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执行蒙特利尔议定书
多边基金执行委员会
第六十六次会议
2012 年 4 月 16 日至 20 日，蒙特利尔

项目提案：土耳其

本文件载有基金秘书处对下列项目提案的评论和建议：

销毁

- 消耗臭氧层物质废物管理和处置试点示范项目 工发组织

项目评估表-非多年期项目

土耳其

项目名称	执行机构
消耗臭氧层物质废物管理和处置试点示范项目	工发组织

国家协调机构：环境和城市化环境管理部

项目讨论最近**报告的**消耗臭氧层物质消费量数据

A: 第 7 条数据（2010 年 ODP 吨）

附件一，氟氯化碳	0		

B: 国家方案行业数据（2010 年 ODP 吨）

消耗臭氧层物质	次级行业/数量	次级行业/数量	合计
氟氯化碳			0

本年度业务计划：资金总额 1,844,700 美元　　淘汰总额 130 ODP 吨

项目名称

企业用途消耗臭氧层物质		暂缺
将淘汰的消耗臭氧层物质		暂缺
逐渐采用的消耗臭氧层物质		暂缺
本业务计划项目		是
行业		消耗臭氧层物质废物
次级		制冷维修行业
项目影响		103.72 公吨 CFC-12
项目时间		24 个月
当地所有权		100%
输出部分		%
申请多边基金赠款	美元	1,076,250
执行机构支助费用(7.5%)	美元	80,719
多边基金负担的项目费用总额	美元	1,156,969
成本效益	美元/公斤	10.37 ODS(公吨)
项目监测进度标志		包括

秘书处的建议	单独审议

项目说明

导言

1. 工发组织代表土耳其政府，向第六十六届会议提交一份消耗臭氧层物质废物管理和处置试点示范项目提案，按原提案费用为1,583,500美元。项目是按照第58/19 号决定提交的，解决在该国销毁130公吨消耗臭氧层物质废物。

2. 执行委员会第五十七次会议向工发组织提供资金，为土耳其编制一个消耗臭氧层物质试点示范项目。会议作出决定，考虑处置消耗臭氧层物质试点项目以响应缔约方大会第二十次会议第XX/7 号决定，其中规定在具有代表性和区域多样性的第5 条国家，展开一些试点项目，可能包括收集、运输、储存和销毁消耗臭氧层物质，着眼于集中的、净全球升温潜力高的库存。成员们还强调处置消耗臭氧层物质试点项目应当是可行的，并应包括利用共同供资方法。土耳其是根据这些标准选择的国家之一。

背景

3. 执行委员会第五十八次会议讨论了消耗臭氧层物质处置项目的选择标准和准则，而后做出第58/19号决定。该决定确立了审查和核准处置消耗臭氧层物质示范项目的基础。秘书处根据该决定确立的原则，对这项提案进行了审查。秘书处也适用了该决定的(a)(二) 分段，该段具体规定，不为试点项目的收集消耗臭氧层物质废物提供资金。第五十七次会议的报告附件三内载有关于收集消耗臭氧层物质的定义，题为“为消耗臭氧层物质处置示范项目供资暂定准则所包括的活动的定”。土耳其的试点项目包含已经收集的消耗臭氧层物质废物和将通过地方一级已有的个回收和收集系统收集更多的数量。

4. 土耳其试点示范项目，设法示范一种以使用多边基金援助作为种子资金，销毁无用消耗臭氧层物质并获得碳信贷的、可持续的（从收集到处置的）消耗臭氧层物质废物管理模式。获得的信贷嗣后将用于维持现有的消耗臭氧层物质回收和收集系统，以便以后纳入其他制冷剂。预计在试点示范项目之后，这一系统应当完全可以自力更生，并在今后岁月中进一步激励消耗臭氧层物质废物的管理和销毁活动。意图是今后由地方焚烧设施进一步销毁消耗臭氧层物质废物。

5. 项目还提供机会同全球环境基金处理销毁持久性有机污染物，尤其是多氯聯苯废物存量项目实现协同作用，项目可以在协调机构监测下平行实施。为本项目第二阶段考虑的消耗臭氧层物质地方焚烧设施（没有多边基金供资）目前正在作为区域持久性有机污染物处置中心进行认证。本文件附件一载有详尽的项目提案。

项目说明

6. 工发组织提交的试点项目处置83.72吨 CFC-12和50吨哈龙，共计133.72 吨无用消耗臭氧层物质。土耳其境内，政府授权在三个城市，即安卡拉（TUHAB）、伊斯坦布尔（ISISO）和伊兹米尔（ESSIAD） ，设立回收和利用中心。还有许许多多向这些较大的中心输送的小型回收和利用行业。因此该项目的一个目的是落实机制措施，将该国现有的回收和收集

系统组织成一个综合有效的收集验证和定值系统，在今后支持该项目使之可以持续下去。在项目编制过程中，已通过协商研究班为这一倡议寻求私营和公营部门合作。

7. 这一收集网络也得到国家的几个法规的支持，其中之一是关于废弃的电器和电子设备的，这一法规是完成技术研究后于2006年末部分采用的。 这一法规将在环境和城市化部的协调下，同相关的行业机构合作实施。预期立法将于2012年中生效。政府政策倡导先进的环境政策（比如禁止排放消耗臭氧层物质，界定回收利用方案的供资责任），支持消耗臭氧层物质废物管理业务模式的可持续性，该项目也会得到政府政策的支持。

8. 土耳其销毁消耗臭氧层物质废物的总体办法是输出销毁，由政府确定的项目开发商(Pan Gulf)进行。Pan Gulf还将为项目共同供资。该试点项目的经验将鼓励地方废物回收/收集商从已在处理准备回收的设备中，收集消耗臭氧层物质废物，以便因销毁获得潜在收入。输出的消耗臭氧层物质将由一个销毁设施销毁，该设施符合技术和经济评估小组销毁技术工作组报告和《良好管理守则》中具体规定的国际标准。土耳其以今后销毁将使用一个地方焚毁设施（IZAYDAS） 。这一设施需要获得达到技术和经济评估小组指示的99.99 %的销毁清除率的认证。

9. 消耗臭氧层物质销毁示范项目预计两年内完成。

将处置的消耗臭氧层物质估计数

10. 按照提交的提案，试点项目将处理的消耗臭氧层物质为133.72 吨。其中有83.72吨的CFC-12和50 吨的哈龙 1301。 这些都储存在单个的回收和利用设施中，随时可以销毁。消耗臭氧层物质废物估算量的来源见下表1：

表1: 项目将处置的消耗臭氧层物质废物估算量

收集来源	**数量(CFC-12 和哈龙)（公吨）**
ASO 回收中心（TUHAB）	0.62
金属商品工匠联盟	5.1
分散的维修工场（金属商品工匠联盟报告）	3
其他来源（制冷和空调设备维修公司和各责任方案等报告）	75
土耳其哈龙库	50 (哈龙)
合计	**133.72**

项目的财务管理

11. 提案预计，通过与项目开发商Pan Gulf签订合同，多边基金的供资可支付将现有消耗臭氧层物质废物输出至美利坚合众国的一个经认证的销毁设施加以销毁的费用。同政府间合同的基础是由属于土耳其的信贷，或者是由政府授权的一个机构分担费用。信贷只能

由环境和城市化部颁发的限于某一具体时段的核准信件发放。这一碳项目将在环境和城市化部管理的登记处登记。

12. 提案还预见设计一种制度，从将销毁消耗臭氧层物质得到的信贷货币化，用于扩大该项目，但要看试点活动的结果。

销毁的监测和核查

13. 为了确保销毁全部消耗臭氧层物质废物，将密切监测销毁过程，通过为此建立的一个电子数据库系统记录数据。项目开发商Pan Gulf 将制定一个涵盖所有作业的监测计划，并就项目的所有相关活动提出报告。计划会规定收集数据的频率，规定记录制度和参与监测的每一个人的任务。该计划还制定质量控制规定，确保在整个项目过程中，不断对全面运作、数据收集和消耗臭氧层物质进行分析。这一切将纳入一个总的数据管理系统，确保消耗臭氧层物质整合商、项目开发商和销毁设施的数据相互协调。该系统同由环境和城市化部气候单位管理的国家碳登记处密切联系。该单位将和国家臭氧机构密切合作。由于土耳其没有生产设施，没有夸大数量或不符合资格的存量的风险。

项目费用

14. 为该项目申请的资金估算总额为1,583,500美元。详情见下表。

表 2：提议的项目费用

	活动	**多边基金资金（美元）**	**Pan Gulf 的共同供资**
1	第一阶段 CFC-12 回收单位油气分离	185,000	
2	三个 ISO 容器（10000 升）	60,000	
3	碳市场项目管理（文档，销售等）	125,000	
4	保健、安全、环境培训（同国际专家举办技术讲习班）	65,000	实物捐助（讲习班、培训员、专家）：150,000 美元
5	提高认识	50,000	
6	销毁由土耳其现有高能效电器替代方案收集的 CFC-12	440,000	CFC-11 和& CFC-12 奖励方案
7	焚毁哈龙	225,000	哈龙奖励方案
8	监测和核查销毁消耗臭氧层物质	100,000	

	活动	多边基金资金（美元）	Pan Gulf 的共同供资
9	将土耳其境内分散的消耗臭氧层物质运至集中设施，在 ISO 容器内汇总，以便运至美国	50,000	
10	将汇总的 CFC-12 运至美国销毁设施 (RemTec)	150,000	
	小计	**1,450,000**	
	应急费（占各项的 10%，第 4 和第 5 项除外）	133,500	
	合计	**1,583,500**	

秘书处的评论和建议

评论

15. 秘书处按照第58/19号决定规定的标准进行了审查，据此对提交的项目申请提出了若干评论和意见。秘书处指出，消耗臭氧层物质废物收集系统基本上由全国已建立的回收利用设施承担，不过还需要设立一个系统来组织更集中地收集。秘书处提请工发组织注意以下事实，根据准则收集活动没有资格获得资金。工发组织回应说，虽然该系统将是试点项目的主要产出之一，但是设立系统不使用多边基金的任何资金。经过项目开发商倡议，目前正设立一个奖励方案，向收集消耗臭氧层物质废物提供小额财务奖励，认为会推动将来形成更广的收集系统。此外，工发组织向秘书处通报，土耳考虑到会成为欧洲联盟的未来成员，正使其现有回收、利用和销毁法规正同欧洲委员会的法规接轨。

16. 还向工发组织提到将哈龙包括在内的问题，提请注意第58/19（a）（二）d号决定，和按照决定要求，该内容没有任何额外的示范价值这一事实。工发组织同意取消提案中涉及的哈龙数量。工发组织随后通知秘书处，政府授权的一个回收利用中心刚刚又记录下20公吨CFC-12，这将补充到试点项目包含的数量之中。于是试点项目将处理的消耗臭氧层物质废物总量最后确定为已经收集到的103.72公吨CFC-12。

17. 秘书处还要求澄清为什么不能在欧洲的一个设施销毁消耗臭氧层物质废物，那里的运输费用可能更具成本效益，对碳信贷的监测也更严格。秘书处也请工发组织注意执行委员会关于墨西哥销毁消耗臭氧层物质项目提出的类似问题，一些成员对如何使用自愿市场计算和决定碳信贷表示关切。秘书处要求工发组织说明选择这一办法的理由。工发组织澄清说，探索过输送到欧洲销毁设施的问题。但是，在欧洲寻找碳信用买家比在美利坚合众国找更具有挑战性，可能由此引起延误。此外Pan Gulf提出的共同供资包括该实体负责开展一切必要活动，通过碳信贷获取收入。Pan Gulf的价值在于它有经验，还有它通过与气候行动储备方案认证的焚烧设施RemTec的长期协定，同气候行动储备方案直接联系。土耳其政府由此得出结论，通过Pan Gulf输出到美利坚合众国的一个设施这一选择，对于项目和国家都会产生可以持久的最好结果。

18. 秘书处还要求对项目第二阶段做出澄清，以便了解今后的可持续性，并审议当地的废物焚烧设施IZAYDAS。工发组织确认IZAYDAS将在进程的第二步中担任主角。该设施得到授权，目前对化学和危险废物，包括按照现有的国家废物处置法规对消耗臭氧层物质进行焚烧作业。可是，该设施和碳交易方案不链接，也不同项目提议的整合收集系统链接。因此试点项目在试点阶段内要建立这样的链接，以确保该公司被包括在碳交易方案之中，进一步获得资金和加强收集、核查和销毁能力。建议该设施用其自身资源、从地方/区域供资机构、或者一旦该设施与本方案链接之后，由碳交易活动中得到的收入，对其处里消耗臭氧层物质废物的能力进行必要的调整。然后，该设施在第二阶段接管国内焚烧消耗臭氧层物质废物。工发组织还强调，试点项目中IZAYDAS不寻求多边基金的资本投资。

19. 秘书处同工发组织进一步讨论预算时指出，一些项目没有资格获得资金，因为它们用于收集活动和/或哈龙，据此对它们做了调整。由于做了这些调整，最后商定项目费用为1,076,250美元，外加支助费用80,719美元，按10.37/公斤美元计算，低于第58/19号决定规定的13.2/公斤美元的低限。归纳为下表：

表 3：商定的项目费用

项目	活动	多边基金供资（美元）	共同供资（美元）
1	三个 ISO 容器（10000 升）	60,000	
2	碳市场项目管理（文档，销售等）	100,000	
3	保健、安全、环境培训（同国际专家举办技术讲习班）	30,000	150,000
4	销毁由土耳其现有高能效电器替代方案收集的 CFC-12	550,000	CFC-11 和 CFC-12 奖励方案
5	监测和核查销毁消耗臭氧层物质	85,000	
6	将土耳其境内分散的消耗臭氧层物质运至集中设施，在 ISO 容器内汇总，以便运至美国	50,000	
7	将汇总的 CFC-12 运至美国销毁设施 (RemTec)	150,000	
	小计	**1,025,000**	
	应急费（占各项的 5%，第 3 项除外）	51,250	
	合计	**1,076,250**	

建议

20. 谨建议执行委员会考虑：

(a) 赞赏地注意到土耳其政府提交了臭氧层物质废物管理和处置项目，销毁103.72公吨消耗臭氧层物质废物；

(b) 是否核准在土耳其执行消耗臭氧层物质废物管理和销毁试点项目，费用为1,076,250美元，外加给工发组织机构支助费用80,719 美元，但有如下谅解，即不再为土耳其今后任何消耗臭氧层物质处置项目提供资金。

MULTILATERAL FUND FOR THE IMPLEMENTATION OF THE MONTREAL PROTOCOL ON SUBSTANCES THAT DEPLETE THE OZONE LAYER				
PROJECT COVER SHEET				
COUNTRY	Turkey	**IMPLEMENTING AGENCY**		UNIDO
PROJECT TITLE	Demonstration project for disposal of unwanted ODS in Turkey			
PROJECT IN CURRENT BUSINESS PROJECT		Yes		
SECTOR		ODS Destruction		
SUB-SECTORS		Refrigeration and Air-conditioners (CFCs) sub-sector; Fire fighting (halons) sub-sector		
ODS DESTROYED	2 years of project (MLF funded) 2 years of project (MLF funded) Carbon Trading Offset Programme, (expected average per year)		80 50 30	mt of CFCs mt of halons mt of CFCs
PROJECT IMPACT	ODS reduction per annum 2 years of project (MLF funded)		 40 25	 mt of CFCs mt of halons
	Reflecting annual emissions in CO_2 equivalent in refrigerating sector Reflecting annual emissions in CO_2 equivalent in fire fighting sector		324,000 140,000	t CO_2e t CO_2e
	Carbon Trading Offset Programme (expected average per year)		27 3 218,700 11,400	mt of CFC-12 mt of CFC-11 tCO_2e tCO_2e
PROJECT DURATION			2 Years (MLF funded phase)	
PROJECT COSTS				
	Incremental Capital Costs	US$	1,335,000	
	Contingencies	US$	133,500	
	Incremental Operating Costs	US$		
	Policy & Management Support	US$	115,000	
	Total Project Costs	US$	1,583,500	
LOCAL OWNERSHIP			100%	
EXPORT COMPONENT			0%	
REQUESTED GRANT		US$	**1,583,500**	
COST EFFECTIVENESS		US$/kg	12.2	
IMPLEMENTING AGENCY SUPPORT COSTS		US$	118,762	
TOTAL COST OF PROJECT TO MULTILATERAL FUND		US$	1,702,262	
STATUS OF COUNTERPART FUNDING			Committed - provided by Pan Gulf (in kind contribution for the training workshops USD 150,000 and incentive programme for substances)	
PROJECT MONITORING MILESTONES			Included	
NATIONAL COORDINATING BODY			TR Ministry of Environment and Urbanisation G.D. of Environmental Management (NOU)	

Project summary

UNIDO is submitting a demonstration project for disposal of unwanted ozone depleting substances (ODS) in Turkey to the 66th Meeting of the Executive Committee. This project will cover the disposal of 80 ODP tons of CFC-12 and CFC-11 in the domestic refrigerator sector of Turkey and 50 ODP tons of halons from the Halon Bank of Turkey in the next 2 years. **This quantity of CFCs has already been collected** from various sources in the country. The collected CFC-12 will be incinerated in an eligible destruction facility in the United States as required by the CAR Protocol *Article 5 Ozone Depleting Substances Project Protocol Destruction of Article 5 Ozone Depleting Substances Banks Version 1.0* (see http://www.climateactionreserve.org/). As supporting measures during the initial period the collection and recovery system will be improved and, if required, the legislative system will be adapted. (The MLF shall fund the transportation/storage and destruction activities of these 2 years, costs for improving the collection system and changing legislation will be covered by income from sale of carbon credits.)

Assuming a price of USD 3 per ton of CO_2e and emission reductions of approximately 300,000 CO_2e, the activities of the first two years will generate a financial value of around 900,000 Mio USD through utilization of the carbon market. This financial benefit will be used to implement a sustainable recovery and collection system for ODSs with the view to later incorporate other refrigerants. This system should be fully self-sustaining without further need for financial support. It should create incentives for further ODS waste management and destruction activities **in future years which will lead to an estimated additional destruction of 30 ODP tons of CFC-11 and CFC-12 per year – Carbon Trading Offset Programme** (Please NOTE: there is no funding requested from the MLF beyond the first two years of the project). This latter part of the programme consists of the recovery and collection of ODS from various sources in Turkey, in particular end of life treatment refrigerators, air-conditioning equipment and servicing activities.

This project is **unique and innovative** in its approach because it demonstrates for the first time:

- That funds from MLF may not only be used for a one time destruction of ODS but will provide a type of "seed money" for implementing a sustainable, comprehensive ODS waste management and destruction system in Turkey for the future,
- the sourcing of co-funding from the carbon market as proposed by the *Report by the Secretariat on funding opportunities for the management and destruction of banks of ozone-depleting substances (UNEP 2009),*
- fund raising in the private sector by involving companies specialized in RAC manufacturing, waste management and incineration activities, and
- the implementation and operation of state of the art recovery and collection technologies in an Article 5 country enabling an improvement of ODS collection and recovery activities and thereby significantly reducing the impact on the ozone layer as well as on the global climate.

PREPARED BY	UNIDO (K. Vigh and M. Cevik)	**DATE**	18 February 2012
REVIEWED BY	UNIDO (P. Krajnik and S. Mohammed)	**DATE**	20 February 2012

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PROJECT OF THE GOVERNMENT OF TURKEY

DEMONSTRATIONPROJECT FORDISPOSAL OF UNWANTED ODS IN REPUBLIC OF TURKEY

1. Project objectives and strategy

UNIDO submits a Demonstration Project for Disposal of Unwanted ODS in Turkey to the 66th Meeting of Executive Committee of the Multilateral Fund for the implementation of the Montreal Protocol.

The project aims to develop a sustainable business model for ODS waste management from collection to disposal, in a way that shows how "seed money" from the MLF can be used within a country to take the banked ODS and destroy it so that it can generate carbon credits. This will create income to those who participate. Thus, the demonstration project will show how this financial mechanism can be used as an incentive to enterprises in A5 countries, such as India, China, Brazil, and Mexico, to participate in carbon trading programs for profit or for lower cost destruction.

Therefore the objective of the project is to implement a sustainable and integrated business model for an efficient ODS waste management system (including the establishment of an effective recovery system for CFC-11 in insulation foam used in refrigerators, as well as CFC-12 in refrigeration equipment) and to destroy 80 metric tons of CFC-12 and CFC-11 in the refrigerator sector in Turkey and 50 metric tons of halons (halon-1301);

1. Destroying already collected/accessible 80 ODP tons of CFC-12 and 50 ODP tons of halon-1301 located in the Halon Bank of Turkey (in the first two years of the project is considered as the demonstration phase- to be funded by the MLF);

2. Investing the financial benefits created through the use of the carbon market *(by selling the emission reductions generated through destruction activities in the first 2 years)* in modifying and/or improving national legislation with regard to a producer/distributor responsibility program for ODS containing equipment and improving the collection and recovery system in Turkey.

This will result in annual destruction of additional 27 ODP tons of CFC-12 and 3 ODP tons of CFC-11 adding up to 30 ODP tons in future years (to be sustainably funded through the annual sale of carbon credits, as well as other national incentive systems to be implemented in parallel).[1]

The proposed implementation mechanism, partially funded by MLF with the in-kind contributions to be provided by Pan-Gulf Co. as well as the beneficiaries listed in Section 6; will recover CFC-12 and CFC-11 from domestic refrigerators and other refrigeration systems to be considered within the implementation process.

The current legislation on ODS and waste management gives the authority of the regulating certification and monitoring of waste recycling and recovery activities to the Ministry of

[1] The consumption of CFC-11 in the past years has been very low.

Environment and Urbanization (MoEnU, G.D. of Environmental Management). Work is ongoing to adapt the system to the requirements of the 2002/96/EC-Directive (WEEE-Directive), under the coordination of MoEnU and in close cooperation with the relevant institutions. The proposed entry into force of this legislation is mid 2012.

Besides this ongoing work of the Ministry, companies have been licensed for the destruction of electric and electronic waste; including licenses for the destruction of the dangerous waste/chemicals (one company also got a license to store such goods). 1 company (İZAYDAŞ) is authorized to conduct waste incineration. 17 companies of different size have been declared as eligible to de-manufacture electronic equipment for recycling. Nine of these facilities recycle air-conditioning and refrigeration equipment. All facilities are capable to recycle materials such as iron, aluminum, copper, chrome, plastics, paper, etc. In 2011, the number of the recycled electronic waste was reported approximately 6,000 tons.

The Turkish Halon Bank (TUHAB) is the only authorized institution for the collection and verification of halons as well as other ODSs. It was established under the Ankara Chamber of Industry in 2007, and carry out its activities in cooperation with the other recovery and reclamation centers established in Istanbul (ISISO) and Izmir (ESSIAD) during the phase-out activities funded by MLF. Implementation will be done under the overall coordination of a Coordination/Implementation Board to be established by the National Ozone Unit in collaboration with these Centers and active participation of relevant institutions such as the RAC Sector Association, private sector and government institutions such as the Waste Management Department of the Ministry of Environment and Urbanization.

IZAYDAŞ Co. as the only authorized incineration plant of the country and other public and private sector companies will also be included in the implementation of the project (chapter 6).

The project complies with the criteria established by Decision 58/19 including focus on specific aspects not addressed by other pilot projects. This project is unique and innovative in its approach, because it demonstrates for the first time in the country/region:

a. Funds from MLF may not only be used for a one time destruction of ODS but will provide a type of “seed money” for implementing a sustainable, integrated and comprehensive ODS waste management and destruction system in Turkey for the future years. If the business model is proven to be viable any lessons learned regarding the application of carbon markets and the introduction of producer responsibility programs could likely be modified and transferred to other countries where collection activities have already been carried out,

b. Resource mobilization from the Turkish private sector, chambers, associations, unions and development agencies,

c. Co-funding from Pan Gulf Industrial Company,

d. The sourcing of co-funding from the carbon market as proposed by the Report by the Secretariat on funding opportunities for the management and destruction of banks of ozone-depleting substances (UNEP 2009),

e. The implementation of advanced environmental policies (such as ban on venting of ODS, defining responsibility for financing recycling programs) which support the establishment of the business model for ODS waste management,

f. The implementation and operation of state of the art recovery and collection technologies in an Article 5 country enabling an increase of ODS collection and destruction efficiency and thereby significantly reducing the impact on the ozone layer as well as on the global climate.

g. The extraction and destruction of CFC-11 from insulation foams would be the next step for setting up an advanced waste management system for ODS. There are ongoing and pipelined R&D activities and projects by research institutions in cooperation with the private sector companies, on the recovery of CFC-11 from insulation foams. The Project will cooperate and include such contributions by the institutions to provide extremely valuable "real life" data about the amount of CFC-11 contained in insulation foams of refrigerators and scientific methodologies, etc. to improve and further develop the system.

h. The project can build upon a well established energy efficiency strategy in Turkey through which around 2 million domestic refrigerators and air conditioners will be collected by the end of 2025 and from which over 100 tons of ODS have been collected for destruction. By providing a clear strategy for the beneficial destruction of ODS, further energy efficient programs will provide incentive opportunities.

UNIDO strongly believes that this project proposal is a real opportunity to demonstrate to Article 5 countries, that ODS destruction could be self-sustained and moreover self-financed through the commercialization of carbon credits, as well as national or self-funding/incentive mechanisms and the results of this demonstration project can be replicated in other Article 5 countries.

2. Justification for the ODS disposal pilot project

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 comply with all the requirements as set out by the above mentioned Decision 58/19.

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

The project includes all categories of activities for the disposal of ODS namely collection, transport, storage and destruction, however it only seeks funding from the MLF for the later three activities in relation to the existing stock of 80 tons of ODS (CFC-12 and CFC-11) as described in (iv) in line with the interim guidelines for the funding of demonstration projects for the disposal of ODS.

All collection activities will be financed through the innovative use of carbon markets and other national incentive programmes to be mobilized by the relevant national bodies involved in the implementation.

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:

The potential synergies with relevant programmes in the country can be listed as follows:

- The ongoing projects on energy efficiency and POPs, under implementation by UNDP in cooperation with UNIDO and relevant ministries (e.g. Ministry of Industry, Minsitry of Energy and Natural Resources, Ministry of Environment and Urbanization), as well as national institutions in the country, funded by GEF and co-financed by partnering Ministries and private sector companies. These efforts are linked with relevant EU and international legislations such as Stockholm Convention, Energy Efficiency and Labeling regulations of EU.
- Improvement of Turkish legislation on environment and chemicals, by the MoEnU, e.g. adaptation of RoHS and WEEE directives of EU, as by-laws,
- Ongoing R&D activities by universities in cooperation with private sector institutions and national research funds.

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

The project activities aim to handle a total estimated amount of 80 MT of CFC-12 within the first two years of the project, based on the official data provided by the authorized institutions to the National Ozone Unit on the already collected and accessible amounts, and the calculation of the potential amount to be covered with the relevant equipment collection or recycling activities together, which is in a very advanced stage of the collection. Details are given below (see item iv.).

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

The expected amount of CFC-12 for incineration for the first two years of the project is estimated to be 80 MT, based on the data on the already collected and recorded quantities provided in the below table.

Table 1: Overview of the reported and accessible amounts of CFC stocks in Turkey by January 2012

Source of collection	**Quantity CFCs**
ASO Recovery Center (Turkish Halon Bank-TUHAB)	0,62 MT
Metal Goods Craftsmen Federation (MESF)	5,1 MT
Dispersed Service Shops (reported by MESF)	3 MT (minimum)
Other sources (reported by servicing companies for refrigeration and air-conditioning equipment, responsibility programmes, etc.)	75 MT (minimum)

Source: TUHAB, MESF

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.

According to the By-law on Phase out of Ozone Depleting Substances and Montreal Protocol, the Government developed a licensing program for individuals and companies involved in the repair and maintenance of refrigerators and other products, which require ozone depleting substance for their continued functioning. This program ensures that the recovery, recycling and recharge of ozone depleting substances will be consistent with the overall goal of ozone depleting substance phase out. Three centers have been established for the recovery, recycling and reclamation of ODS. Those form the basis for the refrigeration management system which already started in 2005.

As a supportive action energy efficiency related collection campaigns for refrigerators and white goods have been launched. The activities aim to replace old equipment by new machinery with a better environmental profile. Within the project the close co-operation with the RAC sector associations, leading manufacturing companies, service shop associations and networks enhanced.

The NOU officially requested the relevant institutions to provide data and update the NOU on their activities on this collection programs on a regular basis. Also NOU declared intention to include this request as a reporting obligation to the relevant legislation, in cooperation with the relevant departments of the Ministry (e.g. Climate Change and Waste Management Departments).

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

As already mentioned in table 1, 50 metric tons of halon-1301 currently stored in the Turkish Halon Bank will also be destroyed. The destruction of this quantity equals an incineration of 500 tons of CFC, thus adding a high environmental benefit to the project. Together with the incineration services provided by Pan Gulf Company (chapter 4) is gives an example on now excess quantities of such substances can be handled on a region level.

3. Background on ODS and waste related legislation in Turkey

List of legislations relevant to the project

Main legislations with respect to the ozone depleting substances are the Law on Environment No.2872 (Official Gazette: 11 August 1983, no 18132) as amended by the Law No.5491 (Official Gazette: 13 May 2006, no 26167) and the By-law on Phase-out of the Ozone Depleting Substances (Official Gazette: 25 July 1999, no 23766) which regulate controlled substances, control of use and placing on the market, trade controls and reporting requirements.

The development of the national legislation reflects Turkey's intention to join the EU and its effort to transpose EU regulations into national laws. Following acts are important for this project:

1. The main laws are the Law No. 2872 on Environment as amended by Law No. 5491 and the Law No 4856 on the Establishment and Duties of MoEnU.

2. Since 2004, Turkey is party to the UN Framework Convention on Climate Change (UNFCCC) and since 2009 to the **Kyoto Protocol**. Therefore Turkey has been considering how Directive 2003/87/EC on **emissions trading** is applicable in the country. The current rate of greenhouse gas emissions per capita in Turkey is lower than the average for the OECD countries or economies in transition.[2] The statistical office, TURKSTAT is responsible for the collection and processing of relevant data.

3. All provisions (the only exception being Article 8 on the establishment of a reporting and data recording system) of Directive 91/689/EEC on **hazardous waste** have been transposed into the 2005 By-Law on Hazardous Waste Control. MoEnU and its Provincial Directorates have been designated as competent authorities for:
    a. Provisional storage, disposal and recovery of hazardous waste;
    b. Inspection of disposal/recovery facilities and preparing plans and programmes for waste management.

4. MoEnU and the Ministry of Transport are responsible for the issuing of licenses for transport. For reporting purposes, waste producers and operators of waste disposal/recovery facilities are obliged to keep the records on type, amount and other characteristics of waste (e.g. mode of transport, method of treatment) and to submit them to MoEnU. Turkey indicated the need to establish an inventory of data on hazardous waste, to strengthen the administrative capacity (notably in the monitoring), to enhance industry awareness with regard to the management of hazardous waste and to build new disposal/recovery facilities.

5. There is an ongoing work on the adaptation of the Directive 2002/96/EC on **waste electrical and electronic equipment** (WEEE), which was partially adopted by the end of 2006 after finalization of technical studies, as the national WEEE by-law, under the coordination of MoEnU, in cooperation with the relevant sector institutions. The proposed period for the entry into force of the draft legislation mentioned to be mid 2012, by the MoEnU Officers.

6. As regards Directive 2001/80/EC on **Large Combustion Plants (LCP),** Turkish legislation (notably the By-Law on Air Pollution Control) provides for definitions of LCPs, sets emission limit values, designates MoEnU, Provincial Governors and local authorities as competent bodies, lays down requirements concerning monitoring of emissions (e.g. methods and frequency of measurements) and reporting. According to the estimations there are around 70 installations13 falling within the scope of the directive, the majority of which meet the emission targets set in the directive. Difficulties in the implementation of the Directive may be expected due to high costs of investment needed (in some cases the modernization of existing installations will be initiated only after completion of privatization process). The administrative capacity, in particular with regard to enforcement and inspection should be strengthened.

7. The Directive 2000/76/EC on **incineration of waste** (incl. definitions, procedure of application, principles of operation, issuance of permits, emission limit values, monitoring

[2] Green House Gas emission per capita in Turkey: 4.17 tonnes

mechanism, methods and frequency of measurements) has been transposed as well as the remaining provisions in 2007. In 2011, there were 18 facilities (1 incineration and 17 co-incineration plants) operating on the basis of a license issued by the MoEnU. These facilities are suitable to destruct the electronical waste and recycle the materials such as iron, aluminum, copper, chrome, plastics, paper, etc. By 2010 the number of the recycled electronical waste recorded by the MoEnU to be around 6,000 tons.

Institutions authorized by the relevant regulations for ODS collection, validation and destruction in the country can be summarized as follows:

The Turkish Halon Bank (TUHAB), established under the Ankara Chamber of Industry in 2007, is the only authorized institution for collection and validation of halons and other ODSs, with a ministerial circular (MoEF -No.200/4). TUHAB also designated as the coordinating institution within the CFC & Halon phase-out activities uner Turkey National Programme for ODS Phase-out, as one of the recovery and reclamation centers.

Recovery and Reclamation Centers ISISO and ESSİAD, in cooperation with the other centers established in Istanbul (ISISO) and Izmir (ESSIAD) within the CFC phase-out activities funded by MLF.

IZAYDAŞ (Izmit Waste and Residue Treatment, Incineration and Valuation Co.Inc.), a company of the Kocaeli Metropolitan Municipality, is the only authorized institution for the waste incineration processes in the country.

Metal Craftsmen Federation (MESF), authorized for the in-site collection, validation and recovery of the ODSs, via their member organizations, service technicians, by using the ODS recovery equipments provided within the previous CFC phase-out programme.

The improvement of Turkish legislation is considered as another important element of the proposed demonstration project, to ensure the creation of a sustainable, integrated and transparent ODS waste management system.

The proposed changes shall include:

1. Ban on venting of ODS and on deposition of ODS containing products/equipments (wastes) in landfills
2. Defining and assigning the responsibility for financing recycling programs (e.g. local authorities, producer responsibility programs).
3. Requirements that the applied recycling technology achieves an acceptable amount of ODS recovery.

Implementation will be done under the overall coordination of a Coordination/Implementation Board to be established by the National Ozone Unit with the active participation of relevant institutions including Waste Management Department of the MoEnU, IZAYDAŞ Co, etc.

4. Co-financing component: Pan Gulf Industrial Company

4.1 Background of Pan Gulf Company

Pan Gulf Industrial Company is a wholly owned subsidiary of Pan Gulf Holdings. The enterprise is active in the business world in the Middle East for over 30 years and is listed in the top 50 companies in Saudi Arabia.

Pan Gulf can be regarded as a leading company offering solutions for environmental problems. As a principal approach the company follows global environmental organizations, which set out strict guidelines for safe recycling and destruction of halons and ODS and global warming gases. It also offers training and educating to individuals as well as organization to improve their environmental profile.

The enterprise offers state of the art processing for halon and ozone depleting substance (ODS) in the Middle East and Asia, meet international standards for recycling and adhere to the most up to date specifications. It also uses the latest in halon and ODS recycling equipment, sophisticated laboratory equipment, performing series of test and by utilizing our internationally trained technicians.

The halon and ODS recovery and recycling provided meets current standards set out by the Montreal Protocol, ASTM – D7673-10, ISO – 7201-1 (1989) Mil Spec – DTL – 38741A for Halon 1211, ASTM D 5632 – 8 Type 1, ASTM D 5632 – 08 Type 2, ISO -7201 (1989) for halon 1301, and GOST standard for halon 2402. Pan Gulf provides our customers with full laboratory certificates.

Pan Gulf has formed a partnership with Reclamation Technologies International Company, RemTec. RemTec provides technical support to Pan Gulf.

4.2 Objective of activities undertaken by Pan Gulf

1. Destroy all Ozone Depleting Substances (ODS), meeting highest standards of the Montreal Protocol
2. Fulfill a United Nations Industrial Development Organization (UNIDO) objective of providing ODS destruction services to Turkey and Western Asia and potentially the Western Asian Region and Africa.
3. Provide an incentive towards the collection of ODS
4. Provide co-financing to the overall project to enhance components such as training, certification and verification.
5. Provide technical assistance to the Government of Turkey.

Through the direct involvement and experience of the company in the area of ODS destruction, the following items will be undertaken to assist the Government of Turkey and UNIDO:

- Destruction of ODS collected through this project.
- Monitoring and Verification of ODS Destruction.
- Provide Carbon Market project management, including handling documentation, sales and other administrative as well as technical assistance.
- Transportation of aggregated CFC to RemTec for destruction.

- Provide technical assistance, including providing training workshops to be held in both facilities located in the USA and Saudi Arabia; the workshops will also cover health and environmental issues.

- **Technical Support Component**

The project will address not only the destruction as the only subject, because the environmental and economic benefit mainly depends on successful marketing of the recovered construction materials (steel, plastics, rubber, aluminum, glass, etc.). These activities will need to be supported through provision of a technical support component for ensuring that the collection of the high quantities of recovered material could be sold. This coincides with the priorities to develop recycling activities in Turkey.

Under the technical support component the following actions are planned:
a) Establish quality standards for the recovered construction materials using data and information from the de-manufacturing equipment supplier.

b) Conduct four workshops to ensure a high level of professional technical assistance in the fields of health and safety and for protection of the environment for technicians who are working in the collection of end-of-life refrigerator. The workshop goal is to ensure a high level of assistance in the fields of health and safety and for protection of the environment.

- **Monitoring and verification of the destruction**

In order to ensure that all the ODS are properly monitored and accounted for, Pan Gulf well develop a monitoring plan capturing all operations and reporting activities associated with this ODS destruction project. It will stipulate the frequency of data collection; a record keeping plan; the role of each individual involved in monitoring; quality control provisions to ensure that operations, data acquisition and ODS analyses are carried out consistently and with precision; and will develop data management systems and coordination of data between ODS aggregators, project developers, and destruction facilities.

4.3 Project Financing & Pan Gulf Co-Financing

The proposal envisaged that funding from the Multilateral Fund will cover the costs of destruction of the currently available ODS waste by exporting it for destruction to an accredited destruction facility in the United States. The demonstration project also foresees co-financing, to which Pan Gulf will undertake the following components and offer co-financing.

- **ODS Collection Incentive – Co-Financing**

Pan Gulf will provide an incentive for the collection of the ODS as described below.

Table 2: Financial incentives provided by Pan Gulf

Substance	**UNITS**	**Incentive amount in US$**	
		Pure	**Non-Pure**
CFC 11*	**kg**	**$ 1.5**	**$ 1**
CFC 12	**kg**	**$ 2.5**	**$ 2**
Halon 1301		**$ 1.5**	

5. Destruction of ODS

RemTec International's' processing systems and plasma arc technology provides the highest levels of Destruction and Removal Efficiency (DRE) levels of any of the technologies available. Dioxins and Furans are almost non detectable. The process can be regarded as safe, environmentally preferred and accepts 100% waste streams of all ODS including halons.

5.1 Facility Requirements

- RemTec International's state of the art processing and tracking systems for ODS
- Plasma Arc Destruction Equipment and Technology
- ARI Standards Certified Laboratory
- Complete Tracking of the recovery, processing, testing, and destruction of the ODS
- Aggregation to qualify for Carbon Offsets
- Protocol to meet Third Party Verification

- **RemTec International – Supporting Information**

RemTec International has proven capability to develop and operate ODS processing and destruction systems and facilities. In the following the capabilities for processing and destroying ODS are documented:

RemTec International is headquartered in Bowling Green, Ohio, USA.The company designed and processed ODS for the National Halon Bank (NHB) in Australia. It was the original contractor chosen to recover and reclaim ODS at the NHB. RemTec also designed the Tank Management software and control system. It also completed the Make Safe Halon 1301 Program from 1996-2002 for the Common Wealth of Australia.

Facility, Storage Tank

The National Halon Bank in Australia was designed to recover, process and destroy ODS using RemTec's proprietary Cylinder Piercing Technology (CPT) and the Modular Automated Reclamation System (MARS) to recover and prepare the ODS for destruction.

RemTec specifically developed Cylinder Piercing Technology (CPT) for this project.

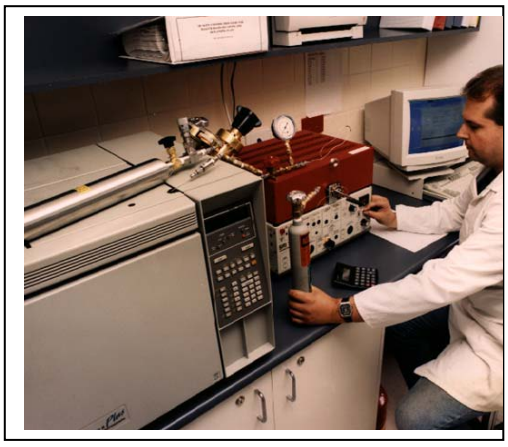
The RemTec Defender Halon Recovery systems were used to collect ODS from larger cylinders.

RemTec utilizes a special forklift clamp attachment that will lift, rotate and invert ton and ½ ton size cylinders. This will facilitate the safe handling of cylinders within the factory.

Inside views of RemTec International facility in Bowling Green, OH

RemTec International is an industry leader in the recovery, reclaiming, separation and destruction of Ozone Depleting Substances (ODS) for several important reasons.

First, the company is committed to developing systems, which are efficient at processing ODSs with minimal loss to the atmosphere. Secondly, the processing systems are flexible. The equipment is designed to operate in stand-alone mode or together as part of our integrated ODS processing and destruction facility. The recovery and processing equipment also meets highest standards.



NHB Laboratory 1996-2002

Tank Farm Management – NHB Australia

In the following the steps RemTec takes in processing ODS are described. Additional information can be found under the following web-address: www.remtec.net

- **Receiving and Inspection**

Each cylinder containing ODS is immediately leak tested to ensure it does not emit any product to the atmosphere. It is weighed and a scale weight is recorded on a tag and this tag is also placed on the pallet. Each cylinder receives a tag to identify the source of the material with the receiving weight and other particulars of the cylinder. A log sheet is then prepared to list all cylinders received by serial number and total weight received.

- **Recovery**

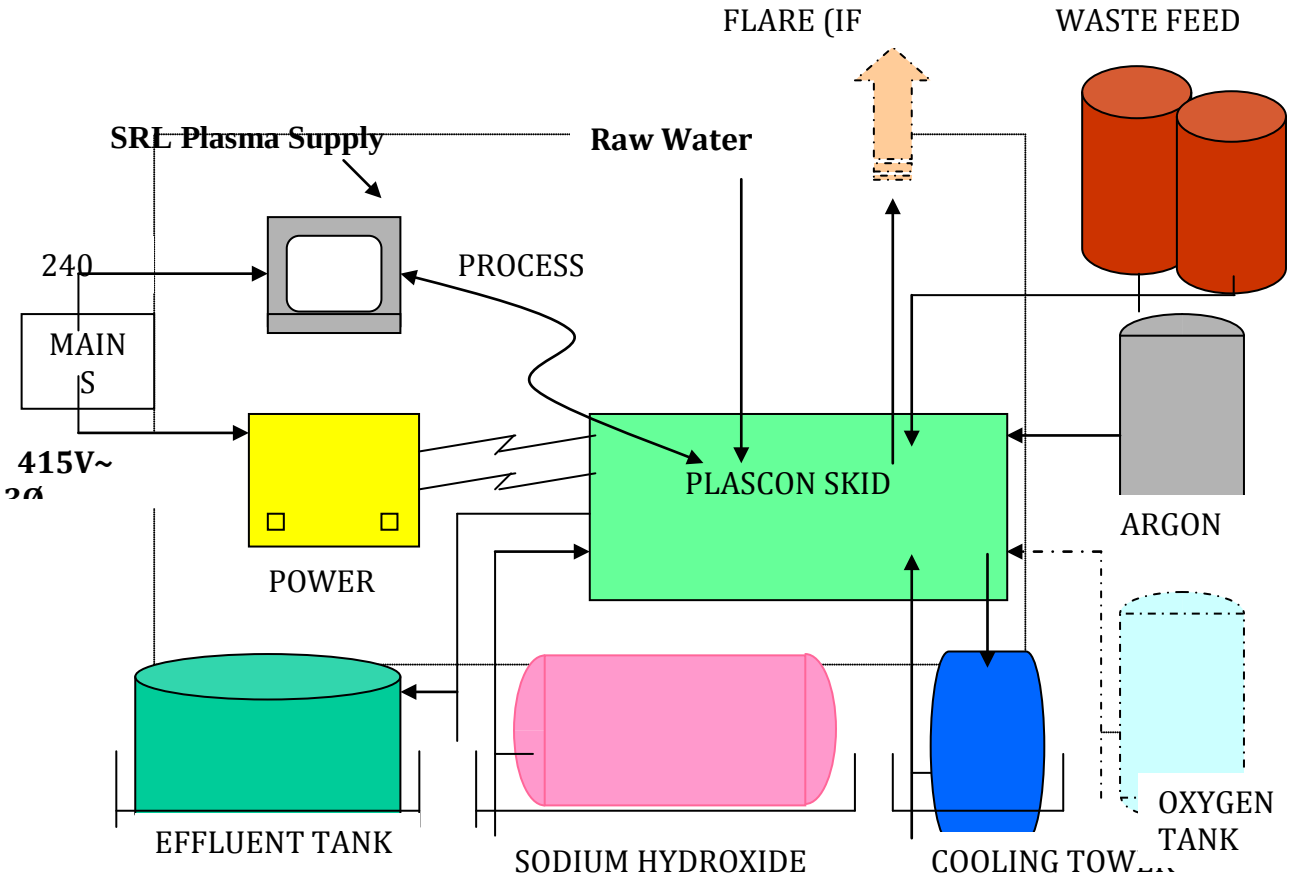
Cylinder Piercing Technology (CPT) equipment is used to efficiently recover the ODS by piercing a hole in the cylinder and collecting the ODS without release of any material to the atmosphere. The ODS is collected into batches of approximately 2,000 pounds. After the cylinder reaches a vacuum, the weight of the empty cylinders is recorded to determine the amount of ODS collected from that cylinder. This information is logged and made part of the report of accountability.

- **Analytical Testing**

Each batch is tested. A sample is drawn from each cylinder and analyzed by the ARI Certified testing laboratory.

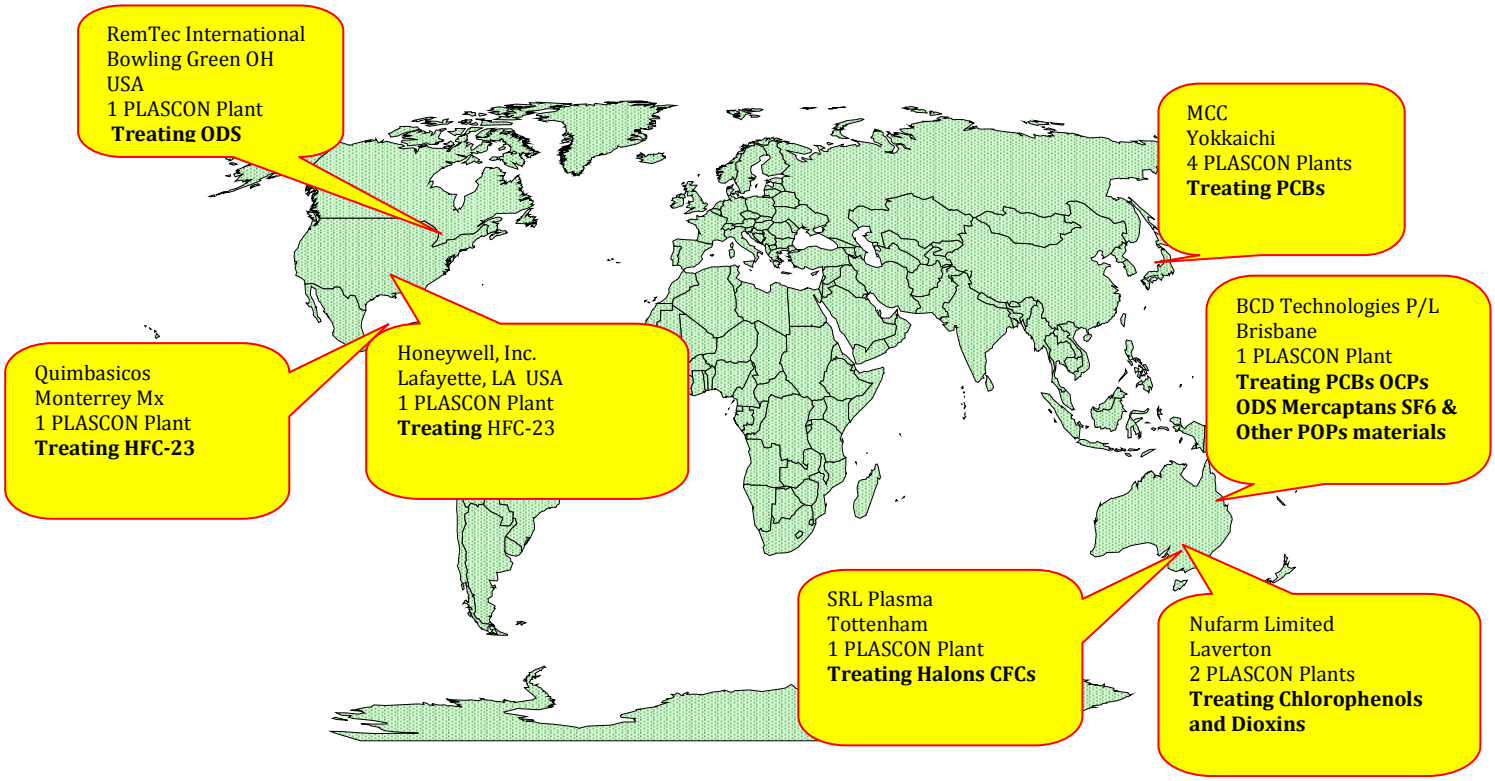
- **PLASCON Services and Scope of Supply**

A block diagram showing SRL Plasma's scope of supply is shown below:



- **Worldwide Application of PLASCON**

The PLASCON in-flight plasma-arc system was developed by the Australian Commonwealth Scientific Industrial Research Organisation (CSIRO) in association with SRL Plasma. The technology was designed to treat chemical manufacturing process wastes. The technology has been adapted to treat a wide range of halogenated organic waste worldwide since it was first commercialised in 1992.



5.2 Process of the Destruction

- **PLASCON - A**

The ODS waste will be destroyed in a destruction facility that is compliant with both the international standards specified in the Technology and Economic Assessment Panel (TEAP) Report of the Task Force on Destruction Technologies and Code of Good Housekeeping. This project will focus exclusively on the destruction of waste CFCs, no CTC or halon will be involved in this pilot project.

- **Electric ARC Plasmas**

Plasma is an ionized gas consisting of molecules, atoms, ions and electrons. It differs from the normal gaseous state because it is electrically conducting. Plasma is often referred to as the fourth state of matter, since material passes from solid, to liquid, to gas and finally becomes plasma with increasing temperature. Gases become electrically conducting at temperatures in excess of 4,000ºC and in most industrial plasmas temperatures greater than 10,000ºC are attained. A plasma

column is generated by the passage of an electric current through a gaseous medium between a cathode and an anode.

Electric arc plasmas offer the advantage of very high temperature, high energy density and accurate, rapid control of the process; attributes which if correctly used, make the technology particularly relevant to waste destruction applications. Any organic molecule injected into the plasma decomposes instantaneously into its component atoms and ions due to the very high temperatures involved.

- **PLASCON Generic Process Description**

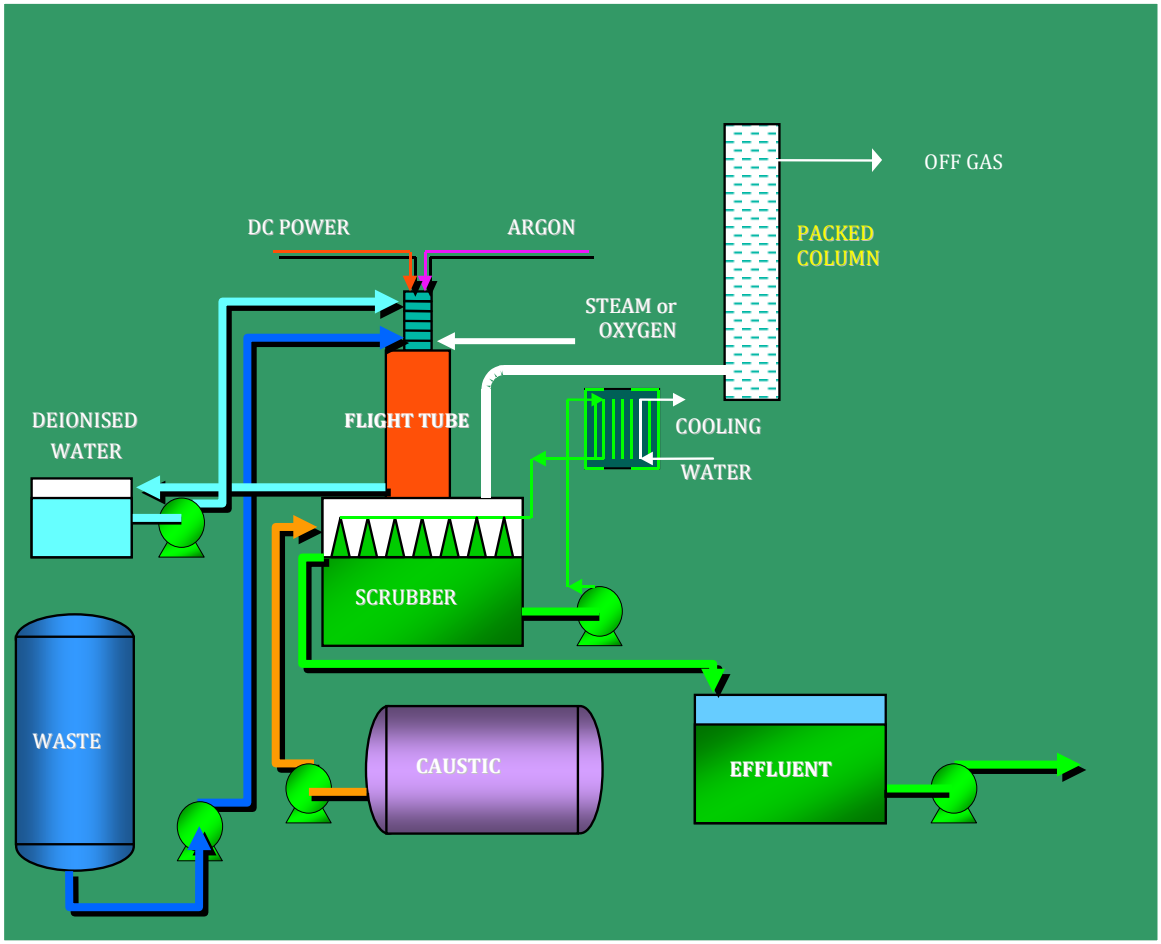
PLASCON is an in-flight argon plasma arc facility for the destruction of organic waste liquid and gases. PLASCON is especially useful for the destruction of concentrated organic halogenated compounds that other processes have difficulty in treating. Typical PLASCON feed stocks are CFCs, Halons, PCBs, organochlorine pesticides and herbicides, chlorinated solvents, sulphur hexafluoride, dioxins and other waste organic compounds.

The PLASCON process is designed to have a high destruction performance for a wide range of materials and to suppress any potential back reactions that would lead to undesirable by-products. This is particularly important when treating chlorinated organic wastes. Although the PLASCON process cannot directly treat solid wastes, the addition of suitable front-end technologies in combination with PLASCON allow for effective treatment of solid wastes. Front- end technologies that have proven successful for treating solids include thermal desorption and solvent extraction. Solid wastes must be evaluated on a case-by-case basis to assess the suitability of the PLASCON process for a particular application.

The process inputs (*electricity, argon, oxygen or steam and sodium hydroxide*) are significantly less than those required for a comparably sized high temperature incinerator. Consequently, the process effluents are also substantially less. The liquid effluent is a low volume, concentrated inorganic salt solution suitable for discharge to an industrial sewer. The gaseous effluent consists of a mixture of argon, carbon gases and water vapor.

The critical conditions that PLASCON achieves are rapid heating of the waste (1 ms to about 3,000ºC), pyrolysis (about 20 ms), followed by rapid quenching (from 1,500ºC to less than 100ºC in 2 ms). The essential components of the PLASCON process include:

1 Plasma generation and waste injection
2 Reaction chamber (flight tube)
3 Quench
4 Scrubbing system
5 Off Gases
6 Liquid Effluent
7 Destruction Efficiency
8 Power supply
9 Process control system



- **Plasma Generation and Waste Injection**

The plasma torch is of segmented design using argon as the plasma gas. The argon plasma is generated by a direct current discharge between a cathode and anode. At typical operating conditions the mean exit enthalpy of the plasma is about 11 MJ/kg at a mean exit temperature in excess of 10,000ºC. The torch is rated at 150 kW and has an electrical efficiency of roughly 50%. Argon was chosen as the plasma gas since it has suitable thermodynamic properties, is monatomic and for its inertness to the torch components. A durable, long-life torch design is therefore possible which is crucial to any industrial application.

Waste enters the torch at a specially designed *Injection Manifold* and instantly mixes with the plasma. The mixture temperature at this point is approximately 3,000ºC.

- **Reaction Chamber (Flight Tube)**

The waste is rapidly pyrolysed (degraded by heat) in the injection zone and the hot gases pass down the flight tube (a water-cooled reaction chamber) undergoing further pyrolysis. Virtually all intractable waste materials contain little or no oxygen and when pyrolysed will produce copious amounts of soot (carbon). Therefore, depending on the nature of the waste stream, oxygen or steam is added at the injection manifold to ensure that all carbon is converted to carbon gases. The hot plasma gases continue to cool to approximately 1000^{o}C in the reaction chamber.

- **Quench**

The hot gas mixture at the bottom of the flight tube resulting from the decomposition of a halogenated organic waste stream is typically CO, CO_2, acid halide gases, Ar and water vapour,

together with trace amounts of carbon fines (less than 0.1% of the feed). The hot gases exiting the *Flight Tube* undergo rapid quenching to approximately 50^{o}C by direct sprays of cool alkaline liquor. This rapid quenching prevents the formation of any undesired organic molecules such as Dibenzodioxins or Dibenzofurans.

- **Scrubbing**

The cool gases from the *Quench* are further sprayed with alkaline scrubber liquor to neutralise acid halide gases. The gas mixture is then passed to a counter-current, packed column where final traces acid gases are removed. A percentage of the carbon dioxide in the gas stream is also removed during this process.

- **Off Gases**

The composition of the off gas from the packed column is dependent on the nature of the waste stream being treated. Off gases resulting from the destruction of ODS gases (CFCs and Halons) can be discharged directly to atmosphere. The destruction of other chlorinated organic wastes results in an off gas mixture that contains levels of H_2 and CO. These gases are passed to a small ground flare that converts CO to CO_2 and H_2 to H_2O prior to atmospheric discharge.

- **Liquid Effluent**

Liquid effluent is an alkaline, near saturated aqueous solution of sodium halide salts. The solution also contains sodium carbonate and bicarbonate. The flow rate of the liquid effluent is generally 1.2 - 2.4 m^3/h. By-products may be recoverable.

- **Destruction Efficiency**

The destruction efficiency of the PLASCON process is typically in excess of 99.9999%, exceeding all current and predicted international standards. PLASCON produces no detectable levels of dioxins or any other undesirable organic compounds

- **Power Supply**

The power supply has been designed to meet the needs of the PLASCON process. It is a 12 pulse, SCR based transformer/rectifier that converts a 415 V AC 3 phase power input into a current controlled DC output. The power supply is designed for an electrical efficiency of at least 95%, with provision for power factor correction from 150 kW to 200 kW. A specialised arc starting device initiates the arc between the cathode and the primary anode.

- **Process Control**

PLASCON operation is controlled by a fully integrated, process control software system that monitors forty-nine process parameters on a continuous basis. Data is logged and stored for analysis, fault finding and to meet regulatory requirements. If set points are exceeded by a specified amount the entire system instantaneously shuts down. Under normal operating conditions a soft shut down routine is executed. In this mode the system shuts down in under one minute. Start-up from cold takes between two and three minutes.

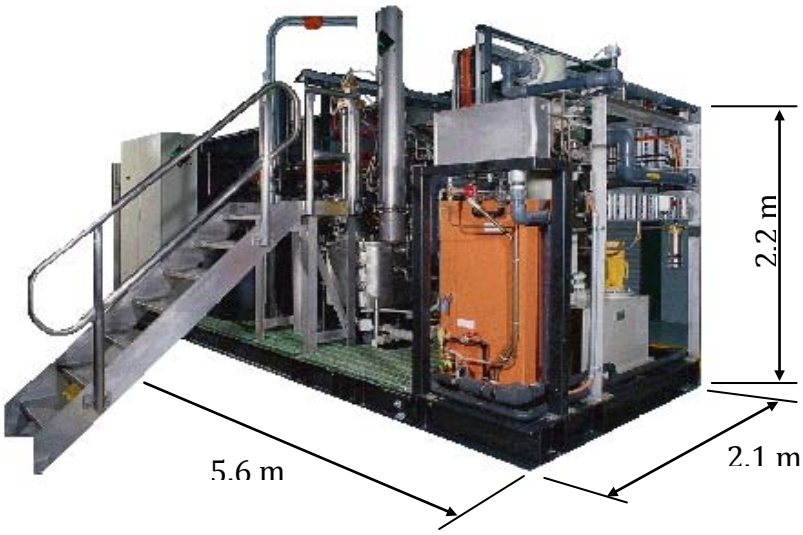
No specialized skills are needed to operate the process. Once the elemental composition of the feed is known all the process parameters can be predetermined and the system then operates in the most efficient manner.

The electrical nature of PLASCON and the unit's rapid start up and shut down capability marry well with a sophisticated process control system. A small distributed process control (DCS) system is the usual control device, although PLASCON is flexible and can easily run on a PLC type controller. PLASCON is fully automatic and can be operated remotely and unmanned if so desired. All critical parameters are constantly monitored by the control system so that rapid shut down is automatically initiated if control is lost.

Less than 0.5 gram of waste is present in the flight tube at any instant so the probability of significant amounts of untreated waste entering the environment by accident is negligible. In this respect alone, PLASCON offers great safety advantages over conventional long residence time processes.

- **Physical Dimensions**

The skid mounted PLASCON™ plant is very compact, being the size of a standard shipping container. This makes the process easy to locate and relocate if the need arises.



The PLASCON™ skid itself includes all of the core PLASCON™ technology components such as the plasma torch, reaction chamber, quench, packed column, steam boiler where required, feed mass flow controller, heat exchangers, closed loop de-ionized water cooling systems and all associated instrumentation and electrical controls. The PLASCON™ power supply and control PC are the only core hardware items that are mounted off-skid.

For safety reasons PLASCON™ is normally mounted in a covered bounded area. The Power supply requires a small undercover area at least 3m * 3m * 2.4m, with adequate ventilation for heat removal.

6. Project implementation

6.1 Implementation structure and beneficiaries

The project proposes multi-dimensional and multi-level implementation model, in order to cover the largest range of stakeholders for a better coverage of activities, sustainability of the action and results, as well as increasing its impact in the relevant sector and the country.

6.1.1 Collection

- **RAC sector and servicing companies, sector associations**

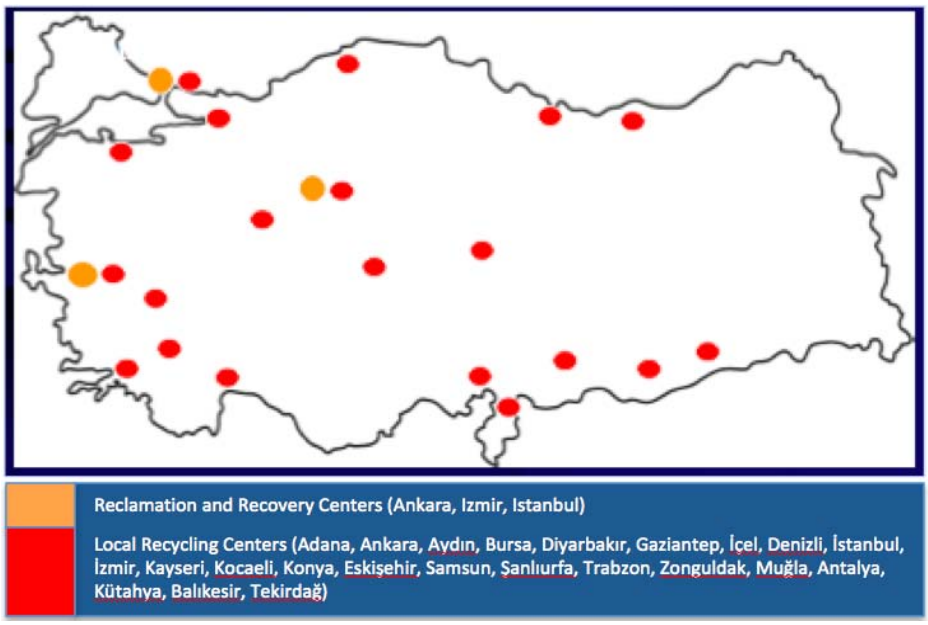
In Turkey, more than 2.000 service shops registered to the ODS Monitoring database of the NOU, as well as more than 50 RAC manufacturing companies of different scale and product range, who are actively involved in the collection of all types of ODSs from the market and existing equipment containing refrigerants like CFCs, HCFCs and HFCs. The collection activities will be organized in cooperation with (but not limited to) the below listed institutions, considered as the beneficiaries of the project.

- **Metal Goods Craftsmen Federation (MESF)**

MESF is an institution established to represent people and companies in ore extraction and metal-working industry. Throughout Turkey, MESF has 300 000 producer members. MESF provides assistance to its members and helps them improve their business. A country-wide communication platform has been created to improve cooperation between members of MESF, dealing with many aspects of general and specialized business issues. Among all the 33 job disciplines, MESF has the highest acceptance among workers.

According to the needs of today's world, MESF started to operate through online market in order to create electronic demand and supply. New developments are also expected to be pursued as the needs change.

Map: Spatial distribution of the recovery centers and local recovery units of MESF in TR



Recycling & Electronical Equipment Demanufacturing Facilities

- **ULUSOY SDK International Co. and GEP Engineering Co. (SEG Umwelt Service GmbH partner)**

Ulusoy Recycling and Waste Management established in 2009, has begun its operations within the body of Ulusoy International Investment Holding. It operates in the areas of directly packaging, disaggregation and selling of a portion of all kinds of scrap and waste material, including but not limited to iron, nonferrous metals, plastic, nylon, paper, cardboard and wood packages, waste batteries and accumulators, used waste tires, waste electrical and electronic goods and cards with their scraps, by bringing them to the field of Ulusoy Recycling and Waste Management.

Ulusoy Recycling and Waste Management provides support and service with a strong supply, marketing and distribution organization structure. The management team mainly composed of qualified engineers.

The business processes of Ulusoy Recycling and Waste Management works with Customer Relationship Management, Reporting and Warehouse Management supported by management information systems. The company renders service in several places in Turkey, with representations in Kocaeli.

Activities of the Company:

- Buying and selling all kind of scraps.
- Removal and transport operations of scraps from the field.
- Disposal of return products guaranteed.
- Disposal of products under control, which should not be released, and making them unusable.
- Delivery of environmentally harmful products to necessary destinations under the necessary rules and procedures.

As per the information provided by the company officers, there is an ongoing cooperation with the GEP Engineering Co, the representative of SEG Umwelt Service GmbH in Turkey, for the establishment of a fridge de-manufacturing and recycling facility, which is planned to have a capacity of 300.000 fridges/year.

- **EXITCOM Co.**

As the quantity of electric and electronic waste generated in Turkey has grown rapidly during the past years, Exitcom provides recycling services in the field of electric and electronic waste at plants in Germany and Turkey since 1999. Within the scope of WEEE, the facilities offer recycling services with high environmental orientation necessary to implement the legal requirements of WEEE and provide support in consulting, logistics, recycling certification, environmental technologies and reverse supply chain management. The company ascribes to a high environmental profile, safety issues, and high quality of services through certified ISO 14001, ISO 9001, and OHSAS 18001 management systems which apply to the entire operation. Adding to this, Recycling services are also offered business partners in Europe and the Middle East.

Exitcom runs large projects with international companies, as well as sets up co-operations on a regular basis; for example IBM, DELL, HP, XEROX, SAMSUNG, ALCATEL, SİEMENS, VODAFONE, FUJİTSU, TOSHİBA, TCHİBO, etc. An additional business operation is the collection and pre-sorting of batteries in Turkey (TAP – Portable Batteries and import dealers institute). In collaboration with TUBİTAK (T.S.T.R.I. / Turkish Scientific and Technical Research Institute) new recycling systems are set up with the objective to introduce new recycling technology to Turkey. Exitcom also established the first recycling plant for electric and electronicwaste in Turkey where used fluorescent lamps were processed. The underlying strategy of the company is to prevent recyclable materials going to landfill or incineration before recycling treatment. In a similar approach, a closed recycle system for Toner Cartridges was developed - before used products were simply sent to incineration. In the recycling process toner dust is separated, with a recovery rate of up to 98 %. A total 42 % of the recovered material is plastic, which can be used in other industrial production processes.

The enterprise also offers know-how to support the implementation of the WEEE directive in Turkey. It co-operates in projects with Turkey's largest electronic markets as ELECTRO WORLD MEDİA MARKT AND TEKNOSA, etc, and shares experiences gained in other European countries and collaborates closely with the Ministry of Environment. Exitcom also works for constitutions running collecting areas in municipalities like ISTANBUL, KOCAELİ, BURSA, IZMIR, SAKARYA, MERSIN, SAMSUN etc, and provides education programmes for schools, universities and other companies.

Other Relevant Institutions

- **Turkish Municipalities Union (TBB)**

Established in 1945 in order to work in the field of municipality working; it operates been as an NGO.

The main roles of the Union are to:

- Train the employees of municipalities in terms of "e-municipalities", information technologies and knowledge management
- Present opinions when new laws for municipalities are prepared
- Improve the coordination and communication among all the municipalities as well as supporting technical and administrative knowledge exchange
- Pursue the developments in municipalities among the world and attend to conferences, seminars, discussions and technical trips which are related to them
- Provide printed publications such as books, magazines etc. which are related to municipalities
- Cooperate and work together with other organizations such as government organizations, NGOs, universities and design projects with them.
- Cooperate with international organizations who are working in the field of municipalities and being a member of international communities in related fields, building up relationships with other country municipalities
- In the procedures of European Union membership, supporting the country to develop local administration skills, build up Projects to work together with EU

6.1.2 Storage, registration and verification

Recovery and reclamation centers

- **Turkish Halon Bank (ASO)**

Turkey presented this National Programme to the Multilateral Fund in 1992 and as a result it got the right to benefit from the financial resources for projects. Through the World Bank, financial resources were provided for the Turkish Halon Bank Project. With the coordination of the Ministry of Environment and Forestry and Ankara Trade Center, this Halon Bank was established.

Halon Bank is responsible for:

- Recording of existing amounts of halons in Turkey
- Providing technical support for alternatives of halons
- Storing and testing halons and selling it to firms and organizations still allowed to use halons (critical uses)

- **ISISO**

This company was founded in 1986 with the objective to help small companies and provide technical assistance. It operates in the region of İstanbul.

Apart from the main goal of establishment, which is to help the partners having their own businesses as developing their technical capabilities, other goals such as providing knowledge of modern production methods, enhancing the coordination between companies and improve their occupational knowledge have gained importance.

- **ESSIAD**

The Association of the Aegean Industrialists and Businessmen of Refrigeration (ESSIAD) was founded by leading businessmen and enterprises of the HVAC-R sector (Heating, Ventilation, Air-conditioning and Refrigeration sector) in 1990. The main purpose of the Association is to keep the rights and the legal ethics of the people and companies in the HVAC-R sector, to support market improvement plans and deliver high quality products to the end-user. The association counts 103 members, from academics to leading regional companies. ESSIAD became the first sector association with ISO-9001:2000 Quality Management System Certificate.

In the following, the most important activities are summarised:

- Authorized ODS recovery and reclamation center in Aegean region.

- Conferences and meetings about CE Marking and similar rules of EU, arranging conferences with EU Business Development Centers and KOSGEB in order to train the members on getting maximum financial and technical support from EU.

- Studies for establishing permanent sector specific trainings and hence plan to increase the number of qualified personnel.

- Increasing Capacity for International Competitiveness of HVRAC Sector, to be funded by the Ministry of Economy of Turkey.

- Feasibility Study Project for an Accredited Test and Analysis Laboratory which is funded directly by Izmir Development Agency.

- Leonardo Da Vinci – European Union Vocational Education and Training Mobility Program. ESSIAD signed the local partnership statement with Buca DMO Multi-programmed High School, who presented this project within "Researching the Hygiene and Mechanical Air-Conditioning Systems in Buildings". ESSIAD attends abroad visits within this content.

- ESSIAD issues a refereed journal under the name "Refrigeration World" four times a year.

6.1.3 Destruction and incineration

- **IZAYDAŞ**

This company was founded in May 1996, established by Kocaeli Metropolitan Municipality, and it has been working in waste management since 1997.

IZAYDAŞ manages all types of waste including

- Clinical and hazardous waste incineration and energy production
- Waste storage and disposal
- Sterilization of medical waste
- Biogas center

The company runs the biggest incineration facility and is able to incinerate all types a waste dealt within this project. However, certification to operate on voluntary carbon markets has not yet been received. A certification in accordance with VCS is considered for the later phase of this project.

- **PAN GULF**

Pan Gulf will provide disposal and incineration services involving voluntary carbon markets (CAR). See chapters 4 and 5.

6.1.4 Implementation structure

Proposed Implementation Structure

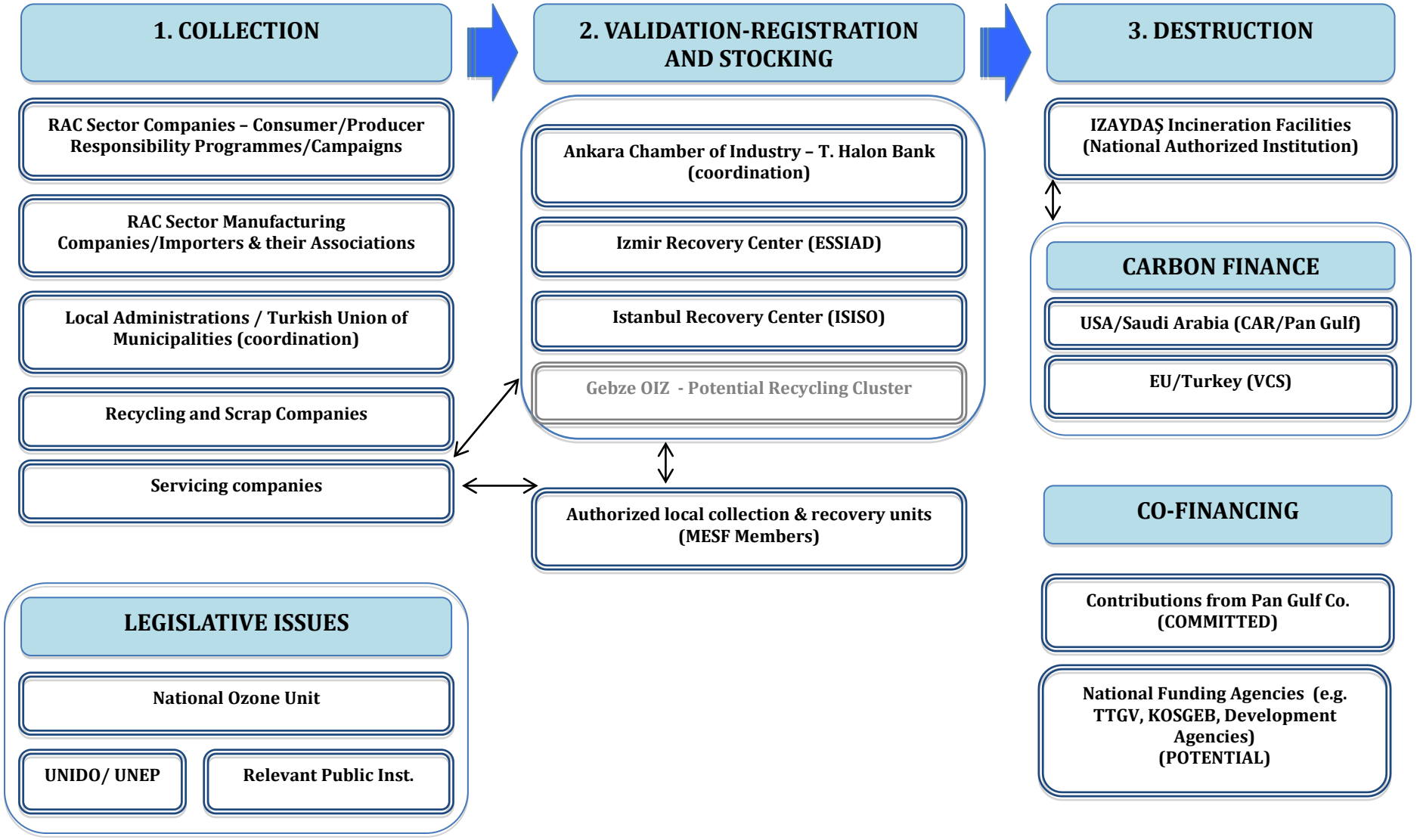
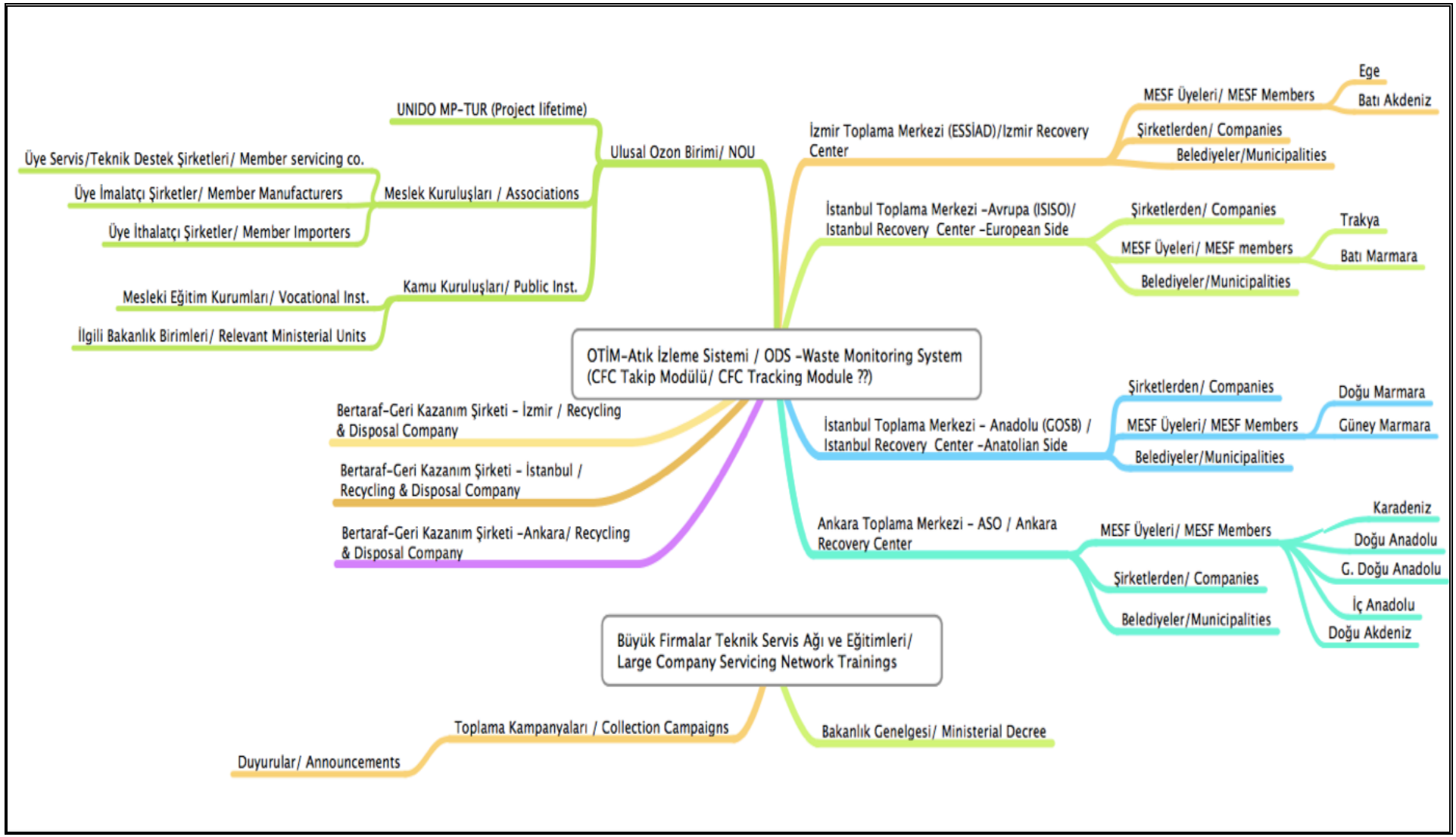


Figure 2: Draft chart for national implementation system



6.2 Sustainability of the business model

Based on the refrigerator manufacturing data of the country between 1992-2004, representing the period of the official years of CFC phase-out, an approximate total of 30.6 million refrigerators produced in the country out of which 15.1 million were sold in the domestic market, while 16.7 million exported, with a very small ratio of imports to the country. This represents an average amount of 1.16 million refrigerators sold per year in the domestic market (Table 3).

Table 3: Manufacturing, Domestic sales and Export Data for refrigerator production (x1000 units) 1992-2004

	1992	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**
Production	1087	1247	1265	1637	1638	1850	1875	2139	2446	2483	3 319	4 286	5 308
Domestic sales	796	927	767	834	963	1230	1410	1258	1468	1018	1088	1362	2 004
Export	281	397	586	802	695	784	818	1046	1088	1530	2247	3035	3 014
Export/Prod. (%)	26	32	46	49	42	42	44	49	44	62	68	71	63

Considering an average 20 years life span of refrigerators, it means 5% demand of the total amount annually. For 100% market penetration it means 15*0.05 = 0.75 million pieces as annual demand with annual domestic sales of more than 2 millions. Because of the average life span of 20 years and the phase out of CFC from the manufacturing at 2005, about half of the appliances running contain CFCs.

In 2011, 5% of this 15 million refrigerators running in Turkey calculated to reach the end of their life (0.75 million pieces), half of which (0.375 million) estimated to contain CFCs. Considering that one unit contains 0.10 kg of CFC-12 as a refrigerant and 0.5 kg of CFC 11 in the insulation foam of the fridge, as an average, altogether (375 000 * 0.60 kg =) 225 metric tons of CFCs will be calculated as an installed capacity which 37.5 t of it is the refrigerant (CFC 12) and 187.5 t CFC 11 in the foam insulation in the domestic refrigerators and freezers.

As a good estimate, also taking into account the recession of the past years, for 2011 only 2 million pieces is calculated in this project.

Till 2005, CFC 12 was used predominantly; therefore half of the running appliances, about 1 million domestic air conditioning units contain CFC 12. This results in an installed capacity of 1 million *1.5 kg/unit CFC content = 1 500 t installed capacity.

The information provided by the private sector recycling and de-manufacturing companies included to the project beneficiaries list (the companies plan investments to improve existing plants for de-manufacture of used equipment), represent the below figures as a base for the assumptions on the total amount to be considered in the project:

Assumptions:	
Plant Input	300,000 fridges/annum
Recovery of CFC-12 from cooling system	130 g/fridge (average)
Recovery of CFC-11 from insulation foam	320 g/fridge (average)

These assumptions would result in annual ODP reduction potential of 30 ODP MT out of which CFC-12 will be approximately 27 ODP MT and CFC-11 will be 3 ODP MT.

7. Activities and project costs

The project has three main phases: “Collection”, “Storage and Verification” and “Destruction / Incineration”. The activities of these phases are indicated below.

Table 4: Implementation phases and activities

Project Phase	Activities
COLLECTION	1. Stage I CFC-12 recovery units with separation of oil and gas
	2. Awareness raising
STORAGE AND VERIFICATION	1. Carbon market project management (documentation, sale etc.)
	2. Destruction of CFC-12 already collected by existing Energy Efficient Appliances Replacement Programs in Turkey
	3. Incineration of halons
	4. Monitoring and verification of ODS destruction
DESTRUCTION/ INCINERATION	1. Three ISO containers (10000 litres)
	2. Health, safety, environment training (technical workshop with international expert)
	3. Transportation of aggregated CFC-12 to US destruction facility REMTEC

7.1 Implementation schedule

The implementation schedule of the activities, for the two years of the project (MLF funded), will follow a strict time plan given in table 5.

Table 5: Implementation schedule 2 years (MLF funded)

	Months - Year 1												Months - Year 2											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Tasks																								
MLF approval and funding																								
Financial appraisal																								
Aggregation of already collected ODS at a central location (Ankara)																								
Transportation of already collected ODSs to the USA *																								
Destruction of ODSs *																								
CAR project development *																								
Monitoring of ODS destruction according to the CAR *																								
Verification of issuance of carbon credits *																								
Adaptation of legislation																								
Commercialization of carbon credits *																								
Workshops (4) *																								
Equipment specification																								
Equipment procurement																								
Project monitoring																								
Project monitoring milestones																								

* Tasks undertaken by Pan Gulf

7.2 Project costs

The following table gives an overview of the activities requested to be funded by the MLF. The co-financing component by Pan Gulf is indicated where it is relevant.

Table 6: The following table gives an overview of the total costs, co-financing component and phase(s) of the activities.

Item	Activity	MLF Funding	Co-Financing Pan Gulf	Project Phase	Activities to be undertaken by Pan Gulf
1	Stage I CFC-12 recovery units with separation of oil and gas	185,000		COLLECTION	
2	Three ISO containers (10000 litres)	60,000		DESTRUCTION/ INCINERATION (STOCK AND VERIFICATION)	
3	Carbon market project management (Documentation, Sale etc.)	125,000		STOCK AND VERIFICATION	XX
4	Health, safety, environment training (Technical workshop with international expert)	65,000	In kind contribution (workshops, trainers, experts): USD 150,000* 1. 1 Workshop in a destruction facility in the USA hosting 10 participants; 2. 1 workshop in Saudi Arabia for max 50 participants; 3. 2 workshops in Turkey for max 150 participants. **This contribution does not cover the travel and*	DESTRUCTION/ INCINERATION & STOCK AND VERIFICATION	XX

			accommodation costs.		
5	Awareness raising	50,000		COLLECTION	
6	Destruction of CFC-12 already collected by existing energy efficient appliances replacement programs in Turkey	440,000	Incentive program for CFC-11 & CFC-12, as indicated in table 2	STOCK AND VERIFICATION	XX
7	Incineration of halons	225,000	Incentive program for halons as indicated in table 2	STOCK AND VERIFICATION	
8	Monitoring and verification of ODS destruction	100,000		STOCK AND VERIFICATION (DESTRUCTION/ INCINERATION)	XX
9	Transportation of dispersed ODS within Turkey to centralized facility to aggregate in ISO containers for transport to the US	50,000		COLLECTION	
10	Transportation of aggregated CFC-12 to US destruction facility RemTec	150,000		DESTRUCTION/ INCINERATION	XX
	SUBTOTAL	**1,450,000**			
	Contigencies (10% all items except 4 and 5)	133,500			
	TOTAL	**1,583,500**			

Annex: Linkages between Montreal Protocol and the Carbon Market(s)

1. Overview of GHG Markets

By implementing the **Kyoto Protocol** and its flexible mechanisms (article 6 Joint Implementation = **JI**, article 12 Clean Development Mechanism = **CDM** and article 17 International Emissions Trading = **IET**) for the first time a market for greenhouse gas (GHG) emission reductions was established[3]. While JI/CDM are project based mechanisms (**crediting system,** meaning that credits are only issued after emissions have been reduced) the IET is classified as a **cap and trade system** (where a central authority issues "allowances" which can be sold and bought immediately after issuance; emission reductions are occurring if the central authority issues less allowances than required by market participants under business as usual scenarios)

Additionally to the carbon market created by the Kyoto Protocol several countries or **regional initiatives have established (compliance) emission trading systems** (e.g. EU ETS, New Zealand etc.) including energy intensive corporations (primarily power companies and heavy industry). Units traded in those systems are usually similar in their nature (presenting 1 ton of CO2e) and structure (allowances allocated through an authority versus carbon credits/offsets from specific projects). However they often differ in their requirements for quality and project categories[4].

Info box 1 provides an overview of the most common carbon markets and units traded:

Units defined by the Kyoto Protocol:
– Assigned Amount Units (AAUs)
– Certified Emission Reductions (CERs)
– Emission Reduction Units (ERUs)
– Removal Units (RMUs)

• **Units defined by EU and national legislation:**
– EU Allowances
– UK Allowances and Credits
– Australian Abatement Certificates and Sequestration Rights
– US SOx and NOx Allowances, Regional Greenhouse Gas Initiatives
– Other

• **Units defined by contracts and non governmental regulated standards:**
– Verified Emission Reductions (VERs)

[3] Often also referred to as carbon market since the general unit traded is 1 ton of CO2-equivalents (other types of GHG emissions such as CH4 or HFC-23 are converted into 1 ton of CO2e; E.G. 1 ton HFC equals 11700 tons of CO2e)
[4] E.G. The EU recently stopped the inflow of carbon credits from HFC-23 and N2O (from adipic acid production) CDM projects by May 2013, while New Zealand may still allow them (but is also discussing a restriction)

Besides the so called **"compliance markets"** a market for verified or voluntary emission reductions units[5] has developed over the past few years. The **"voluntary market"** defines its units through contracts and non-governmental regulated standards (see footnote below for examples). VERs are mainly bought by private persons (to offset their carbon footprint) or companies not covered by any compliance regime in their Corporate Social Responsibility (CSR) programs. This said it is natural that VERs usually achieve lower prices than units traded in compliance carbon markets[6].

Table shows the dominant role of the EU ETS in the global arena with a market value in 2009 of 118,474 Mio USD, but even the market for voluntary emission reductions has a volume of 419 resp. 338 Mio USD in 2008 and 2009.

Table 7: Overview of Carbon Markets (Source: World Bank)

	2008		2009	
	Volume ($MtCO_2e$)	**Value** (US$ million)	**Volume** ($MtCO_2e$)	**Value** (US$ million)
Allowances Markets				
EU ETS	3,093	100,526	6,326	118,474
NSW	31	183	34	117
CCX	69	309	41	50
RGGI	62	198	805	2,179
AAUs	23	276	155	2,003
Subtotal	3,278	101,492	7,362	122,822
Spot & Secondary Kyoto offsets				
Subtotal	1,072	26,277	1,055	17,543
Project-based Transactions				
Primary CDM	404	6,511	211	2,678
JI	25	367	26	354
Voluntary market	57	419	46	338
Subtotal	486	7,297	283	3,370
Total	**4,836**	**135,066**	**8,700**	**143,735**

Subtotals and totals may not exactly add up because of rounding.

The following table shows prices of different kind of VERs. While **CRTs** achieved prices of USD 8.8 and 7.1 in 2008 and 2009, **VCUs** could only be sold at prices of USD 5.5 and 4.6 respectively. This difference in prices can mostly be explained by perceptions of market participants that the inclusion of CAR into any compliance emissions trading in the United States would be more probable in the future than the inclusion of VCS projects.

[5] In general Verified Emission Reductions (VERs) but specifically in the Voluntary Carbon Standard (VCS) Voluntary Carbon Units (VCUs) are traded under Climate Action Reserve (CAR) Climate Reserve Tons (CRT).
[6] This is not always true, in certain cases prices of units traded in compliance markets have gone virtually to zero if there is high oversupply and if such units cannot be traded on other markets (e.g. EU ETS in 2007)

Table 8: Overview of the North American Carbon Market (Source: World Bank)

TABLE 2 North American carbon market – traded volumes and values, 2008–09

	Average Price (US$/tCO$_2$e)		Volume (MtCO$_2$e)		Value (million US$)	
	2008	2009	2008	2009	2008	2009
RGGI (Allowances)†	3.9	3.3	61.9	805.2	198.2	2,178.6
Alberta (Offsets/EPCs)	10.0	13.5*	3.4	4.5	33.5	60.8
CCX (CFIs)	4.4	1.2	69.2	41.4	306.7	49.8
Voluntary Offset Market	6.8	4.9	15.4	29.0	104.1	143.4
of which CAR	*8.8*	*7.1*	*5.3*	*14.9*	*46.6*	*104.5*
of which CCX	*4.8*	*0.8*	*1.0*	*7.4*	*4.8*	*5.9*
of which VCS	*5.5*	*4.6*	*1.5*	*3.3*	*8.3*	*15.2*
of which ACR	*3.8*	*3.4*	*4.3*	*1.8*	*16.3*	*6.1*
of which Other	*8.5*	*7.3*	*3.3*	*1.6*	*28.1*	*11.7*
Total market			**149.9**	**880.1**	**642.5**	**2,432.5**

Source: Bloomberg New Energy Finance, Ecosystem Marketplace. Notes: † RGGI includes quarterly auction figures, * Alberta price is an estimate.

2. Relation of GHG Markets to the Montreal Protocol (MP)

Many chemicals used as refrigerants and blowing agents not only are depleting the ozone layer (Ozone Depleting Substances = ODS) but are also having a significantly adverse effect on the global climate (Greenhouse Gases =GHGs). While the MP regulates consumption and production of ODS (not disposal) the KP regulates emissions not covered by the MP (CO_2, CH_4, N_2O, HFCs, PFCs, SF_6).

Since most ODS are not included in the "Kyoto basket" of gases **reductions of such ODS cannot (yet) be structured as CDM or JI projects** (Please see info box 2 below for details)

Paragraph 44 of the Modalities and Procedures for the CDM requires that a baseline shall cover emissions from all gases, sectors and source categories listed in Annex A of the Kyoto Protocol within the project boundary.

Paragraph 17 of EB 34 provides guidance on project/leakage emissions of GHGs as defined in paragraph 1 of the Convention but not included in Annex A of the Kyoto Protocol such as GHG gases (e.g., CFCs, HCFCs) covered under the Montreal Protocol.

Hence, claiming emission reductions associated with the replacement of CFC or HCFC refrigerants and blowing agents with no-ODP and low-GWP gases is not eligible in accordance to CDM modalities and procedures.

Paragraph 17 of EB 34:
17. With reference to a proposed methodology, the Board considered the analysis of implication of different options proposed by the Meth Panel with regard to accounting emissions of GHGs and also implications on gases covered under the Montreal Protocol.

The Board agreed that:

(a) The project boundary shall encompass all anthropogenic emissions by sources of greenhouse gases, as defined in paragraph 1 of the Convention but not included in Annex A of the Kyoto Protocol, under the control of the project participants that are significant and reasonably attributable to the CDM project activity.

(b) The leakage emissions from greenhouse gases, as defined in paragraph 1 of the Convention but not included in Annex A of the Kyoto Protocol, should be accounted, if the CDM project activity results in an increase of such emissions.

(c) The global warming potentials used to calculate the carbon dioxide equivalence of anthropogenic emissions by sources of greenhouse gases not listed in Annex A, shall be those accepted by the Intergovernmental Panel on Climate Change in its third assessment report

While the international Kyoto based market cannot uptake any emission reductions generated through the destruction of ODS some voluntary standards as well as regional compliance markets have begun to recognize ODS destruction as a highly verifiable source of GHG reduction credits.

In 2007 the Chicago *CCX Offset Project Protocol: Ozone Depleting Substances Destruction*

On January 25th 2010 the Voluntary Carbon Standard www.v-c-s.org *Extension of Scope to Include Ozone-Depleting Substances* and on May 3rd 2010 the first methodology proposal *"Greenhouse Gas Emission Reductions By Recovering and Destroying Ozone Depleting Substances (ODS) from Products"* was submitted which is currently assessed

On February 3rd 2010 *Article 5 Ozone Depleting Substances Project Protocol Destruction of Article 5 Ozone Depleting Substances Banks Version 1.0* as well as *U.S. Ozone Depleting Substances Project Protocol Destruction of U.S. Ozone Depleting Substances Banks Version 1.0* was accepted by the board.

On December 16th 2010 the California Air Resources Board endorsed the cap-and-trade regulation, marking a significant milestone toward reducing California's greenhouse gas emissions under its AB 32 law. Included in the regulation are four protocols, or systems of rules, covering carbon accounting rules for offset credits in forestry management, urban forestry, dairy methane digesters, *and the destruction of existing banks of ozone-depleting substances in the U.S.* (mostly in the form of refrigerants in older refrigeration and air-conditioning equipment).

As of January 2011, 9 ODS destruction projects are registered under the Climate Action Reserve and around 2.5 mio CRTs have been generated. These developments impressively show the increasing importance of ODS destruction projects as GHG mitigation measure and the relevance of the carbon market to incentives destruction activities.

3. Possible Ways of the Utilization of the Carbon Market: Comparison between CAR and VCS

According to decision XX/7 adopted by the Parties to the Montreal Protocol the project is using the carbon market to leverage seed funding from the MLF. The first analysis of Annex I explains in detail which carbon markets resp. regulations/standards accept the creation of carbon credits through the destruction of ODS. It also shows that the Climate Action Reserve

and the Voluntary Carbon Standard are the two main possibilities, which currently provide the most suitable methodologies to calculate, monitor and verify emission reductions achieved through the destruction of ODSs from Article 5 countries. The country should be completely aware of the working mechanism, conditions and possible consequences of selecting one or the other scheme, since it has important long term effects.

Main Characteristics

The two main structural differences between CAR and VCS are the regulations regarding the location of the destruction and the sort of ODSs eligible for destruction.

- Location of the destruction:

CAR requires destruction in the United States, while VCS allows destruction in the project's host country.

- Sort of ODSs eligible for destruction:

CAR covers the destruction of refrigerant gases only (CFC-12 in the project case) in Article 5 countries. VCS also covers the destruction of CFC-11 contained in foams.

Considering Advantages and Disadvantages

As mentioned earlier, any of the carbon market schemes can be applicable for the present project under appropriate considerations, however it is essential to take into account the disadvantages of the schemes just as much as the advantages.

- Location of the destruction:

CAR disposes upon destruction (exclusively) in the United States. This obviously takes the burden of destruction off the stakeholder country in terms of logistics, necessary investments at the incineration facilities, etc. However, the cost of ODS transportation to the United States obviously represents a massive expenditure.

The following table shows the destruction facilities used by all ODS destruction projects registered under the CAR:

Destruction facilities used for ODS destruction projects under the CAR	
Facility	Location
Clean Harbors El Dorado	Arkansas, U.S.
RemTec International Plascon Arc Plasma Destruction facility	Ohio, U.S
Veolia Environmental Services	Texas, U.S.

VCS allows destruction in the project's host country, which may raise more challenges in the beginning. However, in the long-term the development of national capacities should pay off.

- Sort of ODSs eligible for destruction:

CAR covers the destruction of CFC-12 only; it does not offer any solutions for CFC-11 contained in foams.
Under VCS there is no such problem or limitation.

Apart from the above it should be also mentioned that there is no experience worldwide on ODS destruction projects under VCS mechanism, while CAR has already been used for that purpose.

Revenues from the Carbon Markets

Another very important viewpoint is the amount of the expected revenues from the carbon market. As it can be seen in the table below, CAR has offered higher prices then VCS, even during the decreasing tendencies of 2010.

US offset prices 2010
Table 9: Overview Market Prices per VER

	2010	CAR	VCS
Average mid-market price, US$/tCO2e	1st Q	$4.6	
	2nd Q	$3.3	$2.8
	3rd Q	$3.5	$3.1
	4th Q	$2.9	$1.4

Carbon Market Analyst-North America, Point Carbon Research, March, 2010

It should be noted that CAR prices have to be considered always together with the transportation cost to the United States, as mentioned above.

The following table sums up what the two schemes would mean to Turkey, taking into consideration all the pros and contras.

CAR	VCS
Destruction out of Turkey.	Destruction in Turkey.
Local capacities are not involved.	Local capacities are involved.
Higher transportation costs to US.	Local transportation costs.
Destruction of only CFC-12.	Destruction of CFC-12 and CFC-11.
Higher market prices.	Lower market prices.
Experience in ODS destruction projects.	No experience in ODS destruction projects.

Which carbon market schemes to choose?

Being aware already of all the most important points that should be considered when making a decision, the two most convenient options are presented below in details.

- Option 1: VCS – Using Local Resources

Using VCS means using and continuously improving local resources and capacities. This option would offer a solid, calculable plan for the whole length of the project. It would

bring benefits such as the implementation of state of the art recovery and collection technologies, which could be also considered as preparation for EU accession, continuous tracking of ODS movement within the country and many other factors like replacement of old equipment implying improvement of energy efficiency, etc.

- Option 2: CAR and VCS – A Combined Solution

This option divides the destruction project into two phases:

The first phase, the first 2 years of the project, would use exclusively CAR. Thanks to the higher market prices of CAR, the income of the destruction would be considerable and could be used in Turkey for the preparation to the second phase of the project and to miscellaneous local investments, e.g. conversions at the companies.

The second phase, the additional years in the future, would then use the combination of CAR and VCS. In this way, under VCS, the destruction of CFC-11 could also happen.

In the first 2 years the project will destroy all the CFC-12, which had already been collected from various sources in Turkey. The collected CFC-12 will be incinerated in an eligible destruction facility in the United States as required by the CAR Protocol Article 5 Ozone Depleting Substances Project Protocol Destruction of Article 5 Ozone Depleting Substances Banks Version 1.0 (see http://www.climateactionreserve.org/) (Additionally during this start up phase an effective legislative system for ODS-containing appliances can be established.) (The MLF shall fund the transportation/storage and destruction activities of the first 2 years, costs of changing legislation will be covered by income from sale of carbon credits in the 1st year.)

The financial benefit gained during the first two years of the project through the carbon market, can be used to incentivize further ODS waste management and destruction activities in the future, which will lead to further destruction of CFC-11 and CFC-12. It is essential to point out that in this phase of the project there can not be any funding requested from the MLF.

Annex I: ODS Destruction Project in Turkey

Revised Project Costs after discussion with the Multilateral Fund Secretariat

Item	Activity	MLF Funding	Co-Financing Pan Gulf	Activities to be undertaken by Pan Gulf
1	Three ISO containers (10000 litres)	60,000		
2	Carbon market project management (Documentation, Sale etc.)	100,000		XX
3	Health, safety, environment training (Technical workshop with international expert)	30,000	In kind contribution (workshops, trainers, experts): USD 150,000* 1. 1 Workshop in a destruction facility in the USA hosting 10 participants; 2. 1 workshop in Saudi Arabia for max 50 participants; 3. 2 workshops in Turkey for max 150 participants. **This contribution does not cover the travel and accommodation costs.*	XX
4	Destruction of CFC-12 already collected by existing energy efficient appliances replacement programs in Turkey	550,000	Incentive program for CFC-11 & CFC-12, as indicated in table 2	XX
5	Monitoring and verification of ODS destruction	85,000		XX

6	Transportation of dispersed ODS within Turkey to centralized facility to aggregate in ISO containers for transport to the US	50,000		
7	Transportation of aggregated CFC-12 to US destruction facility RemTec	150,000		XX
	SUBTOTAL	**1,025,000**		
	Contingency (5% all items except Activity 3)	51,250		
	TOTAL	**1,076,250**		

Annex II :

Revised amounts of ODS to be included in the project

Source of collection	**Quantity CFC-12**
ASO Recovery Center (Turkish Halon Bank-TUHAB)	0,62 MT
Metal Goods Craftsmen Federation (MESF)	5,1 MT
Service Shops (members of MESF)	3 MT
ESSIAD	20 MT
Other sources (reported by servicing companies for refrigeration and air-conditioning equipment, responsibility programmes,etc)	75 MT