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COMITE EXECUTIF DU
FONDS MULTILATERAL AUX FINS
D'APPLICATION DU PROTOCOLE DE MONTREAL
Soixante-treizième réunion
Paris, 9-13 novembre 2014

PROPOSITION DE PROJET: LIBAN

Le présent document contient les observations et recommandations du Secrétariat du Fonds concernant la proposition de projet suivante:

Destruction

• Projet pilote de démonstration sur la gestion et l'élimination des déchets des SAO	ONUDI

FICHE D'ÉVALUATION DE PROJET -- PROJET NON PLURIANNUEL

LIBAN

TITRE DU PROJET	**AGENCE D'EXÉCUTION**
Projet pilote de démonstration sur la gestion et l'élimination des déchets des SAO	ONUDI

ORGANISME NATIONAL DE COORDINATION: Unité nationale d'ozone du Liban

DERNIERES DONNEES DECLAREES SUR LA CONSOMMATION DE SAO A ELIMINER GRACE AU PROJET

A: DONNEES RELEVANT DE L'ARTICLE 7 (TONNES PAO en 2013)

Annexe I, CFC	0		

B: DONNEES SECTORIELLES DU PROGRAMME DE PAYS (TONNES PAO, 2013)

SAO	**Sous-secteur/quantité**	**Sous-secteur/quantité**	**Totaux**
CFC			0

PLAN D'ACTIVITES DE L'ANNEE EN COURS: Financement total 163 500 $US. Élimination totale 14 tonnes PAO

DÉSIGNATION DU PROJET

Utilisation des SAO dans l'entreprise		s/o
SAO à éliminer		s/o
SAO introduites		s/o
Projet dans le plan d'activités actuel		Oui
Secteur		Destruction de SAO
Sous-secteur		Sous-secteur de la réfrigération et de la climatisation
Impact du projet		12,7 tonnes
Durée du projet		18 mois
Participation locale à la propriété		100%
Composante exportation		0%
Montant demandé au départ		147 733
Subvention du Fonds multilatéral demandée		
ONUDI	$US	123 475
Total	$US	123 475
Coûts d'appui de l'agence d'exécution		
ONUDI (9%)	$US	11 113
Total	$US	11 113
Coût total du projet pour le Fonds multilatéral	**$US**	**134 588**
Coût/efficacité	$US/kg métrique	9,69
Objectifs de suivi du projet		Inclus

RECOMMANDATION DU SECRETARIAT:	Examen individuel

DESCRIPTION DU PROJET

1. Lors de la 72e session, l'ONUDI a présenté au nom du gouvernement du Liban une proposition pour un projet pilote de démonstration sur la gestion et l'élimination des déchets des substances appauvrissant l'ozone (SAO) pour un montant de 173 353 $US, plus les coûts d'appui de l'agence de 15 602 $US pour l'ONUDI, tel qu'initialement présenté[1]. Avant la 72e session, l'ONUDI a retiré la soumission à la demande du Secrétariat étant donné que la proposition ne répondait pas à certains des critères de la décision 58/19.

2. Le Comité exécutif est convenu que le projet pourrait être soumis de nouveau à titre exceptionnel à la 73e réunion, à condition qu'il réponde totalement aux lignes directrices de la décision 58/19, et qu'il considère l'exportation pour destruction comme une option pour le projet (décision 72/21).

3. Par la suite, l'ONUDI a présenté de nouveau la proposition pour un montant de 147 733 $US, plus les coûts d'appui de l'agence de 13 296 $US. Le projet portera sur la destruction de 12,7 tonnes métriques (tm) de déchets de SAO sur une période de 18 mois. La proposition de projet est jointe en annexe I du présent document.

Description du projet

4. Le projet pilote vise à développer une stratégie durable pour la destruction des stocks de SAO indésirables au Liban. Les méthodes envisagées pour la destruction des SAO sont les suivantes: (1) la destruction dans une usine d'incinération de SAO désignée; (2) la destruction par la co-incinération avec d'autres déchets; (3) la destruction dans un four à ciment converti; (4) la destruction grâce à des technologies de plasma; (5) la destruction avec des technologies autres que l'incinération; et (6) l'exportation pour destruction.

5. Lors de la préparation du projet, les diverses stratégies énumérées ci-dessus ont été examinées et évaluées. Afin d'assurer la viabilité à long terme du projet au-delà de la mise en œuvre, la conversion d'un four à ciment au Liban en vue de renforcer sa capacité nationale de destruction des SAO a été la première option considérée. Cependant, le manque d'engagement du propriétaire du four à ciment et les questions de réglementation connexes ont rendu cette option difficile à mettre en œuvre. L'autre option la plus réaliste qui a été considérée était de transporter les SAO indésirables jusqu'à une installation de destruction en Europe.

6. Le projet de démonstration visera également à renforcer et relier le réseau de collecte existant avec le processus de destruction à mettre en place. La stratégie d'exportation des déchets des SAO peut donc être appliquée comme une méthode à long terme du pays pour détruire les stocks futurs de SAO indésirables.

Estimation des déchets de SAO à éliminer

7. Ce projet pilote portera sur 12,7 tonnes métriques de déchets de SAO pour destruction, constituées de stocks de CFC collectés par les ateliers de maintenance, les centres de formation, les utilisateurs finaux et les importateurs, tel qu'indiqué dans le tableau 1. Ces stocks ont été confirmés par une série de collecte de données sur site effectuée par une équipe de consultants nationaux. Quelques stocks de halons (1,8 tm) ont été également identifiés, mais ils ne seront pas exportés pour destruction. Une stratégie d'élimination des halons sera préparée séparément dans le cadre du projet.

[1] À la 61e session, le Comité exécutif a fourni des fonds afin que l'ONUDI prépare un projet pilote de démonstration pour l'élimination des SAO en faveur du Liban.

Tableau 1: Quantités totales de déchets de SAO disponibles pour élimination au Liban

Secteur	CFC-12/kg	CFC-11/kg	R-502/kg	R-500/kg	Total/kg
Ateliers de maintenance	2,57	1,25	0,04	0	3,86
Centres de formation	0,73	0	0	0	0,73
Hôtels	0,23	0	0,03	0,01	0,27
Hôpitaux	0,30	0	0	0	0,30
Centres commerciaux et supermarchés	0,01	0	0	0	0,01
Chambres froides	1,19	0	0	0	1,19
Importateurs	5,54	0,82	0	0	6,36
Armée libanaise*	0	0	0	0	0
TOTAL	**10,57**	**2,07**	**0,07**	**0,01**	**12,72***

* plus 1,8 tm de halons à être traitées dans le cadre de la stratégie d'élimination des halons.

8. Le Liban ne dispose pas actuellement d'un système institutionnalisé de collecte des déchets des SAO à l'échelle nationale malgré la loi en vigueur imposant la récupération, le recyclage et la destruction des déchets de SAO. Les activités de collecte sont actuellement menées par différents acteurs travaillant dans divers secteurs. Des efforts sont actuellement déployés afin qu'un tel système soit mis en place dans le cadre de ce projet.

Les activités du projet

9. Les activités suivantes seront menées dans le cadre du projet: mise en place d'installations d'agrégation à Tripoli et à Beyrouth; agrégation des déchets de SAO et essais de qualité pour l'exportation; identification d'une structure de destruction en Europe, conformément à un processus d'appel d'offres public requis à la fois par le gouvernement et l'ONUDI; transport des stocks de déchets de SAO jusqu'à la structure de destruction sélectionnée; destruction et vérification des stocks de SAO détruits et établissement de rapport.

Durabilité du projet

10. Il a été identifié comme susceptibles de contribuer à la viabilité du projet d'élimination des SAO les éléments suivants:

(a) Le renforcement de l'application de la législation existante relative à la collecte et à l'élimination des déchets des SAO. La mise en œuvre du projet permettrait de créer un environnement propice pour faire respecter la collecte et la destruction obligatoires des déchets des SAO;

(b) L'engagement des parties prenantes afin d'assurer un environnement de coopération dans la mise en place d'une infrastructure d'élimination des SAO dans le pays; et

(c) L'encouragement de la collecte des anciens déchets des SAO pour destruction à travers les leçons tirées de ce projet.

Gestion financière du projet

11. Le financement du Fonds multilatéral (147 733 $US) couvrira les activités décrites au paragraphe 10 ci-dessus, y compris le fonctionnement du projet pilote pendant deux ans, tel que le montre le tableau 2. Le cofinancement (37 200 $US) sera fourni en nature.

Tableau 2: Coût proposé du projet

Poste	Coût ($US)		
	Fonds multilatéral	**Cofinancement**	**Total**
Transport de 12,7 tm de CFC à partir de différents centres aux points d'agrégation	11 000	21 450	32 450
Essai des substances et des impuretés, enlèvement de l'huile si nécessaire, décantation des bouteilles dans des conteneurs ISO, étiquetage, documentation	28 100	15 750	43 850
Expédition et transport de réservoirs ISO, y compris l'assurance et le système de suivi (transport total à 1,50 $/kg)	19 050	0	19 050
Destruction (purification et essai sur le site de destruction à 1,00 $/kg; destruction à 5,00 $/kg)	63 500	0	63 500
Imprévus (5%)	6 083	0	6 083
Soutien politique; unité de gestion du projet (UGP)	15 000	0	15 000
Stratégie d'élimination des halons	5 000	0	5 000
TOTAL ($US)	**147 733**	**37 200**	**184 933**

Suivi et vérification de la destruction

12. Le processus sera suivi de près et les données seront enregistrées par l'unité de gestion du projet. Des assurances solides et la certification seront fournies afin que les 12,7 tm de SAO soient effectivement détruites. L'ONUDI émettra un certificat de destruction à la fin du projet.

COMMENTAIRES ET RECOMMANDATION DU SECRÉTARIAT

COMMENTAIRES

13. Le Secrétariat a examiné le projet sur la base des lignes directrices provisoires pour le financement de projets de démonstration en vue de l'élimination des SAO établies par la décision 58/19. Il a également tenu compte de la décision 72/21 dans laquelle le Comité exécutif a décidé que ce projet pourrait être soumis de nouveau pour examen, avec des conditions spécifiques.

14. En ce qui concerne sa conformité avec la décision 58/19, l'ONUDI a réaffirmé que les activités de collecte ne feront pas partie du projet, et que si un système institutionnalisé de collecte des déchets des SAO fait défaut, il existe quand même un système ayant abouti à l'accumulation des déchets des SAO qui est inclus dans ce projet. L'ONUDI a réitéré l'engagement du gouvernement à utiliser les enseignements tirés de ce projet et à formaliser un système de collecte dans le cadre du projet de démonstration.

15. En expliquant comment le système de collecte fonctionne, l'ONUDI a précisé que les 12,7 tonnes de déchets de SAO ont été identifiées sur la base d'une enquête auprès de diverses sources de ces déchets. Il n'existe pas encore de système institutionnel pour la collecte des déchets, et la collecte de ces SAO indésirables est entreprise par divers acteurs travaillant dans différents secteurs. Alors que le pays dispose d'une politique de récupération et de recyclage des SAO, et que dans le plan national d'élimination des centres de récupération et de recyclage ont été créés, ils ne sont pas pleinement opérationnels à l'heure actuelle. Cependant, plusieurs ateliers de maintenance font la collecte des déchets SAO lors de leurs opérations, et ces déchets sont conservés dans des bouteilles pour élimination future. Un système complet de collecte devrait être en place lorsque le projet est terminé. Le Secrétariat a noté que sur la base des informations complémentaires fournies, le projet répond aux lignes directrices contenues dans la decision 58/19.

16. En abordant les problèmes liés à l'option choisie d'exportation pour la destruction, l'ONUDI a indiqué que la destination préférée serait l'Europe en raison des coûts de transport moins élevés à partir du

Liban, par rapport à ceux liés aux États-Unis d'Amérique. Cependant, il n'a pas été possible d'identifier une installation de destruction spécifique où les déchets seront transportés car on devra la sélectionner par un processus d'appel d'offres ouvert compte tenu des exigences du Groupe d'évaluation technique et économique (GETE)[2] du PNUE pour la destruction des SAO et une efficacité d'élimination supérieure à 99,99 pour cent. L'ONUDI a indiqué que les critères de sélection seront basés sur le fait de savoir si l'installation est en conformité avec les techniques approuvées par le GETE, répond aux exigences de performance et d'émissions fixées par ce dernier et est enregistrée en tant qu'une installation de l'Union européenne.[3]

17. L'ONUDI a également mentionné que le gouvernement du Liban pourrait à l'avenir poursuivre l'option de renforcer les capacités nationales pour la destruction des SAO comme une solution à long terme durable lorsque le soutien réglementaire sera en place, et que les propriétaires des fours à ciment privés seront d'accord pour couvrir les coûts de cofinancement d'une telle opération. Cette voie serait poursuivie en tant qu'activité privée, et sans coût pour le Fonds multilatéral.

18. L'ONUDI a également signalé que l'expérience du projet peut faciliter l'accès aux marchés du carbone lorsque de meilleures possibilités de ces marchés se présenteront. Il a toutefois réitéré que le projet ne s'occupera pas de ces opérations à l'heure actuelle, mais comprendra un mécanisme renforcé de surveillance et de vérification qui permettra l'accès aux marchés du carbone à l'avenir.

19. Le Secrétariat et l'ONUDI ont discuté du financement demandé pour le projet, ce qui a entraîné des ajustements aux coûts liés aux essais, au soutien politique et au retrait de la stratégie d'élimination des halons. Le tableau ci-dessous présente le budget révisé pour le projet, tel que modifié.

Tableau 3: Coût final convenu du projet

Poste	**Coût (USD)**		
	Fonds multilatéral	**Cofinancement**	**Total**
Transport de 12,7 tm de CFC à partir de différents centres aux points d'agrégation	8 000	24 450	32 450
Essai des substances et des impuretés, enlèvement de l'huile si nécessaire, décantation des bouteilles dans des conteneurs ISO, étiquetage, documentation	21 925	21 925	43 850
Expédition de réservoirs ISO, y compris l'assurance et le système de suivi (transport total à 1,50 $/kg)	19 050	0	19 050
Destruction (purification et essai sur le site de destruction à 1,00 $/kg; destruction à 5,00 $/kg)	63 500	0	63 500
Imprévus (5%)	3 500	0	3 500
Soutien politique; unité de gestion du projet (UGP)	7 500	7 500	15 000
Stratégie d'élimination des halons	0	5 000	5 000
TOTAL ($US)	**123 475**	**58 875**	**182 350**

20. Le coût final du projet a été convenu à 123 475 $US (plus des coûts d'appui de l'agence de 11 113 $US) calculé à 9,69 $US/kg, ce qui est inférieur au seuil (13,2 $US/kg).

[2] TEAP - Report of the Task Force on Destruction Technologies: http://ozone.unep.org/teap/Reports/Other_Task_Force/index.shtml

[3] En tant qu'installation enregistrée en UE, ses technologies de destruction doivent être incluses dans l'annexe du règlement (CE) n° 1005/2009 du Parlement européen et du Conseil du 16 septembre 2009 sur les substances qui appauvrissent la couche d'ozone.

RECOMMANDATION

21. Le Comité exécutif pourrait souhaiter:

(a) Noter la soumission par le gouvernement du Liban d'un projet pilote de gestion et d'élimination des déchets des SAO;

(b) Approuver la mise en œuvre d'un projet pilote de démonstration pour la gestion et l'élimination des déchets des SAO au Liban en vue de détruire un total de 12,7 tonnes métriques de déchets des SAO, pour un montant de 123 475 $US plus des coûts d'appui de l'agence de 11 113 $US pour l'ONUDI, étant entendu que:

(i) le Liban à l'avenir ne pourra avoir d'autres fonds pour un projet quelconque d'élimination des SAO;

(ii) toute commercialisation des réductions d'émissions de gaz à effet de serre (GES) qui pourraient être générées par le projet ou associées avec ce dernier sera sujette à une décision du Comité exécutif;

(c) Demander au gouvernement du Liban, par le biais de l'ONUDI, de mettre en place un système de surveillance du fonctionnement et des activités liées au projet de démonstration de gestion et d'élimination des déchets des SAO; et

(d) Demander à l'ONUDI de présenter un rapport au Comité exécutif à la fin du projet en 2016, s'étant assurée qu'aucune commercialisation des réductions d'émissions de GES n'a eu lieu.

MULTILATERAL FUND FOR THE IMPLEMENTATION OF THE MONTREAL PROTOCOL ON SUBSTANCES THAT DEPLETE THE OZONE LAYER			
PROJECT COVER SHEET			
COUNTRY	Lebanon	**IMPLEMENTING AGENCIES**	UNIDO
PROJECT TITLE	Pilot Demonstration Project on ODS Waste Management and Disposal		
PROJECT IN CURRENT BUSINESS PROGRAMME		Yes	
SECTOR		ODS destruction	
SUB-SECTORS		Refrigeration and Air Conditioning sub-sector	
ODS DESTROYED	R11	2.07	Metric tonnes
	R12	10.59	Metric tonnes
	R500	0.01	Metric tonnes
	R502	0.07	Metric tonnes
	Total	12.74	Metric tonnes
		12.68	ODP tonnes
PROJECT IMPACT	Net ODP value per annum	6.34	ODP tonnes
	Annual emissions (CO_2 equivalent)	16,875	tonnes CO_2e
PROJECT DURATION – Demonstration Project			18 months
PROJECT COSTS	Incremental Capital Costs	US$	158,850
	Contingencies	US$	3,500
	Incremental Operating Costs	US$	-
	Policy and Management Support	US$	15,000
	Total Project Costs	US$	182,350
LOCAL OWNERSHIP			100%
EXPORT COMPONENT			0%
REQUESTED MLF GRANT	UNIDO	US$	123,475
	TOTAL	US$	123,475
COST EFFECTIVENESS (Destruction of CFCs)		US$/kg	9.69
SUPPORT COSTS	UNIDO (9%)	US$	11,113
TOTAL COST OF PROJECT TO THE MULTILATERAL FUND		US$	132,118
STATUS OF COUNTERPART FUNDING		Confirmed	
PROJECT MONITORING MILESTONES (Y/N)		Y	
NATIONAL COORDINATING BODIES		National Ozone Unit of Lebanon	

Project summary:
UNIDO, on behalf of the Government of Lebanon, submitted the project document "Pilot Demonstration Project on ODS Waste Management and Disposal in Lebanon" to the 72nd Meeting of the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol. In response to the decision of the ExCom, the project is being resubmitted to include an alternative strategy for ODS destruction abroad.

The **main objective of the project** is to develop a sustainable strategy to destroy stocks of unwanted ODS in Lebanon. The original strategy looked into the establishment of local destruction capacity for the disposal of ODS waste and other chemical waste in Lebanon, which can be used by other countries in the region. The alternate, and preferred strategy looks into the feasibility of exporting ODS for destruction.

To ensure efficient implementation of the project, a total of **14.54 metric tonnes of ODS waste** will be disposed of over a period of 18 months. This amount of ODS waste has already been collected from various sectors at different locations across the country. The amount of ODS waste to be destroyed is distributed as follows:

- 2.07 metric tonnes of R11;
- 10.59 metric tonnes of R12;
- 0.01 metric tonnes of R500;
- 0.07metric tonnes of R502;
- 1.80 metric tonnes of halons.

During project preparation, various strategies were discussed and assessed by relevant stakeholders in the country and UNIDO. In order to ensure sustainability of the project beyond implementation of the MLF-funded project, the **chosen project strategy** involves the export of old ODS stock for destruction abroad.

The implementation of this project will contribute to the **long-term sustainability of ODS destruction activities** in Lebanon by contributing to such sustainability from a variety of angles, namely:

- Introduction and effective enforcement of legislation addressing ODS disposal; implementation of the project would contribute to create the adequate enabling environment to enforce the obligation to destroy ODS waste;

- A thorough stakeholder engagement process will be undertaken in order to ensure a cooperative environment in the setting up of an ODS disposal infrastructure in the country;

- The strategy for export of ODS can be applied as a long-term method for the country to destroy its future unwanted stockpiles of ODS

- Implementation of the project and related lessons learned will contribute to encourage the collection of old ODS for destruction.

PREPARED BY	International Experts (Environment Management Company) National Ozone Unit, Ministry of Environment UNIDO	**DATE**	9 Sept. 2014

Project Document

Ministry of Environment
Republic of Lebanon

United Nations Industrial Development Organization

Pilot Demonstration Project on ODS Waste Management and Disposal

September 2014

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INTRODUCTION

The Executive Committee, at its 61st meeting, provided funds to prepare a pilot demonstration project on ODS waste management and disposal in Lebanon, 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 national and international experts coordinated by UNIDO, in cooperation with the National Ozone Unit/Ministry of Environment of Lebanon. During the preparatory phase of the project, on-site visits were organized to collect data on available ODS stocks and identify possible destruction methods, and several stakeholder meetings were organized by the NOU and UNIDO.

As a result of this process UNIDO, on behalf of the Government of Lebanon, submitted the project document "Pilot Demonstration Project on ODS Waste Management and Disposal in Lebanon" to the 72nd Meeting of the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol. In response to the decision of the ExCom, the project is being resubmitted to include an alternative strategy for ODS destruction abroad.

The main objective of the project is to develop a sustainable strategy to destroy stocks of unwanted ODS in Lebanon. The original strategy focused on the establishment of a local destruction capacity for the disposal of ODS waste and other chemical waste in Lebanon. The preferred alternate strategy is for destruction to take place abroad. For both strategies, the necessary logistical infrastructure will be set in place, and both technical and human resources will be reinforced to facilitate ODS waste management at country level.

To ensure efficient implementation of the project, a total of 14.54 metric tonnes of ODS waste will be disposed of over a period of 18 months. The amount of ODS waste to be destroyed is distributed as follows:

- 2.07 metric tonnes of R11;
- 10.59 metric tonnes of R12;
- 0.01 metric tonnes of R500;
- 0.07 metric tonnes of R502;
- 1.80 metric tonnes of halons.

All ODS stocks identified for destruction under this project have been collected by servicing workshops, training centres, end users and importers. These stocks are related to their use in home appliances and commercial refrigeration equipment. Manufacturing companies (in the commercial and domestic refrigeration, foam and aerosol sectors) have undertaken conversion activities and do not hold any unwanted stocks of ODS. Unwanted Halon stocks will not be destroyed under this project but a strategy for its one-time destruction abroad will be devised.

In addition to the main project activities, the project will introduce and contribute to the effective enforcement of legislation addressing ODS disposal. Implementation of the project would contribute to create the adequate enabling environment to enforce laws dictating the obligation to destroy ODS waste.

1. 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 the following categories of activities for the disposal of ODS: transport, storage and destruction. The project takes advantage of the various ongoing collection activities in Lebanon; however it only seeks funding from the MLF for the three activities above 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 project implementation can be found in Section 6 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.

Lebanon is currently implementing various programmes on POPs management in the framework of its obligations under the Stockholm Convention. In 2006, a project was launched to demonstrate and promote Best Techniques and Practices to reduce health-care waste and to avoid environmental releases of dioxins and mercury. This will be implemented through the establishment of model facilities and programmes. Another project was submitted to the GEF in June 2014 aimed at improving the management of PCBs and its disposal in an environmentally sound manner.

There are opportunities for synergies in terms of ODS waste management and disposal in the future.

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

Implementation of the project will allow for the destruction of 12.73 metric tonnes of CFC waste, distributed as follows:

- 2.07 metric tonnes of R11;
- 10.59 metric tonnes of R12;

- 0.01 metric tonnes of R500;
- 0.07 metric tonnes of R502;

For the 1.80 metric tonnes of halons, a strategy to destroy these stocks will be developed under this project.

A detailed break-down of these amounts and the location of the related stocks can be found in Section 2.6 and the Annexes II to V of this project document.

iv. *The basis for the amount of ODS; this figure should be based on known existing stocks already collected […]*[1].

The total amount of ODS waste considered for destruction in the context of this project has already been identified through the various ongoing collection efforts, according to the definitions in Annex VIII to the report of the 58th Meeting of the Executive Committee. These amounts have been confirmed through a series of data collection exercises. A national consulting team recruited by UNIDO has undertaken on-site data confirmation.

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.*

Since no collection activities are intended to arrive at the amounts covered by this project proposal, this particular part of the decision is not relevant for the assessment of this particular proposal. However, in order to inform about the situation in the country, the available information on on-going ODS waste collection activities in Lebanon has been compiled and can be found in Section 2.6 of this project document.

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

Unwanted halon stocks have been identified under this project. The project aims to develop a strategy for a one-time export and destruction of halons.

[1] Remainder of decision paragraph ", or collection efforts already at a very advanced and well-documented stage of being set up" not relevant since stocks are already existing and confirmed.

b) Specific information required for project submissions

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

Table 1.1: Export for destruction abroad

Item	Cost (USD)		
	MLF	Co-financing	Total
Transportation of 12.7 metric tonnes of CFCs from different centers to aggregation points	8,000	24,450	32,450
Substance and impurity testing, oil removal where necessary, decanting of cylinders into ISO containers, labelling and documentation.	21,925	21,925	43,850
Shipment of ISO tanks for export to another country, including insurance and GPS tracking system; Transportation inland from port to destruction facility. (Total transport @ $1.5/kg)	19,050	0	19,050
Destruction (Purification and testing at destruction site@ $1/kg; Destruction @ $5/kg)	63,500	0	63,500
Contingency	3,500	0	3,500
Policy support; PMU	7,500	7,500	15,000
Halon disposal strategy	0	5,000	5,000
TOTAL (USD)	**123,475**	**58,875**	**182,350**

The following table shows the break-down of funding requested to the Multilateral Fund:

Table 1.2: Project Funding under the Multilateral Fund

Cost Item	Cost (USD)
Project funding requested to the Multilateral Fund	**123,475**
Project support costs	**8,643**
Total requested from the Multilateral Fund	**132,118**

The project funding requested from the Multilateral Fund for the destruction of CFCs (12,733.2kg) is USD 123,475 (excluding support costs), with a total cost efficiency of **9.69 USD/kg** of ODS waste.

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

Section 8.2 of this project document provides information on the total amount of co-financing secured for this project..

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 amount of ODS waste identified for destruction under this project consists of stocks which, in the context of the Lebanese CFC, ODS phase-out, can no longer be used as the market for CFCs has disappeared. Lebanon started CFC phase-out early; and from 1997 to 2009, manufacturing companies (refrigeration, foams and aerosols) converted from CFC to ozone-friendlier alternatives. Furthermore, the import of cars with CFC based mobile air-conditioning has been banned since 1999, which accounted for the majority

of the servicing demand.

The whole amount of ODS waste referred to above, and complete data on its composition and lack of possible alternative application has been compiled and endorsed at Government level; therefore, there are no ODS stocks to be destroyed in this project coming from amounts to be collected in the future (during project implementation), for which additional monitoring measures should be put in place.

It is important to note that, due to the fact that this project will not obtain any revenue from carbon financing in destroying the identified ODS stocks, the destruction strategy does not pose any perverse incentive that may encourage owners of ODS stocks to destroy them instead of giving them an alternative use.

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.

Amounts of ODS destroyed will be verified. Certification of destruction will be issued.

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

As stated above, the amount of ODS waste identified for destruction under this project consists of stocks which have to be disposed of due to the lack of alternative application.

2. BACKGROUND

2.1. Ratification of Amendments to the Montreal Protocol

Lebanon is a Party to the Montreal Protocol and is listed as an Article 5 country. The following are the dates on which Lebanon had ratified the Montreal Protocol and its amendments:

Table 2.1.1: Status of Ratification of Amendments to the Montreal Protocol

Agreement/ Amendment	Entry into force	Date of ratification
Vienna Convention	28th June 1993	30th March 1993
Montreal Protocol	28th June 1993	30th March 1993
London Amendment	29th June 1993	31st March 1993
Copenhagen Amendment	31st July 2000	31st July 2000
Montreal Amendment	31st July 2000	31st July 2000
Beijing Amendment	21st November 2008	21st November 2008

2.2. ODS Consumption in Lebanon

The following table shows the total consumption of all ODSs in Lebanon in ODP tonnes from

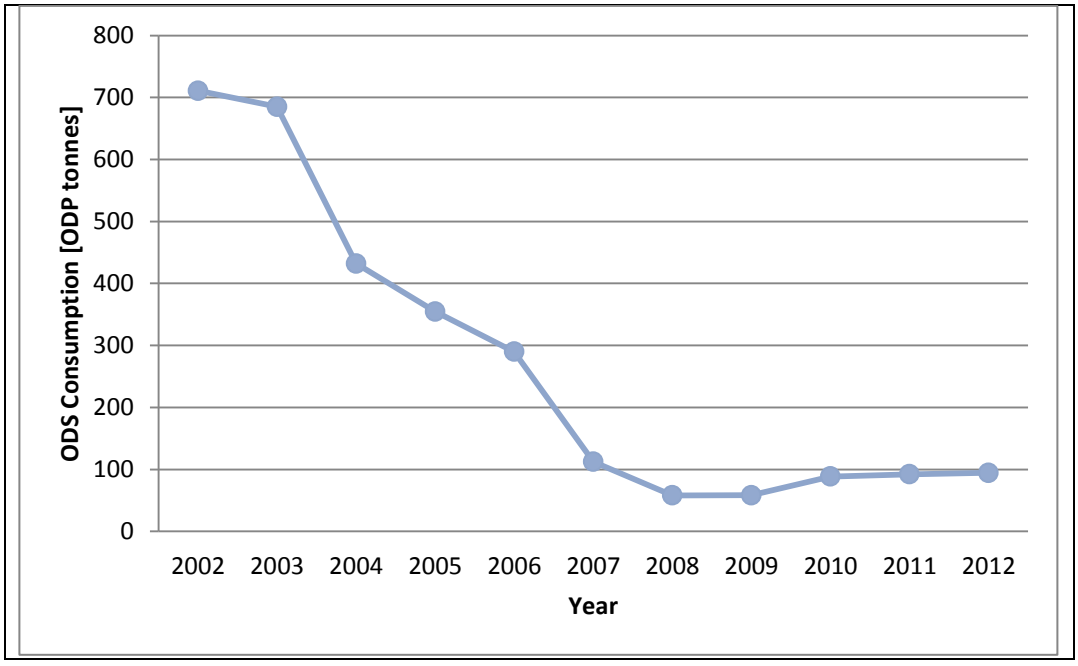
2002 to 2012 as reported by the Ozone Secretariat:

Table 2.2.2: ODS Consumption (in ODP tonnes) in Lebanon[2]

Year	ODS Consumption (in ODP tonnes)
2002	710.8
2003	685.0
2004	432.0
2005	354.6
2006	290.0
2007	112.4
2008	58.2
2009	58.4
2010	88.6
2011	92.26
2012	94.67

The following figure shows the above data graphically:

Figure 2.2.1: ODS Consumption (in ODP Tonnes) in Lebanon



CFC consumption was reported at zero ODP tonnes in 2009. In the same year, the consumption of HCFC began to increase. The increase in HCFC consumption corresponds to the steady increase in ODS consumption since 2009.

[2] Source: Ozone Secretariat

2.3. Stakeholders in ODS Activities in Lebanon

Major Stakeholders

The **National Ozone Unit (NOU)/ Ministry of Environment** of Lebanon coordinates ODS phase-out programmes in the country and implements activities related to the commitment of the Montreal Protocol and its amendments at the national level.

Other Major Stakeholders include the Lebanese **Ministry of Industry, Ministry of Economy and Trade** and the **Customs Authorities**.

Industry Associations

The Association of Lebanese Industrialists (ALI) was established in 1942 and is the main national association of manufacturing companies operating in Lebanon. It deals with both economic and social issues concerning business and advocates a policy of balanced industrial development for all Lebanese regions. (source: www.ali.org.lb)

Other Stakeholders

Other Stakeholders include the Lebanese **Hotels Association, Hospitals Association**, **Association of Importers**, and the **Lebanese Industrial Research Institut**e (www.iri.org.lb)

2.4. ODS- & Waste-Related Legislation

2.4.1. Literature Review

The Lebanese Framework Law on the Protection of the Environment (Law 444 / 2002) mentions the necessity to set standards and criteria to control the transport and movement of hazardous chemicals (import, production, extraction, conversion, marketing, purchase, utilization, abatement, transport and disposal). Through the ratification of the Stockholm Convention in 2002 (Law 432), Lebanon reinforced its commitment to regulate the production, utilization of persistent organic pollutants, specifically those which can be produced from thermal processes involving organic matter and chlorine (hazardous waste).

Other than the legal texts mentioned above, Lebanese legislation addresses hazardous chemicals in different laws, decrees and ministerial decisions especially the law 64/1988 on hazardous waste, and the decree 13389/2004 (amendment of Decree 8006/2002) on the management of health care waste (which includes hazardous and persistent chemicals). National environmental standards were issued by the Minister of Environment (Decision 8/1/2001), however incineration of hazardous wastes were not covered.

Disposal of hazardous material is controlled by the Law 64/1988 which sets the basis for licensing of facilities specialized in the disposal of hazardous waste, and gives the Ministry of Environment the authority to license and monitor these facilities. However, hazardous waste management is still lagging behind due to the delayed application of an integrated solid waste management strategy. Information on issues of chemical management can be found in Annex I.

There is no legislation in place that prohibits the export of hazardous material. Therefore, the export of unwanted ODS for destruction is a feasible option.

2.5. CFC and HCFC Phase-Out Programmes

Lebanon's Country Programme incorporating the national strategy and action plan for controlling the use of ODS was approved at the 19th Meeting of the Executive Committee of the Multilateral fund in May 1996. To date, Lebanon is in compliance with the Montreal Protocol control schedule for substances under Annex A, B and E, through the implementation of a combination of projects; these include investment activities, technical assistance, training and capacity building, knowledge sharing, awareness raising and the institution of a proactive regulatory framework. In compliance with Article 4B of the Montreal Protocol, Lebanon has established a licensing system for import and export of Annex A, B, C and E controlled substances, which includes amounts collected as a result of recovery, recycling and reclamation. All importers and exporters of these substances are required to register and obtain licenses which are issued based on annual quotas and are subject to reporting requirements.

All remaining CFC phase-out activities were addressed through the National Phase-out Management Plan (NPP), which was approved at the 44th ExCom Meeting in November 2004, as a performance-based agreement with annual consumption and phase-out targets and complete phase-out of all remaining consumption of CFCs in Lebanon before the 1st January 2009. The CFC consumption reduction schedule proposed in the NPP was in compliance with the control schedule of the Montreal Protocol.

During the phase-out of CFCs, HCFCs were approved as interim substitutes for CFCs in many of the projects and activities supported by the Multilateral Fund. The sustained economic growth experienced by developing countries during the 1980s and thereafter, rapidly increased the demand for consumer and industrial products using HCFCs. Based on Decision XIX/6 of the MoP, Lebanon has also developed and received approval and funding for its HPMP overarching strategy.

2.6. Sources and Collection of ODS Waste

The total amount of ODS waste considered for destruction in the context of this project has already been identified through the various ongoing collection efforts, according to the definitions in Annex VIII to the report of the 58th Meeting of the Executive Committee. These amounts have been confirmed through a series of data collection exercises. A national consulting team recruited by UNIDO has undertaken on-site data confirmation in the following sectors:

- manufacturing sector;
- servicing sector (servicing workshops; reclaim center)
- vocational training centers;
- end-user sites (malls/supermarkets, hotels, hospitals, cold rooms);
- importers (CFC, Halons, appliances);
- customs authorities;

- Government institutions; and
- Solid-waste sorting facilities.

The collection of ODS waste in Lebanon is executed through a voluntary scheme, involving refrigeration technicians, service workshops and ODS importers combining elements of the NPP. Under the NPP, equipment was provided to refrigeration and A/C technicians (recovery units and servicing tools) and service workshops and importers (recycling/reclaim units). Through the associated training programmes on best servicing practices emphasis was given to ODS containment, re-use or storage for future disposal, potentially through the established recycling/reclaim centers. Through these activities, the country was able to set up a collection network for obsolete ODS, with old ODS collected and stored in cylinders as opposed to being vented into the atmosphere.

The effectiveness of the scheme is demonstrated by the significant amount of CFCs that has been identified for destruction and the large share of the total that was actually accumulated via the existing network (see table 4.1.1).

The sources of ODS waste is further described in the sections below:

2.6.1. Manufacturing Sector

There are several manufacturers in the aerosols, foams and the refrigeration sectors. Most are predominantly small and unorganized. Many of whom have converted to non-CFC technologies through the assistance of the Multilateral Fund. These conversions took place between 1997 and 2009. The same companies, around 100, were surveyed for ODS stocks at their premises (Annex I). The survey revealed that none of the companies have kept CFC stock after the completion of conversion activities.

2.6.2. Servicing Sector and end-users

There is a significant population of existing domestic, commercial, industrial and transport refrigeration appliances, equipment and systems, requiring maintenance services in the country. In addition, due to the economic growth in the past two decades, there are several office buildings and complexes served by CFC-based central air conditioning centrifugal chillers, which require servicing. As a result, there is a fast growing servicing sector comprising of a large number of servicing establishments.

A few service establishments are part of the network of servicing centers owned or managed by the major domestic and commercial refrigeration equipment manufacturers and suppliers or a part of the network of local offices of the main dealers/distributors of refrigeration raw materials, components, consumables, etc. Most remaining service establishments are medium-sized and predominantly independent, catering to small and medium-sized end-users in the respective local markets. There are in addition, a large number of small servicing shops and freelancing service technicians.

Lebanon has approximately 410 refrigeration and air conditioning service workshops. Most workshops are small and operated by the owner himself with minimum staff of technicians. These workshops have a total of 1000-1500 technicians. Only some of these technicians have had some kind of training, but as part of CFC phase-out efforts, around 700 of them have been trained.

2.6.2.1. Refrigeration and Air-Conditioning Servicing Workshop

Under the NPP in Lebanon, support to the refrigeration service sector in Lebanon was provided through the delivery of refrigerant recovery, recycling and recharging units for MAC systems and MAC servicing tools for 125 MAC workshops; and refrigerant recovery, recycling equipment for domestic, commercial appliances for 125 RAC workshops. The survey covered all assisted refrigeration servicing workshops as well as individual refrigeration technicians. 163 refrigeration servicing workshops provided feedback, indicating a total of 3861.2kg of stockpiled CFCs in cylinders. As for the freelance refrigeration technicians surveyed, no stocks of CFCs could be identified with them. (See Annex II)

2.6.2.2. National Training Centers

The survey was able to identify 12 active vocational training institutes that teach and train technicians on maintenance and servicing techniques for refrigeration and air-conditioning systems. A total of 734.4 kg of CFC-12 in cylinders have been identified at centers. The list of training centers is found in Annex III.

2.6.2.3. End-users

The end-users of products containing CFCs are in the domestic (household refrigerators/freezers and hot/cold water dispensers), commercial (small shops and other small commercial establishments, mini markets, departmental stores and supermarkets), industrial (process refrigeration systems, cold stores, etc) and transport refrigeration sub-sectors (refrigerated trucks and trailers) and in the mobile air conditioning (passenger cars and buses) and chillers (centrifugal chillers plants) sub-sectors.(see Annex IV)

HOTELS

In Lebanon, there are around 333 hotels located in different regions across the country. 144 of these are ranked “four stars and above” with an average number of 105 rooms per hotel. The majority of hotels in Lebanon have modified or retrofitted their refrigeration and air-conditioning systems, explaining the cumulative unwanted ODS refrigerant stock of only 272kg from the 35 hotels that have supplied data for the survey. Furthermore, most of the hotels outsource maintenance services for their refrigeration and air-conditioning installations, which results in ODS stocks not being kept at hotel premises, rather are provided by the maintenance service provider upon request.

HOSPITALS

There are 168 hospitals distributed across Lebanon. Feedback on the questionnaire has been collected from 55 hospitals, distributed geographically, with a range of 5 to 500 beds. Out of those surveyed 27 hospitals own CFC-charged refrigerators, 10 have CFC-based cold rooms at their premises. Most hospitals outsources maintenance services, therefore ODS stock are not kept in the premises. The hospitals have an amount of 304.2kg available in cylinders

MALLS AND SUPERMARKETS
Since 2000, Lebanon has experienced a change in its retail sector, with the emergence of new malls and supermarket chains. Having relatively new and newly renovated buildings, of the 12 malls and supermarket chains (with all their branches), CFC stock of only one full cylinder (13.6kg) remained from a renovated mall using other refrigerants today. All other malls and supermarkets, using CFC-free technologies, had no unwanted ODS stocks.

COLD ROOMS
Primarily agricultural cold rooms have been targeted under the survey, with agriculture being the third most important sector in the country after the industrial sectors[3]. Cold rooms surveyed showed a total stock of CFC of 1196.8kg in cylinders at the site of the cold rooms.

AIRPORT
The Beirut Rafic Harriri International Airport has recently been renovated. No ODS stock has been kept at the airport premises. The airport is currently using R134a –based chillers, and FM 200-based as well as CO2 fire extinguishers.

GOVERNMENT INSTITUTIONS
Governmental institutions outsource the maintenance service of their refrigeration and air-conditioning systems, and no ODS stocks are kept at respective premises. However, halon stocks, a total of 1798.3kg of Halon – 1211 in fire extinguishers, were found at the premises of the Lebanese Army.

In 1998, the Lebanese Army, as per Decision 15/1 (ban of halon import), have decided to remove all halon-based fire extinguishers from use and stock them until destruction technology is available.

2.6.2.4. Recovery and Reuse of ODS refrigerants

Legislation on Lebanon's ODS licensing system, Law Number 2604, covers the recovery and reuse of ODS refrigerant. In line with the regulation on recovery and reuse, 12 selected workshops and ODS importers were provided with a reclaim unit each under the NPP. These 12 workshops and importers serve as the framework of the refrigerant recovery and reuse network in the country, collecting and storing old CFC, which is suitable for destruction, in the process. This is reflected in the figures for unwanted ODS stock found at service workshop and importer premises. (See Annex II and V).

Furthermore, a total of 110 MAC recovery units were provided under the NPP and TPMP in Lebanon. These MAC workshops have also been reusing CFCs and collecting old CFCs at their site. (See Annex II). Under the NPP a centralized center was established at the Industrial Research Institute. The center is operational but is momentarily not being operated; thus no CFCs have been collected for destruction at the site.

[3] Main crops included cereals, fruits and vegetables, olives, grapes and tobacco. Lebanon, which has a variety of agricultural lands, from the interior plateau of the Bekaa Valley to the narrow valleys leading towards the sea, enables farmers to grow both European and tropical crops. For instance, tobacco and figs are grown in the south, citrus fruits and bananas are grown along the coast, olives in the north and around the Shouf Mountains, and fruits and vegetables in the Bekaa Valley.

2.6.3. Importers

There is no production, export nor re-export of CFCs and Halons in Lebanon. The entire domestic demand for these products was met through imports into the country. Meetings were held with the 14 main importers of the CFCs. (see Annex V)

Importation of CFCs has been totally prohibited in Lebanon since 2009, upon the enforcement of the Licensing System Decree Nb. 2604 dated 24/09/2009. However, importers have started to decrease their import quota of CFCs prior to 2009. In line with the country's obligations under the Montreal Protocol, the Government of Lebanon provided regulatory and policy support to enable the industry to eliminate its ODS use; regularly interacting with stakeholders and importers to promote the phase-out of CFCs in the manufacturing and servicing sectors and import of alternatives.

CFC stocks were kept for the refrigeration servicing sector in Lebanon, particularly for the provision of maintenance services to existing old refrigerators and mobile air-conditioners. The need for CFCs has further decreased through: the retrofit of old systems; capacity-building activities - training of refrigeration technicians and trainers; development and availability of new technologies; and the short life-time of electrical appliances in Lebanon due to regular power cuts. Importers declared that they cannot market their inventory any more in the country, since the market for CFCs has disappeared completely. At the same time, these quantities of new ODS cannot be exported any more for consumption elsewhere except the country of import would obtain an essential use decision which would pertain to the type of stocks and their particular quality; this appears highly unlikely. Therefore, unwanted CFC stocks identified at the importer level amount to a total of 6356kg.

Importers and dealers of refrigeration appliances were also surveyed. Appliances imported into Lebanon are new and CFC-free, and are charged with CFC alternatives, such as HCFCs, HCs or HFCs. The majority of surveyed importers have their own after-sales service, including refrigeration and cooling systems servicing centers. However, none of these service centers claimed having stocks of CFCs.

Although the import of Halons has been prohibited since 1998 (as per Ministerial Decision 15/1), importers of fire-fighting systems and agents in the country were contacted to identify whether or not old stocks of halon cylinders still exist. No Halons stocks were stored at any of the surveyed importers. The alternatives currently available at the Lebanese market are HFC-227EA, ABC Powder, CO2, and AFFF foam.

LEBANESE CUSTOMS AUTHORITIES

The import of CFCs and Halons had been controlled in close cooperation between the Ministry of Environment and the Lebanese Customs, since the inception of the National Ozone Unit in 1998. In 2000, based on Ministerial Decision Nb. 15/1, the import of Halons was banned in Lebanon. Whereas for CFCs, the import quota was regulated by the ODS Licensing System Decree Nb. 2604/2009. Consequently, the import of CFCs was banned in 2009.

The import data retrieved from the Customs Authorities shows that no ODS stocks are available at customs premises; noting that no CFCs nor Halons were imported into the country since 2009 and 1998, respectively.

2.6.4. Waste Disposal Center

Municipal solid waste collection and treatment is uneven across the various regions in Lebanon, lacking in incentives and management. Despite a few shy community-based incentives on municipal solid waste sorting, the majority of municipal garbage remains unsegregated and unsorted after collection. Nevertheless, existing sorting facilities were contacted, and no ODS stocks were found.

2.7. Disposal Programmes for Other Chemicals

Lebanon ratified the 2002 Stockholm Convention on the phase out of POPs including PCBs by 2025 (Law Nb. 432/2002). Under the Stockholm Convention on Persistent Organic Pollutants, Parties shall promote in some cases and require in others the use of best available techniques, and promote the application of best environmental practices.

Through ratifying the Stockholm Convention, Lebanon has as each other Party taken the minimum measures to reduce the total releases derived from anthropogenic sources of each of the chemicals listed in Annex C, with the goal of their continuing minimization and, where feasible, ultimate elimination. Among the industrial sources that have the potential for comparatively high formation and release of these chemicals to the environment are cement kilns, burning hazardous waste.

It must be reiterated that cement kilns are primarily production processes for clinker, and not all operating conditions that may produce satisfactory clinker product are ideal for the destruction of wastes; for example, cement kilns tend to operate at lower exhaust oxygen levels and more elevated carbon monoxide levels than well-operated incinerators. Destruction of organic wastes requires not only high temperature and long residence time, but also the availability of adequate oxygen and sufficient mixing between the organic compounds intended for destruction and the oxygen. Conditions can arise where wastes are not destroyed adequately if waste is not introduced properly to the kiln or available oxygen levels are too low. Good design and operation are critical to the use of cement kilns for this application. More information on issues pertaining to cement kilns can be found in Annex VI.

3. PROJECT OBJECTIVES

The Government of Lebanon is in the possession of a substantial amount of unwanted ODS which need to be destroyed. Those stocks already collected and known to the Government and which are eligible under decision 58/19 will be destroyed under this project.

There is potential for future stocks of unwanted ODS, in particular CFCs from end-of-life recovery of still existing larger, still operating CFC installations, and HCFCs with future gradual phase-out of the different HCFCs in Lebanon. For these future stocks, the process to follow to achieve their destruction (transport, storage, export, destruction) will have been demonstrated, the related procedures will be in place, and lessons learned documented, making future destruction of unwanted ODS an exercise that the country then has the means to organize itself.

The project preparation included all necessary steps to implement the project on the basis of destruction in the country; for this purpose, cement kilns have been considered as destruction facilities. However, while technically possible, the commitment of the kilns and regulatory issues make this technical possibility difficult to implement. The Demonstration Project on ODS Waste Management and Disposal in Lebanon, with its primary objective to demonstrate a repeatable approach to ODS waste destruction and at the same time covering the known collected waste in the country, is intending to export the ODS to be destroyed. In doing so, the project will develop the appropriate technical and human resources capacity for ODS waste management at country level, including aggregation, storage and disposal.

The project will destroy 12.73 metric tonnes of CFC waste collected from various sectors in Lebanon, and will seek to reinforce and connect the existing collection network with the destruction process established. With the involvement of relevant stakeholders from the onset of project implementation, the country will be able to set up an effective and sustainable ODS disposal infrastructure and process. The strategy for export executed in the project can be applied as a long-term method for the country to destroy its future unwanted stockpiles of ODS.

In addition, a strategy will be formulated focusing on the destruction of the 1.8 metric tonnes of unwanted Halon stocks collected.

4. PROJECT SCOPE

4.1. CFC Banks

The stocks for which the destruction strategy is to be developed include 12,733.2kg of CFCs, collected from various sectors in Lebanon, as shown in the following table:

Table 4.1.1: CFC Stocks for Disposal in Lebanon

Sector	Quantity/kg	Percentage of total CFC stocks/ %
Service workshops	**3861.2**	30.32
Training centers	**734.4**	5.77
Hotels	**272.0**	2.14
Hospitals	**299.2**	2.35
Malls and supermarkets	**13.6**	0.10
Cold rooms	**1196.8**	9.40
Importers	**6356.0**	49.92
TOTAL/ kg	**12,733.2**	**100**

Approximately 50% of the CFC stocks identified for destruction under this project have been collected by importers. Another 30% have been stocks by service workshops across the country. With large end-users outsourcing maintenance services on their refrigeration systems, as described in 3.6, these expectedly have a smaller proportion of the CFCs in stock.

4.2. Halon Banks

The Lebanese Army has the majority of unwanted Halons in stock at its premises (1798.3kg), with only 5kg found at a hospital.

These Halon stocks are not foreseen to be destroyed under this project. The scope of the project covers the development of a strategy to export and destroy Halons in an accredited facility outside of Lebanon.

4.3. Total Amount of ODS Waste for Disposal in the Project

The following table summarizes the total ODS stock identified in Lebanon, showing a total amount of 14,526.5kg available for destruction, including 12,733.2kg of CFCs (eligible) and 1803.3kg of Halons (eligibility uncertain). No stocks of CTC or TCA have been identified in all surveyed sectors. The budget is based on the assumption of non-eligibility of halon stocks for destruction funded by the MLF, thus only formulation of a related strategy is being proposed.

Table: 4.3.1 **ODS Stock – Overall Summary by Sector**

Sector	CFC-12/kg	CFC-11/kg	R-502/kg	R-500/kg	Halon/kg	Total/kg
Service workshops	2570.4	1250	40.8	0	0	**3861.2**
Training centers	734.4	0	0	0	0	**734.4**
Hotels	231.2	0	27.2	13.6	0	**272.0**
Hospitals	299.2	0	0	0	5	**304.2**
Malls and supermarkets	13.6	0	0	0	0	**13.6**
Cold rooms	1196.8	0	0	0	0	**1196.8**
Importers	5540	816	0	0	0	**6356.0**
Lebanese Army	0	0	0	0	1798.3	**1798.3**
TOTAL	**10,585.6**	**2066.0**	**68.0**	**13.6**	**1803.3**	**14,536.5**

5. PROJECT STRATEGY

During project preparation, various strategies were discussed and assessed by relevant stakeholders in the country and UNIDO. The following was considered:

1. Destruction at dedicated ODS incineration plant (reactor cracking; gaseous fume oxidation).

2. Destruction through co-incineration with other waste (rotary kiln incineration; liquid-incineration; municipal solid waste incineration; mass burn incinerators; modular combustors; refuse-derived fuel).

3. Destruction in a cement kiln.

4. Destruction through plasma technologies (argon plasma arc technology; inductively coupled radio frequency plasma; nitrogen plasma arc; microwave plasma).

5. Destruction through non-incineration technologies (gas-phase catalytic dehalogenation; super-heated steam reactor).

6. Destruction of ODS in the country, in existing or new facility.

7. Export for destruction in a facility abroad.

The original strategy submitted at the 72nd ExCom Meeting entailed the establishment of a destruction facility located in the country, which is detailed in Annex VI. However, in response to the decision of the ExCom at the 72nd Meeting, UNIDO in cooperation with the NOU of Lebanon, researched and explored the option of exporting ODS for destruction abroad. The situation in the country has developed in a way that currently only the export appears feasible. The implementation of this strategy is detailed in section 6.1below. The strategy for export falls under the primary objective of the Demonstration Project on ODS Waste Management and Disposal in Lebanon as it demonstrates a repeatable and sustainable approach to ODS waste destruction, and at the same time covers the identified ODS waste stocks in the country.

6. PROJECT IMPLEMENTATION

6.1. Exportation of ODS for destruction in a facility abroad

There are a number of certified destruction facilities across the globe, including facilities in the U.S., in Europe, Australia and East Asia. UNIDO has had experience in destroying ODS in facilities in the U.S. and Europe. Geographically, Lebanon is not restricted in its choice between Europe and the U.S.

The voluntary carbon markets, which would have allowed to provide additional income to the project, are volatile and the interest for carbon credits in ODS destruction overall has been in steady decline over the past couple of years; current market prices do not justify the additional efforts necessary to possibly transport the waste further, and those to be able to issue and sell the associated credits. For the possibility of accruing carbon credits through the voluntary carbon market e.g. the Climate Action Reserve (CAR) or Verified Carbon Standards (VCS), some guidelines have to be considered. The main differences being that CAR requires ODS that is sourced from Article 5 countries to be imported and destroyed in the U.S. Despite this constraint there are more ODS destruction methodologies registered under CAR than VCS. In addition, CAR offsets (Climate Reserve Tons, CRTs) are priced higher than VCS carbon credits.

Though there is a possibility to accrue CRTs, thus offsetting costs for destruction in the U.S. as co-financing, due to the current slump in carbon credit prices from ODS destruction, even for historically higher priced credits such as CRTs, destruction in Europe is a notable cost-effective option due to lower transportation costs from Lebanon to Europe compared to transport costs from Lebanon to the U.S. Therefore, the old ODS stock targeted under this project will be exported to a destruction facility in Europe. This means that destruction will take place without the issuance of credits for reduced GHG emissions.

6.1.1. QUALITY TESTING AND AGGREGATION OF ODS FOR EXPORT

Two aggregation points will be established; one in Beirut and one in Tripoli for ODS stocks collected in the northern and southern parts of Lebanon, respectively. Beirut and Tripoli, are where most old ODS stocks have been stored, and are respectively located near ports. This makes the aggregation and further transport of these stocks easier. The old ODS stocks collected will be brought by a collection truck to the respective aggregations points.

Facilities have been identified by the NOU, both of which are vocational centers and have adequate storage areas for cylinders and are also able to handle ODS accordingly. The capacities of the selected aggregation facilities will be set up to accommodate the CFC stocks identified under this project as well as for future streams of unwanted ODS to be destroyed. This involves the assistance from the Industrial Research Institute (IRI) for the testing of ODS and operation of the banking facilities. The facilities will be run as semi-government institutions under the NOU/Ministry of Environment and the IRI.

In this context, the project will support the identified aggregation facilities by providing them with the necessary equipment (ISO cylinders) and supporting them in the analysis of the composition of the stocks.

In order to prepare the designated facilities for aggregation activities, the project will provide
- 4 ISO cylinders at 950 liters each;
- 6 ISO cylinders at 200 liters each.

Prior to aggregation, testing of the composition of the various cylinders arriving at the aggregation facilities will be done at the facilities themselves. This will be done with a double objective:
- Check that the content of the cylinders corresponds to that reported by the sources of the ODS stocks;
- Aggregate ODS amounts according to similarities in composition and purity (including oil removal where necessary, decanting of cylinders into ISO containers, labelling and documentation).

6.1.2. TRANSPORTATION OF THE ODS STOCKS

All aggregated stocks in the facility in Tripoli will be transported to the facility in Beirut, or vice versa, depending from which port the shipment is launched. The distance between Beirut and Tripoli is around 84km.

Prior to the transport of all stocks, an export approval from the national government has to be acquired, as well as an import approval from the country where the CFCs are to be destroyed. Transportation will be by sea and road, depending on the location of the selected destruction facility.

6.1.3. DESTRUCTION

Destruction at a facility abroad will depend on national guidelines.

There are several options for destruction of ODS in the Europe. Within the EU, there are several incineration facilities licensed for ODS disposal, particularly in the new member states (EU legislation allows import of ODS for environmentally sound destruction). However, Hungary, Romania and the Czech Republic have stricter national legislation than the EU and import of hazardous waste for disposal is prohibited in these countries. Therefore, the only EU countries that accept imports of ODS waste are Germany, France, Netherlands, Poland and Spain, where hazardous waste import is allowed and the facilities have expertise in dealing with imported hazardous waste. All registered facilities in the EU are in line with TEAP requirements for destruction technologies, as these are requested by the EU for a facility to be licensed to destroy ODS waste.

The destruction facility will be selected through an open bidding process, to ensure the most cost-effective option is chosen for the country. The selection criteria will be based on whether the facility, a) is in compliance with the technologies approved by the Technology and Economic Assessment Panel of the Montreal Protocol[4], b) meets the performance and emissions requirements set out by TEAP, and c), is a registered EU facility. As an EU registered facility its destruction technologies have to be included in the Annex of Regulation (EC) No 1005/2009 of the European Parliament and of the Council of 16 September 2009 on Substances that Deplete the Ozone Layer.

To ensure that the destruction of its future unwanted ODS stocks is conducted in an environmentally-friendly, cost-effective manner, Lebanon will be able to repeat the selection exercise.

6.1.4. VERIFICATION OF DESTROYED ODS AMOUNTS AND REPORTING

The facilities in the EU operate on an independent basis. Depending on the facility, the verification of the compositions and amounts of ODS prior to destruction, can take place at the place of origin or at the destruction facility itself. This is either conducted by the destruction facility or by an independent lab. After destruction, a certificate is issued by the facility.

6.2. Policy Support

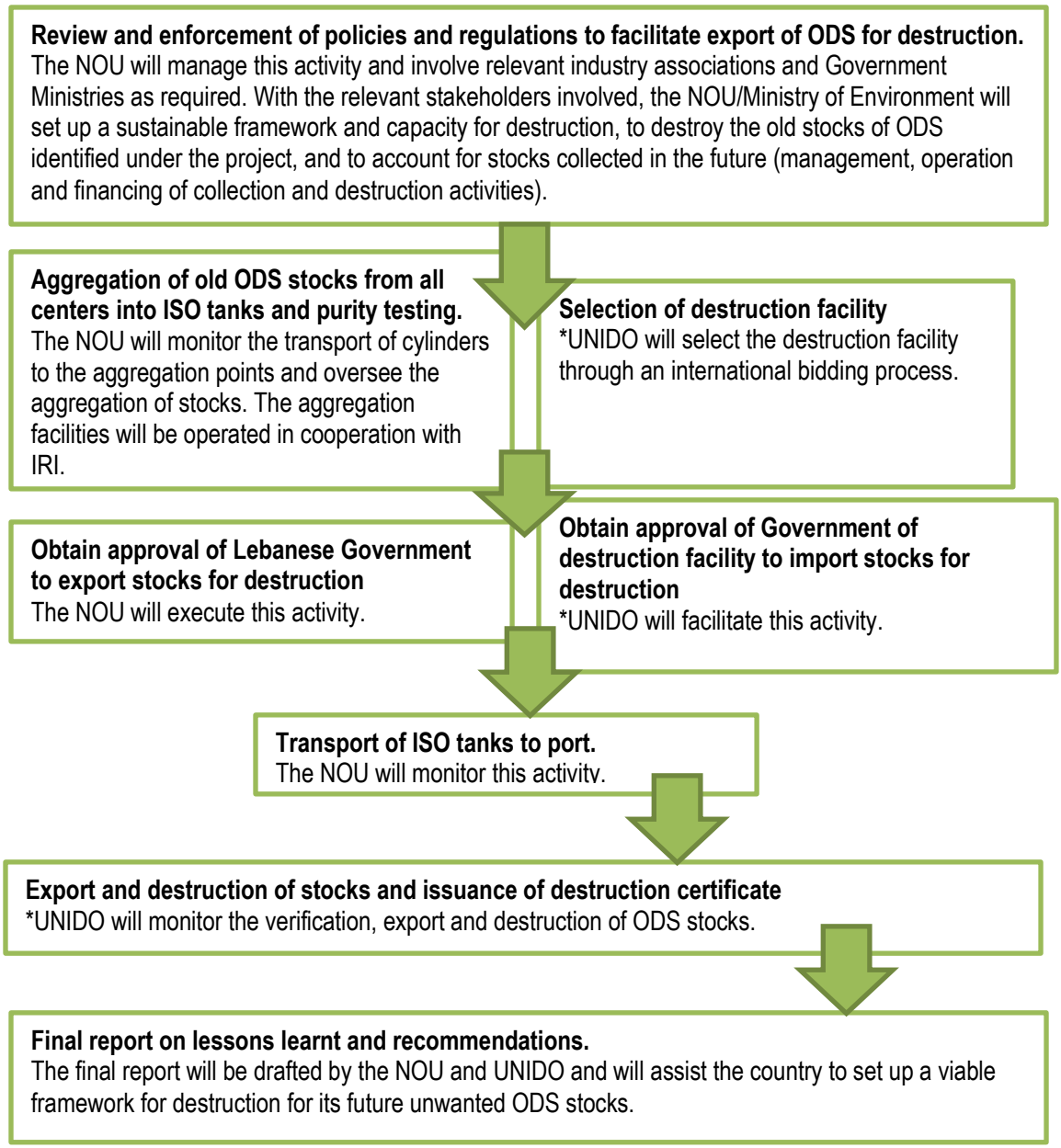
The option for establishing an ODS destruction facility in the country would require considerably more policy support than the option of exporting ODS for destruction abroad. The latter entails the review of legislation with regards to the movement and classification of hazardous waste, to allow for export of ODS waste for destruction. In both cases, policy support is required to reinforce effective legislation addressing ODS disposal in the county.

[4] TEAP - Report of the Task Force on Destruction Technologies: http://ozone.unep.org/teap/Reports/Other_Task_Force/index.shtml

6.3. Project Management and Implementation Schedule

All project activities will be implemented by the NOU and UNIDO, details of which are illustrated in the flowchart below. All activities to be executed locally will be monitored by the NOU. UNIDO will assist the NOU, and will manage all other activities. To demonstrate the sustainability of the chosen strategy to export ODS for destruction, each activity will be implemented such that it can be repeated for future unwanted ODS stocks collected in the country. At the end of the demonstration project, all activities implemented by UNIDO (*) will be managed by the NOU/MoE and the relevant stakeholders identified under the project.

Figure 6.3.1 – Flowchart of Implementation Steps and Monitoring and Management



The time-critical elements for which the project can be monitored are as follows:

- Aggregation of collected ODS for export;
- Approval of Lebanese Government to export stocks for destruction;
- Approval of Government of destruction facility to import stocks for destruction;
- Destruction of stocks and issuance of destruction certificate.

The execution of these activities on time would contribute to the timely completion of the project. The table below shows the time schedule of the various implementation steps over an 18-month period.

Figure 6.3.2: Table of Implementation Schedule for ODS Destruction Abroad

	Activities	Duration of Project (Project Months)																						
	Completion of major activities	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**
0	Introduction and enforcement of policies and regulations to facilitate export of ODS for destruction																								
1	Transportation of 12.73 metric tonnes of CFCs from different centers to aggregation points																								
2	Substance and impurity testing, oil removal where necessary, decanting of cylinders into ISO containers, labelling and documentation																								
3	Obtain approval of Lebanese Government to export stocks																								
4	Obtain approval to import stocks from Government of destruction facility																								
5	Shipment of ISO tanks for export to another country, including insurance and GPS system; Transportation inland from port to destruction facility.																								
6	Destruction (incl. purification and testing at destruction site); Issuance of destruction certificate																								
7	Preparation of a final report detailing all activities of the project and lessons learned																								

7. PROJECT SUSTAINABILITY AND DEMONSTRATION VALUE

The implementation of this project will contribute to the long-term sustainability related to the disposal of Lebanon's future unwanted ODS stocks. The significant amount of existing stocks that will be destroyed under this project will have demonstrated the procedures for their destruction abroad (transport, storage, export, destruction) and extracted the lessons learned, thereby facilitating the destruction of future stocks. As such, future exports of ODS for destruction can be carried out by the country itself. The project will also provide Lebanon the opportunity to revise its legislation on ODS disposal to ensure unwanted ODS is collected (ODS disposal infrastructure) and possible legislative hurdles for its export and destruction are eliminated. This entails the reinforcement of the existing collection scheme and connecting it to the export and destruction capacities established under this project i.e. collection truck, operational aggregation points, export route.

It should also be noted, that HPMP Stage II, will have its primary focus on the servicing sector; which, among others, will have a component on strengthening the collection scheme.

The original strategy submitted at the 72nd ExCom Meeting detailed the capacity for local ODS destruction. Although at present local destruction is not feasible, it is a technically viable option that would also ensure for a long-term sustainable solution with regards to the disposal of Lebanon's unwanted ODS stocks. This is described in detail in Annex VI.

8. PROJECT BUDGET

8.1. Total Budget - Export of Unwanted ODS for Destruction Abroad

Table 8.1.1: Project budget – Export of unwanted ODS for destruction

Item (includes 5% contingencies)	Cost (USD)		
	MLF	Co-financing	Total
Transportation of 12.7 metric tonnes of CFCs from different centers to aggregation points	8,000	24,450	32,450
Substance and impurity testing, oil removal where necessary, decanting of cylinders into ISO containers. labelling, documentation)	21,925	21,925	43,850
Shipment of ISO tanks for export to another country, including insurance and GPS tracking system; Transportation inland from port to destruction facility. (Total transport @ $1.5/kg)	19,050	0	19,050
Destruction (Purification and testing at destruction site@ $1/kg; Destruction @ $5/kg)	63,500	0	63,500
Contingency	3,500	0	3,500
Policy support; PMU	7,500	7.500	15,000
Halon disposal strategy	0	5.000	5,000
TOTAL (USD)	**123,475**	**58,875**	**182,350**

The following table shows the break-down of funding requested to the Multilateral Fund:

Table 8.1.2: Project Funding under the Multilateral Fund

Cost Item	Cost (USD)
Project funding requested to the Multilateral Fund	**123,475**
-UNIDO	123,475
Project support costs	**8,643**
-UNIDO 7%	8,643
Total requested from the Multilateral Fund	**132,118**

The project funding requested from the Multilateral Fund for the destruction of CFCs (12,733.2kg) is USD 123,475 (excluding support costs), with a total cost efficiency of **9.69 USD/kg** of ODS waste.

8.2. Project Co-Financing

The co-financing secured for this project is in-kind.

ANNEXES

Annex I: Management of Chemicals in Lebanon

A number of ministries play a role in chemical management in Lebanon. The Ministry of Agriculture covers activities concerned with agriculture pesticides, the Ministry of Public Health is responsible for pesticides destined for domestic use, the Ministry of Energy and Water is responsible for the import of petroleum derivatives, whereas the Ministry of Environment deals with hazardous and industrial chemicals as per its inaction Law Nb. 690 dated 27/08/2005 (amendment of Law 216 dated 2/4/1993).

The National Standards for Environmental Quality (based on Ministerial Decision 8/1 dated 1/3/2001) are generic standards which were developed for all sectors of industry covering stack emissions and wastewater discharges.

These standards are an important tool for the Ministry of Environment and the industrial sector, for combating common environmental problems, monitoring and enforcing environmental quality, developing environmental mitigation plans leading to sustainable development and future economic prosperity as well as fulfilling duties dictated by international conventions.

The emission limit values elaborated were the result of profound research work and an in-depth overview, revision and analysis of similar legislation in neighbouring countries, the Arab League regulations and the international agreements and obligations to which Lebanon is committed. The decision on the exact values of the thresholds was based on the level and the characteristics of the respective pollutant, the available emission combating technology, the local ecological, geographical and physical characteristics as well as the economic capacity of the Lebanese industry. These standards were scrutinised through an exhaustive evaluation process with all concerned stakeholders and were agreed upon on a consensus basis, allowing them to be nationally owned.

For stack emissions, generic as well as specific emission limit values have been developed for the main sectors of industry, including:

- The energy sector
- Power generators
- Portland cement
- Glass manufacturing
- Electroplating
- Food processing
- Battery manufacturing
- Aluminium manufacturing
- Municipal waste incinerators

Among these mentioned, two sectors are of importance for this study on potential ODS destruction in Lebanon;

Table A: **Portland Cement Industry**

PARAMETER	ELV FOR NEW FACILITIES	ELV FOR EXISTING FACILITIES	REMARK
O2 correction	-	-	Not necessary
NOx (Calculated to NO2) [mg/m^3]	1500 2000	2500	Grate firing pre-heater Cyclone pre-heater
SOx (Calculated to SO2) [mg/m^3]	800	850	

Table B: **Municipal Waste Incineration**

PARAMETER	ELV FOR NEW OR EXISTING FACILITIES
O2 correction (always)	11%
Capacity < 0.75 t/h	
Dust [mg/m^3]	30
CO [mg/m^3]	100
Total carbon of organic pollutants [mg/m^3]	20
SOx (Calculated to SO2) [mg/m^3]	100
HCl [mg/m^3]	50
HF [mg/m^3]	2
Capacity > 0.75 t/h	
Dust [mg/m^3]	30
CO [mg/m^3]	100
Total carbon of organic pollutants [mg/m^3]	20
SOx (Calculated to SO2) [mg/m^3]	200
NOx (Calculated to NO2) [mg/m^3]	400
HCl [mg/m^3]	60
HF [mg/m^3]	4
Hg [mg/m^3]	0.05
The Sum of Cd & TI [mg/m^3]	0.5
PCDD ng I-TEQ/Nm^3	0.1
PCDF ng I-TEQ/Nm^3	0.1

In Lebanon, the cement industry represents the largest source of CO2 emissions in terms of air quality. Lebanon has five plants (Holcim Lebanon, Cimenterie Nationale sal, Ciment de Sibline, Cimenterie du Moyen Orient, Societe Libanaise des Ciments Blancs) of which four are located in the North of Lebanon. Raw materials include silica, aluminium, iron and lime which is obtained from calcium carbonate. Other raw materials are introduced as sand, clay, shale, iron ore and blast furnace slag.

In 1997, the Ministry of Environment prepared a guidance note (Decision 191/1) for the cement industry on how to protect the environment and its workers from exposure to industrial pollutants. The note included conservation measures of air and water quality and kick-started a process of self-monitoring stack emissions. Cement plants monitor their emissions on a daily basis and submits monthly report to the Ministry of Environment for review.

Lebanon has signed several conventions related to waste disposal (hazardous and non-hazardous) and pollution including the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (1973), the Barcelona Convention for Protection against Pollution in the Mediterranean Sea (1976) and the Protocol for the Protection of the Mediterranean Sea against Pollution from Land-based Sources in Athens (1980). In 1994, Lebanon ratified the Basel Convention regulating the trans-boundary movement of hazardous wastes and their disposal. The

Convention also requires the Government to improve waste management, cease open burning of solid waste, minimize the generation of municipal and medical waste through source recovery, reuse, recycling, waste separation, and promoting products that generate less waste.

The following sections describe key regulations and policy issues related to hazardous waste in Lebanon:

BASEL CONVENTION

The Basel Convention was ratified by the Government of Lebanon in 1994 by the Law Nb. 387. The Ministry of Environment released a Ministerial Decision 71/1 dated 19 May 1997 (amendment of Decision 22/1 dated 17/12/1196) that regulates the import of wastes to Lebanon. The decision presents two separate waste lists: allowed waste and banned waste. The MoE receives frequent applications and invoices for waste shipment imports to Lebanon. Waste importers must be classified industrial establishments and must produce a number of documents. Since Lebanon was and still is under pressure to receive hazardous wastes, the Ministerial Decision 71/1/1997, gave the Ministry of Environment the authorization to prohibit a list of hazardous wastes to enter into the country and to put importation conditions to a certain list of hazardous wastes, mainly; (a) allowance of recyclable raw materials to be imported for industrial usage, (b) approval of the Ministry of Environment at the source of origin of exportation of such waste along with laboratory test results (bacteriological, physical and chemical), and (c) commitment from the recipient industry specifying that the imported materials will not be used other than for final disposal, neither for waste to energy applications.

It is to be noted that the ODSs (namely CFC-11, CFC-12, CFC-13, CFC-111, CFC-112, CFC-113, CFC-114, CFC-115, Halon-1211, Halon-1301 and Halon-2402) in the form of wastes had been listed by the Ministry of Environment under Decision 71/1/1997 as hazardous wastes that are not allowed to be imported into the country.

Table C: Hazardous Waste Not Allowed to be Imported into Lebanon (List B – Decision 71/1/1997)

HS CODE	DESCRIPTION OF WASTES
29.03.41	Waste of Halogenated derivatives of acyclic hydrocarbons with fluorine and chlorine (CFC-11)
29.03.42	Waste of Halogenated derivatives of acyclic hydrocarbons with fluorine and chlorine (CFC-12)
29.03.43	Waste of Halogenated derivatives of acyclic hydrocarbons with fluorine and chlorine (CFC-113)
29.03.44	Waste of Halogenated derivatives of acyclic hydrocarbons with fluorine and chlorine (CFC-114 and CFC-115)
29.03.45	Waste of Halogenated derivatives of acyclic hydrocarbons with fluorine and chlorine (CFC-13, CFC-111 and CFC-112)
29.03.46.10	Waste of Halons

STOCKHOLM CONVENTION

Lebanon ratified the 2002 Stockholm Convention on the phase out of POPs including PCBs, by 2025 (Law Nb. 432/2002). Thus, Lebanon has taken the minimum measures to reduce the total releases derived from anthropogenic sources of each of the chemicals listed in Annex C, with the

goal of their continuing minimization and, where feasible, ultimate elimination. Among the industrial sources that have the potential for comparatively high formation and release of these chemicals to the environment are cement kilns burning of hazardous waste.

The selection of wastes is a complex process and is influenced by many factors, such as kiln operation, the nature of the waste itself, the general impact on the environment, the desired clinker quality and the probability of the formation and release of chemicals listed in Annex C of the Stockholm Convention and other releases into the environment. The operator should develop a fuels evaluation and acceptance procedure. Based on this procedure an assessment is carried out of the effect of the fuel on plant emissions and the potential need for new equipment or procedures to ensure that there is no negative impact on the environment.

EUROPEAN UNION

Whereas on the international perspective, a wide range of regulations and policies had been developed regarding the hazardous wastes and their treatment. The incineration of hazardous wastes in Europe is regulated under the Council Directive 94/67/EC. The main aim of this Directive is to provide for measures and procedures to prevent or, where that is not practicable, to reduce as far as possible negative effects on the environment, in particular the pollution of air, soil, surface and groundwater, and the resulting risks to human health from the incineration of hazardous waste and, to that end, to set up and maintain appropriate operating conditions and emission limit values for hazardous waste incineration plants. Article 7 of the Directive 94/67/EC, shows that the incineration plants shall be designed, equipped and operated in such a way that at least the following emission limit values are not exceeded in the exhaust gases:

Table D: Emission limit values from incineration of Hazardous Waste in the EU

PARAMETER	**ELV FOR INCINERATION OF HAZARDOUS WASTE**	
Daily Average Values		
Total Dust [mg/m^3]	10	
CO [mg/m^3]	50	
Total carbon of organic pollutants [mg/m^3]	10	
SOx (Calculated to SO2) [mg/m^3]	50	
HCl [mg/m^3]	10	
HF [mg/m^3]	1	
Half-hourly average values	**A**	**B**
Total Dust [mg/m^3]	30	10
CO [mg/m^3]	150	100
Total carbon of organic pollutants [mg/m^3]	20	10
SOx (Calculated to SO2) [mg/m^3]	200	50
HCl [mg/m^3]	60	10
HF [mg/m^3]	4	2
All average values over the sample period of a minimum of 30 minutes and a maximum of 8 hours		
	New Plants	**Existing Plants**
Hg [mg/m^3]	0.05	0.1
The Sum of Cd & TI [mg/m^3]	0.05	0.1
The sum of Sb, As, Pb, Cr, Co, Cu, Mn, Ni, V &Sn	0.5	1

The Directive states that "the emission of dioxins and furans shall be reduced by the most progressive techniques. At the latest from 1 January 1997, all average values measured over the

sample period of a minimum of six hours and a maximum of eight hours shall not exceed a limit value of 0.1 ng/m^3 ".

Main Findings

Existing EU regulations explicitly require the recovery of all ODS/F-gases from certain categories of products and equipment at end of life. For the "other" categories, including construction foams, the obligation to recover (or immediately destroy) depends on its technical and economic feasibility. The new ODS Regulations offer also the option of destruction without prior recovery. For some end-users — namely vehicles and household/small commercial appliances — schemes are also mandated to assign responsibility for and ensure the safe disposal of products and equipment and the ODS/F-gases contained therein.

Currently, there are very little, if any, known recovery of ODS/F-gases from construction foam applications at time of demolition, with the exception of some in Germany (BING 2008). For other products/equipment for which ODS/F-gas recovery is required by law, actual recovery levels across the EU vary across Member States and end-use, and are somewhat uncertain due to a lack of comprehensive reported data. A number of factors may reduce actual recovery levels, including insufficient technician training, a lack of recovery equipment, high recovery/disposal costs, small quantities remaining in equipment at time disposal, potential losses during transport/handling, and others.

As for Lebanon, over the past decade, the government has developed important legislation (Law 444/2002, Decree 8006/2002 and Decree 13389/2004) and acceded to several new conventions (2001 Stockholm Convention). Additional legislation is still essentially needed to complete the Solid Waste Management system including:

- Law on Integrated Solid Waste Management
- Waste – to – Energy Legislation
- Compost and Sludge Reuse Standards
- E-Waste Legislation

Lebanon, like the rest of the world, is experiencing a quantum leap in electronic waste. The composition of Lebanon's E-waste is poorly documented. Therefore, in its 2010-2012 work program, the Ministry of Environment included preparing "guidelines for the treatment of specific types of waste, for example, used batteries, electronic equipment and expired goods" as a priority action. A decree to control and monitor e-waste still needs to be approved.

On another hand, some e-waste reduction initiatives had been taking place from a Lebanese NGO "Beeatoona". This NGO launched in 2008 and "E-waste and Battery recycling for a better environment" project in Lebanese schools, with the aim of raising awareness among students, teachers, and their families on environmental and health risks associated hazardous disposal of electronic waste and household batteries. The waste (mostly computers) had been dismantled and stored in a warehouse for subsequent shipment to waste disposal / recycling facilities abroad. But, warehousing had proved to be difficult because export procedures are complicated and time-consuming as they must comply with the Basel Convention.

This NGO initiative could be considered as the only shy incentive programme that had been launched in Lebanon, as no other government outreach incentive programme regarding the

electronic wastes (especially the refrigerators, air conditioners and other ODS-containing equipment) had been initiated.

Although the review reveals that no particular law has been approved and issued in relation to the destruction of hazardous wastes in Lebanon, it can be noted that to provide regulatory and policy support for enabling the industry to eliminate ODS, the Government of Lebanon has taken the following initiatives and actions:

a) ODS were included in the list of items requiring import licensing in 1998;
b) Prohibition on imports of Halons from 1998;
c) Exemption of all MLF funded inputs from import taxes from 1998;
d) Regulations on control and monitoring of ODS usage from 2003;
e) Issuance of Decree on ODS licensing and quota system in 2009, which is currently under enforcement;
f) Active monitoring of the progress of implementation of projects funded by MLF;
g) Formulation of guidelines and regulations as necessary for policy implementation;
h) Supporting public awareness initiatives and campaigns for promoting ozone layer protection at the consumer level;
i) Regular interaction with other ministries and departments, industry representatives and implementing agencies for information dissemination related to impact of policy measures.

Annex II: ODS Stock of Refrigeration and A/C Service Workshops

Table of Refrigeration and A/C Service Workshops with unwanted ODS stock - Surveyed workshops that did not report any ODS stock are not listed

	Company Name/Address	Type of workshop (MAC/RAC)	Type of CFC (R-11/ R-12/ R-502)	Quantity/ kg	Number of cylinders
1	Ahmad Al Lawzi / Koura	RAC	R-11	0	0
			R-12	81.6	6
			R-502	0	0
2	Abd el Salam Monla / Tripoli	RAC	R-11	0	0
			R-12	136	10
			R-502	0	0
3	Alaa el dine Bikdach / Koura	RAC	R-11	0	0
			R-12	27.2	2
			R-502	0	0
4	Mohamad Bhamdouni / Tripoli	MAC	R-11	0	0
			R-12	40.8	3
			R-502	0	0
5	Al Hassan Car Services / Tripoli	MAC	R-11	0	0
			R-12	122.4	9
			R-502	0	0
6	Mahsen el Hachem / Tripoli	MAC	R-11	0	0
			R-12	68	5
			R-502	0	0
7	Moukaddem car service / Tripoli	MAC	R-11	0	0
			R-12	204	15
			R-502	0	0
8	Armobel / Mkalles	RAC	R-11	0	0
			R-12	13.6	1
			R-502	13.6	1
9	Cooling Team / Verdum	RAC	R-11	0	0
			R-12	13.6	1
			R-502	13.6	1
10	Electro Hadchiti / Hadath	MAC	R-11	0	0
			R-12	13.6	1
			R-502	0	0
11	Hammoud for A/C & Ref. / Hadath	RAC	R-11	0	0
			R-12	40.8	3
			R-502	0	0
12	Saade Ref. & A/C / Jdita	RAC	R-11	250	1
			R-12	136	10
			R-502	0	0
13.	Electro Waness / Zahle	MAC	R-11	0	0
			R-12	68	5
			R-502	0	0

14.	Khaled Taha Car electric / Ghaza	MAC	R-11	0	0
			R-12	27.2	2
			R-502	0	0
15.	Abdel Latif For Ref./ Sohmor	RAC	R-11	0	0
			R-12	27.2	2
			R-502	0	0
16.	Yasser Assi Est. for Cooling / Hirmel	RAC	R-11	0	0
			R-12	40.8	3
			R-502	0	0
17.	Kiwan Workshop for A/C / Saghbine	RAC	R-11	0	0
			R-12	27.2	2
			R-502	13.6	1
18.	Ahmad Hawi Workshop / Zahle	RAC	R-11	0	0
			R-12	27.2	2
			R-502	0	0
19.	Elias Seif for Cooling & Heating / Zahle	RAC	R-11	0	0
			R-12	27.2	2
			R-502	0	0
20.	Fouad Khoury for cooling / Jdita	RAC	R-11	0	0
			R-12	54.4	4
			R-502	0	0
21.	Elie Semaan / Amchit	RAC	R-11	0	0
			R-12	13.6	1
			R-502	0	0
22.	Salameh Heat & Cool / Byakout	RAC	R-11	0	0
			R-12	27.2	2
			R-502	0	0
23.	Ziad Ephrem / Amchit	MAC	R-11	0	0
			R-12	40.8	3
			R-502	0	0
24.	Garage Louis Youssef / Zouk Mosbeh	MAC	R-11	0	0
			R-12	13.6	1
			R-502	0	0
25.	Naoum Farah / Baskinta	RAC	R-11	0	0
			R-12	27.2	2
			R-502	0	0
26.	Nabil Essayleh Est. / Hadi Nassralah	MAC	R-11	0	0
			R-12	27.2	2
			R-502	0	0
27.	Garage Ahmad Ibrahim / Tallet Khayat	MAC	R-11	0	0
			R-12	27.2	2
			R-502	0	0
			R-11	0	0
			R-12	13.6	1

28.	Arabi Bros. / Haret Hreik	MAC	R-502	0	0
29.	Solaire / Haret Hreik	RAC	R-11	1000	4
			R-12	40.8	3
			R-502	0	0
30.	Omar Zayat for Ref./ Mar Elias st	MAC	R-11	0	0
			R-12	13.6	1
			R-502	0	0
31.	Al Amouri for Ref. & AC / Ghobeiri	MAC	R-11	0	0
			R-12	1128.8	83
			R-502	0	0
	TOTAL		**R-11**	**1250**	**5**
			R-12	**2570.4**	**189**
			R-502	**40.8**	**3**

Annex III: ODS Stock of National Training Centers

Table of Vocational Training Centers with unwanted ODS stock

	Company Name/Address	Type of CFC (R-12)	Quantity/ kg	Number of cylinders
1	National Institute for Technical Training (Dekwaneh , Beirut)	R-12	40.8	3
2	Technical and Industrial Institute (Dekwaneh , Beirut)	R-12	54.4	4
3	Art and Technical School (Dekwaneh , Beirut)	R-12	0	0
4	Ajaltoun Technical School (Ajaltoun, Kesrwan)	R-12	0	0
5	Saida Technical School (Saida, South)	R-12	13.6	1
6	Badnayel Technical School (Badnayel, Bekaa)	R-12	27.2	2
7	Bent Jbeil Technical School (Bent Jbeil, South)	R-12	27.2	2
8	Al Amlieh Technical School (Beirut)	R-12	0	0
9	Tripoli Technical Institute (Tripoli, North Lebanon)	R-12	544	40
10	Deir Amar Technical School (Deir Amar, North Lebanon)	R-12	0	0
11	Bekaa Technical School (Khyara, Bekaa)	R-12	27.2	2
12	Bir Hassan Technical School (Beirut)	R-12	0	0
	TOTAL	**R-12**	**734.4**	**54**

Annex IV: ODS Stock of Large End-users

Table of End-users with unwanted ODS stock - Surveyed end-users that did not report any ODS stock are not listed

	Company Name/Address	Type of CFC (R-11/ R-12/ R-500/R-502/ Halons)	Quantity/ kg	Number of cylinders
	HOTELS			
		R-12	136	10
		R-500	0	0
1	Palma Resort / Tripoli	R-502	0	0
		R-12	68	5
		R-500	0	0
2	San Stephano Resort / Batroun	R-502	0	0
		R-12	13.6	1
		R-500	13.6	1
3	Regency Palace Hotel / Adma	R-502	13.6	1
		R-12	13.6	1
		R-500	0	0
4	Le Commodore Hotel / Hamra	R-502	13.6	1
		R-12	**231.2**	**17**
		R-500	**13.6**	**1**
	TOTAL for hotels	**R-502**	**27.2**	**2**
	HOSPITALS			
		R-12	149.6	11
1	Islami Hospital –A / Tripoli	Halons	0	0
		R-12	108.8	8
2	Islami Hospital-B / Tripoli	Halons	0	0
		R-12	0	0
3	Dallaah Hospital / Saida	Halons	5	1
		R-12	27.2	2
4	U M C (Rizk Hospital) / Achrafieh	Halons	0	0
		R-12	13.6	1
5	Mazboud Hospital / Chouf	Halons	0	0
		R-12	**299.2**	**22**
	TOTAL for hospitals	**Halons**	**5**	**1**
	MALLS & SUPERMARKETS			
1	A B C / Dbayeh	R-12	13.6	1
	TOTAL for malls and supermarkets	**R-12**	**13.6**	**1**
	COLD ROOMS			
1	Maarad (samad) / Tripoli	R-12	163.2	12
2	EL Bissar / Tripoli	R-12	408	30
3	EL Chami / Tripoli	R-12	272	20
4	AL Chemal / Tripoli	R-12	340	25
5	Cortas Conserve S.A.L.	R-12	13.6	1
	TOTAL for cold rooms	**R-12**	**1196.8**	**88**

Annex V: ODS Stock of Importers of Industrial Gases

Table of Importers of Industrial Gases with unwanted ODS stock

	Company Name/Address	Type of CFC (R-11/ R-12)	Quantity/ kg	Number of cylinders
1	A RASSY & CO S.A.L Al Nahr	R-11	0	0
		R-12	3500	257
2	ABCO for Cooling Conditioning & General Trade Mar Mikhael	R-11	0	0
		R-12	0	0
3	B.T. DIGITAL CLIMATE Beirut	R-11	0	0
		R-12	0	0
4	THE NATIONAL TRADING COOPERATION - CARRIER Mark Mikhael	R-11	0	0
		R-12	0	0
5	E.K. Cooling Technology Naccach	R-11	0	0
		R-12	0	0
6	Electro Moussa Beirut	R-11	0	0
		R-12	0	0
7	EMACO S.A.R.L Mar Mikhael	R-11	0	0
		R-12	0	0
8	FARJALLAH TRADING CO. Beirut	R-11	0	0
		R-12	0	0
9	FRIGIGAS Nahr El Mott	R-11	0	0
		R-12	0	0
10	FRIGO ADAM Mar Mikhael	R-11	0	0
		R-12	0	0
11	FRIGO LIBAN Accaoui	R-11	816	3
		R-12	2040	150
12	K.G. GROUP S.A.R.L Ain Roummaneh	R-11	0	0
		R-12	0	0
13	Cedar Cool Beirut	R-11	0	0
		R-12	0	0
14	Baalbaki Group S.A. Beirut	R-11	0	0
		R-12	0	0
	TOTAL	**R-11**	**816**	**3**
		R-12	**5540**	**407**

Annex VI: Development of a Strategy for Local ODS Destruction

The original strategy submitted at the 72nd ExCom Meeting entailed the establishment of a destruction facility located in the country, which is detailed below. However, in response to the decision of the ExCom at the 72nd Meeting, UNIDO in cooperation with the NOU of Lebanon, researched and explored the option of exporting ODS for destruction abroad. The situation in the country has developed in a way that currently only the export appears feasible. The implementation of this strategy is detailed in section 6.1 of the project document.

However, should the situation in the country change again and should sufficient co-funding be available to carry out local destruction with the same level of Multilateral Fund funding, UNIDO proposes to provide the necessary flexibility to do so while maintaining the amounts destroyed.

Cement Kilns

The selection of wastes is a complex process and is influenced by many factors, such as kiln operation, the nature of the waste itself, the general impact on the environment, the desired clinker quality and the probability of the formation and release of chemicals listed in Annex C of the Stockholm Convention and other releases into the environment. The operator should develop a fuels evaluation and acceptance procedure. Based on this procedure an assessment is carried out of the effect of the fuel on plant emissions and the potential need for new equipment or procedures to ensure that there is no negative impact on the environment.

Performance requirements based on best available techniques for control of PCDD/PCDF in flue gases should be < 0.1 ng I-TEQ/Nm3 with reference conditions of 273 K, 101.3 kPa, 11% O2 and a dry gas basis.

As per the BAT/BEP Guidelines of Stockholm Convention in order to control kiln process, continuous measurement is recommended for the following parameters:

- Pressure;
- Temperature;
- O2 content;
- NOx;
- CO, and possibly when the SOx concentration is high;
- SO2 (a technique is being developed to optimize CO with NOx and SO2).

Over and above these parameters control of mercury (if mercury content in the waste is high) should be ensured.
To accurately quantify the emissions, continuous measurement is the best available technique for the following parameters (these may need to be measured again if their levels can change after the point where they are measured to be used for control):

- Exhaust volume (can be calculated but the process is regarded by some as complicated);
- Humidity;
- Temperature at particulate matter control device inlet;
- Dust/particulate matter;
- O2;
- NOx;
- Dust;

- SO2;
- CO.

Regular periodical monitoring is the best available technique for the following substances:
- Metals and their compounds;
- Total organic carbon/organic components;
- HCl, HF;
- NH3;
- PCDD/PCDF.

Measurements of the following may be required occasionally under special operating conditions:
- Destruction and removal efficiency, in the case of destruction of persistent organic pollutants in cement kilns;
- Benzene, toluene, xylene;
- Polycyclic aromatic hydrocarbons;
- Other organic pollutants (principal organic hazardous constituents, e.g. chlorobenzenes, PCB including coplanar congeners, chloronaphthalenes).

It is especially important to measure metals when wastes with higher metal content are used as raw materials or fuels.

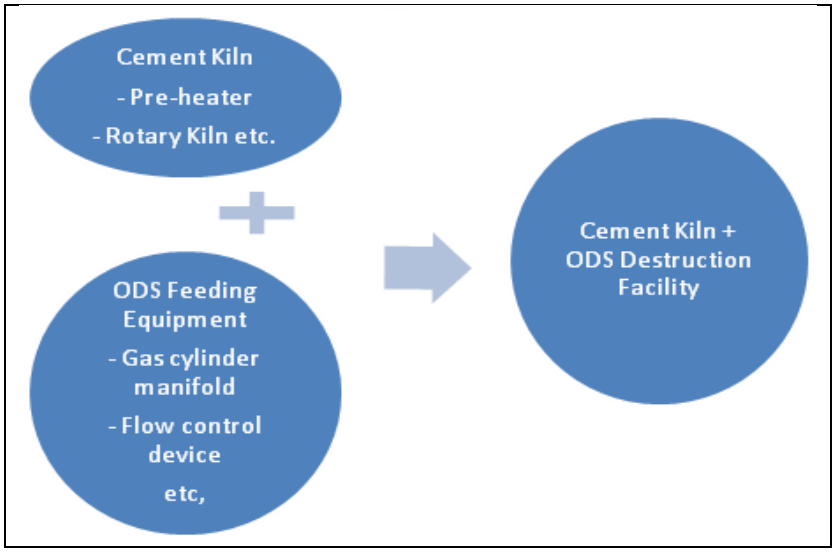
Establishment of a Local Destruction Facility

I) MODIFICATION OF THE CEMENT KILN

Cement kilns can be modified or retrofitted to destroy ODS in them with high efficiency, especially due to the high temperatures that are prevalent in them. However, in addition to the installation of ODS feeding equipment, flue gas and stack monitoring systems need to be installed and the emissions monitored accordingly.

The following diagram represents the process of modifying existing cement kilns to handle ODS:

Figure A: Cement Kiln Retrofitting to Destroy ODS



II) PILOT TESTING

Approach

This stage of the project implementation is of paramount importance in order to ensure adequate disposal of the bulk of ODS waste at a later stage. The pilot tests will be designed to ensure that the facility meets the following requirements:

- High ODS removal capacity;
- The operational parameters should be set in a way to minimize the generation of decomposition products like chlorides and fluorides;
- Proper treatment of chlorides, fluorides and other toxic wastes in exhaust gases, effluent water, ashes etc.

During this stage of project implementation, special attention will be paid to the following:

- Flue gas and stack monitoring systems in the cement kiln have to be checked and, if necessary, re-engineered in its design parameters to ensure that relevant emissions are monitored accordingly;

- The input of ODS into the facility needs to be controlled to avoid chlorine deteriorating the quality of the cement produced during ODS destruction activities.

If the test results are not satisfactory, proper action has to be taken to ensure that all detected problems are rectified, followed by another pilot run.

Technical Aspects of the Pilot Tests

The Technology and Economic Assessment Panel (TEAP) of the Montreal Protocol set up a Task Force on Destruction Technologies (TFDT). The Task Force, in its report in 2002, established destruction efficiency and air emissions recommendations for ODS destruction.

For determining whether facilities are operating with minimal impacts to human and environmental health while destroying ODS, the "TEAP recommendations" include specifications for the following parameters:

- Destruction and Removal Efficiency (DRE);

- Emissions of Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs)/Dioxins and Furans, Hydrochloric Acid (HCl), Chlorine (Cl_2), Hydrofluoric Acid (HF), Hydrobromic Acid (HBr), Bromine (Br_2), Particulate Matter (PM), and Carbon Monoxide (CO);

- Technical capability when destroying ODS on a commercial scale.

The following table presents the DRE and emission limits recommended by the TEAP (for

concentrated sources).

Table B: Destruction Efficiency and Air Emission Limits Recommended by TEAP for ODS Destruction

Efficiency/Emission	Limit[a]
DRE (%)	99.99[b]
PCDD/PCDFs (ng/m^3)	0.2
HCl/ Cl_2 (mg/m^3)	100
HF (mg/m^3)	5
HBr/ Br_2 (mg/m^3)	5
Particulate Matter (mg/m^3)	50
CO (mg/m^3)	100

Source: Task Force on Destruction Technologies, TEAP (2002)
[a] Emission limits are expressed as mass per dry cubic meter of flue gas at 0°C and 101.3 kPa corrected to 11 percent O_2.
[b] A DRE of 95 percent is required for the destruction of dilute sources of ODS (i.e., foams containing ODS).

Measurement of the ODS destruction efficiency during the pilot tests will be done as follows:

- The ODS concentration in the exhaust gas, and the quantity of ODS fed for destruction should be identified. The ODS destruction can be verified based on Removal Efficiency (DRE), shown below:

$$DRE = \frac{N_1^{in} - \sum_i N_i^{out}}{N_1^{in}}$$

  Where N_1^{in} is the number of moles of ODS fed into the system and N_i^{out} is the number of moles of i^{th} type of ODS that is released into the atmosphere.[5]

- ODS removal efficiency can be checked by the ODS concentration in the exhaust gas or decomposition efficiency. The ODS concentration in the final exhaust gas should be 1 ppm or lower or the decomposition efficiency shall be 99.99% or higher;

- The ODS destruction efficiency will be checked at appropriate frequencies.

III) QUALITY TESTING AND AGGREGATION

The ODS waste to be destroyed in the context of this project has been collected through the existing collection activities in the country, as detailed in Section 2.6., namely, the ODS stock collected at various refrigeration service workshops, training centers and large end-users all across the country.

In order to increase the cost-efficiency of the destruction activities, the project plans to aggregate[6] the identified stocks at a reduced number of locations in the country; the objective is

[5] Formula recommended by TEAP 2002.
[6] The concept "aggregation" as defined in this project document cannot be linked to "collection" as defined in Annex VIII of document UNEP/OzL.Pro/ExCom/58/53. Collection takes place outside the scope of the project, in the context of the various collection activities already in place as detailed in Section 2.6. In the context of this

to reduce the transportation costs by optimizing transportation loads on their way to the identified destruction facility. With regard to the selection of the aggregation facility, two options have been assessed in this regard:

- Aggregation prior to transport of the ODS waste to the destruction facility;
- Aggregation at the destruction facility.

The proposed ODS destruction facility – Holcim Lebanon – is located in Chekka in North Lebanon. The establishment of two aggregation points, one at the destruction facility and one in Beirut, for ODS stocks collected in the northern and southern parts of Lebanon, respectively.

In this context, the project will support the identified aggregation facilities by providing them with the necessary equipment (ISO cylinders) and supporting them in the analysis of the composition of the stocks.

In order to prepare the designated facilities for aggregation activities, the project will provide

- 4 ISO cylinders at 950 liters each;
- 6 ISO cylinders at 200 liters each.

Prior to aggregation, testing of the composition of the various cylinders arriving at the aggregation facilities will be done at the facilities themselves. This will be done with a double objective:

- Check that the content of the cylinders corresponds to that reported by the sources of the ODS stocks;
- Aggregate ODS amounts according to similarities in composition and purity.

The latter is especially important given the fact that, for destruction in cement kilns, purity levels above 95% are recommended for the ODS stocks to be destroyed in order to avoid impurities which, upon thermal incineration, may degrade the cement quality by affecting the pH content inside the kiln. However, in the context of this project, it is worth noting that the above-mentioned purity level is not a requirement given the fact that the feed rate of ODS waste is very small compared to the throughput of the kiln. Notwithstanding this, an effort will be made during the aggregation activities in order to maximize purity to the extent possible.

IV) TRANSPORTATION OF THE ODS STOCKS TO THE CEMENT KILN

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

- Location of the established collection points;
- Location of the selected aggregation facilities;
- Location of the selected destruction facility;
- Existing road network.

project, aggregation is understood as a first stage of the transportation activities which aims at minimizing transportation costs.

A clear identification of the distances to be covered is needed in order to have an accurate estimate of transportation costs; in this regard, the following has to be noted:

- Approximately 50% of the ODS stocks identified are located in northern Lebanon. These will be transported from their various collection points and aggregated at the destruction facility in Chekka.

- The other 50% of the ODS stocks are located in their various collection points in the rest areas of Lebanon. These will be transported to the aggregation facility in Beirut.

- The distance from the aggregation facility in Beirut to the destruction facility in Chekka is around 65km.

V) DESTRUCTION

Description of the Destruction Facility

The selected cement kiln where destruction activities in the context of this project will be undertaken is located in the city of Chekka, some 65km from the capital Beirut. Founded in Switzerland in 1912, Holcim is one of the world's leading suppliers of cement and aggregates (crushed stone, sand and gravel). Holcim also supplies ready-mix concrete and asphalt, and provided related services. The Holcim plant in Chekka was built in 1929 and has been operational since. In 1997, it was equipped with a 65 meter-long modern kiln, with a production capacity of about 5800 tonnes of clinker per day, totalling 1.8 million tonnes per year.

The main operational parameters are as follows:

- Temperature in the precalciner: 900 ° C
- Kiln temperature is in excess of 900° C at the inlet and can reach up to 2000° C at the lower end
- Clinkerisation occurs at temperatures at 1400 - 1650° C for 0.5 – 2 hours.

With regard to emissions during normal operation, the following has to be noted:

- **Dust emissions** are regularly monitored at Holcim – Lebanon. For recorded dust emissions that reach 25mg/m3, bag filters are taken in for maintenance. The process consist of separating one compartment filter (1 of 4), reducing the kiln production rate by 30% for 9-10 hours, the time it takes to service a filter or exchange it for a new one.

- Kiln **stack emissions** are continuously controlled with Holcim's own advanced online monitoring system. The recordings conform to Lebanese standards and Holcim's international standards. Reports of the recorded emissions are sent to the Ministry of Environment on a monthly basis. The following table gives an overview of some emission levels at Holcim plant. Recorded emissions are far lower than the set local standards.

Table C: Comparison of Emission Levels at Holcim-Chekka Plant (on 5th June 2012) with National and International Standards

POLLUTANT	Decision 52/1 (29/7/1996)	Decision 8/1 (30/1/2001)	European Directive	Holcim-Lebanon Standards	Measured emissions fr. Holcim-Lebanon on 5th June 2012	Deviation from Decision 8/1
Dusts	50 mg/m^3	200 mg/m^3	30 mg/m^3	<30 mg/m^3	1 mg/m^3	-99.5%
SO_2	500 mg/m^3	800 mg/m^3	200 mg/m^3	<500 mg/m^3	7.4 mg/m^3	-99.1%
NO_x	1200 mg/m^3	1500 mg/m^3	800 mg/m^3	<800 mg/m^3	752.9 mg/m^3	-49.8%

Moreover, once a year, an accredited organisation is mandated to monitor the emissions at the plant (2 to 3 weeks). A copy of the official report is sent to the Ministry of Environment.

Operational Details during Destruction Activities

Operational Control Conditions

The facility will be operated in a similar manner to ordinary cement production so that successful destruction of ODS and safe control of exhaust gas are ensured. ODS feeding will be undertaken as follows:

- The flow rate of ODS to be fed will be determined taking into account the capacity of the exhaust gas treatment system and the influence on quality of products, or cement clinker;
- ODS will be sprayed at the position close to the burner before the kiln under the normal operation control conditions;
- Equipment for feeding ODS will consist of an oil filter, a flow meter and other relevant device to feed ODS quantitatively;

The following will be done to monitor the operational control conditions during destruction activities:

- Measurement of the following items:
  - Physical conditions at the specific points of the kiln where ODS are destroyed, mainly temperature of combustion;
  - Exhaust gas volume after treatment;
  - Concentration of carbon monoxide (CO) at the outlet of exhaust gas;
  - Concentration of oxide (O_2) at the outlet of the incinerator or the secondary combustion chamber;
- Measurements will be pursuant to the procedures set in the applicable laws and regulations and the related standards;
- Measurements should be conducted on a daily basis.

Measurement of Toxic Substances

During ODS destruction activities, plant operators will take the following actions to measure the quantities of toxic substances released, following the normal continuous monitoring procedures:

- Verification that the exhaust gas emitted during ODS destruction activities meet the standards specified by the applicable laws and regulations. The following items which could generate or increase through the ODS destruction shall be measured:

  - Concentration of hydrogen chlorides (HCl) in the final exhaust gas;
  - Concentration of hydrogen fluorides (HF) in the final exhaust gas;
  - Concentration of dioxins in the final exhaust gas;
  - Content of fluorides in effluent water;
  - Concentration of hydrogen ions in effluent water.

- The measurements should be pursuant to the procedures set in the applicable laws and regulations and related standards;

- Measurements will be conducted at least once per year in addition to those required in the applicable laws and regulations;

VI) VERIFICATION OF DESTROYED ODS AMOUNTS AND REPORTING

The Project Management Unit established during the implementation of the will require the cement kiln, where destruction will take place, 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 points of origin of 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 cement kiln, as well as of an accredited independent industry leading inspection, verification, testing and certification service.

Upon completion of the project activities focused on achieving the destruction of the ODS waste, the PMU will be responsible for the preparation of a final report detailing all activities of the project and lessons learned. Such a report will be endorsed by the Lebanese Government and UNIDO, and will be shared with all stakeholders for their understanding.

The proposed project does not contemplate the possibility of generating carbon credits from the

destruction activities to be undertaken during implementation of the project; however, revenues from carbon financing are considered as one of the components of the financing mix that will contribute to ensure long-term sustainability of ODS destruction activities in the country beyond implementation of this project, as described in Section 7 of this project document.

With this in mind, implementation of the project will provide the framework to set up a code of good practices in line with the requirements of the applicable voluntary carbon market schemes which, from the perspective of verification and reporting activities, will include the following:

- Documentary evidence shall be provided to verify the origin of the destroyed ODS waste. Such evidence may consist of shipping manifests, bills of lading, other commercial documentation, and addresses of households, commercial premises and other evidence of collection of the products;

- Where ODS waste is recovered from products that have been imported specifically for their disassembly, destruction facility shall request documentary evidence, such as shipping manifests, bills of lading and evidence of collection of the products in the originating country, to demonstrate the origin of such products;

- Where ODS waste consists of refrigerant mixtures containing substances whose destruction does not generate carbon credits, the destruction facility shall develop a methodology to determine the amount of ODS contained in such mixtures. This shall be achieved using a mass balance analysis and/or other approach (based on conservative assumptions), as appropriate to the nature and scale of the project.

In addition to this, UNIDO will apply its experience in previously approved ODS waste destruction projects to advise the Government of Lebanon on how to set up an electronic verification system with the following functionalities:

- Registry of companies / facilities owning ODS waste (points of origin) with an indication of stored amounts and amounts processed for disposal;

- Registry of enterprises carrying out ODS waste collection;

- Database on ODS destruction data, such as destroyed amounts, regular inspections of the destruction facility and storage sites.

Implementation Schedule for ODS Destruction in Lebanon

	Activities	Duration of Project (Project Months)																							
	Completion of major activities	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**
0	Introduction and enforcement of policies and regulations to facilitate ODS destruction in the country																								
1	Preparation of an implementation plan for the modification of the cement kiln																								
2	Preparation of engineering designs and modification of the cement kiln																								
3	Pilot tests to be done in the modified kiln																								
4	Quality testing and aggregation ODS waste from all sources																								
5	Transportation of the tanks to the cement kiln																								
6	Final destruction of the stocks and issuance of a final destruction certificate																								
7	Preparation of a final report detailing all activities of the project and lessons learned																								

Total Budget for ODS Destruction in Lebanon

Table showing New Budget for Local ODS Destruction

Cost Item	Cost (USD)		
	MLF	Co-financing	Total
Available funding	147,733		
Modification of the cement kiln	0	141,750	141,750
Pilot testing	16,602	25,398	42,000
Transportation	11,000	21,450	31,900
Substance and impurity testing, documentation)	10,814	15,750	26,564
Destruction	68,948	0	68,948
Contingency	5,368	0	5,368
Policy support; PMU	30,000	0	30,000
Halon disposal strategy	5,000	0	5,000
TOTAL (USD)	147,733	204,348	351,531

Project Sustainability and Demonstration Value

a) Technical factors contributing to sustainability of ODS destruction efforts in Lebanon

Destruction in a cement kiln ensures a destruction capacity which is large enough to handle the ODS waste generated in the country, and even that which could arrive at the facility from neighbouring countries. Taking into account that the facility's main activity is not ODS waste destruction but cement production, the sustainability and profitability of the facility's operation is not subject to a regular inflow of ODS waste. The risk that operation of the cement kiln may be halted due to low demand of cement in the country is very low. Even in the case of such a halt occurring for a limited period of time, this would not have an impact on ODS destruction in the cement kiln as the batch-based destruction scheme could be easily adapted at point of aggregation level to avoid accumulation of ODS waste in the cement kiln's storage facilities.

b) Introduction of an effective legislation addressing ODS disposal

The decree issued in 2009 for an ODS licencing and quota system is enforced rigorously in the country. This has allowed Lebanon to be in compliance with the Montreal Protocol's phase-out targets, collecting the unwanted ODS stocks at various locations across the country. There is however no existing law which relates to the destruction of hazardous wastes, including ODS, which are considered hazardous substances. The issuance of a law is essential for the destruction of ODS to be conducted in an environmentally-friendly and sustainable manner.

This demo project provides Lebanon with the opportunity not only to have a facility which can destroy the ODS in an environmentally friendly manner within the country, but also to

issue and enforce a law to mandatorily destroy unwanted ODS. Once the law is in place and is enforced, and the project is implemented, the owners of the stocks will be moved to pay for the testing, transportation and destruction of their stocks. This process would only need the support of the Lebanese government to fix the prices of these activities. This will also provide Lebanon with an opportunity to plan for future disposal operations involving unwanted HCFCs, since their phase-out has also started from 1st January 2013.

At the onset of the implementation of this project, informative sessions will be organized by the National Ozone Unit to inform all relevant stakeholders about the necessity for Lebanon to have laws mandating the destruction of ODS and other hazardous wastes. In addition, with the set-up of an ODS destruction facility in the country, implementation of the project would contribute to create the adequate enabling environment to enforce the obligation to destroy ODS waste, once the law is in place.

c) Awareness raising at stakeholder and civil society level

A thorough stakeholder engagement process will be undertaken in order to ensure for a cooperative environment in the setting up of an ODS disposal infrastructure in the country. Concerns from environmental groups need to be addressed by explaining the environmental integrity of the process and that the resultant products, if handled carefully, would not violate any regulatory or emission norms, apart from having no health and safety implications.

d) Facilitation of access to carbon financing for ODS destruction upon completion of the project

Upon completion of the project, revenues from carbon financing should be considered as one of the components of the financing mix that will ensure sustainability of Lebanon's efforts in undertaking environmentally friendly ODS waste disposal.

There are currently two international carbon market protocols that are important while discussing the issue of generating carbon financing from ODS destruction projects. There is a proven track record of projects that have gained carbon credits by destroying ODS stocks by applying two voluntary standards: the Verified Carbon Standard (VCS), and the Climate Action Reserve (CAR); both standards have robust ODS destruction methodologies in place.

In the case where ODS waste is to be destroyed in the selected facility in the country, the only applicable voluntary carbon market scheme is VCS, due to the fact that CAR only accepts ODS destruction activities undertaken in certified facilities located in the United States. Implementation of the project will provide the framework to set up a code of good practices in line with the requirements of the VCS methodology with specific emphasis in verification and reporting activities.

Upon completion of the project, the cement kiln will be in a position to obtain carbon credits for future destruction activities due to the experience obtained (through the implementation of this project) in terms of project cycle management for registration under VCS. This will pull destruction prices down under any of the following two scenarios:

a) Should ownership of the ODS stocks remain under the points of origin throughout the project cycle, they will obtain a revenue through carbon credit sales, thus partially

compensating for the costs incurred in undertaken destruction of the collected ODS waste; in this case, the role of the destruction facility from the point of view of the carbon financing is that of a mere service provider;

b) Should ownership of the ODS stocks be transferred to the destruction facility, this will be the beneficiary of the revenue obtained from carbon credit sales. Under such a scenario, the destruction facility is the active stakeholder in the carbon financing scheme, and both government and companies owning the stocks will be in a position to negotiate a reduced destruction price.

e) Establishment of a ODS waste disposal infrastructure that can be used by other countries in the Middle Eastern Region

Throughout implementation of the project the Lebanese government will, with the support of UNIDO, engage in a consultative process to assess the possibility of making special provisions to allow the import of unwanted ODS into the country for the purpose of destruction. This would require some amount of supervision and checking to ensure that there is no placing of the ODS waste in the market, but if done, it will provide additional arguments to substantiate the sustainability of the project because there is no other facility in the region.