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执行蒙特利尔议定书
多边基金执行委员会
第六十三次会议
2011 年 4 月 4 日至 8 日，蒙特利尔

项目提案：墨西哥

本文件包括基金秘书处对以下项目提案提出的评论和建议：

气雾剂

• 淘汰 Silimex 公司气雾剂生产所用的 HCFC-22 和 HCFC-141b	工发组织

销毁

• 墨西哥处置不需要的消耗臭氧层物质示范项目	工发组织/法国

项目评价表-非多年期项目
墨西哥

项目名称		双边/执行机构
(a)	淘汰 Silimex 公司气雾剂生产所用的 HCFC-22 和 HCFC-141b	工发组织

国家协调机构	国家臭氧办事处，环境与自然资源部

最新报告的项目所涉消耗臭氧层物质的消费数据

A: 第 7 条数据（ODP 吨，2009 年，截至 2011 年 3 月）

附件 C，第一类物质	1,125.9

B: 国家方案行业数据（ODP 吨，2009 年，截至 2011 年 3 月）

物质	行业消费量（ODP 吨）						
	气雾剂	泡沫塑料	制冷生产	制冷维修	溶剂	其它	共计
HCFC-22	30.17	29.15	198.0	260.73			518.05
HCFC-141b	30.58	269.50	305.25				605.33

仍符合供资条件的氟氯烃消费量（ODP 吨）	暂缺

本年度业务计划拨款		供资（美元）	淘汰（ODP 吨）
	(a)	1,000,000	10.0

项目名称	(a)
企业使用的消耗臭氧层物质（ODP 吨）：	11.06
即将淘汰的消耗臭氧层物质（ODP 吨）：	11.06
项目的期限（月）：	30
项目成本（美元）：	
增支资本费用：	282,200
应急费用（10%）：	28,220
增支经营费用：	210,496
项目费用总额：	520,916
当地所有权（%）：	100
出口部分（%）：	0
申请的赠款（美元）：	520,916
成本效益值（美元/千克）	3.8
执行机构支助费用（美元）	39,069
项目向多边基金申请的总费用（美元）	559,985
对应资金是否已确认（是/否）	是
是否包括了项目监测阶段目标（是/否）	是

秘书处的建议：	单独审议

项目说明

简介

1. 工发组织代表墨西哥政府向执行委员会第六十三次会议提交了题为“淘汰 Silimex 公司气雾剂生产所用的 HCFC-22 和 HCFC-141b”的淘汰项目。该项目的项目编制供资在第五十八次会议上获得批准。该企业是一家专业气雾剂产品生产商，消耗 60.48 公吨（3.3ODP 吨）HCFC-22 和 70.24 公吨（7.73ODP 吨）HCFC-141b。实施该项目所需的供资为 520,916 美元，外加批给工发组织的支助费用 39,069 美元。

2. 工发组织初次向第六十二次会议提交了项目，相关的申请供资额是 1,108,404 美元，外加机构支助费用，特别依据的是申请提供为期四年的增支经营费用。在第 62/9 号决定中，执行委员会要求工发组织在确定为该项目提供一年增支经营费用的基础上，向第六十三次会议重新提交项目提案。

国家和行业背景

3. 从消费量（ODP 吨）方面来看，Silimex 是迄今墨西哥气雾剂行业规模最大的企业。该行业一共有九家企业，这九家企业全都使用 HCFC-22，其中六家企业使用 HCFC-141b。拟议项目的影响是，淘汰使用 60.48 公吨 HCFC-22 和 70.24 公吨 HCFC-141b，总计占该行业中即将淘汰的 ODP 吨数的 52.3%。项目提案附有墨西哥气雾剂行业的详细说明，包括该行业消费氟氯烃的所有企业的名称，以及自 2007 年来各家企业的消费量。

4. 工发组织通知秘书处，墨西哥气雾剂行业 2007-2009 年平均消耗 426.03 公吨（23.43 ODP 吨）HCFC-22 和 117.17 公吨（12.89 ODP 吨）HCFC-141b。出于技术原因，在不能使用碳氢化合物气雾剂推进剂的情况下，通常使用氟氯烃推进剂。因此，与淘汰氟氯化碳时的情况相反，生产商使用替代技术的成本效益通常低于当前所用氟氯烃的成本效益，必须进一步付出努力来实现转用的可持续性。项目提案载有关于控制消耗臭氧层物质（包括氟氯烃）进口的现行许可证制度的信息。目前，氟氯烃不受配额限制。项目提案指出，就只是对气雾剂生产限制使用氟氯烃而言，难以确定监管行动是否有效或是否可行，因为仅仅针对该行业发布禁令可能只会导致非法使用大量供应的氟氯烃。在这种情况下，项目提案指明，打算使墨西哥的氟氯烃制造商和进口商参与自愿控制，以便支持减少气雾剂行业所用氟氯烃的数量的策略。

5. 在第五十九次会议上，执行委员会批准了转换 Mabe 公司生产家用冰箱的聚氨酯硬质绝缘泡沫塑料过程中使用的 HCFC-141b 和 HCFC-22 的项目。该项目淘汰了 55.87ODP 吨消费量，占墨西哥淘汰起点的 4.6%，该起点是 2008 年提交上述泡沫项目时所报告的消费量。本项目将贡献额外 1%的削减量，以此作为选定的起点。项目提案预计向执行委员会第六十四次会议提交氟氯烃淘汰管理计划，主要侧重于淘汰聚氨酯泡沫和制冷绝缘泡沫次级行业使用的 HCFC-141b。

公司简介

6. Silimex 公司成立于 1969 年，最初生产两种主要产品：硅脱模剂和电气清洁剂。该企业为百分之百国有企业，各种产品的年产量约为 500,000 罐。当墨西哥其它企业从使用氟氯化碳转用丙烷/戊烷时，Silimex 没有进行技术转换，原因分为两个方面：一方面如果不对设备进行重大改造，就无法安全地将碳氢化合物气雾剂推进剂填入设备，从而引发大量投资的需求；另一方面公司的主要客户需要完全不易燃的产品。当气雾剂行业淘汰使用

氟氯化碳时，Silimex 自筹资金转用氟氯烃。该企业目前有两台气雾剂灌装机，不能改造用于碳氢化合物气雾剂推进剂。

技术选择

7. 项目提案指出气雾剂产品的差别大，销售高，未来市场是不可预测的。因此，项目提案可能只列明提示性数据，即哪些不同的产品可以进行何种技术转换的历史数据。提案指出，Silimex 生产专业气雾剂，规定了具体使用要求，通常不能依赖对碳氢化合物气雾剂推进剂的使用。表 1 概括了不同产品及其当前使用氟氯烃的情况，以及这些产品的不同替代技术。

表 1：Silimex 生产的产品及其当前使用情况和替代技术

产品	技术转换前的年消费量（公吨）		技术转换后的年消费量（公吨）			
推进剂	HCFC-22	HCFC-141b	HAP	HFC-152a	HFC-134a	HFC-365mfc / HFC-227ea
Silijet	3.2	9.6	5.6	0	0	0
Silimpo	3.2	0	3.2	0	0	0
不易燃的 Silijet	19.2	57.6	0	57.6	0	0
Aerojet	28.8	0	0	28.8	0	0
Compuklin	6.08	3.04	0	0	9.12	3.04
小计	60.48	70.24				
共计		130.72	8.8	86.4	9.12	3.04

项目提案中可预见的技术转换活动

8. 工发组织申请的供资将特别促成使用易燃的替代品，包括储存罐、一台新的气雾剂灌装机、推进剂泵、蓄电池、混合器、通风和抽气系统、检漏器，以及其它安全设备和技术援助。资金项目和技术援助所需的供资总额为 310,420 美元。此外，工发组织计算出为期一年的经营费用，为 210,496 美元。项目的实施将在 2012 年底或 2013 年第一季度完成，因此，将支持墨西哥在 2013 年实现冻结氟氯烃消费量。

秘书处的评论和建议

评论

起点

9. 在向执行委员会第五十九次会议提交关于转换 Mabe 公司生产家用冰箱的聚氨酯硬质绝缘泡沫塑料过程中使用的 HCFC-141b 和 HCFC-22 的项目时，委员会还没有澄清是否需要为提交的项目设定起点。因而，执行委员会就该项目做出的决定没有规定选择一个起点；然而，墨西哥政府已经选择 2008 年作为该国的起点，2008 年是 Mabe 公司项目获得批准时最新报告消费量的一年。因此，秘书处在其建议中包括了以 2008 年 1,214.8 ODP 吨的消费量作为墨西哥起点的措辞，包括 7,459.7 公吨 HCFC-141b、7,142 公吨 HCFC-22、16 公吨 HCFC-142b、13.9 公吨 HCFC-123 和 2.7 公吨 HCFC-124。

环境问题

10. 工发组织提议为 Silimex 生产的五种不同产品引入四种不同的替代技术。这些替代技术包括：易燃但全球升温潜能值低或相对低的碳氢化合物气雾剂推进剂和 HFC-152a；全球升温潜能值为 1,430 的 HFC-134a，仅仅略微低于混合 HCFC-22/HCFC-141b 的推进剂，其加权的全球升温潜能值为 1,448；以及 HFC-365mfc/HFC-227ea 混合物。在 HFC-365mfc/HFC-227ea 混合物的成分构成中，HFC-227 的全球升温潜能值非常高，但项目提案中并未提到这一点；然而，HFC-365mfc 和 HFC-227ea 的唯一生产商建议生产气雾剂时使用 7%的 HFC-227ea 和 93%的 HFC-365mfc；将 HFC-227ea 混入 HFC-355mfc，以确保混合物具有不易燃性。在此基础上，混合物的全球升温潜能值为 964。

11. 秘书处使用这些数字计算出技术转换产生的气候影响，即节省 133,531 公吨二氧化碳当量（见表 2）。秘书处的计算结果有赖于 Silimex 的产品组合，正如工发组织指出的那样，计算结果会因市场条件而出现重大变化。以历史产品组合为基础计算出的节省量显示，对变暖影响的削减量增加 5.97 倍。

表 2：Silimex 技术转换的气候影响

产品	转换前的年度变暖影响（吨二氧化碳当量）	推进剂技术转换后的年度变暖影响（吨二氧化碳当量）					技术转换的气候影响（吨二氧化碳当量）
推进剂技术	HCFC-22 / HCFC-141b	HAP	HFC-152a	HFC-134a	HFC-365/227	产品共计	
全球升温潜能值（100a）	1,810 / 725	20	124	1,430	964	-	
Silijet	12,752	112	0	0	0	112	-12,640
Silimpo	5,792	64	0	0	0	64	-5,728
不易燃的 Silijet	76,512	0	7,142	0	0	7,142	-69,370
Aerojet	52,128	0	3,571	0	0	3,571	-48,557
Compuklin	13,209	0	0	13,042	2,931	15,973	2,764
共计	160,393	176	10,713	13,042	2,931	26,862	133,531

*假定 HFC-365mfc/HFC-227ea 混合物的比例为 93:7。

费用问题

12. 最初向执行委员会第六十二次会议提交的项目包含为期四年的增支经营费用申请。委员会在第 62/9 号决定中澄清，只能提供一年的增支经营费用。秘书处也提出了一些问题，如水槽、输送机的费用，和气雾剂灌装机的费用。除增支经营费用以外的所有费用问题，都已经在第六十二次会议之前得到解决。工发组织向第六十三次会议提交的项目考虑到了这些问题以及第 62/9 号决定，并按先前商定的增支费用提交项目。不同的项目和商定的费用列于表 3：

表 3：Silimex 技术转换的增支资本费用

项目	数量	单位费用（美元）	总费用（美元）
5000 升碳氢化合物气雾剂推进剂储存罐	2	4,000	8,000
手动气雾剂灌装机，易燃推进剂	1	50,000	50,000
推进剂泵和蓄电池	1	10,000	10,000
建设露天气体处理室	1	12,000	12,000

项目	数量	单位费用（美元）	总费用（美元）
手动水槽	1	19,000	19,000
通风/抽气系统	1	14,000	14,000
壁装式/落地式气体传感器	2	4,000	8,000
便携式气体传感器	1	1,000	1,000
卷曲度测定仪	1	1,200	1,200
水管	1	4,000	4,000
输送器（其他厂房的内外）	2	6,000	12,000
配料混合槽、混合器、设备	1	12,000	12,000
火警警报器/消防系统	1	24,000	24,000
研究、开发、顺应产品的机械和流体性质，为5种产品编制和分发新产品说明书和信息	5	20,000	100,000
安全审查，审计	1	7,000	7,000
小计			282,200
应急费用	10%	282,200	28,220
共计			310,420

建议

13. 谨建议执行委员会考虑：

(a) 核准关于 Silimex 公司淘汰气雾剂生产所用的 HCFC-22 和 HCFC-141b 的投资项目，供资总额为 520,916 美元，外加批给工发组织的 39,069 美元的机构支助费用，并将墨西哥仍符合供资条件的消费量减少 60.48 公吨（3.3ODP 吨）HCFC-22 和 70.24 公吨（7.73ODP 吨）HCFC-141b；以及

(b) 注意到墨西哥政府已经同意将 2008 年报告的 1,214.8 ODP 吨作为持续总体削减氟氯烃消费量的起点，2008 年消费量是第五十九次会议核准 Mabe 公司氟氯烃项目时的现有最新数据。

(c) 根据第 59/34(b)号决定，将墨西哥仍符合供资条件的 HCFC-141b 减少 507.9 公吨（55.87ODP 吨），其涉及对 Mabe 公司家用冰箱的绝缘泡沫塑料生产进行技术转换。

项目评价表 – 非多年期项目
墨西哥

项目名称	执行机构
处置墨西哥不需要的消耗臭氧层物质示范项目	工发组织 法国

国家协调机构：环境部 - 环境与自然资源部

最新报告的项目所涉消耗臭氧层物质的消费数据

A: **第 7 条数据（ODP 吨，2009 年）**

附件一，氟氯化碳	-101.7		

B: **国家方案行业数据（ODP 吨，2009 年）**

消耗臭氧层物质	次级行业/数量	次级行业/数量	共计
CFC-11 / CFC-12			125

本年业务计划：供资总额 1,064,000 美元　总共淘汰 11.9 ODP 吨

项目名称		
企业使用的消耗臭氧层物质		暂缺
即将淘汰的消耗臭氧层物质		暂缺
使用的消耗臭氧层物质		暂缺
本业务计划中的项目		是
行业		销毁消耗臭氧层物质
次级行业		制冷和空调（氟氯化碳）
项目影响		166.7 公吨 CFC-12
项目的期限		2 年
当地所有权		100%
出口部分		0%
申请的多边基金赠款	美元	1,522,915
执行机构支助费用（9%）	美元	141,179
项目向多边基金申请的总费用	美元	1,664,094
成本效益	美元/千克	9.14 ODS（公吨）
是否包括了项目监测阶段目标		包括

秘书处的建议：	单独审议

项目说明

简介

14. 工发组织作为牵头执行机构，代表墨西哥政府向第六十三次会议提交了关于处置不需要的消耗臭氧层物质示范项目的提案，费用是最初提交的 1,522,915 美元。该项目的实施也将得到法国政府的援助。本项目根据第 58/19 号决定提交，将销毁墨西哥 166.7 公吨消耗臭氧层物质的废弃物。墨西哥政府请求在第六十三次会议上批准该项目。

15. 在第五十七次会议上，执行委员会为工发组织提供资金，用于编制墨西哥消耗臭氧层物质试点销毁示范项目。在这次会议上，执行委员会做出审议消耗臭氧层物质处置试点项目的决定，以回应缔约方第二十次会议第 XX/7 号决定，该决定规定试点项目可包括消耗臭氧层物质的收集、运输、储存和销毁，重点是全球升温潜能净值高的集中存货，以及第 5 条国家不同区域的代表性样本。缔约方也强调，消耗臭氧层物质处置示范项目应当具有可行性，并且应当包括利用共同供资的方法。墨西哥是根据该标准选定的国家之一。

背景

16. 在第五十八次会议上，执行委员会讨论了选择消耗臭氧层物质处置项目的标准和准则，并最终制定了第 58/19 号决定。该决定为审查和核准消耗臭氧层物质处置示范项目奠定了基础，而且秘书处开展的审查也基于该决定确立的原则。秘书处想要强调它适用该决定第（a）（二）a 分段的规定，其中具体规定不会向消耗臭氧层物质的收集提供资金。收集消耗臭氧层物质的定义载入第五十八次会议报告题为“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义”的附件八。墨西哥示范项目将涵盖已经收集的消耗臭氧层物质，以及由墨西哥领导通过节约能源基金，采用新的节能模式在加速替换旧冰箱方案下收集的其他数量。

项目说明

17. 本试点项目将首先处置已经收集并做好销毁准备的 166.7 公吨 CFC-12。同时，它将采取措施，通过扩大废弃的消耗臭氧层物质现行收集系统，通过采用最先进的回收和收集技术增加收集的消耗臭氧层物质的废弃物，以支持该项目的可持续性。该示范项目持续两年，其目标是为有效的消耗臭氧层物质废弃物管理系统建立可持续的业务模式，探讨出口用于销毁的消耗臭氧层物质，并考虑出售消耗臭氧层物质排放量的可能性，销毁这些物质的目的在于获得财务利益，从而在示范阶段之后维持该国更广泛的销毁活动。政府也将通过制定促进先进的环境政策的方式给予该项目支持（如有关排放消耗臭氧层物质的禁令，确定资金回收方案的责任），以期支持消耗臭氧层物质废弃物管理业务模式的可持续性。

18. 如上所述，提议的项目与报废家用制冷和空调设备的国家奖励方案密切相关。该奖励方案于 2005 年制订，替换并随后销毁家用冰箱 604,000 台。2007 年和 2008 年，98 所拆卸中心收到了用于从这些中心拆毁的旧家电中回收制冷剂的设备。2009 年，政府根据高效照明和家用电器项目，为替换家用冰箱建立了另一个雄心勃勃的方案，目标是在 2012 年底前收集并替换 160 万台家用电器。该方案预期将成为本项目示范阶段所需废气的消耗臭氧层物质的一个主要来源。

19. 消耗臭氧层物质的废弃物将在销毁设施中销毁，这些销毁设施须符合销毁技术和良好管理守则工作队的技术和经济评估小组报告所规定的国际标准。该项目将重点集中销毁废弃的氟氯化碳，本试点项目不涉及四氯化碳和哈龙。

待处置的消耗臭氧层物质的估计数量

20. 墨西哥环境和自然资源部确认，2009 年已经收集了 119.7 公吨 CFC-12，2010 年将进一步收集的数量（40 公吨来自旧冰箱和旧空调，7.0 公吨来自冷风机），共计 166.7 公吨 CFC-12。估计数量列于表 1。

表1：本项目所用的消耗臭氧层物质废弃物的估计数量

批次	说明	CFC-12 收集量（公吨）
1	2007-2009 年收集的消耗臭氧层物质结余	119.7
2	2010 年将要收集的消耗臭氧层物质结余	40.0
3	将要从冷风机收集的消耗臭氧层物质结余	7.0
	共计	166.7

项目的财务管理

21. 提案设想多边基金的供资将用于支付将当前现有消耗臭氧层物质废弃物出口到美国认证销毁机构进行销毁的费用。示范项目还预先设计了将有待销毁的消耗臭氧层物质产生的碳信用额货币化的制度。根据试点活动的成果，利用碳信用额货币化制度按比例扩大项目。该示范项目设想，按照气候储备公吨或自愿减碳额度计算，每公吨二氧化碳当量的保守价格为 3.00 美元，并设想前两年期间的活动所产生的削减量大约为 180 万公吨二氧化碳当量。通过利用碳市场，该削减量有望带来大约 500 万美元的经济价值。

销毁活动的监测和核查

22. 为确保所有的消耗臭氧层物质都得到适当的监测和说明，将针对与本消耗臭氧层物质销毁项目有关的所有运作和报告活动制订一项监测计划。该计划将规定数据收集的频率；记录计划；参与监测活动的个人的职责；质量控制规定，以确保严格按照规定运作、收集数据和分析消耗臭氧层物质；将开发数据管理系统并协调消耗臭氧层物质收集者、项目编制者和销毁工厂之间的数据。气候行动储备或自愿碳标准组织的监测机制将用作制订这种监测制度的基础。这会确保监测程序对销毁的消耗臭氧层物质开展独立的外部核查，以便认证碳信用。墨西哥政府环境和自然资源部将负责监管该监测制度。

项目费用

23. 与最初提交的数额一样，下表列明的项目总费用估计为 1,522,915 美元。

表 2：项目的拟议费用

活动	单位数量	美元/单位	费用（美元）
将墨西哥国内分散的消耗臭氧层物质集中运到中央设施中，再合计装入国际通用标准集装箱，以便运往美国	1	20,000	20,000
国际通用标准集装箱（10,000 升）	3	20,000	60,000
将合计的 CFC-12 运往美国的销毁设施（如阿肯色州的 El Dorado 清洁港）	27	6,023	162,618
销毁墨西哥根据高效家用电器替换方案已经收集的 CFC-12	166,700	5.5	916,850
监测和核查消耗臭氧层物质的销毁	2	40,000	80,000
碳市场项目管理（国际专家）	7 w/m	115,000	115,000

活动	单位数量	美元/单位	费用（美元）
健康安全环境培训	1	30,000	30,000
应急费用（占总费用的 10%）			138,447
共计			1,522,915

24. 尽管工发组织明确指明本次会议寻求的供资仅用于该项目的示范部分，但也提供了有关该项目拟议后续阶段的信息和文件，这将确保销毁设施连续和持久的运作。

秘书处的评论和建议

评论

25. 秘书处就该提案向工发组织提出一些评论和意见，根据第 58/19 号和第 62/69 号决定制定的标准对该提案进行了审查。秘书处指出，与提交的情况一样，提案包括有关未提出供资申请的第二阶段项目的详细信息。秘书处向工发组织明确表示，秘书处的意见和评论仅限于第 58/19 号和第 62/69 号决定商定的暂定准则规定的示范项目，而对第二阶段项目的审议只能确定未来项目的可行性和可持续性。因此，这将使秘书处在审查消耗臭氧层物质示范项目的类似项目时遵循一致性办法。秘书处建议工发组织修订提案，并只是重点讨论两年期的示范阶段，该项目的成果将最终决定随后十年期的项目，并且说明，项目的成果如何为技术、财务、监管和体制障碍和风险提供解决方案，以便实施项目的第二阶段。工发组织按要求对提案做了必要修订。

26. 秘书处还要求工发组织在提案中载入第 58/19 号决定要求的信息，以便能够对提交的项目进行全面审查。工发组织提供的其他信息已在上文各段做出说明。为了回应墨西哥是否考虑使用消耗臭氧层物质废弃物的其它选择而不是销毁的询问，工发组织的答复是，与很多其他第 5 条国家一样，墨西哥已经尝试探讨循环利用这些消耗臭氧层物质废弃物的机会，但是从经济奖励和价格上来看，回收物质与新物质相比不具备竞争性。此外，墨西哥靠近美国，美国是墨西哥的一个重要贸易伙伴，并且美国现在禁止使用氟氯化碳，必然要探索这些废弃物的其它方式而不是重复利用，因而正在收集这些物质以便销毁。

27. 秘书处审查示范项目的总体目标时要求工发组织证实，该项目旨在证明运输销毁是墨西哥未来一个可行的选择办法，以及通过碳交易有可能带来收入，而这笔收入将用作维持未来的销毁活动。工发组织证实了这种认识并强调，事实上当前的消耗臭氧层物质废弃物存量将运往美国的销毁工厂，相应的二氧化碳当量将用于交易，并用于维持项目未来在财务上的可行性。

28. 秘书处向工发组织提出了许多其他问题，其中包括墨西哥的冰箱收集、废弃物从拆卸中心运往中央设施及其最终运输销毁等方面的情况。工发组织向秘书处提供的信息澄清了这些问题。

29. 关于项目的获利能力和可持续性问题，秘书处提请工发组织注意未来自动限制出口/自愿减碳额度的价格很不确定这一事实，由于产生的收入将用于持续供资，有益的做法是提供有关其它选择办法的信息，以免这些排放未能完全产生预期的收入。尽管工发组织同意秘书处对自动限制出口/自愿减碳额度价格的评论，但认为示范项目的一部分是考虑碳市场项目管理，将进行必要的分析并核证文件和销售情况，从而确保从销毁的消耗臭氧层

物质产生收入。据工发组织报告，墨西哥政府积极致力于该项目并通过国家政策给予支持，因此将成为推动该项目实施的一股力量。

30. 秘书处和工发组织还讨论了项目所需的供资，并指出提案产生的费用为每销毁 1 千克消耗臭氧层物质需要 9.13 美元，低于第 58/19 号决定规定的每销毁 1 千克消耗臭氧层物质需要 13.2 美元的费用。秘书处要求澄清提议预算中的某些要素，工发组织已经据此做出相应回复。

31. 在工发组织澄清这些问题之后，秘书处同意项目的最终费用为最初提交的数额，即 1,522,915 美元外加上表 2 概述的支助费用。

建议

32. 谨建议执行委员会考虑：

(a) 赞赏地注意到墨西哥政府提交的消耗臭氧层物质销毁示范项目共计销毁消耗臭氧层物质废弃物 166.7 公吨；

(b) 原则上核准实施墨西哥消耗臭氧层物质销毁示范项目，供资总额为 1,022,915 美元，外加批给工发组织的 76,719 美元的支助费用，以及批给法国政府的 500,000 美元外加 65,000 美元的支助费用。

(c) 在第六十三次会议上核准 1,522,915 美元的供资，指出此次核准的条件是未来不再为墨西哥任何消耗臭氧层物质处置项目提供进一步的资金。

MULTILATERAL FUND FOR THE IMPLEMENTATION OF THE MONTREAL PROTOCOL ON SUBSTANCES THAT DEPLETE THE OZONE LAYER

PROJECT COVER SHEET

COUNTRY	Mexico	**IMPLEMENTING AGENCY**	UNIDO FRANCE
PROJECT TITLE	Demonstration project for disposal of unwanted ODS in Mexico		
PROJECT IN CURRENT BUSINESS PROJECT		Yes	
SECTOR		ODS destruction	
SUB-SECTORS		Refrigeration and Air-conditioners (CFCs) sub-sector	

ODS DESTROYED	Demonstration Project 2 year (CFC-12) and	166.7	ODP MT
	10 year (CFC-12 &CFC-11)	900	ODP MT
	Total	1,066.7	ODP MT
PROJECT IMPACT	Reflecting the net ODP value per annum (Demonstration project) & (10 year project)	83.35 90	ODP MT
	Reflecting annual emissions in CO_2 equivalent in refrigerating sector	469,192	t CO_2e
	10 Year Carbon Trading Offset Phase B Programme (estimate) - 900 MT	CFC-12 - 260 CFC-11 - 640 CFC-12 – 2,731,360 CFC-11 – 1,173,392	ODP MT ODP MT tCO_2e tCO_2e
	Additional 10 Year Carbon Trading Offset Programme (estimate, only CFC-12)	Total CFCs - 3,905,280	tCO_2e

PROJECT DURATION – Demonstration Project			2 years	
CARBON TRADING OFFSET PROGRAMME DURATION -			10 Years	
TOTAL PROJECT DURATION				
PROJECT COSTS -				
	Capital Costs	US$	1,384,469	
	Policy & Management Support		145,000	
	Contingencies	US$	138,447	
	Total Project Costs	US$	1,522,915	
LOCAL OWNERSHIP			100%	
EXPORT COMPONENT			0%	
REQUESTED GRANT				
	MP FUND	US$	1,022,915	
	FRANCE	US$	500,000	
	TOTAL	US$	1,522,915	
IMPLEMENTING AGENCIES SUPPORT COSTS 7.5% - UNIDO, 13% - FRANCE		US$	141,719	
TOTAL COST OF PROJECT TO MULTILATERAL FUND		US$	**1,664,094**	
COST EFFECTIVENESS (1,066.7 OPD MT)		US$/kg	9.14	
STATUS OF COUNTERPART FUNDING			The counterpart contributes funds in kind (premises, labor, lab equipment, CFC collection expenses, etc.)	
NAME OF COUNTERPART			Joint Venture established by Mexican Corporation and Diagnostico y Administracion de Logistica Inversa SA de CV (DALI), Ecofrigo and other companies advised by the Government of Mexico	
PROJECT MONITORING MILESTONES			Included	
NATIONAL COORDINATING BODY			Ministry for Environment SEMARNAT	

Project summary:

Project summary:

UNIDO will submit a Demonstration ODS Destruction Project for Mexico to the 63rd ExCom meeting. This Project will cover the disposal of 1066.7 ODP tons of CFC-12 and CFC-11 in the domestic refrigerator sector in Mexico over 12 years.

In the first 2 years the project will destroy 166.7 ODP tons of used CFC-12 **which have already been collected** from various sources in Mexico. 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 will 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.)

Assuming a price of USD 3 per ton of CO2e and emission reductions of approximately 1,800,000 CO2e, the activities of the first two years will generate a financial value of around 5.4 Mio USD through utilization of the carbon market. This financial benefit will be used to incentivize further ODS waste management and destruction activities **for additional 10 years which will lead to another estimated destruction of 900 ODP tons of CFC-11 and CFC-12.** (Please NOTE: there is no funding requested from the MLF for this 2nd part of the project). This part of the project consists of the recovery of ODS from end of life refrigerators to be collected in Mexico by using state of the art de-manufacturing facilities (step I machinery – CFC12 recovery unit 1 Mio USD) and step II machinery (shredder and ODS extraction 4 Mio USD).

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 Mexico for the next 12 years,
- 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) and*
- the implementation and operation of state of the art recovery and collection technologies in an article 5 country enabling a dramatic increase of ODS collection and destruction efficiency and thereby significantly reducing the impact on the ozone layer as well as on the global climate.

PREPARED BY	UNIDO (V. Shatrauka)	**DATE**	22 September 2010
UPDATED AND REVISED	UNIDO (C. Plöchl and G. Castellá)	**DATE**	2 February 2011
REVIEWED BY	C. Norris and UNDIO (S. Mohammed)	**DATE**	4 February 2010

Abbreviations

CAR	Climate Action Reserve
CCX	Chicago Climate Exchange
CDM	Clean Development Mechanism
CER	Certifie Emission Reductions
CFC	Chlorofluorocarbone
CFI	Carbon Financial Instrument
CO_2e	CO_2-equivalent
CRT	Climate Reserve Ton
DNA	Designated National Authority
DOE	Designated Operational Entity
EB	Executive Board
ExCom	Executive Committee of the Multilateral Fund for Implementation of the Montreal Protocol
GHG	Greenhouse Gas
GWP	Global Warming Potential
IET	International Emissions Trading
KP	Kyoto Protocol
LoA	Letter of Approval
MLF	Multilateral Fund for Implementation of the Montreal Protocol
MLS	Secretariat of the Multilateral Fund for Implementation of the Montreal Protocol
MP	Montreal Protocol
ODS	Ozone Depleting Substance
PIN	Project Idea Note
PP	Project Participant
UNFCCC	United Nations Framework Convention on Climate Change
VCS	Voluntary Carbons Standard
VCU	Voluntary Carbon Unit

Table of Content

PROJECT OF THE GOVERNMENT OF MEXICO

DEMONSTRATION PROJECT FOR UNWANTED ODS DESTRUCTION IN MEXICO

1 Project Objective and Project Strategy

UNIDO will submit a Demonstration Project for Disposal of Unwanted ODS in Mexico to the 63rd Meeting of ExCom of the Multilateral Fund for the implementation of the Montreal Protocol.

The project aims to develop a 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

Since 2005 the Government of Mexico (GoM) through the Fund for Energy Savings (FIDE) has successfully accelerated the replacement of old refrigeration appliances with new energy efficient ones. In 2007/2008 98 scrapping centers received equipment for recovery of refrigerants from old appliances that were dismantled in these centers. In 2009 the GoM established another ambitious program for substituting domestic refrigerators with the goal to collect and replace 1,600,000 appliances until the end of 2012. Through these and other activities 166.7 tons of ODP CFC-12 were collected by the end of 2010 which are dispersedly stored throughout Mexico.

Even though a large quantity of ODS in absolute terms has already been collected in the replacement programs, , the ODS recovery process is rather inefficient in Mexico. The scrapping centers recovered on average 36g of CFC-12 per fridge, when name plates of fridges indicated 155g content, which is a recovery-efficiency below 25%. Additionally the CFC-11 contained in insulation foams has not been recovered at all so far.

Therefore the objective of the project is to implement a sustainable business model for an efficient ODS waste management system (including the increase of recovery efficiency of CFC-12 from 36g per fridge to 130g and 90% recovery of all CFC-11 contained in insulation foams) and to destroy 1066.7 ODP tons of CFC-12 and CFC-11 in the refrigerator sector in Mexico over 12 years by

1. Destroying already collected 166.7 ODP tons of CFC-12 (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 /improving local legislation with regard to a producer/distributor responsibility program for ODS containing equipment and in a new state of the art facility for de-manufacturing end-of-life refrigerators and recovering ODS. This will result in annual destruction of additional 26 ODP tons of CFC-12 and 64 ODP tons of CFC-11 adding up to 900 ODP tons over a 10 years period. (to be sustainable funded through the annual sale of carbon credits)

The proposed project facility (not to be funded by the MLF) will recover CFC-12 and CFC-11 from domestic refrigerators using a two-step approach:

1. In Step I, the CFC-12 refrigerant together with the refrigeration oil are removed from the refrigeration cycle; oil is treated to remove the CFC-12 dissolved in it in order to increase the efficiency of the CFC-12 recovery; and

2. In Step II, the refrigerator without CFC12 and oil is placed into a shredder, where, after shredding operation the shredded materials are sorted and the polyurethane foam insulation panels of the refrigerator finely grounded. This destroys the cell structure of the foam and releases a significant portion of the CFC-11 within the cells. The insulating gas/blowing agent (CFC) released is collected, adsorbed in activated carbon and, following desorption from the activated carbon, liquefied under pressure by means of compressors.

The facility will be operated by a joint venture consisting of the Mexican corporations Diagnostico y Administracion de Logistica Inversa SA de CV (DALI), Ecofrigo and other companies advised by the Government of Mexico.

The two most important elements of the proposed project to ensure the sustainability of ODS waste management activities are:

1.1 Utilization of the Carbon Market:

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 analysis in Annex I of the proposal 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 (*Article 5 Ozone Depleting Substances Project Protocol*[1] *Destruction of Article 5 Ozone Depleting Substances Banks Version 1.0*) currently provides the most suitable methodology to calculate, monitor and verify emission reductions achieved through the destruction of refrigerant ODS (CFC-12 in the project case) from Article 5 countries[2]. The methodology being developed under VCS (see Annex I) will be used for creating credits from destruction of CFC-11 contained in foams. The two main differences between CAR and VCS are that VCS allows destruction in the project host country (Mexico) (while CAR requires destruction in the United States) and VCS also covers the destruction of CFC-11 contained in foams in Mexico (while CAR covers only refrigerant gases in Article 5 countries)

Assuming a rather conservative price of USD 3 per ton of CO2e (either CRT or VCU) and emission reductions of approximately 1,800,000 CO2e, the activities of the first two years will generate a financial value of around 5.4 Mio USD through utilization of the carbon market. This financial benefit will be used as o incentives for further ODS waste management and destruction activities for additional 10 years which will lead to another estimated destruction of 900 ODP tons of CFC-11 and CFC-12. (Please NOTE: there is no funding requested from the MLF for this 2nd part of the project).

The (2) modification/improvement of Mexican legislation is considered as another important element of the proposed demonstration project to ensure the creation of a sustainable and transparent ODS waste management system. The proposed changes shall include:

1. Ban on venting of ODS and on deposition of ODS containing products (wastes) in landfills
2. Defining and assigning the responsibility for financing recycling programs (e.g. either local authorities, power utilities [as current status of voluntary schemes in Mexico] or producer responsibility programs)
3. Requirement that the applied recycling technology achieves an acceptable amount of ODS recovery

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

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, comprehensive ODS waste management and destruction system in Mexico for the next 12 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. 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),

c. 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,

d. The implementation and operation of state of the art recovery and collection technologies in an article 5 country enabling a dramatic increase of ODS collection and destruction efficiency and thereby significantly

[1] Under CAR the term "Protocol" means the "methodology" to calculate and monitor emission reductions as well as to assess additionality of projects.

[2] The Climate Action Reserve Protocol (*Article 5 Ozone Depleting Substances Project Protocol Destruction of Article 5 Ozone Depleting Substances Banks Version 1)* does not yet cover destruction of ODS contained in foams for Article 5 Countries

reducing the impact on the ozone layer as well as on the global climate. Assuming an annual throughput of 200,000 fridges UNIDO expects the yearly collection and destruction of approximately 26 tons of CFC-12 and 64 tons of CFC-11,

e. The extraction and destruction of CFC-11 from insulation foams. Until now almost only ODS refrigerants have been recovered in the Mexican refrigerator replacement programs. The recovery of CFC-11 from insulation foams would be the next step for setting up an advanced waste management system for ODS. The project could provide extremely valuable "real life" data about the amount of CFC-11 contained in insulation foams of refrigerators,

f. The continuous tracking of ODS movements as well as detailed monitoring of ODS point of origin, collection, aggregation, storage, transport and destruction. The project will explore destruction facilities in the US (CFC-12 according to CAR) as well as within in Mexico (CFC-11 according to VCS). Carbon standards require an exact monitoring of quantity and detailed composition of ODS destroyed. Destruction facilities must meet requirements of TEAP *Report of the Task Force on Destruction Technologies* and the *Code of Good Housekeeping*.,

g. The project can build on an well established energy efficiency strategy in Mexico through which around 2.2 million domestic refrigerators and air conditioners will be collected by the end of 2012 (started in 2005) 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 are will be incentives.

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. The results of this demonstration project can be replicated in other Article 5 countries.

2 Justification for the ODS Disposal Pilot Project

2.1 Updated and more detailed information on all issues that were required for obtaining project preparation funding

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 166.7 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.

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

ELAP in cooperation with the Secretariat of Energy, SENER and this project is expected to result in early retirement of 1.5 million domestic refrigerators over the next 4 years. However, this demonstration project is be able to recycle such a quantity of the early retired refrigerators.

A World Bank project, is aimed to study the market conditions for the disposal of ODS recovered from residential refrigerators and air conditioners in Mexico,. The program provides rebates to consumers for their older, inefficient appliances. The rebates are used to offset the cost of newer, more efficient models. The appliance take-back program is being coordinated by the Secretaria de Energia (SENER) and currently operated by the Fideicomiso

para el Ahorro de Energía Electrica (FIDE), the Trust for Electric Energy Saving3, with technical support from the World Bank. Financing for the program is being provided in part by the Kyoto Protocol Clean Development Mechanism.

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

The Mexican Ministry of Environment and Natural Resources (SEMARNAT) confirmed the already collected amount of CFC-12 of 119.7 MT before 2010 and additional estimate of CFC-12 to be collected in 2010 as 40 MT of old refrigerators and air-conditioners and 7.0 MT from chillers. Table 1: Overview of ODS Already Collected

Batch	Description	CFC-12 collection
1	ODS Surplus collected between 2007-2009	119.7*
2	ODS Surplus to be collected in 2010 year	40.0 **
3	ODS surplus to be collect from Chillers	7.0***
	Total	166.7

*/Considering other stocks from DuPont (15.0 tons more), 6.0 tons from Polimyd company (stocked in Quimobásicos facilities); more tons recovered and reported through the SISSAO system from the R/R centers and scrapping centers (FIDE programme), the quantity of ODS collected from 2007- 2009 could be of the value of 119.7 MT.
**/ SEMARNAT is considering 40.0 MT of ODS that could be recovered in the scrapping and R/R centers in 2010 and 7.0 MT from chillers.
***/ Some of the chillers would provide not more than 7.0 MT of CFC-12 including 3.0 MT from Mexichem Derivados S.A. de C.V., Coatzacoalcos Plant, Veracruz and 4.0 MT from social security hospitals

The expected amount of CFC-12 for incineration for the first two years of the project is estimated to be 166.7 MT.

The expected amount of CFC-12 and CFC-11 for the following 10 years is calculated as follows:

As mentioned above a state of the art technology for de-manufacturing refrigerators and/or air conditioners will be set up (For a detailed description of the technology, see Annex III). The plant will consist of three so called step 1 units, inter alia extracting the ODS refrigerant from the cooling system and one so called step 2 unit which is designed to shred cooling appliances, separate the different materials of the appliance casings while recovering around 90% of the ODS blowing agent contained in the insulating foam.

Assumptions:

Plant Input	200,000 fridges/annum
Recovery of CFC-12 from cooling system	130g/fridge on average
Recovery of CFC-11 from insulation foam	320g/fridge on average

These assumptions would result in annual ODP reduction potential of 90 ODP MT out of which CFC-12 will be approximately 26 ODP MT and CFC-11 will be 64 ODP MT.

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

As mentioned in iii above, around 166.7 tons of ODS have already been recovered and are currently stored in Mexico. SEMARNAT has confirmed this number. Additional 900 tons are expected to be recovered through the advanced ODS waste management system (as described under iii as well),

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.

[3] FIDE is a private non-profit organization, founded with the goal to promote rational electric energy use and energy saving. Its technical Committee includes electric utilities, industry associations and CONUEE, which is Mexico's National Commission on Energy Saving, a technical arm of SENER.

Energy costs are high in Mexico, and the cost of electricity is a major factor in the purchase of a new domestic refrigerator and AC unit. The Mexican government, through the National Electric Commission (CFE, the official energy provider), has been promoting the sale of new AC and refrigeration units equipped with energy saving devices for many years.

A very successful incentive program for retirement of old domestic refrigeration and air conditioning equipment was organized in 2005 by the Fund for Energy Savings (FIDE). This program has accelerated the replacement of old appliances, resulting in reductions of the use of CFCs, since the new equipment is free of CFC and thus the release of CFCs in the service sector has continuously been reduced. 604,000 domestic refrigerators and 126,000 air conditioners have been replaced and destroyed. 22 tons CFC-12 from old refrigerators (36 g per one refrigerator as an average) and 88 tons of HCFC-22 from old air conditioners have been recovered.

In 2007-8 the national recovery and recycling network was enhanced using FIDE's current infrastructure, made available under the NPP, as well as through some new recovery centers. For this purpose, 14 regions covering the country and managing the program using a regional approach were selected. 98 centers were equipped in 2007/2008 with recovery equipment for refrigerants recovery from old appliances that were dismantled in these centers

Mexico's Department of Energy has established a Mexican standard (NOM) that indicates that all new AC and refrigeration units produced in or imported into Mexico must contain energy saving devices.

End-of-life fridges collected for de-manufacturing in Mexico

In 2009 the Mexican Government through the Secretariat of Energy established another very ambitious program of further substituting domestic refrigerators and with a goal of 1,600,000 pieces to be collected until 2012. Under this scheme, the Government offers to Mexican residents low-interest financing and a cash rebate of up to 50% of the cost of a new, energy-efficient refrigerator, when an old fridge is turned in for recycling. The re-payment is made together with the electric energy bill as a low interest rate loan. Major retailers of new appliances - including Wal-Mart and Sears - deliver the new appliance to the customer and collect the old unit for recycling.

While this programs have been a big success in terms of energy efficiency and collection of ODS (166.7 tons) recovery efficiency of ODS continues to be very low (36g per fridge on average) and insulation foam containing CFC-11 is still sent to landfills where harmful ODP and GHG are released into the atmosphere.

Therefore, the UNIDO demonstration project on ODS destruction will concentrate on extraction of CFC-12 from the compressor circuit, separation of oil from the gas, cleaning of the gas to remove all the residues to prepare the gas for incineration and its further liquefaction for transportation to any incineration plant. Further PUR foam panels from refrigerators and air conditioners will be shredded in a shredding plant and CFC-11 as a blowing agent will be extracted under vacuum and collected through the activated carbon filter, then liquefied for its further incineration. The project provides the best-available-technology for CFC-12 and CFC-11 extraction

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

This project will focus exclusively on the destruction of contaminated CFCs, no CTC or halon will be involved in this pilot project.

3 Detailed information on issues required for project submission

Beneficiaries of the Project

The largest scrapping company in Mexico is *Diagnostico y Administracion de Logistica Inversa SA de CV* (DALI) which was created in 2007. It is based in San Luis Potosi, S.L.P. Mexico. Currently it employs over 110 people throughout the country. DALI has the required personnel, established procedures, and equipment to carry out energy efficiency and environmentally-oriented management programs. Among DALI's shareholders are Appliance Recycling Centers of America Inc. (ARCA), Servicios de Administración en Programas Productivos S.A. de C.V. and Three Flags Trading and Management Inc. DALI operates 44 centres in Mexico under its brand, specialized in collection of used household appliances using five processes and materials recovery centres and two material deposit sites. DALI has partnerships and services contracts with several specialized service providers in the industry like MABE Mexico, S.R.L. de C.V. and L.G. Electronics Mexico. DALI has recycled over 150,000 appliances.

Ecofrigo S.A. is another group of companies dedicated to promoting sustainable environmental technologies in Mexico. Ecofrigo has two centres for collection and destruction of refrigerators and air conditioners (Mexico City and Michoacan) and other tow collection centres (San Luis Potosi and Michoacan). The company is planning under the frame work of the UNIDO project to open five new collection centres in 2010. Ecofrigo is also operational under the Refrigerator Replacement Program SENER-FIDE and cooperates with Walmart, Comercial Mexicana, Elektra, Famsa, Copel, Chedraguy, Soriana, Dose, Angel Furniture and Coca Cola Bottling, Mexico as well as with local air-conditioners producers.

Ecofrigo's premises to accommodate the project equipment

These two companies, i.e., Diagnostico y Administracion de Logistica Inversa SA de CV (DALI) and Ecofrigo S.A. have established an infrastructure and collection network for handling of CFC-12 gas extraction, its confinement and final destruction. They fulfilled the reception activities, recovery of the refrigerant gas (only CFC-12), its storage and the shipment of gas to their final disposal place. They issued official documents for all recyclable materials such as copper, aluminum or other materials for their further processing. The CFC-12 gas recovered by these two companies was used only for refrigerators servicing. No CFC-12 incineration practices were introduced in Mexico.

It was agreed with SEMARNAT that DALI and Ecofrigo and other Mexican recycling companies could establish a joint venture – which will be the project counterparty. The joint venture will be responsible for the extraction and subsequent destruction in of, CFC-12 and CFC-11 of old fridges and ACs. UNIDO strongly believes that this project contributes indeed considerably to the improvement of performance of the network of 98 scrapping companies by providing to them assistance in proper extracting refrigerants and blowing agents.

3.1 Sustainability of the Business Model

The business model of the proposed project is based on leveraging the injected seed money through the use of the carbon market. As described in detail in Annex I various national/regional and international markets for carbon credits have developed over the past few years and have created demand for emission reductions from ODS destruction projects. Just recently by the end of 2010 US State of California announced the introduction of a state wide cap and trade system which also allows the use of offsets from ODS destruction projects (in the first step only from US sourced projects, however it is very widely assumed that also international offsets especially from Mexico will be accepted in the near future).

Even when assuming a rather conservative price per carbon credit of USD 3/tCO2e the simplified cash flow analysis (see section 4) shows that this project is financially viable over the proposed period of time. Funds from MLF will not only be used for a one time destruction of ODS but will provide a kind of "seed money" for implementing a sustainable, comprehensive ODS waste management and destruction system in Mexico for the next 12 years

3.2 Time Critical Elements of the Implementation

Year 1 (time critical output is the destruction of ODS and commercialization of first carbon credits in order to receive the funding for activities not funded by MLF)

- Aggregation of already collected ODS at central facility/ storage
- Transportation of ODS to US
- Destruction of ODS
- Monitoring of ODS destruction according to CAR
- Documentation according to CAR
- Verification
- Sale of carbon credits

Year 2 (time critical output is the procurement specification of equipment, implementation of supportive policies/legislation)

- Activities as mentioned under year 1
- Issuing of policies/norms
- Equipment specification for step 1 and step 2 plant
- Equipment procurement

Activities in year 3-12 are not expected to be as time critical as activities in year 1 and year 2.

As indicated above the other source of funding will be the carbon market (see Annex I for detailed elaboration of the carbon markets to be applied to the project). The following table provides an overview of prices for GHG emission reductions for 2009.

US offset prices 2009

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

Table 2: Overview Market Prices per VER

	2009	CAR	VCS
Average mid-market price, US$/tCO^{2}e	1st Q	$7.3	$5.0
	2nd Q	$6.0	$4.6
	3rd Q	$5.1	$3.9
	4th Q	$5.2	$2.9

UNIDO assumes a conservative price of USD 3.0/tCO2e for calculations of income from the carbon markets.

Both carbon standards mentioned under (iii) imply a rigorous monitoring and independent verification of actual amount of ODS destroyed and associated emission reductions.

The Monitoring Plan will be established for all monitoring, 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 individuals performing each specific monitoring and operational activity
- QA/QC provisions to ensure that operations, data acquisition and ODS analyses are carried out consistently and with precision.
- data management systems and coordination of data between ODS aggregators, project developers, and destruction facilities.

In relation to the origin of recovered ODS the Beneficiary is responsible for collecting data on the point of origin for each quantity of ODS, as defined in the next table:

Table 6.1. Identification of Point of Origin

ODS	Point of Origin
1. Virgin stockpiles	Location of stockpile
2. Used ODS stockpiled greater than 12 months	Location of stockpile
3. Used ODS quantities less than 500 lbs, and collected in the last 12 months	Location where ODS is first aggregated to greater than 500 lbs[a]
4. Used ODS quantities greater than 500 lbs, and collected in the last 12 months	Site of installation from which ODS is removed

[a] The point of origin for ODS collected by service technicians in individual quantities less than 500 pounds is defined as the holding facility at which several small quantities were combined and exceeded 500 pounds in aggregate. That is, those handling quantities less than 500 pounds need not provide documentation. However, once smaller quantities are aggregated and exceed 500 pounds collectively, tracking will be required from that location and point in time forward.

All data must be generated *at the time of collection* from the point of origin. Documentation of the point of origin of ODS shall include the following:

- Address of point of origin
- Identification of the system by serial number, if available, or description, location, and function, if serial number is unavailable (for quantities greater than 500 pounds)
- Serial or ID number of containers used for storage and transport

In conjunction with establishing the point of origin and importation process for each quantity of ODS, the Beneficiary must also document the custody and ownership of ODS. These records shall include names, addresses, and contact information of persons buying/selling the material for destruction and the quantity of the material (the combined mass of refrigerant and contaminants) bought/sold.

The transfer of custody may be established using the following documentation, as appropriate:

- Tax ID, or other applicable identifier, of transferor and transferee
- Bill of lading (where appropriate)

- Date of transfer of custody
- Serial or ID numbers of all containers containing ODS (received and delivered)
- Weight of all containers containing ODS (received and delivered)
- Distance and mode of transportation used to move ODS (truck, rail or air)

The verification body will review these records and will perform other tests necessary to authenticate the previous owners of the material and the physical transfer of the product and the title transfer of ownership to the Beneficiary. No GHG credits may be issued under this protocol for ODS where ownership cannot be established.

Prior to destruction the precise mass and composition of ODS to be destroyed must be determined according to a very detailed procedure as outlined in the CAR Protocol *Article 5 Ozone Depleting Substances Project Protocol Destruction of Article 5 Ozone Depleting Substances Banks Version 1.0.*

Destruction Facility Requirements
VCS as well as CAR require that all ODS be destroyed at a destruction facility that is compliant with both the international standards specified in the TEAP *Report of the Task Force on Destruction Technologies* and Code of Good Housekeeping, (and in the case that destruction will take place in the US the requirements of domestic U.S. law).

Data shall be provided to the independent verification body (independent certification body such as DNV, SGS TUEV etc. accredited under CAR and/or VCS) to demonstrate that during the destruction process, the destruction unit was operating similarly to the period in which the DRE was calculated.

To monitor that the destruction facility operates in accordance with applicable regulations and within the parameters recorded during DRE testing, the following parameters must be tracked continuously during the entire ODS destruction process:

- The ODS feed rate
- The amount and type of consumables used in the process (not required if default project emission factor for transportation and destruction is used)
- The amount of electricity and amount and type of fuel consumed by the destruction unit (not required if default project emission factor for transportation and destruction is used)
- Operating temperature and pressure of the destruction unit during ODS destruction
- Effluent discharges measured in terms of water and pH levels
- Continuous emissions monitoring system (CEMS) data on the emissions of carbon monoxide during ODS destruction

The beneficiary must maintain records of all these parameters for review during the verification process.
Destruction facilities shall provide a valid Certificate of Destruction for all ODS destroyed. The Certificate of Destruction shall include:

- Project developer
- Destruction facility
- Generator name
- Certificate of Destruction ID number
- Serial, tracking, or ID Number of all containers for which ODS destruction occurred
- Owner of destroyed ODS
- Weight of material destroyed from each container
- Start destruction date
- Ending destruction date

3.3 Project Schedule:

Investment Component

The investment component of the project will focus on the fact that the project is only for demonstration, but to keep open the possibility to continue the activities, which have proved to be effective and economical. It consists of the following elements:

- Assessment of the technical requirements of conversion of the equipment available
- Determining the scope of international and local procurement
- Development of technical specifications and terms of reference for procurement
- Pre-qualification and short-listing of vendors
- International/local competitive bidding
- Procurement contracts
- Site preparation
- Customs clearance and delivery
- Installation and start-up
- Product and process trials
- Operator training
- Commissioning and start up

This approach draws on previous implementation experience and has been designed based on the size, level of organization, location and customer base of enterprises concerned and also based on ease and convenience for execution and management. Given the small and medium to large size of the enterprises involved, the need for adequate investments for Plant and process changes, supported by investments on adequate technical assistance, trials and training, is critical and will involve significant inputs.

Project and Process Investments

UNIDO will ensure the installation of modern and appropriate technologies that are best adapted to the needs of the given destruction problems. The specification of the de-manufacturing as well as the mobile plasma arc destruction facility shall ensure protection of workers and the environment. In case of leasing the de-manufacturing facility for the separation of CFCs from the collected end-of-life domestic refrigerators, the collection efficiency for the CFCs and the efficient separation of the construction materials are the two main aims that determine the technical specification.

Product and Process Trials

Trials will be required to validate the new equipment as well as the production process using the new technology, specifically to establish their performance and suitability for the separation and destruction efficiency according to the specifications and project objectives. Trial costs will cover the cost of chemicals, components, consumables and utilities required during site preparation and commissioning, as well as the cost of the operators.

Technical Support Component

The project will address not only the destruction as an only subject, because the environmental and economic benefit mainly depends on successful marketing of the recovered construction materials (steel, plastics, rubber, aluminium, glass, etc.). These activities will need to be supported through provision of a technical support component for ensuring that the collection of the high volume many thousand tonnes of recovered material could be sold. This should be consistent with the recycle priorities of the Government.

Technical Support Component Actions

The Technical Support Component will:

a) Establish quality standards for the recovered construction materials using data and information from the de-manufacturing equipment supplier.

b) Conduct one workshop 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.

Policy and Management Support Component

The implementation of the demonstration project will need to be closely aligned and coordinated with the various policy, regulatory, fiscal, awareness and capacity-building actions that the Government of Mexico is taking to ensure that the implementation of the project is consistent with the Government priorities.

The demonstration project will be managed by a dedicated management committee, consisting of a coordinator to be designated by the Government and supported by representatives and experts from the implementing/executing agency and the necessary support infrastructure. The management support component of the project will include the following activities for the duration of the project:

a) Management and co-ordination of the project implementation with the various Government policy actions
b) Establishment of a policy development and enforcement program, covering various legislative, regulatory, incentive, disincentive and punitive actions to enable the Government to acquire and exercise the required mandates in order to ensure compliance by the industry
c) Development and implementation of training, awareness and capacity-building activities for key government departments, legislators, decision-makers and other institutional stakeholders, to ensure a high-level commitment to the Project objectives and obligations.
d) Creation of awareness of the Project and the Government initiatives in the sector among consumers and public, through workshops, media publicity and other information dissemination measures
e) Preparation of an implementation plan including determining the sequence of enterprise participation in planned sub-projects
f) Verification and certification of results of the demonstration project completed through visiting and performance auditing
g) Establishment and operation of a reporting system for collected refrigerators, end-of-life separated CFCs.

Co Financing will be arranged with the Beneficiary of the project

The counterpart contributes funds in kind (premises, labour, lab equipment, CFC collection expenses, etc.)

4 Project Costs

The following table gives an overview of total annual costs related to the implementation of the proposed project:

Table 3: Overview: Total Annual Project Costs

			Years											
	USD	Units	1	2	3	4	5	6	7	8	9	10	11	12
Project Output														
Collected ODS CFC-12		tCFC-12	83	83										
ODS Collection CFC-12		tCFC-12			26	26	26	26	26	26	26	26	26	26
ODS Collection CFC-11		tCFC-11			64	64	64	64	64	64	64	64	64	64
Associated Emission Redcutions (according to CAR and VCS)														
Collected ODS (CFC-12)		tCO2e	907,890	907,890										
ODS Collection CFC-12		tCO2e			283,205	283,205	283,205	283,205	283,205	283,205	283,205	283,205	283,205	283,205
ODS Collection CFC-11		tCO2e			98,248	98,248	98,248	98,248	98,248	98,248	98,248	98,248	98,248	98,248
Costs														
Investment Stage I CFC-12 Three Recovery Units with Separation of Oil and Gas				900,000										
Investment Stage II CFC-11 one Extraction and Liquefaction Plant					4,000,000									
Investment three ISO Containers (10000 Litres)			60,000											
(ODS Sourcing) Buying Collected ODS CFC-12	4.0	USD/kgCFC-12	333,400	333,400										
Operating Costs De-Manufatcuring (Energy,Wages)					110,400	110,400	110,400	110,400	110,400	110,400	110,400	110,400	110,400	110,400
Transportation of Dispersed ODS within Mexico to Centralized Facility to Aggregate in ISO Containers for Transport to the US			10,000	10,000										
Transportation of Aggregated CFC-12 to US Destruction Facility (e.g. Clean Harbors El Dorado, Arkansas) 17 times			51,000	51,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000
Transportation of Collected Fridges Mex.					2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
Transportation of CFC-11 to Mexican Desruction Facility					800	800	800	800	800	800	800	800	800	800
CFC-12 Destruction (Incineration) Costs US	5.5	USD/kgCFC-12	458,425	458,425	143,000	143,000	143,000	143,000	143,000	143,000	143,000	143,000	143,000	143,000
CFC-11 Destruction (Incineratio) Costs Mex.	3.0	USD/kgCFC-11			192,000	192,000	192,000	192,000	192,000	192,000	192,000	192,000	192,000	192,000
Monitoring & Verification (ODS Destruction)			40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000
Transaction Fee Carbon Registries	0.2	USD/tCO2e	181,578	181,578	56,641	56,641	56,641	56,641	56,641	56,641	56,641	56,641	56,641	56,641
Carbon Market Project Management (Documentation, Sale etc.)			115,000		115,000									
Health, Safety, Environment Training			30,000											
Policy Support (Management USD 50,000, Dissemination 45,000)				95,000										
Total Costs			**1,279,403**	**2,069,403**	**4,671,841**	**556,841**	**556,841**	**556,841**	**556,841**	**556,841**	**556,841**	**556,841**	**556,841**	**556,841**

The following information sources were used to make assumptions:

Investment Stage I CFC-12 (3 units)	information by manufacturer
Investment Stage II CFC-11	information by manufacturer
Investment 3 ISO Containers	information by logistics experts
Buying Collected CFC-12	information by local experts
Operating Costs (Energy, Wages)	information by manufacturer
Transportation of dispersed ODS within Mexico	own assumptions
Transportation of Aggregated ODS to US	information by logistics experts
Transportation of Collected Fridges within Mexico	own assumptions
CFC-12 Destruction US	information by destruction facility
CFC-11 Destruction Mexico	own assumption
Monitoring and Verification ODS Destruction	information by carbon market expert
Transaction Fee Carbon Registries	information by Climate Action Reserve
Carbon Market Project Management	information by carbon market expert
Health, Safety, Environment Training	own assumption
Policy Support	own assumption

The following table provides an overview of the total Incremental (Capital) Costs/Investment Component of the full size project

Table 4: Incremental Costs Full Size Project

Activity	Full Scale Project Cost USD
Investment Cost	
Centralized Facility for ODS Collection at the Beneficiary Site	
Stage I CFC-12 Three Recovery Units with Separation of Oil and Gas	900,000
Stage II CFC-11 One Extraction and Liquefaction Plant	4,000,000
Three ISO Containers (10000 Litres)	60,000
Contingency 10%	496,000
Sub-total	*5,456,000*
Policy Management Support	
Eligible part of Management, Coordination and Monitoring, Communication and Transportation including the Improvement/Upgrade of Local Legislation including the First Stakeholder Meeting	50,000
One Workshop in the First Year for Public Awareness and One Workshop in 2011 for Information Dissemination	45,000
Contingency 10%	9,500
Sub-total	*104,500*
Technical Component	
Carbon Market Project Management (Documentation, Sale etc.)	230,000
Health, Safety, Environment Training (Technical Workshop with International Expert)	30,000
Contingency 10%	26,000
Sub-total	*286,000*
Incremental Operating Costs	
Transaction Fee Carbon Registries	929,566
Monitoring and Verification of ODS Destruction	480,000
Collection ODS CFC-12	666,800
Operating Costs De-Manufacturing (Energy, Wages)	1,104,000
Transportation of Dispersed ODS within Mexico to Centralized Facility to Aggregate in ISO Containers for Transport to the US	20,000
Transportation of Aggregated CFC-12 to US Destruction Facility (e.g. Clean Harbors El Dorado, Arkansas)	222,000
Transportation of Collected Fridges Mex.	20,000
Transportation of CFC-11 to Mexican Destruction Facility	8,000
CFC-12 Destruction (Incineration) Costs US	2,346,850
CFC-11 Destruction (Incineration) Costs Mex.	1,920,000
10% Contingency	771,722
Sub-total	*8,488,938*
Total Incremental Costs Full Size Project	**14,335,438**

Activities to be funded by the MLF

The following table gives an overview of the activities or costs to be funded by the MLF

Table 5: Activities to be funded by the MLF

Activity	Number of Units	USD/Unit	Cost
Transportation of Dispersed ODS within Mexico to Centralized Facility to Aggregate in ISO Containers for Transport to US	1	20,000	20,000
ISO Container (10,000 Litres)	3	20,000	60,000
Transport of Aggregated CFC-12 to US Destruction Facility (e.g. Clean Harbors El Dorado, Arkansas)	27	6023	162,618
Destruction of CFC-12 Already Collected by Existing Energy Efficient Appliances Replacement Programs in Mexico	166700	5.5	916,850
Monitoring and Verification of ODS Destruction	2	40,000	80,000
Carbon Market Project Management (International Experts)	7 w/m	115,000	115,000
Health Safety Environment Training	1	30,000	30,000
Contingencies 10% (of total costs)			138,447
Total			1,522,915

Total costs to be requested funding for from MLF are 1,522,915 USD.

The following table gives an overview of the total annual income generated by the project

Table 6: Total Annual Income Generated by the Project

			Years											
	USD	Units	1	2	3	4	5	6	7	8	9	10	11	12
Project Output														
Collected ODS CFC-12		tCFC-12	83	83										
ODS Collection CFC-12		tCFC-12			26	26	26	26	26	26	26	26	26	26
ODS Collection CFC-11		tCFC-11			64	64	64	64	64	64	64	64	64	64
Associated Emission Redcutions (according to CAR and VCS)														
Collected ODS (CFC-12)		tCO2e	907,890	907,890										
ODS Collection CFC-12		tCO2e			283,205	283,205	283,205	283,205	283,205	283,205	283,205	283,205	283,205	283,205
ODS Collection CFC-11		tCO2e			98,248	98,248	98,248	98,248	98,248	98,248	98,248	98,248	98,248	98,248
Income														
Sales Collected CFC-12	3.0	USD/tCO2e	2,723,670	2,723,670										
Sales ODS Collection CFC-12	3.0	USD/tCO2e			849,615	849,615	849,615	849,615	849,615	849,615	849,615	849,615	849,615	849,615
Sales ODS Collection CFC-11	3.0	USD/tCO2e			294,744	294,744	294,744	294,744	294,744	294,744	294,744	294,744	294,744	294,744
Total Income Carbon Market			**2,723,670**	**2,723,670**	**1,144,359**	**1,144,359**	**1,144,359**	**1,144,359**	**1,144,359**	**1,144,359**	**1,144,359**	**1,144,359**	**1,144,359**	**1,144,359**

The following information sources were used to make assumptions:

Already Collected ODS CFC-12	please refer to section 2.1
ODS Collection CFC-12 (Additional 10 years)	please refer to section 2.1
ODS Collection CFC-11 (Additional 10 years)	please refer to section 2.1
Associated Emission Reductions	estimation based on CAR and VCS meth.
Price per Emission Reduction (CO2e)	please refer to section 3

The funds provided by the MLF can therefore be paid back by the income generated through the utilization of the carbon market.

5 Implementation Schedule First 2 Years

Table 7: Implementation Schedule First 2 Years

	Months												Months											
	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																								
Sub-grant agreement																								
Aggregation of Already Collected ODS in Centralized																								
Transportation of Already Collected ODS to the USA																								
Destruction of ODS																								
CAR/VCS Project Development																								
Monitoring of ODS Destruction According to the CAR																								
Verification and Issuance of Carbon Credits																								
Change of Regulation																								
Commercialization of Carbon Credits																								
Issuing Norms																								
Workshops																								
Equipment specifition - Stage 1																								
Equipment procurement - Stage 1																								
Equipment specification - Stage 2																								
Equipment procurement - Stage 2																								

6 Annex I Linkage between the Montreal Protocol and the Carbon Market

6.1 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[4]. 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[5].

[4] 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)

[5] 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)

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)

Besides the so called **"compliance markets"** a market for verified or voluntary emission reductions units[6] 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[7].

Table 8 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 8: 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.

[6] 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).
[7] 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)

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.

Table 9: Overview of the Nort 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.

6.2 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.

7 Annex II Background on ODS related Legislation and Policies in Mexico

Mexico used to be the largest CFC and HCFC producing country in Latin America, with a diversified industrial infrastructure and has been consuming a multitude of ODS. Mexico´s obligations under the Montreal Protocol are administered by the Ministry of Environment and Natural Resources SEMARNAT. The main achievement in reducing ODS consumption in Mexico have been so far:

1990: More than 90% reduction in the consumption of chlorofluorocarbons (CFCs), due to the implementation of more than 100 projects for substituting the use of these substances in domestic and commercial refrigerators, air conditioners, aerosol sprays, solvents and polyurethane foams.

1997: All the domestic and commercial refrigerators produced in the country are CFC-free.

2002: Start of the ''Program for the Financing for electric energy saving'' (PFAEE) in which the objective was to back up the Federal Government's Program for electric energy saving and efficient use. In the said program, the creation of Centers for gathering destruction of the out-of-use refrigerators was performed. These centers had the infrastructure for the control of the handling, gas extraction, confinement and destruction of the refrigerators. The aforementioned program was operational until 2006 and involved over 100 Centers, of which it is uncertain if any of them are still active or whether they have the infrastructure to be operational. However, the Mexican authorities informed that after CFC-12 recovery, it was not destroyed. Neither PUR foam panels containing CFC-11 gas.

2005: The Mexican Government made a commitment with the Montreal Protocol to go ahead and close the CFC production plant operated by the Quimobásicos company in Monterrey, Nuevo Leon. The country took this action four years earlier than the date stipulated in the Protocol. This meant that CFC production in North America was

completely phased out, thereby promoting an end to this production not only in Mexico, but in all of Latin America and other regions of the world, thereby reducing total CFC production in the world by 12% and in the hemisphere by 60%. The product was used in refrigerators, air conditioners, aerosol sprays and in the production of polyurethane foams.

2005: 100% elimination of CFC use in the production of polyurethane foams, thereby eliminating the consumption of more than 600 metric tons of these compounds in more than 200 companies in the country.

Mexico has in place very effective ODS legislation and has been complying with all MP control measures. The ODS awareness program reached out to the general public all over the country. The table below summarizes the most important legislation related to ODS.

Table 10: Overview of ODS Related Legislation in Mexico

No.	Regulation	Brief description	Promulgating Agency	Came into force
1	General Law of Environmental Protection and Ecologic Equilibrium	General environmental policy framework		1987
2	Law for Prevention and Control of Climate Change	General strategy for prevention, control and policy evaluation of ODS.		
3	ODS Import/Export Licensing System	Enabling the country to implement an import license system and control procedures for CFCs and CTC, particularly at customs entry points.	Promulgated by Secretariats of Environment, Agriculture and Health	
4	NOM-125-ECOL-2001	Regulatory framework to control the use of ODS in all sectors restrictions over national production and imports of freezers and domestic or commercial air conditioning containing or having been produced with ODSs.		2001
5	Voluntary reporting of trade on CFCs	The national CFC producing enterprises to voluntarily report domestic and international commercial activities such as production, imports and exports volumes	SEMARNAT	1992
6	Justice Codes	Any illegal traffic and mishandling of CFCs is a federal crime		
7	NOM-085-SEMARNAT-1994	Atmospheric contamination – fixed sources. for fixed sources that utilize solid, liquid, or gas combustible fossil fuels, or any of their combinations, that establishes the maximum permissible levels of emission to the atmosphere of smoke, total suspended particulates, sulfur dioxides and nitrogen oxides	SEMARNAT	1994
8	NOM-015-ENER-2002	Energy efficacy of refrigerators sold	Ministry of Energy	2003

8 Annex III Background on Technology Selection

Destruction Facility

VCS as well as CAR require that all ODS be destroyed at a destruction facility that is compliant with both the international standards specified in the TEAP *Report of the Task Force on Destruction Technologies* and *Code of Good Housekeeping*, (and in the case that destruction will take place in the US the requirements of domestic U.S. law).

CFC-12 will probably be destroyed in a facility in the United States.

CFC-11 will either be destroyed in a plasma arc facility or cement kiln or any other appropriate technology financially feasible and in compliance with above mentioned guidelines being confirmed by an independent third party (verification)

De-manufacturing End-of-Life Refrigerators

De-manufacturing aims at recovering CFCs, VOCs, other refrigerants and blowing agents, harmful substances and any components containing harmful substances, and to retrieve and separate recyclable materials, and involves the – breaking-up (i. e. shredding, crushing, milling), sorting and classification of the materials obtained in Step I and Step II and the preparative steps needed before recycling or disposing of these materials. As a general requirement, the RAL-GZ 728 quality standard of Deutsches Institut für Gütesicherung und Kennzeichnung E. V. may be considered:

Overview of the Technology for De-commissioning end-of-life Domestic Refrigerators and Air-conditioning units

The technology has two well separated steps. The first step is essential to take part as soon as possible after the collection of the refrigerators because this step recovers the CFC in the cooling circuits which may escape into the atmosphere during a long outdoor storage period. After this step the fridges can be stored for months because the CFC in the insulation foam is more contained and can escape only through a slow degradation and diffusion process.

Step 1 - Pre-treatment

Within the scope of Stage 1 pre-treatment, the cooling devices are “dried up”, i.e. the cooling system is completely evacuated by means of an extraction system. The extraction process sequence is as follows:
By means of a hoisting and turning gear, the individual appliances are positioned such that the cooling system can be opened at its lowest point in order to enable full extraction of refrigerating agent and refrigerating oil. Refrigerating agent and refrigerating oil are sucked into a closed system, which is kept at a negative pressure of approx. 300 mbar. Within this closed system, the refrigerating agent is separated from the refrigerating oil and, upon liquefaction, is exported into compressed gas cylinders. Upon complete removal of the refrigerating agent, the refrigerating oil is collected in two tanks integrated into the plant and transferred into suitable drums as soon as a defined tank level is reached.

De-manufacturing compressor circuit unit (CFC-12 extraction)-
CFC-12 extraction from the compressor circuit

The extraction process and the separation of refrigerating agent and refrigerating oil are electronically controlled and monitored to ensure operational safety of the plant at any time. All Stage 1 plant parts are installed on collecting pans, so that liquids escaping during the work process are safely retained. In proper operation of the plant, the treatment process does not give rise to any emissions. Via roller conveyors and an automatic, photocell-controlled charging system, the CFC -containing PUR devices are, on a just-in-time basis, forwarded to the Stage 2 section and processed there. The de-manufacturing capacity of the Step 1 unit is 60-70 fridges per hour, approximately 200,000 fridges per one shift per year. Its cost as advised by SEG De-manufacturing, Germany is US$ 315,000 for two arms manipulator with a capacity of only 20-24 fridges. The cost of three 2 arms manipulators and three CFC-12 extraction units with oil/gas separation with capacity of 60-70 fridges per hour will be about US$ 1.0 million in order to accommodate the primary quantity of 200,000 old fridges per year- project target.

Step 2 – Treatment

After “drying up” of the appliances, the compressors, all wooden and glass parts and all components containing harmful substances, such as capacitors and mercury switches, are removed and collected separately. The Step II treatment plant is designed to shred cooling appliances and separate the different materials of the appliance casings while recovering to a large extent the CFC blowing agent contained in the insulating foams. For this purpose, the appliance casings are input into a closed system and shredded there in a 2-stage shredding system; the resulting mixture of materials is then divided up by means of an air separating system. The fraction consisting of scrap steel and iron, plastics and non-ferrous metals is discharged from the system and further divided up into its constituents by means of a magnetic separator and an eddy-current separator system, while the separated PUR foam is ground within the plant and heated up in order to drive out the CFC adhering to the PUR foam. Upon completion of this treatment step, the PUR powder is also discharged from the plant. The insulating gas/blowing agent (CFC) released during the process of shredding, grinding and heating is collected, adsorbed in activated carbon and, following desorption from the activated carbon, liquefied under pressure by means of compressors.

Shredding unit (CFC-11 extraction)

Equipment Specifications to be Advised by the Beneficiary

- Annual capacity: 200 000 pcs of domestic refrigerators in one shift;
- Recycling efficiency: min. 90% meaning that min 90% in weight of the original end-of-life refrigerator is separated in the form of materials, which can be sold;
- Efficiency of recovery of CFCs from cooling circuits and from the insulation foam should be higher than 90% by weight;
- The components of end-of-life refrigerators, which are considered as hazardous waste (e.g. mercury switch, capacitors, etc.) can be collected separately. These hazardous components of end-of-life refrigerators must not make any recyclable construction materials hazardous.