the Lead IA, the sector Lead IAs and the Cooperating IAs with access to the information necessary to verify compliance with this Agreement.

13. The completion of stage I of the HPMP and the associated Agreement will take place at the end of the year following the last year for which a maximum allowable total consumption level has been specified in Appendix 2-A. Should there at that time still be activities that are outstanding, and which were foreseen in the Sector Plan, and its subsequent revisions as per sub-paragraph 5(b)(iii) and paragraph 7, the completion will be delayed until the end of the year following the implementation of the remaining activities. The reporting requirements as per sub-paragraphs 1(a), (b), (d), (e) and (g) of Appendix 4-A will continue until the time of the completion unless otherwise specified by the Executive Committee.

14. All of the conditions set out in this Agreement are undertaken solely within the context of the Montreal Protocol and as specified in this Agreement. All terms used in this Agreement have the meaning ascribed to them in the Montreal Protocol unless otherwise defined herein.

15. This updated Agreement supersedes the Agreement reached between the Government of China and the Executive Committee at the 65th meeting of the Executive Committee.

APPENDICES

APPENDIX 1-A: THE SUBSTANCES

Substance	Annex	Group	Starting point for aggregate reductions in consumption (ODP tonnes)
HCFC-22	C	I	11,495.31
HCFC-123	C	I	10.13
HCFC-124	C	I	3.07
HCFC-141b	C	I	5,885.18
HCFC-142b	C	I	1,470.53
HCFC-225	C	I	1.22
Total			18,865.44

APPENDIX 2-A: THE TARGETS, AND FUNDING

		2011	2012	2013	2014	2015	Total
Consumption targets							
1.1	Montreal Protocol reduction schedule of Annex C, Group I substances (ODP tonnes)	n/a	n/a	19,269.0	19,269.0	17,342.1	n/a
1.2	Maximum allowable total consumption of Annex C, Group I substances (ODP tonnes)	n/a	n/a	18,865.4	18,865.4	16,978.9	n/a
1.3.1	Maximum allowable consumption of Annex C, Group I substances in the ICR sector (ODP tonnes)	n/a	n/a	2,402.8	2,402.8	2,162.5	n/a
1.3.2	Maximum allowable consumption of Annex C, Group I substances in the XPS foam sector (ODP tonnes)	n/a	n/a	2,540.0	2,540.0	2,286.0	n/a
1.3.3	Maximum allowable consumption of Annex C, Group I substances in the PU foam sector (ODP tonnes)	n/a	n/a	5,392.2	5,392.2	4,449.6	n/a
1.3.4	Maximum allowable consumption of Annex C, Group I substances in the RAC sector (ODP tonnes)	n/a	n/a	4,108.5	4,108.5	3,697.7	n/a
1.3.5	Maximum allowable consumption of Annex C, Group I substances in the solvent sector	n/a	n/a	494.2	494.2	455.2	n/a
Funding industrial and commercial refrigeration and air conditioning (ICR) sector plan							
2.1.1	Sector Lead IA (UNDP) agreed funding (US $)	25,380,000	6,900,000	8,495,000	11,075,000	9,150,000	61,000,000
2.1.2	Support costs for UNDP (US $)	1,903,500	*	*	*	*	*
Funding extruded polystyrene (XPS) foam sector plan							
2.2.1	Sector Lead IA (UNIDO) agreed funding (US $)	21,372,000	10,217,000	3,998,000	6,330,000	6,733,000	48,650,000
2.2.2	Support costs for UNIDO (US $)	1,602,900	*	*	*	*	*
2.2.3	Sector cooperating agency (Germany) agreed funding (US $)	459,023	390,977	-	-	500,000	1,350,000
2.2.4	Support costs for Germany (US $)	51,260	*	*	*	*	*
Funding polyurethane rigid (PU) foam sector plan							
2.3.1	Sector Lead IA (World Bank) agreed funding (US $)	38,859,000	5,520,000	13,592,000	4,079,000	10,950,000	73,000,000
2.3.2	Support costs for World Bank (US $)	2,914,000	*	*	*	*	*
Funding room air conditioning (RAC) sector plan							
2.4.1	Sector Lead IA (UNIDO) agreed funding (US $)	36,430,000	9,200,000	8,495,000	9,625,000	11,250,000	75,000,000
2.4.2	Support costs for UNIDO (US $)	2,732,250	*	*	*	*	*
Funding service sector plan, including enabling programme							
2.5.1	Sector Lead IA (UNEP) agreed funding (US $)	1,579,000	598,000	1,104,000	1,173,000	786,000	5,240,000
2.5.2	Support costs for UNEP (US $)	176,703	*	*	*	*	*
2.5.3	Sector cooperating agency (Japan) agreed funding (US $)	80,000	80,000	80,000	80,000	80,000	400,000
2.5.4	Support costs for Japan (US $)	10,400	*	*	*	*	*
Funding national co-ordination							
2.6.1	Overall Lead IA (UNDP) agreed funding (US $)	360,000	-	-	-	-	360,000
2.6.2	Support costs for UNDP (US $)	27,000	-	-	-	-	27,000
Funding solvent sector plan							
2.7.1	Overall Lead IA (UNDP) agreed funding (US $)	2,500,000	0	2,000,000	0	500,000	5,000,000
2.7.2	Support costs for UNDP (US $)	187,500	0	*	0	*	*
Overall funding							
3.1	Total agreed funding (US $)	127,019,023	32,905,977	37,764,000	32,362,000	39,949,000	270,000,000
3.2	Total support cost (US $)	9,605,513	*	*	*	*	*
3.3	Total agreed costs (US $)	136,624,536	*	*	*	*	*

APPENDIX 2-A: THE TARGETS, AND FUNDING - continuation

Phase-out and remaining eligible consumption		
4.1.1	Total phase-out of HCFC-22 agreed to be achieved under this Agreement (ODP tonnes)	1,443.73
4.1.2	Phase-out of HCFC-22 to be achieved in previously approved projects (ODP tonnes)**	35.99
4.1.3	Remaining eligible consumption for HCFC-22 (ODP tonnes)	10,015.59
4.2.1	Total phase-out of HCFC-123 agreed to be achieved under this Agreement (ODP tonnes)	0.00
4.2.2	Phase-out of HCFC-123 to be achieved in previously approved projects (ODP tonnes)	0.00
4.2.3	Remaining eligible consumption for HCFC-123 (ODP tonnes)	10.13
4.3.1	Total phase-out of HCFC-124 agreed to be achieved under this Agreement (ODP tonnes)	0.00
4.3.2	Phase-out of HCFC-124 to be achieved in previously approved projects (ODP tonnes)	0.00
4.3.3	Remaining eligible consumption for HCFC-124 (ODP tonnes)	3.07
4.4.1	Total phase-out of HCFC-141b agreed to be achieved under this Agreement (ODP tonnes)	1,681.25
4.4.2	Phase-out of HCFC-141b to be achieved in previously approved projects (ODP tonnes)***	16.71
4.4.3	Remaining eligible consumption for HCFC-141b (ODP tonnes)	4,187.22
4.5.1	Total phase-out of HCFC-142b agreed to be achieved under this Agreement (ODP tonnes)	260.81
4.5.2	Phase-out of HCFC-142b to be achieved in previously approved projects (ODP tonnes)****	6.66
4.5.3	Remaining eligible consumption for HCFC-142b (ODP tonnes)	1,203.06
4.6.1	Total phase-out of HCFC-225 agreed to be achieved under this Agreement (ODP tonnes)	0.00
4.6.2	Phase-out of HCFC-225 to be achieved in previously approved projects (ODP tonnes)	0.00
4.6.3	Remaining eligible consumption for HCFC-225 (ODP tonnes)	1.22

* to be determined subsequently

** Associated with previously approved funding not included in row 3 of US $ 12,081,951, including a compressor manufacturing conversion project and 50 per cent of the funding for an XPS project with consumption in HCFC-22 and HCFC-142b

*** Associated with previously approved funding not included in row 3 of US $ 2,753,079

**** Associated with previously approved funding not included in row 3 of US $ 986,650, including 50 per cent of the funding for an XPS project with consumption in HCFC-22 and HCFC-142b

APPENDIX 3-A: FUNDING APPROVAL SCHEDULE

1. The Funding Approval Schedule consists of several tranches. Under this Agreement, a tranche is defined as the funding set out in each year for each sector plan or the national co-ordination, respectively, as specified in Appendix 2-A.

2. Funding for the future tranches will be considered for approval at the last meeting of the year specified in Appendix 2-A.

APPENDIX 4-A: FORMAT OF IMPLEMENTATION REPORTS AND PLANS

1. The Lead IA, on behalf of the Country, will submit at least eight weeks[2] prior to the third meeting of the Executive Committee in any given year, for consideration at that meeting, the following reports to the Multilateral Fund Secretariat:

(a) A verification report of the consumption of each of the Substances mentioned in Appendix 1-A, as per sub-paragraph 5(a)(ii) of the Agreement. If not otherwise decided by the Executive Committee, such a verification has to be provided together with each tranche request and will include verification of the consumption for all relevant years as specified in sub-paragraph 5(a)(i) of the Agreement for which a verification report has not yet been acknowledged by the Committee;

(b) For each sector plan a narrative report, with data provided by calendar year, regarding the progress since the year prior to the previous report, reflecting, for each sector, the situation of the Country in regard to phase-out of the Substances, how the different activities contribute to it, and how they relate to each other. The report should include ODS phase-out as a direct result from the implementation of activities, by substance, and the alternative technology used and the related phase-in of alternatives, to allow the Secretariat to provide to the Executive Committee information about the resulting change in climate relevant emissions. The report should further highlight successes, experiences, and challenges related to the different activities included in the Plan, reflecting any changes in the circumstances in the Country, and providing other relevant information. The report should also include information on and justification for any changes vis-à-vis the previously submitted Annual Implementation Plan(s), such as delays, uses of the flexibility for reallocation of funds during implementation of a tranche, as provided for in paragraph 7 of this Agreement, or other changes. The narrative report will cover all relevant years specified in sub-paragraph 5(a)(i) of the Agreement and can in addition also include information on activities in the current year;

(c) For each sector plan, a written description of the activities to be undertaken until and including the year of the planned submission of the next tranche request as per sub-paragraph 5(b)(iii). The description should highlight the interdependence of the activities, and take into account experiences made and progress achieved in the implementation of earlier tranches; the data in the plan will be provided by calendar year. The description should also include a reference to the overall plan and progress achieved, as well as any possible changes to the overall plan that are foreseen. The description should further specify and explain in detail such changes to the overall sector plan. This description of future activities can be submitted as a part of the same document as the narrative report under sub-paragraph (b) above;

(d) For each sector plan with activities that include the conversion of manufacturing capacity, a verification report related to completed conversion as per sub-paragraph 5(b)(i) of the Agreement;

(e) For each sector, quantitative information for all annual implementation reports and annual implementation plans, submitted through an online database. This quantitative information, to be submitted by calendar year with each tranche request, will be amending the narratives and description for the report (see sub-paragraph 1(b) and (c) above), the annual implementation plan and any changes to the overall plan, and will

[2] Tranches with requested level of funding of more than US $5 million should be submitted in full 12 weeks in advance to the applicable Executive Committee meeting in line with decision 20/7.

cover the same time periods and activities; and

(f) An Executive Summary of about five paragraphs, summarizing the information of the above sub-paragraphs 1(a) to 1(e).

APPENDIX 5-A: MONITORING INSTITUTIONS AND ROLES

1. The Foreign Economic Cooperation Office/Ministry of Environment (FECO/MEP) is responsible for the overall co-ordination of activities to be undertaken in the HPMP with assistance of the Lead IA and acts as the National Ozone Unit, responsible for carrying out national policies and legislations regarding the control of ODS.

2. The national consumption will be monitored and determined based on production data and official import and export data for the Substances recorded by relevant government departments in line with paragraph 5(a)(ii) of this Agreement.

3. In addition to the a national system of licensing and quotas for HCFC imports, production and exports referred to in paragraph 5(a)(iii), a quota system covering enterprises using large quantities of HCFC in the different consumption sectors, where applicable, will be established to control the consumption growth, achieve the consumption reduction in those enterprises and collect the consumption data.

4. For those sectors with large amounts of small and medium enterprises, like PU foam sector, solvent sector, XPS foam sector and ICR sector, the consumption would be managed by limiting the quantities of the relevant substances to be sold to the domestic market.

5. FECO/MEP will closely supervise those enterprises carrying out the conversion activities in stage I of the HPMP to ensure the phase-out target in those enterprises had been achieved.

6. FECO/MEP will co-ordinate with the Lead IA and Cooperating IAs to facilitate the verification of the targets set in the Agreement.

7. FECO/MEP will cooperate with the Lead IA and Cooperating IAs in the preparation of reports according to paragraph 5(b)(ii) and Appendix 4-A of this Agreement.

APPENDIX 6-A: ROLE OF THE LEAD IMPLEMENTING AGENCY

1. The Lead IA for stage I of the HPMP is UNDP. It will be responsible for a range of activities, including at least the following:

(a) Activities related to national co-ordination;

(b) Ensuring performance and financial verification in accordance with this Agreement and with its specific internal procedures and requirements as set out in the Country’s HPMP;

(c) Assisting the Country in preparation of the Implementation Plans and subsequent reports as per Appendix 4-A;

(d) Providing independent verification to the Executive Committee that the Targets have been met (except for overall consumption targets specified in row 1.2 of Appendix 2-A) and associated annual activities have been completed as indicated in the Implementation

Plan consistent with Appendix 4-A. This independent verification can consist of a compilation of sector-specific independent verification carried out by the respective sector Lead IAs;

(e) Ensuring that the experiences and progress is reflected in updates of the overall sector plan and in future annual implementation plans consistent with Appendix 4-A;

(f) Fulfilling the reporting requirements for the annual implementation reports, annual implementation plans and the overall plan as specified in Appendix 4-A for submission to the Executive Committee;

(g) Ensuring that appropriate independent technical experts carry out the technical reviews;

(h) Carrying out required supervision missions;

(i) Ensuring the presence of an operating mechanism to allow effective, transparent implementation of the Implementation Plan and accurate data reporting;

(j) Ensuring that disbursements made to the Country are based on the use of the indicators; and

(k) Providing assistance with policy, management and technical support when required.

2. After consultation with the Country and taking into account any views expressed, the Lead IA will select and mandate an independent entity to carry out the verification of the HPMP results as per sub-paragraph 5(b)(i) of the Agreement and sub-paragraph 1(d) of Appendix 4-A. The Lead IA can delegate the task described in this paragraph to the respective sector Lead IA on the understanding that such delegation will not interfere with the Lead IA's responsibility to carry out the verification of the HPMP results.

APPENDIX 6-B: ROLE OF UNDP

1. UNDP, as the sector Lead IA for the industrial and commercial refrigeration (ICR) sector and the solvent sector, will be responsible for a range of activities described in those sector plans, including at least the following:

(a) Providing assistance for policy development, planning and management of sector programming as set out in these sectors, when required;

(b) Ensuring verification of performance and progress of disbursement in accordance with this Agreement and with its specific internal procedures and requirements as set out in these sectors and assisting the Country in the implementation and assessment of the activities;

(c) Assisting the Country in the preparation of the ICR sector annual Implementation Plans as per Appendix 4-A;

(d) Preparing reports to the Lead IA on these activities as per Appendix 4-A; and

(e) Ensuring financial verification of the activities implemented.

2. UNDP will also act as sector Lead IA for any sector related obligations arising from any HCFC consumption sectors not specifically mentioned in this Agreement, with responsibilities closely resembling those under paragraph 1 above.

APPENDIX 6-C: ROLE OF UNIDO

1. UNIDO, as the Lead IA for the refrigeration and air conditioning (RAC) sector as well as for the extruded polystyrene (XPS) foam sector, will be responsible for a range of activities described in those sector plans, including at least the following:

(a) Providing assistance for policy development, planning and management of sector programming as set out in the RAC and XPS foam sector plans, when required;

(b) Ensuring verification of performance in accordance with this Agreement and with its specific internal procedures and requirements as set out in the Country's RAC and XPS foam sector plans and assisting the Country in the implementation and assessment of the activities;

(c) Ensuring progress of disbursement in accordance with this Agreement and with its specific internal procedures and requirements as set out in the Country's RAC and XPS foam sector plans;

(d) Assisting the Country in the preparation of respective RAC and XPS foam sector annual implementation plans as per Appendix 4-A;

(e) Providing reports to the Lead IA on these activities as per Appendix 4-A; and

(f) Ensuring financial verification of the activities implemented.

APPENDIX 6-D: ROLE OF THE GOVERNMENT OF GERMANY

1. The Government of Germany, as a Cooperating IA for the XPS foam sector, will be responsible for a range of activities described in that sector plan, including at least the following:

(a) Providing assistance for policy development, planning and management of sector programming as set out in the XPS foam sector plan, when required;

(b) Assisting the Country in the implementation and assessment of the activities;

(c) Providing reports to the sector Lead IA on these activities as per Appendix 4-A; and

(d) Ensuring financial verification of the activities implemented.

APPENDIX 6-E: ROLE OF THE WORLD BANK

1. After consultation with the Country and taking into account any views expressed, the World Bank will select and mandate an independent entity to carry out the verification of the consumption of the Country as specified in row 1.2 of Appendix 2-A, as per sub-paragraph 5(a)(ii) of this Agreement and sub-paragraph 1(a)(i) of Appendix 4-A.

2. The World Bank, as the sector Lead IA for the polyurethane foam (PU) sector, will be responsible for a range of activities described in that sector plan, including at least the following:

(a) Providing assistance for policy development, planning and management of sector programming as set out in the PU sector plan, when required;

(b) Ensuring verification of performance and progress of disbursement in accordance with this Agreement and with its specific internal procedures and requirements as set out in the Country's PU sector plan and assisting the Country in the implementation and assessment of the activities;

(c) Assisting the Country in the preparation of PU sector annual implementation plans as per Appendix 4-A;

(d) Providing reports to the Lead IA on these activities as per Appendix 4-A; and

(e) Ensuring financial verification of the activities implemented.

APPENDIX 6-F: ROLE OF UNEP

1. UNEP, as the sector Lead IA for the refrigeration servicing sector, will be responsible for a range of activities described in that sector plan, including at least the following:

(a) Providing policy development assistance when required;

(b) Assisting the Country in the implementation and assessment of the activities under its responsibility and refer to the Lead IA of the HPMP to ensure a co-ordinated sequence in the activities;

(c) Assisting the Country in the preparation of service sector annual implementation plans as per Appendix 4-A;

(d) Providing reports to the Lead IA on these activities as per Appendix 4-A; and

(e) Ensuring financial verification of the activities implemented.

APPENDIX 6-G: ROLE OF THE GOVERNMENT OF JAPAN

1. The Government of Japan, as a Cooperating IA for the refrigeration servicing sector, will be responsible for a range of activities described in that sector plan, including at least the following:

(a) Providing policy development assistance when required;

(b) Assisting the Country in the implementation and assessment of the activities funded by the Cooperating IA, and refer to the sector Lead IA to ensure a co-ordinated sequence in the activities;

(c) Providing reports to the sector Lead IA on these activities as per Appendix 4-A; and

(d) Ensuring financial verification of the activities implemented.

APPENDIX 7-A: REDUCTIONS IN FUNDING FOR FAILURE TO COMPLY

1. In accordance with paragraph 10 of the Agreement, the amount of funding provided may be reduced by US $160 per ODP kg of consumption beyond the level defined in row 1.2 of Appendix 2-A for each year in which the target specified in row 1.2 of Appendix 2-A has not been met.

APPENDIX 8-A: COMMITMENTS UNDERTAKEN BY THE COUNTRY WITH RESPECT TO CONVERSION IN THE RAC SECTOR

1. During stage I of the HPMP, the Country agrees to convert at least 18 manufacturing lines for the production of RAC equipment to hydrocarbon technology as part of the RAC sector plan.

MULTILATERAL FUND FOR THE IMPLEMENTATION OF THE MONTREAL PROTOCOL ON SUBSTANCES THAT DEPLETE THE OZONE LAYER				
PROJECT COVER SHEET				
COUNTRY	People's Republic of China		**IMPLEMENTING AGENCY**	UNIDO JAPAN
PROJECT TITLE	Pilot Demonstration Project on ODS Waste Management and Disposal			
PROJECT IN CURRENT BUSINESS PROJECT			Yes	
SECTOR			ODS destruction	
SUB-SECTORS			Refrigeration and Air Conditioning sub-sector	
ODS DESTROYED	CFC-11		183.63	ODP tonnes
	CFC-12		8.37	ODP tonnes
	Total		192.00	ODP tonnes
PROJECT IMPACT	Net ODP value per annum		76.8	ODP tonnes
	Annual emissions in CO_2 equivalent		322,000	tonnes CO_2e
PROJECT DURATION – Demonstration Project				30 months
PROJECT COSTS -				
	Incremental Capital Costs		US$	2,018,375
	Contingencies		US$	100,920
	Incremental Operating Costs		US$	
	Policy and Management Support		US$	280,000
	Total Project Costs		US$	2,399,295
LOCAL OWNERSHIP				100%
EXPORT COMPONENT				0%
REQUESTED MLF GRANT				
	UNIDO		US$	1,297,885
	JAPAN		US$	900,000
	TOTAL		US$	2,197,885
COST EFFECTIVENESS			US$/kg	11.45
IMPLEMENTING AGENCY SUPPORT COSTS				
	UNIDO (7.5%)		US$	97,341
	JAPAN (13% / 11%)		US$	109,000
	TOTAL		US$	206,341
TOTAL COST OF PROJECT TO MULTILATERAL FUND			US$	2,404,226
STATUS OF COUNTERPART FUNDING			Committed – Provided by project participants to support main project activities (100,490 USD), plus contingency costs (100,920 USD)	
PROJECT MONITORING MILESTONES (Y/N)				Y
NATIONAL COORDINATING BODY			Foreign Economic Cooperation Office, Ministry of Environmental Protection of the People's Republic of China (FECO / MEP)	

Project summary:

The Foreign Economic Cooperation Office of the Ministry of Environmental Protection of the Government of China (FECO/MEP) and UNIDO are submitting a pilot demonstration project on ODS waste management and disposal to the 67th Meeting of the Executive Committee.

The main objective of the project is to contribute to set up a sustainable model for ODS destruction in the country by providing key information and lessons learned relevant to the various relevant aspects of ODS destruction (technical, financial, regulatory and operational).

In order to achieve this objective, the project will cover the disposal of **192 ODP tonnes of CFCs** over a period of three years. The amount of CFCs to be destroyed is distributed as follows:

- 8.37 tonnes of CFC-12 refrigerant;
- 59.86 tonnes of CFC-11 previously extracted from foams;
- 123.77 tonnes of CFC-11 contained in foams.

This amount of CFCs has already been collected or will be available during the implementation period as a result of well-documented on-going collection initiatives. The main source of CFCs to be destroyed are ODS waste collection activities targeting household appliances; a small share of the ODS waste destroyed under this project comes from the disposal of decommissioned vehicles and ships and refrigeration servicing.

The **project strategy** consists of three components

- Component #1 (Destruction of CFC-12 refrigerant): this component will focus on the destruction of CFC-12 refrigerant obtained from the disassembling of domestic refrigerators, and stored in cylinders. Implementation of this component will take place in two local destruction facilities using two different technologies (plasma and rotary kiln).
- Component #2 (Destruction of CFC-11 contained in foams): this component will focus on the destruction of CFC-11 used as blowing agent in foams obtained from disassembled domestic refrigerators applying two different foam management strategies:
  - Strategy #1: extraction of CFC-11 for destruction in a local hazardous waste treatment facility operating with a rotary kiln;
  - Strategy #2: direct destruction of foam containing CFC-11 in two different types of destruction facility.
- Component #3 (Synergies with POPs destruction): this component will focus on the destruction of both CFC-12 refrigerant and of foams containing CFC-11 in a facility with on-going POPs destruction activities.

Implementation of the project will take place in three provinces and one municipality in China, with ODS destruction being undertaken in four facilities showcasing various technologies and ODS management and disposal strategies.

The **demonstration value** of the project can be summarized as follows:

- For each of the technologies applied, the project will draw conclusions relevant to various aspects of the practical implementation of ODS waste disposal, which can be replicated in similar facilities throughout the country after the conclusion of the project;
- Comparison between different management and disposal strategies for CFC-11 contained in foams, based on cost-effectiveness, logistic aspects and technology-related issues;
- Development of a suitable sampling and chemical analysis protocol to determine the amount of CFC-11 destroyed by direct foam destruction;
- Analysis of the impact of combining POPs and CFCs destruction on the incremental costs associated to the latter, and technical aspects where potential synergies between both activities can be found.

PREPARED BY FECO (Z. Zhong)
Beijing University of Technology (H. Li)
UNIDO (M. Caballero)

DATE 8 June 2012

Project Document

Ministry of Environmental Protection, People's Republic of China

United Nations Industrial Development Organization

Pilot Demonstration Project on ODS Waste Management and Disposal

May 2012

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Abbreviations

CFCs	Chlorofluorocarbons
CHEAA	China Household Electric Appliances Association
CRAA	China Refrigeration and Air-Conditioning Industry Association
EPB	Environmental Protection Bureau
ExCom	Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol
FECO	Foreign Economic Cooperation Office, Ministry of Environmental Protection of the People's Republic of China
GDP	Gross Domestic Product
GWP	Global Warming Potential
HCs	Hydrocarbons
HCFCs	Hydrochlorofluorocarbons
HPMP	HCFC Phase Out Management Plan
IEC	Information, Education and Communication
MEP	Ministry of Environmental Protection of the People's Republic of China
MP	Montreal Protocol
Mt	Metric ton
ODP	Ozone Depleting Potential
ODS	Ozone Depleting Substance
PMO	Project Management Office
RAC	Refrigeration and Air Conditioning
UNIDO	United Nations Industrial Development Organization
WEEE	Waste Electrical and Electronic Equipment

1. INTRODUCTION

The Executive Committee, at its 59th meeting, provided funds to prepare a pilot demonstration project on ODS waste management and disposal in China, to be developed in line with the criteria and guidelines for the selection of ODS disposal projects as reflected in Decision 58/19.

The project document has been prepared by experts coordinated by UNIDO and the Foreign Economic Cooperation Office of the Ministry of Environmental Protection of the Government of China (FECO/MEP). During the preparatory phase of the project, UNIDO and FECO staff and external experts have visited various provinces and have organized seminars and workshops attended by representatives from local Environmental Protection Bureaus (EPBs), appliance disposal enterprises, and industry experts. The present project document has been prepared based on the outcome of these activities.

As a result of this process, FECO/MEP and UNIDO submit the present project document to the 67th Meeting of the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol.

The main objective of the project is to contribute to set up a sustainable model for ODS destruction in the country by providing key information and lessons learned relevant to the various relevant aspects of ODS destruction (technical, financial, regulatory and operational).

In order to achieve this objective, the project strategy consists of three components, which address a number of issues that have been identified during the preparatory phase of the project as key areas to secure the long-term sustainability of ODS destruction activities in the country (see Section 6).

To ensure efficient implementation of the three project components, the project will proceed to the destruction of 192 tonnes of CFCs over a period of three years. The amount of CFCs to be destroyed is distributed as follows:

- 8.37 tonnes of CFC-12 refrigerant;
- 59.86 tonnes of CFC-11 previously extracted from foams;
- 123.77 tonnes of CFC-11 contained in foams.

This amount of CFCs has already been collected or will be available during the implementation period as a result of the on-going collection initiatives described in Section 3.2. of this document. The main source of CFCs to be destroyed are ODS waste collection activities targeting household appliances; a small share of the ODS waste destroyed under this project comes from the disposal of decommissioned vehicles and ships and refrigeration servicing.

Implementation of the project will take place in three provinces and one municipality in China, with ODS destruction being undertaken in four facilities showcasing various technologies and ODS management and disposal strategies.

In addition to the main project activities (those directly supporting on ODS destruction), the project includes a technical assistance component aimed at facilitating the integration of this pilot demonstration project into an overall strategy to ensure long-term sustainability of ODS destruction efforts in China. These supporting activities will address the following areas:

- Assistance on the development of an appropriate policy framework;
- Training activities;
- Supervision, verification and management information system (MIS).

2. COMPLIANCE OF THE PROJECT CONCEPT WITH THE FUNDING GUIDELINES (DECISION 58/19)

The Executive Committee, at its 58th Meeting, approved a set of interim guidelines for the funding of demonstration projects for the disposal of ODS in accordance with paragraph 2 of decision XX/7 of the Meeting of the Parties. The following information is provided to show the project's compliance with all the requirements as set out by the above mentioned Decision 58/19.

a) Updated and more detailed information for all issues mentioned under project preparation funding

i. An indication of the category or categories of activities for the disposal of ODS (collection, transport, storage, destruction), which will be included in the project proposal.

The project includes all categories of activities for the disposal of ODS namely: collection, transport, storage and destruction, however it only seeks funding from the MLF for the later three activities in line with the interim guidelines for the funding of demonstration projects for the disposal of ODS.

A detailed description of the activities to be undertaken during the project implementation can be found in Section 7 of this project document.

ii. An indication of whether disposal programmes for chemicals related to other multilateral environmental agreements are presently ongoing in the country or planned for the near future, and whether synergies would be possible.

During the preparation of the project document, on-going disposal programmes for other chemicals in China have been analyzed; the project document includes information on these programmes in Section 3.4.

One of the three components taken into consideration in the project strategy will explore synergies between POPs and ODS destruction activities through the destruction of both CFC-12 refrigerant and of foams containing CFC-11 in a facility with on-going POPs destruction activities. A detailed description of this project component can be found in Section 6.3. of this project document.

iii. An estimate of the amount of each ODS that is meant to be handled within the project.

In order to achieve the project objectives, the project will cover the disposal of 192 ODP tonnes of CFCs over a period of three years. The amount of CFCs to be destroyed is distributed as follows:

- 8.37 tonnes of CFC-12 refrigerant;
- 59.86 tonnes of CFC-11 previously extracted from foams;
- 123.77 tonnes of CFC-11 contained in foams.

iv. The basis for the estimate of the amount of ODS; this estimate should be based on known existing stocks already collected, or collection efforts already at a very advanced and well-documented stage of being set up

The amount of ODS to be destroyed has already been collected or will be available during the implementation period as a result of well-documented on-going collection

initiatives in the four provinces participating in the project implementation. Section 3.2. includes detailed information on these collection activities; Section 5.3. provides data on the available ODS banks in these four provinces.

v. For collection activities, information regarding existing or near-future, credible collection efforts and programmes that are at an advanced stage of being set up and to which activities under this project would relate.

Existing collection activities focused on the disposal of electric household appliances are described in Section 3.2.1. of this document; collection activities linked to the disposal of decommissioned vehicles and ships and refrigeration servicing are described in Section 3.2.2.

vi. For activities that focus at least partially on CTC or halon, an explanation of how this project might have an important demonstration value

The project will focus on the destruction of CFCs; neither CTC nor halon disposal will be addressed during the implementation of this project.

b) Specific information required for project submissions

i. A detailed description of the foreseen management and financial set up.

In line with the guidelines for the funding of demonstration projects included in Decision 58/19, the project document has to include information on the following aspects:

- Total cost of the disposal activity including costs not covered by the Multilateral Fund, as well as the sources of funding for covering these costs: the following table summarizes this information, for which further details is provided in Section 9.2.4. of this project document:

Table 1: Total cost of the disposal activity

Item	Cost (USD)
Project Costs	
- Main project activities	2,018,375
- Supporting project activities	280,000
- Contingencies (5% of main project activities)	100,920
Total Project Costs	**2,399,295**
Project Costs not covered by the Multilateral Fund	
- Foam transportation	50,490
- Technical validation of the plasma destruction facility	50,000
- Contingencies	100,920
Total Project Costs not covered by MLF	**201,410**
Requested MLF grant	**2,197,885**
Cost-efficiency (USD/kg.)	**11.45**

- The sources of funding for covering costs for which MLF grant is not requested: Section 9.2.3. contains information on the co-financing sources;
- Description of the sustainability of the underlying business model: the implementation of this project will contribute to the long-term sustainability of ODS destruction activities in China by providing a comprehensive set of technical, economic, logistic and managerial data and lessons learned which will be an input

for the adaptation of the current legislative framework addressing ODS management and disposal. Section 8 of the project document describes how sustainability will be achieved by clearly defining the expected areas of intervention, the project beneficiaries, the environmental benefits and the issues that have been identified as key factors to ensure sustainability of the business model;

- Identification of time-critical elements of the implementation: these elements are outlined in Section 7.3.3. of this project document.

ii. A clear indication how the project will secure other sources of funding.

Section 9.2.3. describes how the project strategy secures co-financing for both its implementation and beyond, in line with the objective of the outlined business model of ensuring long-term sustainability of ODS destruction activities in China.

iii. A concept for monitoring the origin of recovered ODS for future destruction, with the objective of discouraging the declaration of virgin ODS as used ODS for destruction.

The project concept highlights the importance of this issue by including it as one of the main project activities, as described in Section 7.1.2. of this project document.

iv. Valid assurances that the amount of ODS mentioned in the proposal will actually be destroyed, and the agencies should submit proof of destruction with the financial closure of the project.

In order to ensure that this requirement is met during project implementation, detailed procedures have been designed as described in Section 7.1.6. of this project document.

v. An exploration of other disposal options for the used ODS such as recycling and reuse opportunities;

Exploration of alternative disposal options for ODS waste is undertaken by the recycling and recovery centres. The centres perform a qualitative characterization of the collected ODS waste and, should the purity be high enough and depending on existing demand, they promote reusing these relatively pure CFCs. Therefore, the amounts of ODS waste reported for destruction reflect those stocks for which alternative uses are not feasible.

3. BACKGROUND

3.1. ODS Waste-Related Legislation

The Government of China considers environmental issues in economic development of great importance; the current legislative framework in the country includes provisions for the recycling and destruction of ODS in the regulation addressing the management of ozone depleting substances.

The preparatory phase of the project has shown two important factors to be taken into consideration:

- The existing regulation only deals with ODS destruction in a limited way;
- The implementation of the ODS-related regulation is linked to other environmental regulations such as those regulating solid wastes and atmospheric pollutants.

The existing regulatory framework related to ODS recycling and disposal of vehicles and appliances in China consists of the following pieces of legislation:

1. *Scrap Automobile Recycling Administrative Policy*: the policy was passed on 13 June 2001 and determines that the State manages the automobile scrapping as a special profession, and practices a qualification system. Any firms or individuals other than those which obtained the qualification for recycling decommissioned automobiles shall not participate in the business.
2. *Announcement on Prohibiting the Production, Sales, Import and Export of Household Appliances that Use CFCs as Refrigerant or Foaming Agent*: the announcement points out that from 1 September 2007, no enterprise should sell household appliances using CFCs as refrigerant or foaming agent; from this same date, the import and export of household appliances using CFCs as refrigerant or foaming agent is banned, as well as the import and export of compressors for household appliances that use CFCs as refrigerant. The announcement emphasizes that it applies to products including refrigerators, freezers, household ice machines, household ice cream machines, rice cookers, and water heaters.
3. *Circular on Conducting Dichlorodifluoromethane (CFC-12) Recycling and Reuse in the Automobile Servicing Sector*: the Circular states that from 1 January 2008 enterprises in the automobile air-conditioner servicing business should gradually be equipped with CFC-12 refrigerant recycling equipment, and must recycle and reuse CFC-12 when servicing automobile air-conditioners.
4. *Circular Economy Promotion Law of People's Republic of China*: this law was issued on 29 August 2008 and came into effect on 1 January 2009. The law aims at improving the efficiency of resource utilization, protect and improve the environment, and achieve sustainable development through promoting the concept of circular economy, based on three pillars:

   - Reduce: minimization of resource consumption and generation of wastes in production, distribution and consumption processes;
   - Reuse: waste processing in order to make waste usable for productive purposes, or use the whole or a part of the waste as parts of other products;
   - Reclamation: using the waste as raw material or recycle the waste.

   This law established a series of incentives to support and push entities such as enterprises to voluntarily develop a circular economy, and penalties for behaviors of not fulfilling its obligations.
5. *Implementation Measures for the Used Household Appliances Trading Policy*: issued on 28 June 2009, the policy stipulated the subsidies for trading of appliances, the implementation steps, and responsible parties in detail. Products that are accepted include TV sets, refrigerators, washing machines, air-conditioners, and computers.
6. *Guidelines on Implementing Household Appliance Trade-in and Enhance Environmental Management of Waste Appliance Disposal*: announced on July 1st, 2009 the guidelines include the following elements:

   - Recognition of the need to develop disassembling and disposal technologies and equipment that suit China's situation;
   - Consumers who buy new appliances can enjoy subsidies by returning the replaced waste appliance to appointed recycling enterprises;
   - During the effective period of the policy the qualified enterprises that buy waste appliances from the consumers and send them to appointed disposal enterprises for disassembling can enjoy reimbursement of transportation expenses, while disposal enterprises that complete the disposal of waste appliances sold by the consumers can enjoy subsidies for disposal

Over 90 million appliances including TV sets, refrigerators, washing machines, air-conditioners and computers were disposed in 2009. The policy significantly promoted the recycling and responsible treatment of waste appliances.

7. *Regulation on Ozone Depleting Substances*: this regulation, which came into effect on June 1st, 2010, states that enterprises involved in the servicing and disposal of refrigeration equipment and systems and firefighting systems should proceed as follows:

   - They shall register at the local competent environmental protection department of the government;
   - They shall recycle and reuse ODS according to regulations of the environmental protection department of the State Council, or hand them over to enterprises specialized in recycling, reusing and destruction to render them harmless, and do not directly discharge them.

   Those who violate the regulation should be fined by the competent environmental protection department of the local government.

8. *Administrative Rules on Certifications for Waste Electrical and Electronic Equipment*: the rules were issued on November 5th, 2010 and came into effect on January 1st, 2011, with the following goals:

   - Regulate the certification of waste electrical and electronic equipment (WEEE) disposal;
   - Prevent WEEE from polluting the environment.

   The rule focuses on the application, approval and monitoring of the qualification for processing WEEE. The rule stipulates that enterprises processing WEEE must follow a specific local planning. The rule also provided information on application process, management of the certification, monitoring and legal responsibilities.

9. *Regulation on the Administration of the Recovery and Disposal of Waste Electrical and Electronic Equipment*: this regulation was issued on August 20th, 2008 and came into effect on January 1st, 2011. Its rationale is to regulate the recovery and disposal of WEEE, promote the comprehensive utilization of resources and development of a circular economy, and protect the environment and human health. This regulation applies to products including TV sets, refrigerators, washing machines, room air-conditioners, PCs, etc. The regulation specified the administrative departments for recycling WEEE, certification system, subsidies etc., as well as each stakeholder's management and legal responsibilities.

3.2. ODS Waste Collection Activities

3.2.1. Household Appliances

The most relevant on-going ODS waste collection activities in China are those targeting household appliances. As pointed out in the previous section, the *Implementation Measures for the Used Household Appliances Trading Policy* were issued on 28 June 2008 in order to encourage domestic demand through a subsidy system for the purchase of a number of appliances (including TV sets, refrigerators, washing machines, air-conditioners, and computers). This nation-wide piece of legislation has been implemented at provincial level by the corresponding Environmental Protection Bureaus (EPBs).

This programme has helped to define those parties involved in collection efforts as well as their respective capabilities and responsibilities in detail. The implementation of the programme has allowed for the set up of a collection, transportation and dismantling system targeting used

household electric appliances in provinces and cities[1].

The key elements of the programme are listed below:

- Certification: the sales, collection and dismantling enterprises have been chosen by bidding and certified by the local government through its EPB;
- Subsidy scheme: a consumer, whose used appliance was collected by the certificated collection enterprise, can get the subsidy for the procurement of the new appliance in the certificated sales enterprise;
- Responsibility: the collection enterprise is responsible to the collection of the used appliances from the consumers and the storage, as well as the transportation of the used appliances to the dismantling enterprises, in which the appliances will be dismantled;
- Monitoring: the sales and collection enterprises are monitored by the local commercial department and the dismantling enterprises are monitored by the local EPBs;
- Reporting requirements:
  - The information on the collection and transportation of the used appliances, as well as the delivery to the dismantling stations, should be reported by the collection enterprise;
  - The information on the receipt of the used appliances from the collection enterprise, as well as the dismantling numbers, should be reported by the dismantling stations;
  - The local commercial and environmental protection departments, as well as the local financial department, should double-check the consistency of the information from the stakeholders;

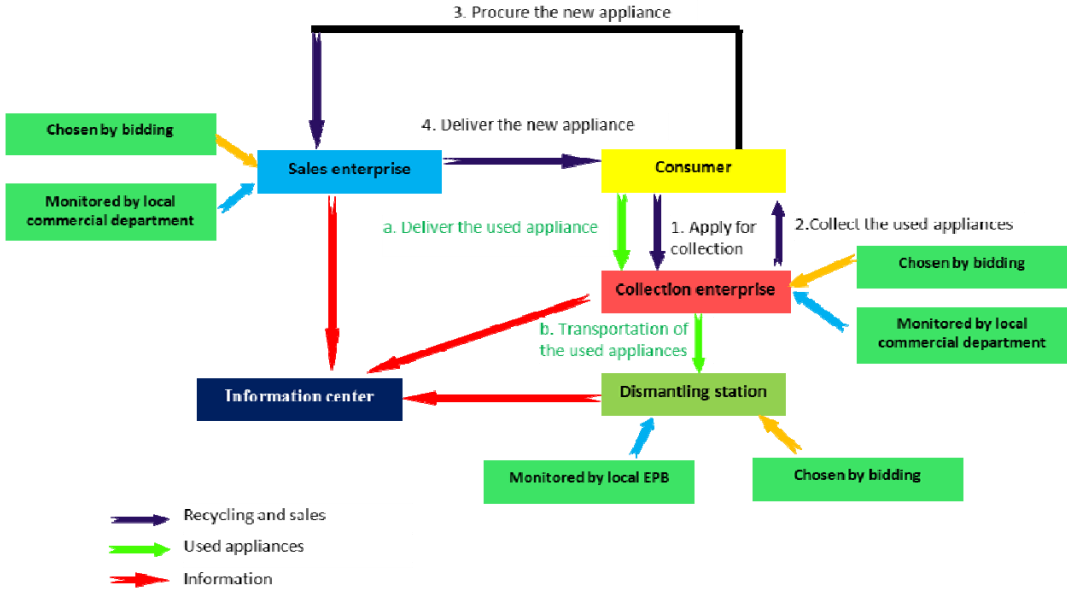
In line with the above, the key stakeholders involved in the collection programme are the following:

- Consumers;
- EPBs;
- Other departments within the local government (commercial, financial);
- Sales enterprises;
- Collection enterprises;
- Dismantling stations.

The following figure summarizes the procedure for the collection, transportation and dismantling of the used household electric appliances set up under the programme, as well as the relationships among key stakeholders:

[1] The People's Republic of China is organized in four different types of administrative divisions: provinces, autonomous regions, special administrative regions and municipalities. For the sake of simplicity, this document groups both provinces and autonomous regions under the term "province", and special administrative regions and municipalities under the term "city".

Figure 1: Collection, transportation and dismantling of household appliances in China



During the implementation of the programme, the number of refrigerators recycled, disassembled, and stored in disposal enterprises in some relevant provinces and cities can be found in Table 2. According to statistics, over 90% of the recycled refrigerators use CFC-12 as refrigerant, and CFC-11 as foaming agent, mainly due to the long life of refrigerators.

Table 2: Refrigerator collected in some relevant provinces and cities

Province / City	Number of refrigerators		
	Disassembled	Stored	Total
Beijing	30,712	197,398	228,110
Fuzhou	11,957	60	12,017
Guangdong	244,372	21,273	265,645
Jiangsu	248,393	7,120	255,513
Shandong	188,682	12,007	200,689
Shanghai	82,396	865	83,261
Tianjin	35,644	26,558	62,202
Zhejiang	104,749	39,934	144,683

3.2.2. Other Collection Activities

Besides the household appliance sector, the CFC phase-out plan for China's refrigeration servicing sector also initiated refrigerant recycling and reclamation in the automobile, industrial and commercial refrigeration and ship disassembling sub-sectors.

In the **automobile air conditioning subsector**, automobile servicing and disposal enterprises must obtain refrigerant recycling or refrigerant recycling and reclamation equipment before they can start operation. In addition to this, refrigerants must be recycled during servicing and disposal and careless discharge is forbidden.

Technological assistance activities such as policy making, standard making and public awareness have been conducted in this sub-sector. Funding from the Multilateral Fund has been used to undertake the following activities:

- Over 1,000 air conditioning systems have been recycled;

- Identification and reclamation devices have been provided;
- A data management system has been established;
- Over 6,000 technicians have been trained.

All these activities promoted refrigerant recycling and reclamation in the process of automobile servicing and decommissioning, and reduced the discharge of refrigerant.

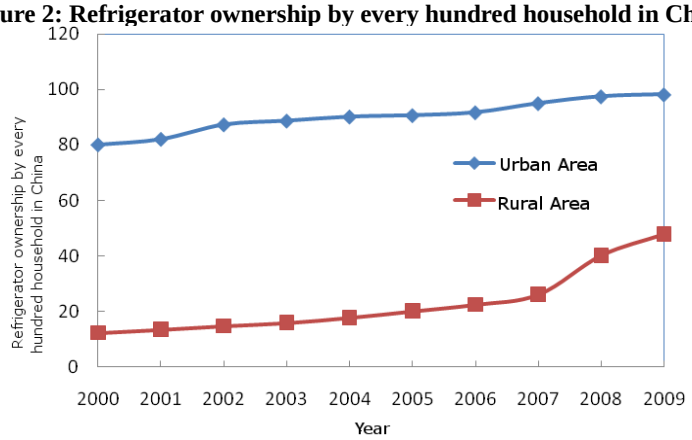
In the **industrial and commercial refrigeration** and **ship disassembling sub-sectors**, some servicing enterprises and ship disassembling enterprises have been equipped with refrigerant recycling devices. However, it is worth noting that the refrigerant recycling activities in these two sub-sectors are just starting, and have not reached the scale of the automobile air-conditioning sector. Refrigerants recycled from ship disassembling generally are sold to local servicing enterprises, where they are reclaimed and reused. Due to lack of supply, some industrial and commercial refrigeration servicing enterprises also recycle and reclaim CFC refrigerants, but the volume is small. Many large servicing enterprises recycle all ODS refrigerants when the cost is acceptable.

For refrigerants which are not recyclable, some are stored in enterprises or servicing shops, but still some are discharged into the atmosphere due to lack of destruction capability, lack of supervision, and high cost of destruction.

3.3. Forecast

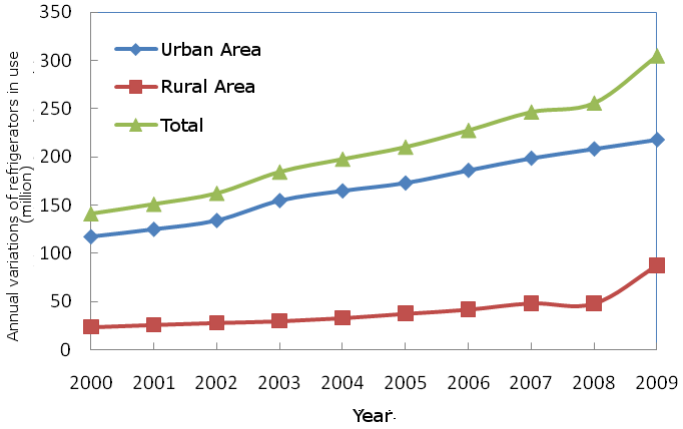
With the improvement of people's life standards in China, the number of refrigerators in use and in the market also rises. Figure 2 shows the ownership of refrigerators by every hundred families in the urban and the rural areas in China. The mean annual growth rate of refrigerator ownership for every hundred households is around 2.3% from 2000 to 2009 in the urban area and around 16.8% for rural areas, which is far higher than the urban area. This is due to the implementation of projects such as "Appliances for the Rural Areas" in the period from 2007 to 2009.

Figure 2: Refrigerator ownership by every hundred household in China



The average life of a refrigerator in China is 11-14 years, and Figure 3 shows the increase in refrigerators in use based on the production and sales figures of China's refrigerators. As shown, the average growth rate of refrigerators in use in China in the period from 2000 to 2009 is about 10.8%.

Figure 3: Annual variations of refrigerators in use (Million Units)



Using a market supply model, the number of refrigerators that can potentially be disposed from 2011 to 2017 in each province or city can be deducted from the apparent annual consumption of refrigerators in these places, as shown in Table 3.

Table 3: Forecast of refrigerator decommissioned in 2011-2017 for each province

Province	Year						
	2011	2012	2013	2014	2015	2016	2017
Anhui	491,600	544,100	492,800	544,300	784,800	1,116,900	1,422,900
Beijing	368,400	427,500	481,600	524,800	587,900	665,000	662,700
Chongqing	239,600	244,300	338,300	429,200	526,700	658,500	797,400
Fujian	261,800	324,500	418,900	514,600	654,300	890,600	1,035,100
Gansu	221,400	214,800	204,300	191,800	217,900	287,400	380,500
Guangdong	847,100	1,070,000	1,302,900	1,541,000	1,744,500	1,998,800	2,278,100
Guangxi	356,200	400,100	394,400	345,800	481,200	653,400	828,100
Guizhou	293,000	322,000	331,200	295,500	281,900	317,900	410,300
Hainan	62,600	59,400	67,400	79,900	93,500	111,700	154,900
Hebei	513,500	519,300	705,500	920,300	1,204,500	1,479,200	1,816,600
Helongjiang	299,600	289,400	301,600	379,200	496,900	626,800	788,900
Henan	769,600	803,300	728,900	942,200	1,312,200	1,752,800	2,207,800
Hubei	474,200	457,000	478,000	586,100	743,100	956,200	1,213,700
Hunan	566,700	549,400	506,600	567,600	699,900	923,000	1,208,800
In. Mongolia	181,700	258,600	395,200	556,800	673,700	814,400	948,700
Jiangsu	755,300	1,161,500	1,429,200	1,724,100	2,039,600	2,368,700	2,772,400
Jiangxi	364,800	322,600	366,700	480,000	596,500	729,400	1,004,300
Jilin	204,200	202,000	253,700	386,800	560,100	739,200	934,600
Liaoning	340,000	457,100	661,300	902,100	1,152,800	1,406,600	1,722,500
Ningxia	48,500	70,400	83,600	98,000	109,500	129,000	167,700
Qinghai	50,500	56,100	64,000	73,300	90,300	105,400	124,000
Shandong	738,400	1,180,900	1,539,400	1,995,100	2,309,800	2,537,600	2,966,100
Shanghai	446,300	495,300	574,800	637,700	688,300	754,000	800,400
Shanxi	297,700	275,200	324,300	415,100	551,000	741,300	952,900
Sichuan	738,600	688,600	652,200	779,000	976,700	1,252,200	1,555,000
Tianjin	177,700	221,900	257,800	297,900	346,800	417,900	537,700
Xinjiang	173,100	214,600	254,900	297,400	345,900	403,300	479,700
Xizang	22,800	29,500	36,100	40,300	50,800	58,400	65,600
Yunnan	355,300	367,000	339,100	380,400	486,100	613,300	759,000
Zhejiang	768,700	1,014,900	1,194,300	1,321,300	1,486,700	1,611,800	1,735,600

As shown in the table, it is expected that the number of decommissioned refrigerators will show an upward trend for all provinces and cities. Due to causes such as economy size, population size and area of the region, places such as Shandong, Jiangsu, and Guangdong have higher numbers than other provinces or cities. It is also observed that the number of refrigerators decommissioned descends when moving from East to West throughout the country.

3.4. Disposal Programmes for Other Chemicals

Two programmes addressing disposal of Persistent Organic Pollutants (POPs) are currently being implemented in China:

a) POPs disposal project by FECO

The Foreign Economic Cooperation Office of the Ministry of Environmental Protection (FECO/MEP) and the United Nations Industry Development Organization (UNIDO) jointly developed the project of "Environmentally Sound Management and Disposal of Obsolete POPs Pesticides and Other POPs Wastes in China". The project has already been approved by the CEO of the Global Environment Facility (GEF).

The project will utilize environmentally sound technology recommended by the Stockholm Convention, collect and process pesticide POPs wastes, explore management and disposal technologies for dioxin flying ash that are technically and economically practical, and conduct a series of technology assistance activities.

At the moment, in Hubei Province and Hebei Province, where the largest stockpiles of POPs pesticides are located, the collection and disposal of POPs wastes is under way. In the two provinces about 3,000 tons of pesticide POPs wastes have been disposed using co-processing in cement kilns.

b) POPs disposal in Tianjin's Hejia Velia facility

Hejia has carried out nearly 100 industry service projects involving field clean up, collection and safe disposal of various hazardous industry wastes for a range of hazardous waste generating enterprises all over China. The total amount of industry hazardous wastes cleaned, collected and disposed has exceeded 10,000 tons.

Since September 2003, the corporation has safely disposed about 1,602 tons of POPs wastes such as pesticides and PCBs. The safe disposal approach has been incineration, with discharge of gases conforming to the standards and remains sent to the landfill.

4. PROJECT OBJECTIVES

The Pilot Demonstration Project on ODS Waste Management and Disposal in China aims to achieve the following objectives:

- The project will contribute to set up a sustainable model for ODS destruction in the country by providing key information and lessons learned relevant to the various relevant aspects of ODS destruction (technical, financial, regulatory and operational);
- The project will address a number of specific issues that have been identified during the preparatory phase of the project as key areas to secure the long-term sustainability of ODS destruction activities in the country, namely:
    a) Suitability of four local destruction facilities for the destruction of CFC-11 contained in foams and CFC-12;

b) Comparison among various destruction technologies and strategies based on technical, operational and economic criteria;

c) Assessment of two different management strategies for the disposal of CFC-11 contained in foams;

d) Identification of linkages to, and synergies with, on-going initiatives addressing destruction of POPs and other chemicals;

e) Integration of ODS management and disposal into the targets and planning of the existing framework for management of hazardous wastes.

5. PROJECT SCOPE

5.1. Scope of Activities

In order to achieve the objectives listed in the previous section, the project will be implemented following a strategy consisting of three components:

- Component #1 (Destruction of CFC-12 refrigerant): this component will focus on the destruction of CFC-12 refrigerant obtained from the disassembling of domestic refrigerators, and stored in cylinders. Implementation of this component will take place in two local destruction facilities using two different technologies (plasma and rotary kiln).
- Component #2 (Destruction of CFC-11 contained in foams): this component will focus on the destruction of CFC-11 used as blowing agent in foams obtained from disassembled domestic refrigerators applying two different foam management strategies:
- Component #3 (Synergies with POPs destruction): this component will focus on the destruction of both CFC-12 refrigerant and of foams containing CFC-11 in a facility with on-going POPs destruction activities.

A detailed description of these project components can be found in Section 6.

5.2. Geographical Scope

In order to implement the three project components, a total of four provinces will participate in the project, with one destruction facility being used in each province. The following table summarizes the geographical scope of the project for each of the three project components:

Table 4: Geographical scope of the project

Province	Component		
	#1	#2	#3
Guangdong	✓		
Jiangsu		✓	
Shandong		✓	
Tianjin	✓	✓	✓

All four provinces share the following characteristics:

- High level of economic development with a large refrigerator market and a high turnover ratio of refrigerators;
- The established collection system for household appliances shows high recycling rates;

- Locally available destruction facilities.

A representative sample of household electric appliances dismantling stations in the four provinces listed above will be involved in this project.

During the preparatory phase of the project, a number of factors have been taken into consideration when defining the geographical scope of the project and implementation modalities. At an early stage of the project design, trans-provincial transportation of ODS waste was considered as an option in order to explore various pathways for maximizing cost-effectiveness in the implementation.

In this regard, it is worth noting that the current legislative framework *per se* does not represent a barrier for trans-provincial co-operation in the context of this project. However, the existing decentralized model for the transposition of nation-wide environmental legislation seriously hinders such co-operation. The consideration of ODS waste varies from province to province, with some of them referring to it as hazardous waste and some of them not; in this context, obtaining trans-provincial transport permits is at best a challenging task, if not an impossible one.

In the context of the provinces participating in the implementation of the project, consideration of ODS waste varies as follows:

- In Jiangsu, CFC-12 and CFC-11 are not treated as hazardous waste, and in the other three provinces they are treated as hazardous waste;
- In all four provinces, liquid CFC-12 is given the consideration of waste for which special precaution has to be taken during transportation due to the high pressure;
- The foam contained with CFC-11 is treated as normal waste in all four provinces, although some specific requirements on the transportation and storage have to be met due to the flammability of foams.

According to provincial and nation-wide regulation, hazardous waste has to be destroyed in certified waste treatment stations. Similarly, transportation of dangerous waste and hazardous waste should only be done by certified transportation enterprises.

Another factor that has prevented the project concept from advocating for trans-provincial co-operation is the high transportation costs identified during the budget preparation stage of the project design.

5.3. Amounts of ODS to be Destroyed

In order to achieve the objectives listed in the previous section of this document, the project will undertake the destruction of 192 tonnes of ODS waste. The lion's share of this amount comes from the disposal of electric household appliances undertaken under the collection scheme described in Section 3.2.1. of this document. A small share of the ODS waste destroyed under this project comes from the disposal of decommissioned vehicles and ships and refrigeration servicing, as described in Section 3.2.2.

5.3.1. Availability of ODS Banks

The following table shows the latest data concerning **recycled refrigerators** in each of the selected provinces:

Table 5: Number of recycled refrigerators in the relevant provinces

Province	Period	Number of refrigerators		
		Recycled	Dismantled	Stockpiled
Guangdong	2009	89,733	89,733	
	2010	143,547	119,673	
	1st Q of 2011	32,365	34,966	21,273
Jiangsu	2009	98,432	77,984	
	2010	110,218	125,099	
	1st Q of 2011	46,863	45,310	7,120
Shandong	2009	71,893	69,802	
	2010	103,742	102,878	
	1st Q of 2011	25,054	16,002	12,007
Tianjin	2009	24,527	18,000	
	2010	30,086	16,060	
	1st Q of 2011	7,589	1,584	26,558

The following table shows the **currently banked amounts of CFCs** available for destruction in each province:

Table 6: Amounts of CFC-11 and CFC-12 collected in the relevant provinces (*)

Province	CFC-12 (kg.)			CFC-11 (kg.)			
	From refrigerators		Other sources	Pure		In foam	
	Stockpiled	To be extracted		Stockpiled	To be extracted	From stockpiled foams	From foam in stockpiled refrigerators
Guangdong	3,431.32	487.04	468	-	-	*1,879.78*	*19,145.7*
Jiangsu	*1,275.09*	*156.64*	-	-	-	2,143.07	12,379.50
Shandong	*384.04*	*264.15*	-	4,127.26	7,564.41	-	-
Tianjin	235.44	584.28	-	-	-	274.18	23,902.20

(*) Amounts in italics refer to ODS banks which will not be addressed by the project in line with the outlined project strategy

In addition to the amount of CFCs already collected, an assessment was made in order to estimate the **amount of CFCs that will be available on an annual basis** as a result of the on-going collection initiatives in the provinces taken into consideration (see Section 3.2. for a description of these initiatives):

Table 7: Amounts of CFC-11 and CFC-12 to be collected in the relevant provinces (*)

Province	Refrigerators recycled annually	CFC-12 (kg.)	CFC-11 (kg.)	
			Pure CFC-11	In foams
Guangdong	149,444	3,287.77	-	*116,514.00*
Jiangsu	201,780	*4,123.94*	-	181,602.00
Shandong	100,216	*2,204.75*	63,136.08	-
Tianjin	30,276	666.07	-	27,248.40

(*) Amounts in italics refer to ODS banks which will not be addressed by the project in line with the outlined project strategy

The **total amount of ODS waste available for destruction** during the implementation of the project is shown in Table 8, and can be defined as the sum of the following amounts:

- Currently banked amounts of CFCs available for destruction in each province (as per Table 6);
- Amounts of CFCs not collected yet but that will be available during the implementation

period as per the annual estimates included in Table 7, for the following periods of time:

- Second half of 2012;
- 2013;
- First half of 2014 (it is not realistic to assume that amounts collected during the second half of 2014 will be readily available to be destroyed in the context of this project, given the plan to finish destruction activities before the end of 2014).

Therefore, this amount of future available CFCs can be calculated as the amount estimated to be collected over a period of two years (that is, twice the amounts reflected in Table 7 above).

Table 8: Total amounts of CFC-11 and CFC-12 available for destruction in the relevant provinces (*)

Province	CFC-12 (kg.)			CFC-11 (kg.)				
				Pure CFC-11		In foams		
	Currently Available	Estimated	Sub-total	Currently Available	Estimated	Currently Available	Estimated	Sub-total
Guangdong	4,386.36	6,575.54	10,961.90	-	-	*21,025.48*	*233,028.00*	*254,053.48*
Jiangsu	*1,431.73*	*8,247.88*	*9,679.61*	-	-	14,522.57	363,204.00	377,726.57
Shandong	*648.19*	*4,409.5*	*5,057.69*	11,691.67	126272.16	-	-	137,963.83
Tianjin	819.72	1,332.14	2,151.86	-	-	24,176.38	54,496.80	78,673.18
Total	7,286.00	20,565.06	**27,851.06**	11,691.67	126,272.16	59,724.43	650,728.80	**848,417.06**

(*) Amounts in italics refer to ODS banks which will not be addressed by the project in line with the outlined project strategy

The table above shows that 27.8 tonnes of CFC-12 and 848.4 tonnes of CFC-11 will be available for destruction in the four provinces, taking into account the amounts already collected and the ones to be collected during the implementation of the project.

For the amounts already collected, it is important to note that these amounts are lower than what could be expected given the estimated collection capacity in the four provinces; this is due to the fact that the current practice for recovery and recycling centers, in the absence of a ODS destruction scheme in place, is to stockpile foams containing CFC-11 for a limited period of time, and then send some of the stockpiled foams to landfills in order not to go beyond the storage capacity of the centers. However, it is expected that this situation will change in the four provinces through implementation of this project, an in the whole country through the establishment of a sustainable ODS destruction scheme which will make recovery and recycling centers to manage a large share of the stockpiled foams through destruction rather than through landfilling.

In order to provide a comprehensive view of the situation of ODS waste supply in the four provinces participating in the project implementation, vis-à-vis what is already collected and available, a table summarizing the data above is included in the following page:

Table 9: Amounts of ODS Waste Available for Destruction

Province	Substance	Amount already collected (kg.)	Estimated amounts available in the future (kg.)			
			During implementation of the project (kg.)			After implementation of the project (on an annual basis)
			2012 (2nd half)	2013	2014 (1st half)	
Guangdong	CFC-12	4,386.36	1,643.89	3,287.77	1,643.89	3,287.77
	CFC-11	21,025.48	58,257.00	116,514.00	58,257.00	116,514.00
Jiangsu	CFC-12	1,431.73	2,061.97	4,123.94	2,061.97	4,123.94
	CFC-11	14,522.57	90,801.00	181,602.00	90,801.00	181,602.00
Shangdong	CFC-12	648.19	1,102.38	2,204.75	1,102.38	2,204.75
	CFC-11	11,691.67	31,568.04	63,136.08	31,568.04	63,136.08
Tianjin	CFC-12	819.72	333.04	666.07	333.04	666.07
	CFC-11	24,176.38	13,624.20	27,248.40	13,624.20	27,248.40

Substance	Amount already collected (kg.)	Estimated amounts available in the future (kg.)			
		During implementation of the project (kg.)			After implementation of the project (on an annual basis)
		2012 (2nd half)	2013	2014 (1st half)	
CFC-12	7,286.00	5,141.28	10,282.53	5,141.28	10,282.53
CFC-11	71,416.10	194,250.24	388,500.48	194,250.24	388,500.48

Totals (available during implementation of the project):

- CFC-12: 27,851.09 tonnes
- CFC-11: 848,417.06 tonnes

5.3.2. ODS Banks Targeted by the Project

The project will destroy a fraction of the total available amount of ODS described in the previous section, based on the following:

- At the early stages of the implementation, the project will have a limited impact on the current management practices of foams in the recovery and recycling centers. This is mainly due to the time needed for a number of activities such as setting up a project management structure, preparing the Terms of Reference for the subcontracting of some of the activities to be undertaken, conducting the bidding processes (when applicable), undertaking the technical validation in the four facilities, etc. Therefore, it is estimated that the flow of foams directed to destruction will be low at the beginning of the project implementation but it will increase with time.
- Cost-efficiency has to be taken into consideration in the case of destruction of CFC-12 as one of the technologies has a higher cost-efficiency than that allowed under the guidelines established by Decision 58/19; therefore, the amount of CFC-12 destroyed under that option has been reduced in order to fine-tune the overall cost efficiency of the project;
- Timeline of the project versus destruction capacity: it is a fact that facilities have a destruction capacity which is limited by optimal feeding rates, combination of ODS destruction with other destruction activities undertaken in the facilities on a regular basis, etc. That has an impact on the maximum ODS amount that can be processed during the 30 months when the project will be implemented.

Taking into account the criteria outlined above, the following table summarizes the amounts that will be destroyed in each of the provinces:

Table 10: Amounts of CFC-11 and CFC-12 to be destroyed during the project implementation

Province	CFC-12 (kg.)	CFC-11 (kg.)	Sub-total (kg.)
Guangdong	7,016.58	-	7,016.58
Jiangsu	-	98,062.29	98,062.29
Shandong	-	59,862.20	59,862.20
Tianjin	1,352.58	25,712.39	27,064.97
Total	**8,369.16**	**183,636.88**	**192,006.04**

Therefore, a total of 192 tonnes of CFCs will be destroyed in the context of the project, consisting of 8.37 tonnes of CFC-12, 59.86 tonnes of pure CFC-11 and 123.77 tonnes of CFC-11 in foam.

6. PROJECT STRATEGY AND DEMONSTRATION VALUE

6.1. Component #1: Destruction of CFC-12 Refrigerant

This component will focus on the destruction of CFC-12 refrigerant obtained from the disassembling of domestic refrigerators, and stored in cylinders.

Implementation of Component #1 will be undertaken in the provinces of Guangdong and Tianjin; each province will manage CFC-12 refrigerant banked in their own recycling and recovery centers, with destruction taking place in a facility located in each province:

a) Guangdong: hazardous waste treatment station with a plasma facility;

b) Tianjin: hazardous waste destruction facility with rotary kilns.

The demonstration value of this component is twofold:

- For each technology, this component will allow drawing conclusions relevant to various aspects of the practical implementation of CFC-12 disposal, which can be replicated in similar facilities throughout the country after the conclusion of the project. This includes the following:
  a) Definition of a destruction testing protocol for each technology;
  b) Resolution of technical issues for each technology, such as:
     - Optimization of CFC-12 feeding point;
     - Optimization of CFC-12 feeding rate;
     - Analysis of the impact of CFC-12 destruction in the process operation parameters.
  c) Monitoring requirements (continuous end-of-pipe emission monitoring, process operation monitoring).
- Comparison between the two tested technologies based on logistic aspects and cost-efficiency considerations. In spite of the fact that destruction in rotary kiln is more cost-efficient than destruction in a plasma facility, the project will provide an opportunity to assess the impact on costs of a number of activities other than destruction which have to be undertaken in order to ensure efficient destruction.

6.2. Component #2: Destruction of CFC-11 Contained in Foams

This component will focus on the destruction of CFC-11 used as blowing agent in foams obtained from disassembled domestic refrigerators. Implementation of this component will take place in the provinces of Jiangsu, Shandong and Tianjin; each province will manage CFC-11 contained in foams stored in their own recycling and recovery centers, with destruction taking place in facilities located in each province.

Implementation of this component will showcase two different foam management strategies:

Strategy #1

This strategy involves the extraction of CFC-11 with available adequate equipment, and transportation of the CFC-11 stored in cylinders to a local hazardous waste treatment facility operating with a rotary kiln. This strategy will be implemented in a province which already has the adequate extraction equipment; therefore using such equipment does not imply an additional cost to the project.

This strategy will be implemented in the province of Shangdong, more specifically in a hazardous waste treatment station working with a rotary kiln. Shandong is one of the provinces that currently have adequate extraction equipment in operation; therefore, using this equipment does not involve any additional cost to the project, as its operation is part of the current collection scheme currently in place in this province.

Extraction of CFC-11 from foam is considered a collection activity as per decision 58/19 of the Executive Committee, for which this project does not request for funding to the Multilateral Fund (extraction activities are integrated within the on-going collection scheme in Shandong, thus not generating an additional cost to the project).

The following text box provides further details about the extraction activities undertaken in Shangdong:

Box 1: Information on the operation of the extraction equipment in Shandong province

The foams of the refrigerators are crushed into pieces by two stages in two sealed chambers successively. The gas will go through the adsorption device using activated carbon, after which, the carbon will be heated for desorption of the CFC-11. The liquid CFC-11 will be cooled to liquid and tanked.

There are two adsorption and desorption systems. When one is adsorbing CFC-11, the other one is desorbing; when one has adsorbed enough CFC-11, it will turn to the process of desorption, and the other one, which is already finish desorption, will adsorb the CFC-11. The recovery rate of CFC-11 is about 83%.

The waste gas will be purified by another activated carbon device before the venting.

The main operational parameters of the CFC-11 recovery system are the following:

- Power Source: 380V*50HZ;
- Operation Temperature: 0℃-40℃
- Rated Power: 40KW;
- Water Consumption: 3 tonnes.

Strategy #1 ensures lower transportation costs per kilometre due to the fact that the substance to be moved is pure CFC-11 in liquid state. On the other hand, it is worth noting that this strategy can only be applied if the adequate extraction equipment is available, which involves a significant capital cost.

Strategy #2

This strategy involves direct destruction of foam containing CFC-11 in two different types of destruction facility:

- Local municipal solid waste facility using a rotary kiln (located in Jiangsu);
- Local hazardous waste destruction facility using a rotary kiln (located in Tianjin).

Strategy #2 involves higher transportation costs per kilometre due to the low density of CFC-11 in foam, as well as costs related to the establishment of a sampling and testing protocol to determine the CFC-11 content in the foam to be destroyed. However, direct destruction of foam is considered to be more efficient (or less energy-intensive) than that of liquid CFC-11; several studies claim that, from a CFC destruction point of view, it is not advisable to extract CFCs from the foam due to the fact that a significant part of the CFC-11 is dissolved in the matrix and, secondly, because the combustion efficiency of CFC-11 in foam is better than as a gas.

The demonstration value of this project is defined by the following key elements:

- The project implementation will allow drawing conclusions on cost-effectiveness issues for both strategies. A very limited number of provinces in China have access to adequate equipment for extraction of CFC-11 contained in foams, and purchase of such equipment is costly and outside the scope of this demonstration project and of other MLF-funded activities. The implementation of the management strategy addressing direct foam destruction will provide valuable data concerning transportation costs of foam; by doing so, it will be possible to define a “distance threshold” related to the location of the foam stocks relative to the destruction facility, which can be used as a decision criterion to define the best foam management strategy at provincial level;
- Destruction of extracted CFC-11 stored in cylinders will provide information that will facilitate widespread implementation of destruction activities in the country beyond the project. This information is similar to the one to be obtained from implementation of Component #1, that is:

a) Definition of a suitable destruction testing protocol;

b) Resolution of technical issues such as: optimization of CFC-11 feeding point; optimization of CFC-11 feeding rate; and analysis of the impact of CFC-11 destruction in the process operation parameters;

c) Monitoring requirements (continuous end-of-pipe emission monitoring, process operation monitoring).

- Destruction of foam containing CFC-11 will provide similar information to the one provided by destruction of extracted CFC-11. In addition to this, the project will address an issue which is worth noting: direct destruction of foams prevents from knowing the exact amount of CFC-11 which is actually being destroyed. Therefore, the project will develop a sampling and laboratory testing protocol as a means of verification in order to ensure that accurate estimates of the amounts of CFC-11 destroyed are available.

6.3. Component #3: Synergies with POPs Destruction

This component will focus on the destruction of both CFC-12 refrigerant and of foams containing CFC-11 in a facility with on-going POPs destruction activities. In order to design this project component, discussions have taken place with all relevant stakeholders involved in POPs destruction projects in China, namely:

- Owners of the facilities involved in on-going POPs destruction facilities (cement kilns at Hubei and Hebei, hazardous waste treatment plant at Tianjin);
- Relevant staff from the local EPBs and central government monitoring the POPs destruction activities;
- UNIDO staff managing the projects at Hubei and Hebei.

Implementation of Component #3 will be undertaken in the province of Tianjin, where both CFC-12 and foam containing CFC-12 will be destroyed in a facility where POPs are also destroyed; this facility is the same as the one where Components #1 and #2 will be implemented in Tianjin.

During the preparatory phase of this project, an exploration of **potential synergies** between POPs and ODS destruction was thoroughly undertaken in order to define the best approach to this component, given the on-going initiatives addressing POPs destruction in China (see Section 3.4.). The main conclusions of such analysis are included in the text box below:

Box 2: Analysis of synergies between POPs and ODS destruction in China

When considering destruction in a cement kiln or a hazardous waste incinerator, the facility has to meet three main requirements:

1. An adequate feeding system for the substance to be destroyed;
2. A continuous emission monitoring system;
3. Application of a testing protocol prior to the destruction activity.

The second requirement may be subject to synergies, due to the fact that such a system is basically the same regardless of the substance to be destroyed. The cement kilns at Hubei and Hebei provinces where POPs destruction has taken place in the context of the POPs disposal project by FECO will have this system in place; the same applies to the hazardous waste incinerators such as Tianjin Hejia Velia, included in the submitted project proposal.

However, the first and third requirements are not especially prone to synergies with POPs destruction projects. With regard to the feeding system, a facility destroying POPs requires a system designed for feeding liquid streams, whereas a facility destroying ODS may require additional systems for either

gaseous or solid streams (CFC-12 used as refrigerant and CFC-11 contained in foams, respectively). Such systems are found in hazardous waste incinerators due to the wide range of substances they deal with, but this may not be the case for cement kilns already undertaking POPs destruction; for the latter, even if they were using alternative fuels in solid state (e.g. tires), the feeding system may not be adequate for the foams, depending on the location of the entry point.

With regard to the testing protocol, different substances require different protocols; facilities such as cement kilns, whose main line of business is not destruction of ODS or POPs, will most likely have undertaken tests just for those substances which they have been requested to destroy due to the related costs. The cement kilns at Hubei and Hebei, as well as the hazardous waste destruction facility in Tianjin have undertaken test burns as a pre-requisite for initiating POPs destruction facilities.

The analysis above was key on the decision to focus this project component on the implementation of synergies in a local hazardous waste destruction facility using a rotary kiln, given the various constraints (both logistical and technical) to maximize such synergies in cement kilns such as the ones in Hubei and Hebei.

The analysis during the preparatory phase has also focused on **potential problems** related to the combination of POPs and ODS destruction in the same facility; some technical information shows that the change from POPs to ODS destruction for the same rotary kiln makes the equipment less efficient, and also results in higher negative emissions (i.e. fluorine and chlorine).

This issue has been discussed with the technicians of the destruction facility where this component will be implemented. The conclusion is that such problems can be minimized or completely removed by choosing the adequate operational parameters in terms of:

- Operational time of the facility between the destruction of POPs and ODS batches;
- Amount of chemicals destroyed in successive POPs and ODS batches;
- Physical state of the POPs and ODS destroyed in successive batches.

Under this component, the following **activities** will be undertaken:

- Implementation of synergies related to cost-optimization of the logistic aspects of POPs and ODS destruction (transportation, on-site storage, etc.);
- Collaboration with on-going POPs destruction projects in the definition of procedures for the handling of the stored ODS waste, labelling, etc.;
- Collaboration with on-going POPs destruction projects in the definition of a comprehensive set of criteria for environmentally sound disposal of ODS waste;
- Definition of common aspects related to the technical validation of facilities undertaking both POPs and ODS destruction activities.

Therefore, the demonstration value of this component will focus on an analysis of the pros and cons of combined POPs and CFCs destruction, more specifically:

- Impact of combining POPs and CFCs destruction on incremental costs for the latter;
- Technical aspects where potential synergies between both activities can be implemented;
- The implementation of this project component will allow for the development of guidelines for optimized POPs – ODS combined destruction.

6.4. Summary

Taking into account the previous description of the three project components, the following table summarizes the key information concerning each of the components:

Table 11: Summary of Project Components

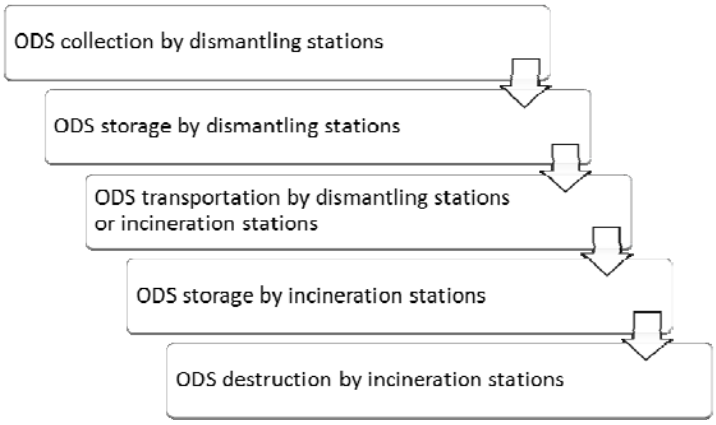
	Component #1	Component #2	Component #3
Title	Destruction of CFC-12 refrigerant	Destruction of CFC-11 contained in foams	Synergies with POPs Destruction
Description	Destruction of CFC-12 refrigerant obtained from the disassembling of domestic refrigerators, and stored in cylinders	Destruction of CFC-11 used as blowing agent in foams obtained from disassembled domestic refrigerators through two different strategies: • Strategy #1: extraction of CFC-11 with available equipment, and transportation of the CFC-11 stored in cylinders to a local hazardous waste treatment facility operating with a rotary kiln • Strategy #2: direct destruction of foam containing CFC-11 in two types of destruction facility	Destruction of both CFC-12 refrigerant and of foams containing CFC-11 in a facility with on-going POPs destruction activities
ODS to be Destroyed - **Amount** - **Type**	 8.37 tonnes CFC-12	 183,67 tonnes CFC-11	 28.05 tonnes (already considered under #1 and #2) CFC-12 (1,35 tonnes) and CFC-11 (25,7 tonnes)
Provinces	Guangdong and Tianjin	Shangdong, Jiangsu and Tianjin	Tianjin
Destruction Facilities	• Hazardous waste treatment station with plasma facility (Shenzen Hazardous Waste Treatment Station, Guangdong) • Tianjin: hazardous waste destruction facility with rotary kilns (Tianjin Hejia Velia, Tianjin)	• Hazardous waste treatment station working with a rotary kiln (Qingdao New World, Shangdong) • Municipal solid waste destruction facility with a rotary kiln (Jiangsu) • Hazardous waste destruction facility with rotary kilns (Tianjin Hejia Velia, Tianjin)	• Hazardous waste destruction facility with rotary kilns (Tianjin Hejia Velia, Tianjin)
Demonstration Value	• For each technology: a) Definition of a destruction testing protocol b) Resolution of technical issues concerning operating conditions at the facilities c) Monitoring requirements (continuous end-of-pipe emission monitoring, process operation monitoring) • Comparison between the two tested technologies based on logistic aspects and cost-efficiency considerations	• Draw conclusions on cost-effectiveness issues for both strategies dealing with destruction of CFC-11 contained in foam (definition of a "distance threshold" indicator) • Draw conclusions relevant to various aspects of the practical implementation of extracted CFC-11 disposal a) Definition of a destruction testing protocol b) Resolution of technical issues c) Monitoring requirements (continuous end-of-pipe emission monitoring, process operation monitoring) • Development of a sampling and laboratory testing protocol as a means of verification in order to ensure that accurate estimates of the amounts of CFC-11 destroyed are available	• Implementation of synergies related to cost-optimization of the logistic aspects of POPs and ODS destruction (transportation, on-site storage, etc.) • Collaboration with on-going POPs destruction projects in the definition of procedures for the handling of the stored ODS waste, labelling, etc. • Collaboration with on-going POPs destruction projects in the definition of a comprehensive set of criteria for environmentally sound disposal of ODS waste • Definition of common aspects related to the technical validation of facilities undertaking both POPs and ODS destruction activities

7. PROJECT IMPLEMENTATION

7.1. Main Project Activities

The following figure describes the main project activities for the destruction of the identified ODS banks:

Figure 4: Main activities for ODS destruction



All these activities will be monitored by the local EPBs according to the existing regulations, as well as the rules and guidelines to be developed under this project.

7.1.1. Collection

On-going collection activities through which the amount of ODS to be destroyed in the context of the project have already been described in Section 3.2. Such activities have been set up by the Government of China and have been provided with adequate funding support. In line with the criteria and guidelines for the selection of ODS disposal projects (ExCom Decision 58/18), this project does not request for funding to support the related collection activities.

Notwithstanding this, collection activities are a key factor for the successful implementation of the project, due to the following reasons:

- Exploration of alternative disposal options for ODS waste is undertaken by the recycling and recovery centres. The centres perform a qualitative characterization of the collected ODS waste and, should the purity be high enough and depending on existing demand, they promote reusing these relatively pure CFCs. Therefore, the amounts of ODS waste reported for destruction reflect those stocks for which alternative uses are not feasible.
- These activities ensure the availability of the ODS amounts to be destroyed in the context of this project;
- These activities determine the starting point for the implementation in terms of:
  - Quantitative and qualitative characterization of the substances to be destroyed;
  - Physical location of the banks available for destruction.

The latter has a direct impact on the first activity to be considered under this project, that is the transportation from the location of the ODS banks to the destruction facility. Table 12 shows the distribution of the identified amounts of ODS to be destroyed among the various recycling and recovery centers in each province.

Table 12: Distribution of CFC-11 and CFC-12 to be destroyed among recycling and recovery centers

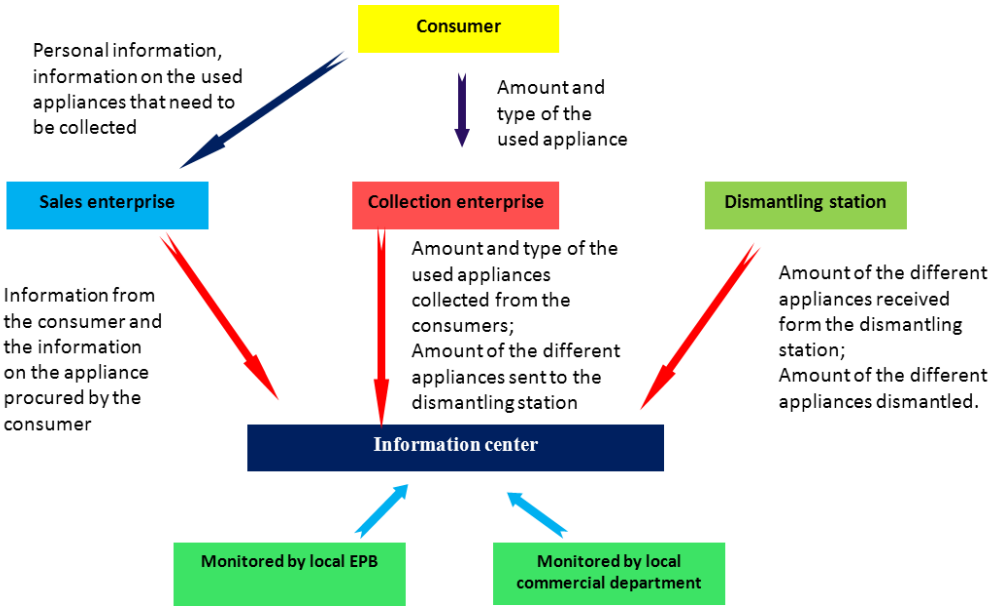
Province	Recycling and recovery center	Location	Refrigerators			CFC-12 Stockpiled (kg.)	CFC-11 Stockpiled			Foam Stockpiled (kg.)
			Recycled	Dismantled	Stockpiled		Pure CFC-11 Stockpiled (kg.)	In stockpiled foams (kg.)	In stockpiled refrigerators (kg.)	
Guangdong	Huizhou Dingchen	Huizhou	195,687	192,354	3,333	3,122.60	-	-	-	-
	Foshan Shundexin	Foshan	69,958	52,018	17,940	40.90	-	-	-	-
	Shenzhen Hazardous Waste Treatment Station	Shenzhen	-	-	-	347.00	-	-	-	-
	Sub-total		**265,645**	**244,372**	**21,273**	**3,510.50**	-	-	-	-
Jiangsu	Nanjing Huanwu	Nanjing	29,146	28,649	497	-	-	220.38	447.30	1,224.32
	Nanjing Kaiyan	Nanjing	129,993	127,976	2,017	-	-	984.43	1,815.30	5,469.06
	Suzhou Tonghe	Suzhou	13,735	12,616	1,119	-	-	97.05	1,007.10	539.15
	Suzhou Weixiang	Suzhou	72,892	70,865	2,027	-	-	545.12	1,824.30	3,028.42
	Yangzhou Ningda	Yangzhou	9,747	8,287	1,460	-	-	63.75	1,314.00	354.15
	Sub-total		**255,513**	**248,393**	**7,120**	-	-	**1,910.72**	**6,408.00**	**10,615.09**
Shandong	Qingdao New world	Qingdao	81,316	77,128	4,188	-	-	593.29	3,769.20	3,296.07
	Yantai Lvhuan	Yantai	66,611	63,895	2,716	-	-	491.50	2,444.40	2,730.56
	Shandong Zhonglv	Linyi	52,762	47,659	5,103	-	4,127.26	366.61	4,592.70	2,036.71
	Sub-total		**200,689**	**188,682**	**12,007**	-	**4,127.26**	**1,451.40**	**10,806.30**	**8,063.33**
Tianjin	TCL Aobo	Tianjin	55,596	29,119	26,477	92.44	-	223.99	23,829.30	1,244.40
	Taiding	Tianjin	5,636	5,636	0	143.00	-	43.35	0.00	240.85
	Hechang	Tianjin	970	889	81	0.00	-	6.84	72.90	37.99
	Sub-total		**62,202**	**35,644**	**26,558**	**235.44**	-	**274.18**	**23,902.20**	**1,523.25**

An important factor to take into account when describing how the collection systems in the four provinces participating in the project have an impact on ODS collection and later destruction is the dismantling capacity if the recycling and recovery centres. A survey conducted among 13 centres in the four provinces shows a wide range of disassembling capacities in terms of refrigerators dismantled per month, ranging from 889 in a small centre in Tianjin to the 127,976 in the largest surveyed centre, located in Jiangsu; in this context, average disassembling capacities can be determined for individual centres, but averages at provincial or project level are not meaningful.

7.1.2. Monitoring the Origin of Recovered ODS

Figure 1 shows that there is an information center in place for the traceability of dismantled household appliances in China. Detailed information about how this information center works is provided in the following figure:

Figure 5: Main activities for ODS destruction



Depending on the province, the information system is monitored and managed by either the commercial department of the local government or the local EPB. The sales department, the collection enterprises and the dismantling stations are requested to submit detailed data to ensure an adequate chain of custody; this way, information on the amount and type of the appliances from the collection enterprises to the dismantling stations can be traced.

In order to provide a simple practical explanation of how the information system works, the following scenario is provided:

- There is a collection enterprise (named “CC”) and a dismantling station (named “DD”);
- CC reports that they have collected 10,000 refrigerators, and only 5,000 refrigerators have been sent to DD;
- DD reports that they have received 5,000 refrigerators from CC and they have only dismantled 3,000 of them;
- Under this scenario, local authorities can then find that a total of 3,000 refrigerators have been dismantled, a total of 5,000 refrigerators are stockpiled in CC and a total of 2,000 refrigerators are stockpiled in DD.

Given the information that the different stakeholders have to submit to the system, the traceability of the ODS waste can be set in the same way as explained for the appliances. The existing monitoring system has been used to collect information on existing CFC stocks at each of the recovery and recycling centers participating in the implementation of the project (see Table 12 above). Such a level of detail and the corresponding verification activities undertaken on the field by the local EPBs prevent the inclusion of virgin ODS as used ODS, given the established requirement for the recycling and recovery centers to provide "cradle to grave" information on collected ODS.

It is worth noting that the implementation of the project will also provide additional tools for monitoring purposes, as detailed in Section 7.2.3.

7.1.3. Transport and Storage

The transportation distances to be covered during the project implementation are determined by the following factors:

- Location of the established recycling and recovery centers where the ODS waste is banked;
- Location of the destruction facilities (one destruction facility per province);
- Existing road network in each province;
- Restrictions to ODS waste transportation (e.g. trans-provincial transportation).

As it has been stated when outlining the project strategy (see Section 6), the project will address transportation of three types of waste:

- CFC-12 stored in high-pressure cylinders;
- CFC-11 stored in cylinders;
- Solid foam containing microencapsulated gaseous CFC-11.

When defining the unitary transportation costs, the following factors have to be taken into consideration, which lead to an increase in such costs:

- CFC waste in liquid state is regulated as dangerous goods or waste, which implies that its transportation can only be undertaken by the existing certificated transportation enterprises or appointed institutions following a specific handling and management protocol.
- Costs of foam transportation are affected by the following issues:
  - The content of CFC-11 per kilogram of foam is very small by definition;
  - Usually, only 2 tonnes of foam can be transported by a vehicle with a capacity of 10 tonnes due to the low density of the foam.

Given the expected operational procedure at the selected destruction facilities, there will be a lag time between reception of each of the ODS waste batches to be destroyed and the beginning of the destruction procedure. Therefore, appropriate storage area and handling practices have to be ensured in the facilities:

- Such conditions are met in three of the facilities (Guangdong, Shandong and Tianjin) as they are dedicated hazardous waste treatment centers properly equipped for the storage of handling of substances in any physical state;
- The fourth facility (Jiangsu) is a municipal solid waste destruction facility which will

receive foam, for which appropriate storage area is ensured.

7.1.4. Verification of ODS to be Destroyed

All four destruction facilities participating in the pilot demonstration project are equipped with the necessary tools to undertake a qualitative characterization of CFC-11 and CFC-12 arriving at the premises prior to destruction.

In the case of the destruction facilities destroying foam containing CFC-11 (located in Jiangsu and Tianjin) qualitative characterization of the foam to be destroyed is of outmost importance, due to the following reasons:

- It is difficult to know the original content of CFC-11 in the insulating foams used in domestic appliances; a recent study[2] shows that the refrigerators decommissioned in China contain foam where the CFC-11 level is high, about 20% of the weight of the foam. Depending on the size of the refrigerator, the mass of foam contained in it varies. As decommissioned refrigerators are generally small now, the weight of foam in them on average is 5 kg, therefore the average amount of CFC-11 in each refrigerator is about 1kg.
- The foams to be destroyed are obtained from a wide variety of appliances, in terms of manufacturer, model, manufacturing date, etc.;
- Depending on how the refrigerator disassembling process has been conducted, a varying amount of the CFC-11 originally contained in the foam will have been emitted to the atmosphere, thus increasing the variability in the composition of the foam to be destroyed.

In order to tackle this issue, the two facilities involved in direct foam destruction will apply an adequate sampling and testing protocols to ensure an accurate characterization of the amount of CFC-11 contained in the foam and thus destroyed.

Sampling protocol

The initial (and perhaps most critical) element in a procedure designed to evaluate the composition of foam waste is the plan for sampling the waste. The uncertainty inherent to any sampling procedure is increased by the fact that the substance to be sampled (the foam) is in solid state.

In a first step, a "gross sample" has to be obtained from the bulk population (this being the foam batch available in the storage area of the destruction facility and ready for destruction). This step, which obviously has to be undertaken at the destruction facility itself, is critical because it can determine the validity of the subsequent chemical analysis.

The "gross sample" will be obtained following a procedure that ensures the following:

- The sample is a representative one, that is, it can be considered an unbiased depiction of the bulk population;
- The sample reflects the variability of the bulk population to be tested;
- The sample will allow measurements of the chemical properties of the foam composition that are both accurate and precise.

Given the nature of the bulk population, the preferred sampling methods will be simple random sampling, or cluster sampling combined with simple random sampling for each cluster. The latter

[2] YANG Yong, LIU Jing yang, etc. (2009) "Release and Residual Mass and Content Distribution of CFC-11 during Shredding of Rigid Polyurethane Foam". Research of Environmental Sciences, Vol. 22, No. 8, p. 961.

will be recommended in those circumstances when the various source points of the foam in the bulk population can be identified and there are reasons to assume that the point of origin can have a systematic effect on the composition of the foam.

An important factor to be taken into consideration is the need to ensure a minimum sample size that will prevent emission of the CFC-11 microencapsulated in the foam at the extent possible. According to different studies on this issue, foam pieces used for sampling purposes should have a minimum size of 2 to 3.2 cm.

Alternatively, larger foam samples can be collected in the storage area of the destruction facility and taken to the testing laboratory, where a sub-sampling procedure should be followed in order to adapt the size of the foam piece to the laboratory testing procedure. This procedure is usually recommended if significant heterogeneity is expected in the composition of the solid waste or if the individuals responsible for the gross sampling are facility staff without advance training in sampling procedures.

Chemical analysis

Chemical analysis will be undertaken in a certified laboratory, in order to determine the average CFC-11 content of each of the foam batches destroyed.

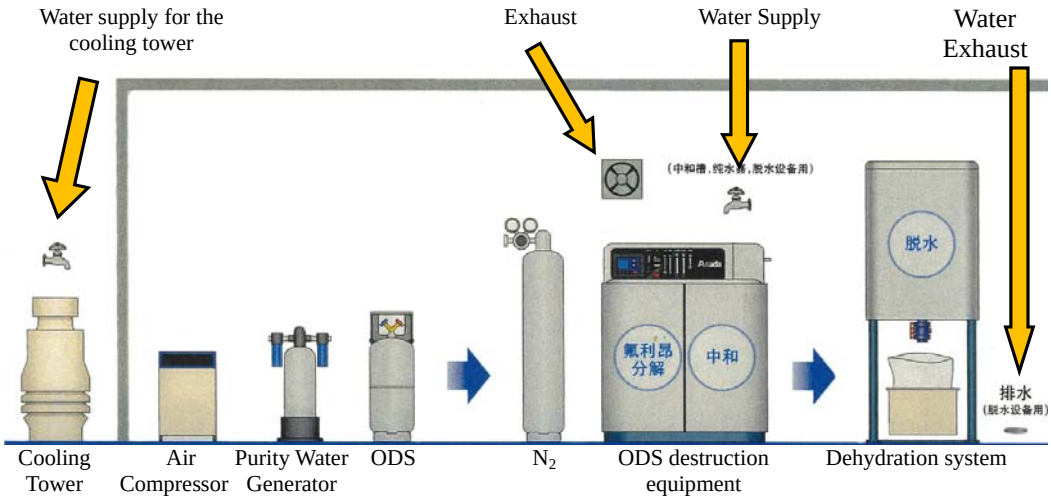
7.1.5. Destruction

Guangdong: Shenzhen Hazardous Waste Treatment Station

Shenzhen Hazardous Waste Treatment Station was founded in 1998, with a total hazardous waste treatment capacity of 350,000 tonnes/year. The facility will be equipped with a small-scale plasma destruction equipment for the destruction of ODS and other F-gases. The equipment will be purchased outside the scope of this project (i.e. purchase of the equipment has no impact on the project budget) and will be available by the time project implementation starts at Guangdong.

The typical process for ODS destruction with plasma technology is shown in Figure 6:

Figure 6: Plasma technology process for ODS destruction



This equipment uses a plasma torch to decompose waste CFC, HCFC and HFC with a temperature of about 1400 ^{o}C. Liquefied gases can be fed directly from their pressurized storage into the reactor, while liquids (e.g. CFC-11) are first transferred to a pressure vessel and then transferred with compressed air to an evaporator before being fed to the reactor.

The thermal plasma is generated by a dc non-transferred plasma torch operating with a water-cooled hafnium cathode and a water-cooled copper cylindrical anode. The plasma gas is nitrogen that has been concentrated from air. The plasma torch power is 200-220V × 60A.

A reactor nozzle of a special alloy is aligned below the anode, and connected to an oxidation tube. Two inlet-pipes are connected to the nozzle: one is located at the upper part for steam, and the other is located at the bottom of the nozzle for air. HCFCs and HFCs are first reacted with steam, being decomposed into carbon monoxide (CO), hydrogen fluoride (HF) and hydrogen chloride (HCl). The CO is subsequently oxidized to carbon dioxide (CO_2) with air in the oxidation tube. The destruction of CFCs is completed without additional air. Immediately after the oxidation tube, the reaction gas mixture is quenched in a scrubber, where the acid gases HCl and HF are absorbed by sodium bicarbonate and the salts generated are settled by flocculant.

Detailed specifications of the operational parameters:

- Decomposition rate of CFCs: more than 99.9%;
- Process capacity: 1kg/h for CFC-12, 2kg/h for HFC-134a and 2kg/h for HCFC-22;
- Power source: 3 phase 220v, capacity of more than 10 KW required;
- Parts: decomposition unit, dehydratation unit, nitrogen generation unit and cooling tower for the torch system.

Jiangsu: Municipal Solid Waste Incinerator

TEAP's *Report of the Task Force on Destruction Technologies* (Volume 3B, April, 2002) states that foams containing CFC-11 can be destroyed in the municipal solid waste incineration facilities.

The first municipal solid waste incinerator was put into operation in 1987 in China. Most of the provinces and cities, especially in the large and medium-sized cities in the South have a municipal solid waste incinerator generation station.

The number and size of the average processing of the incineration plant in China is constantly increased on a yearly basis due to the improvement in installed capacity, supporting technology and management system.

The municipal solid waste incinerator of Jiangsu, with a processing capacity of 100 tonnes/year, is used for the incineration of normal solid waste. The main characteristics of the process are the following:

- The waste is transferred mechanically from the refuse pit to a bin;
- The waste will be fed from the bin into a moving grate with a temperature of 900-1,000^{o}C;
- Ash generated by the combustion will be discharged from the lower end of the moving grated and conveyed to landfill;
- The heat in the gases from the combustion of the waste is used for the electricity generation boiler;
- The cooled gas will be cleaned in an acid-removal reactor followed by an activated carbon addition system and a bag house to remove acid gases, particulate matter and other pollutants.

Shandong: Qingdao New World

New World was founded in 1994 and currently is one of the certificated hazardous waste treatment enterprises in Shandong province. The rotary kiln of New World is used for the incineration of hazardous waste, including ODS. The ODS destruction capacity of the kiln is 89 tonnes/year.

Figure 7: Qingdao New World facilities

The main characteristics of the process are described below:

- A specific feed-in point will be used for the pure CFC-11;
- As the CFC-11 to be destroyed has a very low heat value, additional fuel will be fed to the system, and the calculated quantity of the fuel will help to achieve the required high operating temperatures;
- The whole system is operated at low pressure;
- Operating conditions at the secondary combustion chamber:
  - Temperature ranges between 800 - 1000 ^{o}C and more than 1100 ^{o}C;
  - Residence time of the waste in the secondary combustion chamber will be 4.5s, which ensures the decomposition of the organic waste and dioxins.
- Operating conditions at the heat recovery chamber (placed after the secondary combustion chamber):
  - 3-5% urea will be sprayed in to deoxidize the NO_x to N_2;
  - The waste gas with the temperature of about 550 ^{o}C goes through the cooling tower, where the residence time is less than 1 second with temperature ranging from 200 to 550 ^{o}C to avoid the re-generation of dioxins.
- HF and HCl react with the $NaHCO_3$ in the acid-removal reactor followed by an activated carbon addition system and a bag house to remove particulate matter and other pollutants.

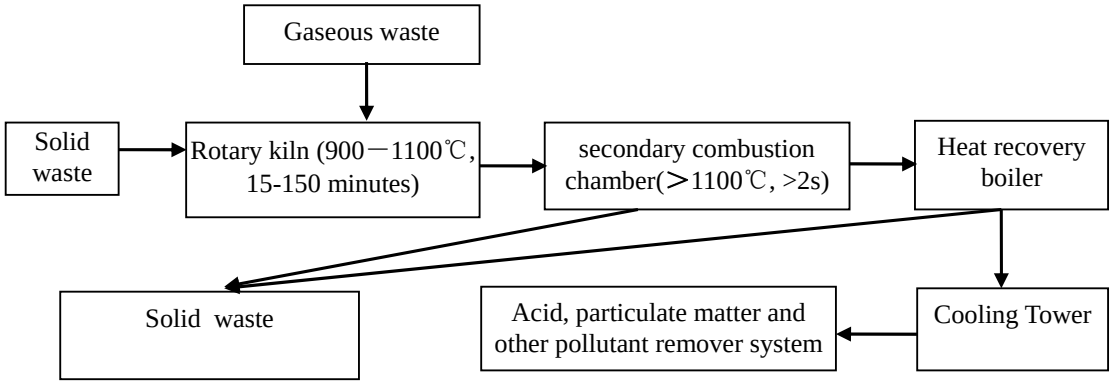
Tianjin: Hejia Velia

This facility was founded in 2001 and it focuses on the treatment of municipal solid waste and hazardous waste with rotary kilns. The processing capacity for hazardous waste is 45,000 tonnes/year.

Figure 8: Hejia Velia facilities

The process is described in the figure below:

Figure 9: Incineration process at Hejia Velia



Technical validation of the destruction facilities

a) Applicable national standards

China has a defined set of applicable emission standards in both municipal solid waste incinerators and hazardous solid waste incinerators; all facilities used for chemicals destruction in China (including the ones that will be used for the implementation of this project) meet these standards.

b) Rationale for the technical validations

In this project, existing waste incinerators will be used for ODS destruction, reducing significantly the equipment costs and corresponding destruction costs.

However, the waste incineration facilities will need adjustment of some operation parameters; this is due to the fact that incineration of different substances usually requires an adjustment of the operating parameters of the facility in order to meet the requirement of the standards. There is a risk that the facility cannot meet the requirements of the standards if there is no technical adjustment especially for CFCs, considering that the concentration of chlorine and fluorine are higher than for other substances. It is thus indispensable to validate the destruction results and emission controls.

The technical validation activities to be undertaken during the implementation of this project aim at ensuring that the destruction facilities participating in the project will continue meeting the standards during ODS destruction activities.

Three technical validations should be carried out under this project, i.e. validation on municipal solid waste incinerator in Jiangsu, rotary kiln in Shandong and Tianjin, as well as the plasma equipment in Guangdong.

The technical validation will consist on the development and implementation of a trial destruction protocol which will make sure the destruction facility to meet the accepted destruction removal efficiency of 99 percent, which is accepted by the TEAP and the Parties to the Montreal Protocol as the standard for ODS destruction, as well as to meet the requirement of the environmental protection regulated by national and local policies and standards.

The trial destruction protocol will consist of the processing of a quantity of the received ODS waste of not less than 5 tonnes in each of the facilities participating in the implementation of the project. Strict monitoring will be applied to the key operating parameters as well as to the characterization of the resulting emissions. The destruction facility shall permit the conduct of verification on these criteria by an independent entity.

Concentrations of chlorine and fluorine will be controlled after treatment to ensure compliance with the performance parameters and emissions requirements set out by the Technology and Economic Assessment Panel of Montreal Protocol (TEAP). In all facilities, calculation on the heat value and concentrations of fluorine and chlorine will also be done before the ODS destruction to ensure adequate operation parameters.

c) Emission monitoring

The selected destruction facilities have an on-line system to monitor the concentration of most of the pollutants in the waste gas flue. The information provided by the system has to be provided to the local EPBs, and if there is any parameter higher than the limit, the system will give an alarm signal so the enterprise and local EPB are aware of the anomalous situation and can apply corrective measures.

For other pollutants which cannot be measured online, there will be regular monitoring.

These measures ensure that the selected facilities meet the requirement for emission standards.

7.1.6. Verification of Destroyed ODS Amounts

The management information system (MIS) established during the implementation of the project (see Section 7.2.3.) will require destruction facilities to provide a destruction verification document, which documents that the materials entering the facility will be destroyed. Copies of these verification documents will also be submitted to the recycling and recovery centres from which they received the ODS waste. This verification document must include:

- Name and address of the destruction facility;
- Date(s) of destruction of the received ODS waste (in case of destruction in several batches, an indication of the amounts destroyed in each batch will be included);
- An indication of the fact that the ODS waste has been destroyed with a DRE of at least 99.99 per cent as established by TEAP;
- Signature of a person entitled to legally represent the destruction facility, as well as of an accredited independent industry leading inspection, verification, testing and certification service.

In addition to individual “proofs of destruction”, the MIS will require the destruction facilities to report on an annual basis the quantities and composition of the ODS waste destroyed during the year.

7.2. Supporting Project Activities

In addition to the activities to ensure the planned destruction of 192 tonnes of ODS waste, the project implementation plan includes a number of activities aimed at facilitating the integration of this pilot demonstration project into an overall strategy to ensure long-term sustainability of ODS destruction efforts in China. These supporting activities will address the following areas:

- Assistance on the development of an appropriate policy framework;
- Training activities;
- Supervision, verification and management information system (MIS).

The figure below shows the relationship among these activities:

Figure 10: Relationship among different supporting activities

7.2.1. Assistance on the development of an appropriate policy framework

ODS destruction activities imply a cost which has to be taken by some of all of the involved stakeholders (production enterprises, servicing enterprises, or even end-users). Therefore, regulations and policies of mandatory nature are necessary for ODS destruction in an efficient and effective manner; the implementation of the project will contribute to improve existing regulations and policies and to develop new ones if needed.

In this context, the project implementation plan considers the following two activities:

Activity 1: *Assistance on the adaptation of the existing regulation, policy and standard systems*

Based on the experience obtained from the implementation of this pilot demonstration project, this assistance will focus on the following issues:

- Development of a strategy to include ODS destruction into the targets and planning of existing systems for home appliances and motor vehicle discarding and treatment, and hazardous wastes management.
- Based on the lessons learned from the implementation of the project:
  - Formulate procedures on ODS destruction, including operation specifications for ODS destruction devices including incineration facilities for destruction of waste, and include the results and standards in a training programme;
  - Validate the regulating effects of these procedures among relevant stakeholders;
  - Provide legal basis for EPBs to implement the procedures.

- Compare and validate the technological, economic and environmental effectiveness of various destruction technologies during the implementation of the project
- Determine the targets and contents of future regulations and policies, and lay the foundation for an improved technological supporting system for ODS destruction.

Activity 2: *Assistance on the definition of a sustainable ODS destruction mechanism*

This activity will focus on the following issues:

- Establish a trial operation mechanism for ODS destruction including collection, reclamation, transportation, storage and destruction in each province;
- Put forward and validate a framework for a long-term funding mechanism for ODS destruction in China;
- Analyze the feasibility of extended-responsibility of the producer (funding system) and construction of a relevant management system.

7.2.2. Training activities

Training activities in the context of this project will ensure that:

- Technical staff at the destruction facilities receive specific training on the specific operation parameters needed to destroy ODS;
- Management staff at local EPBs and other departments are trained on the monitoring of the ODS destruction activities.

The training will make full use of existing job training programmes in China. Experts from different fields (producers, destruction enterprises and technical consultants) will be fully engaged. In addition, the training system established during the CFC phase-out phase shall be employed. Local EPBs will take responsibility in organizing the training activities, which will be integrated with technical validation activities.

Training contents include but are not limited to:

- Facts about ozone layer protection and ODS;
- Regulations, policies and standards related to disposal of ODS waste in China;
- ODS destruction technologies, operation of related equipment and emission control;

In addition to the training activities during the implementation of the project, a key output of the project will be the preparation of complete and comprehensive technical documentation providing details of the processes implemented during the project, in order to provide guidance for the development of ODS destruction activities in other provinces in the country.

7.2.3. Supervision, verification and management information system (MIS)

The management procedure and the supervision system will be mainly based on the existing working mechanism of local EPBs, including but not limited to:

- Explore the feasibility of setting up a recording system for enterprises carrying out ODS collection, storage, transportation as well as destruction, to be managed by local EPBs;
- Set up a management information system for the collection of ODS destruction data, such as destroyed amount as well the progress of the project;

- Set up of a mechanism of regular inspection and supervision on equipment emission to allow local EPBs to supervise the progress of the activities.
- Verification of the amount destroyed during the implementation of the project.

Most of the stakeholders participating in the implementation of this project are already registered in the existing system, and those which exceptionally are not will be requested to register as a pre-condition to participate in the project.

All stakeholders will report on the activities to be undertaken in the context of the project, as well as on those related ones (mainly collection) which are not part of the project implementation but have a relevant impact on it.

7.3. Implementation Schedule

7.3.1. Overall Description

UNIDO will be the international implementing agency of the project, whereas domestic implementation will be coordinated by FECO, which establish a project implementation office.

Other stakeholders involved in the project implementation include:

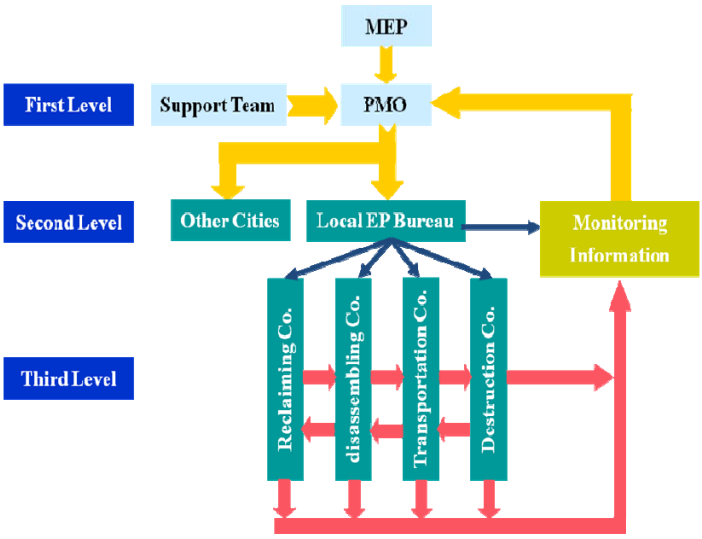
- Local EPBs and specific departments of the national government, which will play a supervisory and managerial role in the project;
- Sectoral associations, which will act as a link to strengthen the cooperation between government and enterprises;
- Independent technical consultants, who will provide the necessary technical support (international consultants will be invited when necessary);
- Relevant scientific institutes and enterprises.

Effective communication will be established among all stakeholders involved to advance the implementation of the project. FECO will organize and be in charge of a special working group of all relevant stakeholders, whose responsibility includes:

- To organize the implementation and supervise the operation and progress of the project;
- To organize local EPBs, institutes and consultants to verify the destroyed amount;
- To organize economic and technological research and feasibility analysis;
- To organize the formulation of laws, regulations, rules, standards and specifications;
- To coordinate the connection, cooperation and progress in the implementation, to remove obstacles;
- To organize the necessary bidding processes for sub-contracting and carry out supervision;
- To supervise the operation of information system and obtain relevant information and make adjustment to the activities and schedule accordingly.

The following figure summarizes the implementation and management structure of the project:

Figure 11: Implementation and management structure of the project



7.3.2. Responsibilities

1. UNIDO

As the international implementing agency, UNIDO is responsible for the overall implementation of this project and the accomplishment of its objectives as approved by the ExCom. UNIDO will:

- Sign the contract with MEP/FECO for the timely implementation of the activities outlined in this document;
- Monitor the implementation of this project and review the annual report prepared by MEP/FECO;
- Report to the ExCom on the implementation of the work plan;
- On behalf of MEP/FECO, request the ExCom to replenish funds;
- Provide necessary technical support, policy advise and managerial support; and
- Conduct necessary monitoring exercises throughout the implementation and verification of achievement of the targets outlined in this document.

2. FECO

As the national implementation agency, MEP/FECO will be responsible for the overall project management and coordination for the implementation of this project. MEP/FECO will:

- Elaborate and coordinate with relevant stakeholders and be responsible for the daily management and monitor of the project;
- Through UNIDO, submit the documents required to the ExCom;
- Submit the progress reports and work plan to UNIDO;
- Select the eligible organizations and/or enterprises to undertake the activities described in this document;
- Establish and operate project management database and system;
- Ensure the implementation of this project as planned, monitor the project implementation;

Verify the achievement of the ODS destruction targets and performance indicators;

3. Local EPBs

The local EPBs of the demonstration provinces and cities will assist UNIDO and MEP/FECO to implement this project. The EPBs will:

- Finalize the local detailed rules on ODS treatment and the implementation plan;
- Strengthen the capacity on the management and monitoring of the ODS treatment;
- Organize the relevant enterprises to participate in this project;
- Assist FECO on the ODS destruction activities;
- Assist FECO on the verification;
- Other activities entrusted by FECO.

4. Industrial Associations and Experts

The industrial associations and experts will assist FECO and UNIDO on the implementation of the project as the technical supporters. They will:

- Assist FECO and local EPBs on the study and finalization of the policies, regulations, standards and guidelines, as well as the detailed rules and feasibilities;
- Provide technical support and information to FECO and local EPBs on training, technical validation and other activities;
- Finalize the verification method and participate in the verification;
- Other activities entrusted by FECO.

5. Project Enterprises

The project enterprises, including the electric household appliances dismantling stations, waste treatment enterprises, transportation enterprises and servicing stations, will be requested to carry out the ODS destruction. They will:

- Carry out the transportation, storage and destruction of the ODS accordingly commissioned and monitored by UNIDO, FECO, local EPBs and the experts;
- Carry out the technical validation commissioned, supported and monitored by local EPBs and the experts;
- Accept the supervision of UNIDO, FECO and/or local EPBs or personnel or team commissioned by FECO UNIDO and/or local EPBs;
- Keep the files and materials as required;
- Other activities entrusted by FECO and local EPBs.

7.3.3. Time Schedule and Time-Critical Elements of the Implementation

The **time schedule** for the implementation of the project can be found in the table below:

Table 13: Time schedule

Year	2012				2013				2014			
Quarter	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Activities	**Schedule**											
- Mechanism of implementation and management												
- Technical validation												
- Destruction												
- Set up the training system												
- Preparation of training materials												
- Training activities												
- MIS												
- Policies and regulations												
- Standards and guidelines												
- Monitoring and verification												

Taking into consideration the proposed timeline for the implementation of the project (30 months, assuming starting date during the second half of 2012), the following **time-critical elements** of the project implementation have been identified per calendar year:

2012 (second half)

- Mechanism for the implementation and management of the project set in place (Steering Committee established and operational);
- Inception meeting with the participation of UNIDO, MEP/FECO and all local stakeholders from the four provinces participating in the implementation of the project;
- Completion of procurement processes for activities scheduled in 2012;
- Technical validation and first destruction trials for one destruction facility.

2013

- Completion of procurement processes for activities scheduled in 2013;
- Technical validation and destruction trials completed for all destruction facilities;
- Monitoring and verification system established and operational for all four provinces;
- Destruction of 50% of the ODS waste undertaken by the end of the year;
- Training schedule agreed upon and training materials prepared;

2014

Completion of the project as scheduled and delivery of expected outputs provided that time-critical elements for 2012 and 2013 meet the proposed schedule.

8. CONTRIBUTION TO THE SUSTAINABILITY OF ODS DESTRUCTION ACTIVITIES IN CHINA

The first condition that has to be met in order to ensure long-term sustainability of ODS destruction activities in China is the existence of a robust collection system, as described in Section 3.2. Although the project does not include activities addressing collection initiatives, these will benefit from the technical and cost-related information provided by the pilot demonstration project.

The implementation of this project will contribute to the long-term sustainability of ODS destruction activities in China by providing a comprehensive set of technical, economic, logistic and managerial data and lessons learned which will be an input for the adaptation of the current legislative framework addressing ODS management and disposal. If ODS destruction can be included in the existing national framework for management of hazardous wastes, destruction activities will be sustainable.

8.1. Expected Areas of Intervention

The project implementation will have an impact on various areas:

1. Technical capacity

The need for the project is based on the fact that there is a large number of equipment containing ODS in China and only a very small portion of them are currently being destroyed.

The project will contribute to establish the appropriate capacity for ODS collection, treatment, transportation, storage as well as destruction based on local ODS inventory and collection difficulties. This is the basis which ensures the successful treatment of ODS.

A long-term ODS destruction in China requires adapting the existing destruction capacity in the country. The project will provide key data needed for the adaptation of municipal solid waste incinerators for ODS destruction based on the improving incineration capacity and technology in cities in China. There is also room for further adoption of specific ODS destruction equipment.

In addition, the management information system, supervision mechanism and training system can play a long-term role as well as be improved and advanced based on changing conditions.

2. Financial support

The project implementation will provide information on cost efficiency issues that can be useful for the establishment of a future financial mechanism to support ODS destruction activities (e.g. producer's fund, revolving fund to support collection activities).

3. Policies and regulations

Policies and regulations are the policy foundation and legal basis. A series of laws and regulations have been issued in China to set a framework, but there are not enough implementing rules. On the other hand, the laws and regulations are independent from each other and their main focus is not on ODS destruction. The system needs to be supplemented and improved. The project aims at obtaining the legal and normative requirements for ODS destruction through activities that will contribute to the definition of guidelines, targets and contents to be included in future regulations and laws.

4. Development of technical standards

Standards and specifications provide the technical support and necessary assurance for ODS destruction. The standard and specification system for ODS destruction in China is not fully developed. There are general requirements stating that ODS which cannot be reused must be

destroyed to avoid secondary pollution; however, there are no specifications on technical requirements such as destruction method, emission values and requirements for emission detection, which poses technical obstacles to ODS destruction. Data on ODS destruction acquired in the project will facilitate the improvement of the technical supporting system for ODS destruction and the determination of guidelines, targets and contents to be included in future regulations and laws.

5. Establishment of an implementing mechanism

Local ODS destruction implementation and management systems will be established in the provinces participating in the project. Based on this experience, a national ODS destruction implementation and management system can be established. The project will also explore the way of integrating the existing regulation system of home appliance and motor vehicle discarding as well as hazardous waste treatment with ODS destruction activities.

8.2. Project Beneficiaries

1. Central government

The project will help the central government to obtain the legal and normative requirements for ODS destruction through activities that will contribute to the definition of guidelines, targets and contents to be included in future regulations and laws.

Also, the data on ODS destruction costs through pilot activities and preliminary studies and validation procedures on a sustainable funding mechanism for ODS destruction in China will contribute to the definition of a funding system based on extended responsibility of producers and a suitable funding management system.

2. Local Environmental Protection Bureaus (EPBs)

Local ODS destruction implementation and management systems will be established in pilot provinces and cities in the project to help the local EPBs and government on the management and monitoring.

3. Destruction facilities

The experiences from the project will promote the adaptation of incineration equipment of urban wastes and hazardous waste for ODS destruction based on the improving incineration capacity and technology in cities in China, as well as the further adoption of specific ODS destruction equipment, like plasma destruction unit.

4. Others

The project will establish a nation-wide system for ODS destruction, including transportation and storage; this will make all identified stakeholders gain experience from the project.

8.3. Environmental Benefit of the Project

The implementation of the project will result in a **direct environmental benefit** that will also provide an incentive to continue ODS destruction activities beyond the scope of this pilot demonstration project. This direct environmental benefit consists of emission reductions of 192 ODP tonnes of ODS or 805,000 tonnes of CO_2 equivalent due to the destruction of the specified amounts of ODS waste.

Table 14: Environmental benefits of the project implementation

Substance	ODP	GWP	Destruction (tonnes)	ODS Reduction (tonnes)	Greenhouse Gas Emission Reduction (tonnes)
CFC-11	1.0	4,000	183.64	183.64	734,548
CFC-12	1.0	8,500	8.37	8.37	71,138
				Total	**805,000**

In addition, the project will provide an **indirect environmental benefit** due to direct foam destruction, due to the fact that the foam's calorific value can be used for heat recovery and therefore for electricity generation, should the adequate co-generation facilities be in place.

Estimates by national experts show that the incineration of the foam contained in one refrigerator can generate about 360MJ and reduce emission of 30kg CO_2; the following table provide further details on this issue:

Table 15: Energy conditions and CO_2 emission for recovering one refrigerator

Process/energy emission	Energy consumption/ MJ	kg CO_2
Collecting waste refrigerator (transportation)	70	5
Energy consumption during dismantling, shredding and sorting	100	7
Distribution of treated materials	15	1.5
Energy production process		
Reuse of mental	900	-70
PU foam and plastic reuse	600	-35
Reuse of glass	-	-
PU foam and plastic incineration	-360	-30

Almost all the municipal waste incinerators (like the one that will be used in Jiangsu during the implementation of this project) have a boiler for either electricity generation or for hot water and/or vapour generation using the heat in the waste gas.

However, very few hazardous waste facilities (none of the ones considered in this project) have such a heat recovery system. The reason is that the heat generated from the incineration of the hazardous waste is not as constant as the one of the municipal waste. For example, some hazardous wastes are flame retardant (like halon and CFCs), which will not generate enough heat when incinerated.

8.4. Sustainability of the Business Model

Taking into account the expected areas of intervention and the beneficiaries of the implementation of this project, the sustainability of the proposed business model for long-term ODS destruction activities in China revolves around the following key elements:

- China has undertaken significant steps in setting up a legislative framework which has resulted in robust collection schemes set up at provincial level; the project will contribute to enhance the existing legislative framework in the most suitable way to make the adequate relevant stakeholders assume the cost of destruction through the implementation of regulations and policies of mandatory nature;
- Development of local capacity is a key issue to ensure sustainability of the model; this is due to the fact that, given the expected amounts of ODS waste to be available for destruction in the short and long run, exports of ODS waste for destruction overseas is not a cost-effective option. In this regard, all data provided by the project about specific

aspects of destruction per se as well as of related logistic activities will contribute to the development of a nation-wide strategy for ODS waste disposal;

- All local stakeholders participating in the project implementation have agreed on their support to the efficient and effective functioning of the proposed system;
- The development of an implementing and management system for ODS destruction will benefit from the already existing procedures of local EPBs. Once the project is implemented, this mechanism will remain in place in the provinces participating in the project, and will be instrumental in the setting up of similar structures in other provinces;
- The project implementation will showcase the use of municipal solid waste incinerators for direct foam destruction, and the related electricity generation by co-generation. Widespread adoption of these practices at country level will provide an economic benefit that can contribute to the long-term sustainability of ODS destruction activities in China.

9. PROJECT BUDGET

9.1. Budget Components

9.1.1. Main Project Activities

1. Transport and storage

Transportation costs for one ton of ODS per kilometer account for 0.16 USD, plus 0.08 USD as empty fare, which makes the transportation cost 0.24 USD /ton/kilometer.

- For transportation of CFC-11 and CFC-12 in cylinders, assuming a transport radius of 100 kilometers, average cost for refrigerant per ton would be 24 USD, excluding the weight of the container.
- For foam transportation, only 2 tonnes of foam can be transported by a vehicle with a capacity of 10 tonnes due to the low density of the foam, which is equivalent to the transportation of 0.4 tonnes of CFC-11. Assuming a transport radius of 50 kilometers, the average cost of ODS per ton would be 300 USD. Foam transportation will be co-financed by the project beneficiaries.

Storage of the CFC-11 will require using metal pail with a capacity of 200 l. and a price of 30 USD, which can be used as much as fifty times. The average cost of storage is3 USD/ton.

2. Fuel

The incineration of pure CFC-11 and CFC-12, which are non-flammable substances, requires additional fuel (for example, diesel oil with a calorific value of 10,000 kcal/kg). The incineration of one ton of pure CFC-11 or CFC-12 will require additional 1.86 tonnes of fuel; assuming a price of waste diesel oil of 919.35 USD per ton, the total cost of extra fuel for incineration sums up to 1,710 USD per ton.

The incineration of CFC-11 in foams requires little extra fuel compared to the additional fuel required for the incineration of pure CFC-11 and CFC-12.

3. Power consumption

On average, incineration of one ton of refrigerant in a rotary kiln takes two hours, consuming 800kwh of power. Calculated on an averagely basis of 0.16 USD/kwh of power in China, total power cost would be 128 USD/ton.

For plasma equipment, it takes on average one hour to incinerate one kilogram of refrigerant, consuming 8kwh of power. Total power consumption cost would be 1,280USD/ton.

4. Emission absorbing materials

Incineration of one ton of CFCs in rotary kiln requires an average of 15 tonnes of sodium carbonate (332.50 USD/ton), 2 tonnes of sodium bicarbonate (698.35 USD/ton) and 20 kilograms of active carbon (1.61USD/kg), which makes the total cost 6,416.40 USD/ton.

Incineration of one ton of CFCs in plasma equipment requires an average of 7 tonnes of sodium bicarbonate (774.20 USD/ton) and 25 kilograms of flocculant (20 USD/kg), which makes the total cost 5,919.40 USD/ton.

5. Waste treatment

Destruction activities will produce 18 tonnes of waste per ton of CFCs (including blends of caustic waste and active carbon). Total cost of waste treatment reaches 2,580.64 USD for destruction in rotary kilns, and 1,146.95 USD in plasma equipment.

6. Depreciation

In order to make the calculations, an incineration facility with an investment of 9.68 million USD has been taken as an example; such investment includes 8.06 million USD of equipment investment and 1.62 million USD of land and infrastructure.

- For rotary kilns, the calculation assumes an operation life of 8 years for the incineration system, assuming a machine life of 20 years with 250 days of operation per year, and daily treatment of 48 tonnes. The residual value is set at 5 percent of the total value. Under these assumptions, depreciation costs are 86.29 per ton, including 79.84 USD of equipment depreciation cost and 6.45 USD for others.
- For plasma destruction equipment, investment is 100,000 USD. The calculation is based on a machine life of 20 years with 250 days of operation per year, and an operation life of 10 hours per day. The residual value is set at 5 percent of the total value. Under these assumptions, depreciation of the plasma equipment accounts for 1,900 USD per ton.

7. Maintenance costs

Maintenance costs are calculated as 20 percent of the depreciation cost, that being 15.97 USD/ton for rotary kilns and 380 USD/ton for plasma equipment.

8. Labor

Total labor cost per ton is 18.06 USD, based on an average wage of 4,838.71 USD/person/year and 45 workers (four shifts, three groups).

9. Technical validation

Technical validation for rotary kiln, municipal solid waste incinerator and plasma equipment should be carried out to confirm the best incineration technology and operation parameters to meet the emission requirements. The main component of the technical validation will be the development and implementation of a trial destruction protocol for the three types of facilities involved in the implementation of the project.

Each technical validation has a cost of USD 50,000. Validation of the plasma will be co-financed by the beneficiaries; therefore, funding requested for this item accounts for 100,000 USD.

9.1.2. Supporting Project Activities

1. Policy assistance

The total cost associated to the group of activities addressing policy issues (as described in Section 7.2.1.) is estimated to be USD 20,000.

2. Training

The cost breakdown for the activities described in Section 7.2.2. is as follows:

- Compilation of the training materials, including training ToR, training materials, testing and evaluation plans as well as exercise set: the cost is estimated to be USD 10,000, including research cost, consultant cost, workshops and printing.
- For each province/city, approximately 25 trainees from the local EPBs and the destruction facilities will be trained (therefore, the total number of trainees will be approximately 100).
- Staff training costs will be used for 100 trainees at all levels, which will add up to USD 40,000 on a standard of 3 days/person, USD 50/person/day for consumables and food and accommodation.

3. Management information system

The cost for the system operation described in Section 7.2.3., estimated to be UDS 10,000, includes system maintenance, upgrade, data analysis, and labor and telecommunication costs. Similar systems currently in place will be enhanced to meet this project's requirements.

4. Consultancy services

The implementation of the supporting project activities outlined in Section 7.2. will require part-time employment of a technical expert, a publicity expert, an evaluation expert, a supervision expert, etc. It is estimated that the total consultant costs would be USD 50,000.

5. Technical documentation

As it has been stated before, the output of this activity will be the preparation of a complete and comprehensive technical documentation providing details of the processes implemented during the project, in order to provide guidance for the development of ODS destruction activities in other provinces in the country.

The cost related to the preparation of this documentation is estimated to be 25,000 USD, taking into account that some of the other supporting activities (e.g. development of training materials, consultants' fee, or implementation and management) will contribute to deliver this output, and therefore budget assigned to those activities will be leveraged to deliver the technical documentation.

6. Project implementation and management

The total cost of this component is USD 150,000, including supporting personnel, traveling, coordination, training, project reviews, project completion acceptance, etc.

9.2. Detailed Budget Breakdown

9.2.1. Budget for Main Project Activities

A. Unit Costs by Technology

In line with the budget components outlined in Section 9.1.1., the following table shows the unit costs associated to the main project activities for each of the substances and technologies taken into consideration in this project:

Table 16: Unit costs by technology

Item	Unit cost (USD/ton)			
	CFC-11 (Pure)	CFC-11 (In foam)	CFC-12 (Rotary Kiln)	CFC-12 (Plasma)
1. Transportation	24	*300* (*)	24	24
2. Storage	3	0	42	42
3. Destruction				
3.1. Fuel	0	0	1,710	0
3.2. Spare parts	0	0	0	6,250
3.3. Power consumption	128	128	128	1280
3.4. Emission absorbing materials	6,416.40	6,416.40	6,416.40	5,919.40
3.5. Waste treatment	2,580.64	2,580.64	2,580.64	1,146.95
3.6. Depreciation	86.29	86.29	86.29	*1900* (*)
3.7. Maintenance	15.97	15.97	15.97	15.97
3.8. Labor	18.06	18.06	18.06	18.06
Total	**9,272.36**	**9,545.36**	**11,021.36**	**16,596.38**
Adjusted total (excluding co-financing component)	**9,272.36**	**9,245.36**	**11,021.36**	**14,696.38**

(*) Budget components co-financed by project participants

The table above excludes costs related to technical validation; these costs are linked to the facility and not to the destruction *per se*. Therefore, technical validation costs have been included in the budget breakdown by province.

B. Breakdown by Province

The following table shows the budget breakdown by province for the main project activities:

Table 17: Budget breakdown of main project activities by province

Provinces	CFC-12			CFC-11			Technical Validation (USD)	Sub-total (USD)
	Rotary Kiln (kg.)	Plasma (kg.)	Unit Cost (USD/kg)	Rotary Kiln (kg.)	MSWI (kg.)	Unit Cost (USD/kg)		
Guangdong		7,016.57	16.6				*50,000* (*)	166,475
Jiangsu					98,062.29	9.55	50,000	986,495
Shandong				59,862.20		9.27	25,000	580,064
Tianjin	1,352.57		11.02	25,712.39		9.55	25,000	285,341
							Total	**2,018,375**

(*) Budget components co-financed by project participants

Taking into account those components which will be co-financed by the project participants, an adjusted budget breakdown by province can be defined as follows:

Table 18: Adjusted budget breakdown of main project activities by province (excluding co-financing)

Provinces	CFC-12			CFC-11			Technical Validation (USD)	Sub-total (USD)
	Rotary Kiln (kg.)	Plasma (kg.)	Unit Cost (USD/kg)	Rotary Kiln (kg.)	MSWI (kg.)	Unit Cost (USD/kg)		
Guangdong		7,016.57	14.7					103,144
Jiangsu					98,062.29	9.25	50,000	957,076
Shandong				59,862.20		9.27	25,000	579,923
Tianjin	1,352.57		11.02	25,712.39		9.25	25,000	277,742
							Total	**1,917,885**

9.2.2. Budget for Supporting Project Activities

The table below summarizes the budget for the supporting activities outlined in Section 7.2. for which budget components have been listed in Section 9.1.2.:

Table 19: Budget for supporting project activities

Item	Unit Cost (USD)	Amount	Budget (USD)
1. Policy research	20,000	1	20,000
2. Training materials	10,000	1	10,000
3. Training	150	100	15,000
4. Information system	10,000	1	10,000
5. Consultant fee	10,000	5	50,000
6. Technical documentation	25,000	1	25,000
7. Implementation and management	150,000	1	150,000
		Total	**280,000**

9.2.3. Co-financing from Project Participants

The project secures co-financing for both its implementation and beyond, in line with the objective of the outlined business model of ensuring long-term sustainability of ODS destruction activities in China.

<u>During implementation of the project</u>

Taking into account the budget breakdown for both main and supporting project activities, project participants will provide co-financing for the following activities:

- Foam transportation costs assumed by the reclaiming and disassembling companies participating in the project (50,490 USD);
- Technical validation of the plasma destruction facility in Guangdong, to be co-financed by the owners of the destruction facility (50,000 USD);
- Contingency costs accounting for a total of 100,920 USD will be assumed by all local stakeholders participating in the project;

The total co-financing amount related to these activities is 201,410 USD.

There are other activities which also imply a co-financing component:

- Acquisition of the plasma equipment that will be used for the implementation of the project at Guangdong will be co-financed by the facility owner and the government (the equipment will be purchased outside the scope of this project);
- Collection costs assumed by the reclaiming and disassembling companies participating in the project: collection activities, despite being outside the project boundary and not being eligible to be included in the funding request to the MLF, also imply a co-financing component; this is due to the fact that recovery and recycling centers incur in a cost for the dismantling of refrigerators.

The following text box provides further details about such costs in the case of China:

Box 3: Information on costs related to ODS waste collection activities in China

The cost to dismantle a single refrigerator in China is the following (based on 2008 data):

i. Power consumption and water consumption: about 8.11 RMB/refrigerator;
ii. Depreciation: about 26.8 RMB/refrigerator;
iii. Maintenance costs and labour cost: about 12.78 RMB/refrigerator;

iv. Taxes: about 0.75 RMB/refrigerator;

v. Waste treatment: except for the treatment of CFCs, foam and oil from the compressor, some plastics and glasses contained with brominated flame retardants also need to be treated with 2.93 RMB/refrigerator.

The total cost of dismantling a refrigerator accounts for about 8.15 USD (6.3 RMB=1 USD), excluding the cost for the treatment of foam, compressor oil and refrigerant.

- Extraction costs: in the case of Shangdong, CFC-11 will be extracted from foams at a cost assumed by the dismantling facility; such cost is detailed in the following text box:

Box 4: Information on costs related to extraction of CFC-11 from foams in Shangdong

The cost is calculated as the designed capacity (240 refrigerators/day, with a work time of 8 hours/day), with total 150kg of CFC-11 collected and a total of 960 kg. of foams (without CFC-11) collected.

The real situation in the station is that only about 60-70 refrigerators can be dismantled per day, so they usually run the machine every 4 or 5 days.

1. Power consumption

About 350kwh of power will be consumed per day. Calculated on an averagely basis of 0.16 USD/kwh of power in China, total power cost would be 56.00 USD/day, i.e. 0.37 UDS/kg.

2. Foam transportation and treatment

The foam without CFC-11 will be filled into the landfill, which costs 0.75/kg. Total cost for the treatment of foam will be 720.00 USD/day, i.e. 4.80 USD/kg. The foam will be transported by the landfill company.

3. Depreciation

The whole facility was imported from Germany with an investment of 1.46 million USD. The calculation is based on a life of 20 years with 250 days of operation per year. The residual value is set at 5 percent of the total value. Under these assumptions, depreciation costs are 277.40 USD/day. For the CFC-11 collection machine, there is no single price since the whole line was procured. But the station assumes that the price of the CFC-11 collection machine is about 20% of the whole, which means the depreciation is 55.48 USD/day, i.e. 0.37 USD/kg.

4. Maintenance costs

Maintenance costs are calculated as 20 percent of the depreciation cost, that being 11.10 USD/day, i.e. 0.07 USD/kg.

5. Labor

Total labor cost per day is 35.71 USD with two workers, i.e. 0.24 USD/kg.

Total cost

The total cost is 5.86 USD/kg. Total 59,862.20 kg. of liquid CFC-11 is planned to be destructed, which leads to a co-finance component of 350,509.14 USD.

The table below shows the details:

Item	Unit cost (USD/day)	Unit cost (USD/kg)
Power consumption	56.00	0.37
Foam transportation and treatment	720.00	4.80
Depreciation	55.48	0.37
Maintenance	11.10	0.07
Labor	35.71	0.24
Total	**878.29**	**5.86**
Co-finance (59,862.20kg)		**350,509.14**

- Energy savings secured through electricity generation in Jiangsu municipal solid waste incinerator.

Beyond implementation of the project

In addition to the continuous costs co-financed by the project participants during the implementation of the project, the following co-financing will be secured:

- Collection costs assumed by reclaiming and disassembling companies at national level;
- Foam transportation costs assumed by the reclaiming and disassembling companies at national level;
- Technical validation of new destruction facilities used for ODS destruction (reduced costs due to the fine-tuning undertaking during the implementation of the project);
- Energy savings secured through electricity generation in all municipal solid waste incinerators involved in direct foam destruction activities, as well as those hazardous waste facilities with co-generation equipment in place;
- Costs related to the maintenance of the supervision, verification and MIS system will be shared by national and provincial governments.

9.2.4. Total Budget

The following table shows the total cost of the disposal activity including costs not covered by the Multilateral Fund:

Table 20: Total cost of the disposal activity (including costs not covered by the Multilateral Fund)

Item	Cost (USD)
Project Costs	
- Main project activities	2,018,375
- Supporting project activities	280,000
- Contingencies (5% of main project activities)	100,920
Total Project Costs	**2,399,295**
Project Costs not covered by the Multilateral Fund	
- Foam transportation	50,490
- Technical validation of the plasma destruction facility	50,000
- Contingencies	100,920
Total Project Costs not covered by MLF	**201,410**
Requested MLF grant	**2,197,885**
Cost-efficiency (USD/kg.)	**11.45**

The breakdown of costs for which funding is requested to the MLF is detailed in the following table:

Table 21: Total budget (funding request to the MLF)

Category	Items	Cost per unit (USD)	Number of units	Amount (USD)
Main project activities	CFC-12 by rotary kiln	11.02	1,352.57	14,902
	CFC-12 by plasma	14.70	7,016.57	103,144
	Pure CFC-11	9.27	59,862.20	554,923
	CFC-11 in foam	9.25	123,774.68	1,144,916
	Technical validation	50,000	2	100,000
	Sub-total			**1,917,885**
Supporting project activities	Policy research	20,000	1	20,000
	Training materials	10,000	1	10,000
	Training	150	100	15,000
	Information system	10,000	1	10,000
	Consultant fee	10,000	5	50,000

Category	Items	Cost per unit (USD)	Number of units	Amount (USD)
	Technical documentation	25,000	1	25,000
	Implementation and management	150,000	1	150,000
	Sub-total			**280,000**
TOTAL (USD)				**2,197,885**
Cost-efficiency (USD/kg.)				**11.45**