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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：哥伦比亚

本文件由基金秘书处就以下项目提案提出的评论意见和建议组成：

销毁

- 关于消耗臭氧层物质废物管理和处置的试点示范项目 开发计划署

淘汰

- 氟氯烃淘汰管理计划（第一阶段，第二次付款） 开发计划署/环境规划署

项目评估表 – 非多年期项目

哥伦比亚

项目名称	执行机构
关于消耗臭氧层物质废物管理和处置的试点示范项目	开发计划署

国家协调机构：臭氧技术单位（UTO）

项目中所涉消耗臭氧层物质的最新报告消费数据

A: **第 7 条数据（ODP 吨，2010 年）**

附件一，氟氯化碳	0		

B: **国家方案行业数据（ODP 吨，2010 年）**

消耗臭氧层物质	分行业/数量	分行业/数量	总计
氟氯化碳			0

本年度业务计划：供资总额为 1,209,375 美元，总共淘汰 75 ODP 吨

项目名称

消耗臭氧层物质在企业中的使用		暂缺
待淘汰的消耗臭氧层物质		暂缺
逐步淘汰的消耗臭氧层物质		暂缺
本业务计划中的项目		是
行业		消耗臭氧层物质废物
分行业		制冷维修行业
项目影响		114 公吨 CFC-12
项目持续时间		36 个月
本地所有权		100%
出口组成部分		%
申请多边基金赠款	美元	1,195,000
执行机构支助费用（7.5%）	美元	89,625
给多边基金的项目总费用	美元	1,284,625
成本效益	美元/公斤	10.48 ODS（公制）
项目监测重要事件		包括

秘书处的建议：	单独审议

项目说明

导言

1. 开发计划署代表哥伦比亚政府向第六十六次会议提交了一个关于消耗臭氧层物质废物管理和处置的试点示范项目的提案，原申请总额为 1,195,000 美元。该项目提案是根据第 58/19 号决定提交的，并且将涉及在哥伦比亚销毁 114 公吨消耗臭氧层物质废物。

2. 在第五十七次会议上，执行委员会为开发计划署提供资金，以便为哥伦比亚编制一个试点消耗臭氧层物质示范项目。在这次会议上，做出这一决定的目的是要考虑应对缔约方第二十次会议关于试点消耗臭氧层物质处置项目的第 XX/7 号决定，该决定规定试点项目可以涵盖、收集、运输、储存和销毁消耗臭氧层物质，重点关注如何处理净全球升温潜能值高的组装库存问题，并且重点关注具有代表性的不同区域第 5 条国家的范例。成员们还强调，消耗臭氧层物质处置示范项目应该可行，并且应该包括影响联合供资的方法。哥伦比亚就是按照这一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问题，并且最终通过了第 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确定了依据。秘书处依据该决定所确立的各项原则对本提案进行了审查。秘书处还适用于该决定的第(a)(二)段，其中明确规定不会为试点项目提供用于收集消耗臭氧层物质废物的供资。有关收集消耗臭氧层物质废物的定义载于第五十八次会议报告中名为“消耗臭氧层物质处置示范项目的临时供资准则中所包括各项活动的定义”的附件之中。哥伦比亚试点项目将涵盖已经收集的消耗臭氧层物质废物以及根据一项即将出台的废弃电气电子设备国家政策另外收集的消耗臭氧层物质废物，该项政策拟于 2013 年之前实施。

4. 这个试点示范项目是要论证一种从收集到销毁消耗臭氧层物质废物管理的可持续做法，所采取的方式是将该项目纳入哥伦比亚国内更广泛的危险废物、废弃电气电子设备和节能倡议从而加强哥伦比亚国内设施的销毁能力。该项目的时间安排也为实现与一个同时实施且涉及消除多氯联苯废物库存的全球环境基金（全环基金）项目的协同增效提供了机会，全环基金项目将接受共同机构的监督。这些努力将会得到现有项目的补充，特别是氟氯烃淘汰管理计划及其与现有制冷设备维修的回收业务有关的活动，这些活动也会产生可能不再重新使用的消耗臭氧层物质量。本文件的附件一中载有一份详细的项目提案。

项目说明

5. 这个试点项目最初涉及处置 114 吨需要销毁的消耗臭氧层物质废物。它还将采取措施，支持该项目的可持续性，所采取的方式是顾及到将要通过哥伦比亚强大的国内制冷维修行业收集到的可用消耗臭氧层物质废物，哥伦比亚国内制冷维修行业拥有一个由配备完善的技术人员和私营公司组成的网络，并且向各国各地再循环和再生中心分发了各种制冷剂回收设备。这个收集网络将会得到三个相关且协调一致的政策倡议的支持，这三个倡议目前正在实施，并且将会导致产生大量需要销毁的报废消耗臭氧层物质。

6. 第一个倡议是为了合理和高效地利用能源和非常规能源，其中包括一个涉及利用节能模式替换家用制冷设备的组成部分。该方案也是在全环基金供资的一个涉及建筑物节能的项目的框架内实施，包括考虑空调系统。第二个方案涉及在一个关于危险废物管理的更大环境政策范围内制定长期战略，其中的一个目标包括执行《斯德哥尔摩公约》的一项行动计划和依据《蒙特利尔议定书》淘汰消耗臭氧层物质。这一倡议的结果是在最后两年内建起了现代化的回转炉高温焚烧设备，为销毁消耗臭氧层物质提供了一种备选办法，但条件是必须满足国际销毁标准。第三个政策方案是关于废弃电气电子设备的，是一个关于收集废弃电气电子设备的扩大方案，其中的一个组成部分明确涉及到提前报废使用 CFC-11 和 CFC-12 老旧家用/商业制冷和空调设备。该方案的部分供资将由国家生产者延伸责任机制提供，涉及到用更加节能/非消耗臭氧层物质设备来更换家用制冷设备并为此提供补贴，其中包括与收集、处理以及对包括销毁制冷剂和泡沫塑料在内废弃设备实施无害环境管理相关的费用。

7. 这三项政策已经导致通过了一项有关从 2013 年开始在十年内更换 260 万台使用氟氯化碳的家用制冷设备的国家目标。该试点项目的目标针对的是从将要项目启动期（2013-2015 年）的两年内处理的 300,000 台制冷设备中收集到的废弃消耗臭氧层物质，由此将销毁 114 吨 CFC-11 和 CFC-12。

8. 为销毁哥伦比亚境内废弃消耗臭氧层物质所采取的总的做法是利用国内现有危险和工业废物管理能力进行国内销毁。因此，该试点项目的目标是要通过证明三个国内回转炉焚烧厂（TECNIAMSA SA Baranquilla、波哥大的 TECNIAMSA SA 和莫斯奎拉的 PROSARC, SA）具备按照国际标准销毁报废 CFC-12、CFC-11 和含有 CFC-11 的聚胺脂泡沫塑料的能力，证明一个发展中国家如何才能拥有管理报废消耗臭氧层物质的国家能力，以便进行推广，所采用的方式是至少在每个焚烧厂进行针对上述每一种废物流不少于 5 吨的全面试验性焚烧。在这三个焚烧厂中，有两个将通过增加一个用于处理 CFC-12 的喷射口的方式加以履行，而另一个将用于销毁从制冷设备中收集到的泡沫塑料。所要采用的监测程序涉及到操作条件（即燃烧室温度、估计停留时间、烟囱出烟口的温度）、包括多氯二苯并二恶英和多氯二苯并呋喃以及涉及所有残余排放路径（固体、液体和气体）的质量平衡输入在内的管制排放标准清单、以及对主要污染物（包括以固体形式存在于底部灰烬、洗涤器残留物之中的多氯二苯并呋喃）以及任何液体残液的分析。其意图是确定销毁清除效率（DRE）和销毁效率（DE）。

9. 该消耗臭氧层物质销毁示范项目拟分三年实施。

对即将处理的消耗臭氧层物质的估算

10. 如上所示，该试点项目即将处理的消耗臭氧层物质的数量将为 114 吨。其中，有 11 吨是已经收集并储存在钢瓶中的 CFC-12 和已经收集并存放在袋中的含有 CFC-11 的泡沫塑料。这些消耗臭氧层物质可以随时销毁。三年项目期内将要销毁的消耗臭氧层物质估计数量中将包括通过现有国家收集系统收集的数量，其数量如下文表 1 所示：

表1：本项目中将要使用的废弃消耗臭氧层物质的估计数量

来源和数量		2012年			2013年				2014年				2015年	
		第二季度	第三季度	第四季度	第一季度	第二季度	第三季度	第四季度	第一季度	第二季度	第三季度	第四季度	第一季度	第二季度
CFC-11	*合计：* 8,120 公斤													
正回收、已回收和储存	4,120 公斤	—												
在2012年之前回收	900 公斤	—	—	—										
在2013年之前回收	3,100 公斤	—	—	—	—	—	—	—						
CFC-12	*合计：* 5,674 公斤													
回收和储存	5,674 公斤	—												
其他	1,249 公斤													
氟氯烃、氢氟碳化物混合物	919 公斤	—												
四氯化碳	330 公斤	—												
来自生产者延伸责任方案的四氯化碳	99,000 公斤													
含在被包装泡沫塑料中的 CFC-11	65,000 公斤		—	—	—	—	—	—	—	—	—	—	—	
CFC-12	34,000 公斤		—	—	—	—	—	—	—	—	—	—	—	
合计	114,043 公斤													

项目的财务管理

11. 提案设想，将利用来自多边基金的供资支付检测选定焚烧设备以及提升其业务使其达到国际标准以便使上述数量的消耗臭氧层物质能够在今后三年里销毁所需的费用。该提案预计，一旦试点项目完成后，这些设施的未来业务费用将完全通过生产者延伸责任/废弃电气电子设备方案进行支付，在该方案中，从老旧设备中收集到的其他材料将产生足够的收入，这些收入将使持续销毁未来的废弃消耗臭氧层物质成为可能。将要在试点项目结束后收集的报废制冷设备的当前目标数字是 200 万台，根据保守估计，预期将会产生约700-800吨废弃消耗臭氧层物质。

销毁技术/做法的选择

12. 对销毁包括泡沫塑料中所含 CFC-11 在内报废消耗臭氧层物质的各种战略和技术选择进行了审查，以便作为确定项目设计及其详细范围的一种依据。考虑了三种潜在选项：(一) 向合格的危险废物管理厂家出口；(二) 建设新的、利用进口技术的国内厂家；和(三) 利用现有国内危险和工业废物管理能力。没有考虑第一选项，原因是其成本太高（11-12美元/公斤，含运输和交易成本），而且在国内还涉及《巴塞尔公约》管制问题。对在国内新建工厂的选项也进行了研究，得出的结论是资本投入太大，且这些技术的能力不适合哥伦比亚的要求。

13. 最后一个选项涉及对利用现有国内焚烧设施的潜力进行了分析和研究，条件是这些设施满足国际标准，然后能够允许它们销毁消耗臭氧层物质。对适用于危险废物热处理/焚烧设施的哥伦比亚现行允许和资质协议及标准进行了审查。有四个处理厂被确定为可能具有销毁报废消耗臭氧层物质的能力，但条件是要通过检测程序得到技术验证。一旦这四个处理厂被证明符合国际标准，则哥伦比亚政府相信，利用国内销毁能力比其他拟议选项的成本效益更高。因此，本提案就是围绕这个选项提出的。

对销毁活动的监测与核查

14. 为确保所有消耗臭氧层物质废物都得到适当处理，需要对销毁过程进行密切监测，并将要通过为此目的而设立的一套电子数据系统记录所有数据。因目前可用消耗臭氧层物质库存均由原来的来源地保存，并都通过明确的活动（即海关扣押、制冷维修活动以及冷风机示范项目、计量吸入器转用等淘汰倡议）加以收集，为销毁之目的而回收的所有报废消耗臭氧层物质的来源地都能够轻易查明。在全国生产者延伸责任制冷设备更换方案启动阶段回收的报废消耗臭氧层物质将会在其产生的源头得到密切监测。在这两种情况下，为了对这些材料进行追踪，项目对从后续综合、品质鉴定、储存、运输到销毁等程序做出了明确的规定，包括详细的证明文件和使用电子数据监测系统，它是项目产出的一部分。由于哥伦比亚境内没有消耗臭氧层物质生产设施，故也没有夸大数量或库存不合格的可能。

项目费用

15. 按照最初提案申请的数额，本项目的费用总额估计为 2,750,000 美元，多边基金秘书处申请的供资额为 1,195,000 美元，如下表所示。

表 2：拟议的项目费用

预算	费用（美元）		
	多边基金	共同融资*	合计
组成部分 1：消耗臭氧层物质销毁示范	835,000	1,235,000	2,070,000
CFC-11 和 CFC-12 报废消耗臭氧层物质的综合/储存/品质鉴定/运输	100,000	50,000	150,000
在废料场对制冷设备进行人工处理将要产生 10 至 15 吨 CFC-11 泡沫塑料	100,000	-	100,000
在选定危险废物焚烧炉对 CFC-11 和 CFC-12 进行试验性焚烧示范	250,000	165,000	415,000
在选定的工业/危险废物焚烧厂对含有 CFC-11 的泡沫塑料进行试验性焚烧示范	140,000	80,000	220,000
启动生产者延伸责任方案时所拥有的 CFC-12 和含有 CFC-11 泡沫塑料的销毁（基于 300,000 台，34 吨 CFC-12，1,228 吨泡沫塑料中含有 65 吨 CFC-11）	245,000	940,000	1,185,000
组成部分 2：技术援助	200,000	150,000	350,000
法律和监管体制技术援助	50,000	25,000	75,000
对生产者延伸责任制度之下的报废消耗臭氧层物质管理的技术/业务规划支助	100,000	100,000	200,000
公共咨询和宣传	50,000	25,000	75,000
组成部分 3：项目管理/监测/评价	160,000	170,000	330,000
国家项目协调员	60,000	60,000	120,000
项目办公室行政管理	-	60,000	60,000
杂项合同服务和差旅	20,000	20,000	40,000
国际技术/业务顾问	50,000	-	50,000
监测和评价费用	30,000	30,000	60,000
合计	1,195,000	1,555,000	2,750,000

*来自私营企业和焚烧企业经营者

秘书处的评论意见和建议

评论意见

16. 在按照第 58/19 号决定所述标准进行审查的基础上，秘书处向开发计划署提出了若干评论和观察意见。它指出，废弃消耗臭氧层物质收集制度的依据是一项政策，该政策目前正处在议会批准的最后阶段，它还对如果该法规未得到批准的可能表达了关切。开发计划署解释说，如果出现这种情况，环境部将发布一项部长令，要求从 300,000 台目标制冷设备收集废弃消耗臭氧层物质，这是该试点项目的一部分。但是，环境部对拟议立法在拟于 2012 年头三个月举行的议会下届会议上获得批准非常乐观。

17. 秘书处还对废弃电气电子设备方案之下拆解制冷设备的后勤问题表示关切。开发计划署指出，有几家公司参与这一方案，并且还有更多的公司对拆解工作表示感兴趣，并且它们都位于全国各地的主要城市中。分散化的人工拆解结构使后勤运作更加容易。金属废料及其他回收材料的价格很高；因此，拆解业务以及废弃消耗臭氧层物质的收集工作要自负盈亏。

18. 秘书处还要求澄清为什么必须在三个焚烧炉进行试验，而不是只作一个试点。开发计划署指出，这些厂家的选择是基于政府所采取的非常严格的标准，目的就是显示销毁的不同方面。由于这一进程既要涉及属于气体物质的 CFC-12，又要涉及属于液态的 CFC-11，故为此需要对高温回转炉进行检测和证明。这一进程不仅要涉及试烧气态的 CFC-12，液态的 CFC-11，还要试烧固态/气态（泡沫塑料中）的 CFC-11。利用这三个焚烧设备将提供广泛的技术能力，使本国能够推行利用这些国内处理厂销毁消耗臭氧层物质的战略。开发计划署还强调，在试点项目中，这些处理厂不需要向多边基金申请资本投入。作为共同融资的一部分，技术改造所需的费用将由每个处理厂自行承担。该提案将重点关注检测、证明和记录各种检测程序的结果。

19. 按照与开发计划署进行讨论的结果，秘书处建议编写一份技术报告/手册将该项目的一个重要且有助于证明项目成果的产出，该报告/手册将记录检测程序所采取的措施和取得的结果、如何进行试验焚烧、如何进行技术验证、设施如何升级改造以及所涉及费用等。它建议，该报告可以用于类似焚烧厂家的类似检测程序，不仅可以在本国使用，也可以在其他第 5 条国家使用，并且将成为该示范项目的一个重大成果。开发计划署考虑到了这一点，并且已对预算进行相应的调整。

20. 秘书处还对试点阶段完成后的项目可持续性提出疑问。虽然提案明确指出，在对这些处理厂的检测完成及已经达到可以接受的销毁标准之后，这些处理厂将继续自己运行。但不清楚一旦试点项目完成之后由谁最终负责支付剩余废弃消耗臭氧层物质的销毁费用。开发计划署解释说，试点项目只涉及启动阶段，所供资金只占销毁费用中的很小部分，但未来费用将完全由废弃电气电子设备/生产者延伸责任方案及其所产生的利润来支付。为了确保采取无害环境方式销毁从管制危险废物等方案中回收的报废消耗臭氧层物质，这些处理厂实施了经济奖励措施。多边基金为检测提供资金是为收集和拆解制冷设备的企业提供支助方案的一个条件。从较长期来讲，预计此种销毁也可能会吸引碳财政收入，不过目前在哥伦比亚并没有人认为这很重要，因为当前对基于人工拆解系统的预期可以维持。

21. 按照提案，项目的最后费用商定为 1,195,000 美元外加支助费用，按 10.48 美元/公斤计算，该价格低于第 58/19 号决定中规定的极限价格（13.2 美元/公斤）。根据秘书处的建议，对产出和费用进行了修改，下表对修改情况进行了总结：

表 3：商定项目费用

预算	费用（美元）
组成部分 1：消耗臭氧层物质销毁示范	830,000
CFC-11 和 CFC-12 报废消耗臭氧层物质的综合/储存/品质鉴定/运输	100,000
针对实验性焚烧示范的含泡沫塑料的 CFC-11 的综合/储存/品质鉴定/运输	100,000
在选定危险废物焚烧炉对 CFC-11 和 CFC-12 进行试验性焚烧示范	250,000
在选定的工业/危险废物焚烧厂对含有 CFC-11 的泡沫塑料进行试验性焚烧示范	135,000
启动生产者延伸责任方案时所拥有的 CFC-12 和含有 CFC-11 泡沫塑料的销毁（基于 300,000 台，34 吨 CFC-12，1,228 吨泡沫塑料中含有 65 吨 CFC-11）	245,000
组成部分 2：技术援助	255,000
法律和监管体制技术援助	50,000
对生产者延伸责任制度之下的报废消耗臭氧层物质管理的技术/业务规划支助	75,000
公共咨询和宣传	50,000
技术监督和总体项目技术报告	80,000
组成部分 3：项目管理/监测/评价	110,000
国家项目协调员	60,000
项目办公室行政管理	-
杂项合同服务和差旅	50,000
合计	1,195,000

建议

22. 谨建议执行委员会考虑：

(a) 赞赏地注意到哥伦比亚政府为一个试点消耗臭氧层物质废物管理和处置项目提交的提案，以便销毁共计 114 公吨废弃消耗臭氧层物质；和

(b) 核准在哥伦比亚执行一个有关消耗臭氧层物质废物管理和销毁的试点项目，项目金额为 1,195,000 美元，外加给开发计划署的金额为 89,625 美元的机构支助费用，但有一项谅解，不会继续为哥伦比亚境内今后可能实施的任何消耗臭氧层物质处置项目提供资金。

项目评价表 – 多年期项目

哥伦比亚

(一) 项目名称	机构
氟氯烃淘汰计划（第一阶段）	开发计划署（牵头机构）

(二) 最新第 7 条数据（附件 C 第 1 组）	年份：2010 年	241.5 （ODP 吨）

(三) 最新国家方案行业数据（ODP 吨）								年份：2010 年	
化学品	气雾剂	泡沫塑料	消防	制冷		溶剂	加工剂	实验室用途	行业消费总量
				生产	维修				
HCFC-123			2.3		0.0				2.3
HCFC-124					0.0				0.0
HCFC-141b	0.6	160.1	4.1		5.6	0.6			171.1
HCFC-142b					0.6				0.6
HCFC-22	0.2	7.6		3.2	56.4				67.4

(四) 消费数据（ODP 吨）			
2009 – 2010 年基准：	225.57	持续总体削减起点：	225.57
符合供资条件的消费量（ODP 吨）			
已核准：	79.40	剩余：	146.17

(五) 业务计划		2011 年	2012 年	2013 年	2014 年	合计
开发计划署	淘汰消耗臭氧层物质（ODP 吨）		10.5		2.9	13.4
	供资（美元）		591,250		161,250	752,500
环境规划署	淘汰消耗臭氧层物质（ODP 吨）		1.0			1.0
	供资（美元）		56,500			56,500

(六) 项目数据			2010 年	2011 年	2012 年	2013 年	2014 年	2015 年	合计
蒙特利尔议定书的消费限量			暂缺	暂缺	暂缺	225.57	225.57	203.01	暂缺
最高允许消费量 （ODP 吨）			暂缺	暂缺	暂缺	225.57	225.57	203.01	暂缺
商定供资（美元）	开发计划署	项目费用	6,021,483	0	550,000	0	150,000	0	6,721,483
		支助费用	451,611	0	41,250	0	11,250	0	504,111
	环境规划署	项目费用	50,000	0	50,000	0	0	0	100,000
		支助费用	6,500	0	6,500	0	0	0	13,000
执行委员会核准资金（美元）		项目费用	6,071,483	0	0	0	0	0	6,071,483
		支助费用	458,111	0	0	0	0	0	458,111
申请本次会议核准的供资总额（美元）		项目费用	0	0	600,000	0	0	0	600,000
		支助费用	0	0	47,750	0	0	0	47,750

秘书处的建议：	单独审议

项目说明

23. 开发计划署作为牵头执行机构代表哥伦比亚政府向执行委员会第六十六次会议提交了一份关于氟氯烃淘汰管理计划第一阶段第二次付款的供资申请，总费用 647,750 美元，包括批给开发计划署的项目费用 550,000 美元外加机构支助费用 41,250 美元，以及批给环境规划署的项目费用 50,000 美元外加机构支助费用 6,500 美元。提交的申请材料中包括一份关于氟氯烃淘汰管理计划的第一年执行情况的进度报告加上一份关于哥伦比亚氟氯烃消费量核查报告以及 2012 和 2013 年的年度执行计划。

背景

24. 哥伦比亚氟氯烃淘汰管理计划获得执行委员会第六十二次会议核准，目标是在 2014 年底之前在氟氯烃基准消费量的基础上实现减少消费 10%，该项目的供资总额原则为 6,821,483 美元，外加机构支助费用 517,111 美元。这包括在第六十次会议上批给开发计划署的项目费用 5,621,483 美元外加机构支助费用 421,611 美元，目标是淘汰家用制冷分行业内生产绝缘泡沫塑料所使用的 56.00 ODP 吨 HCFC-22 和 HCFC-141b。同样是在第六十二次会议上，执行委员会还核准了批给开发计划署的项目费用 400,000 美元外加机构支助费用 30,000 美元和批给环境规划署的项目费用 50,000 美元外加机构支助费用 6,500 美元，以便用于执行第一年的氟氯烃淘汰管理计划。

<u>关于氟氯烃淘汰管理计划第一次付款执行情况的进度报告</u>

25. 在家用制冷分行业内，泡沫塑料企业（即 Mabe Colombia、Industrias Haceb, S.A.、Challenger 和 Indusel S.A）在生产绝缘泡沫塑料方面从 HCFC-22 和 HCFC-141b 转用碳氢化合物技术的转产项目的执行情况进展顺利。每家企业都与环境和可持续发展部之间签发了《谅解备忘录》，对每个利益攸关方的具体责任、资金支付标准以及核查报告做出规定。就 Industrias Haceb 和 Challenger 而言，这两家企业都已安装了必要的设备，并且目前正在进行试生产。据预期，无氟氯烃生产可从 2012 年开始。就 Mabe Colombia 而言，转产所需设备将在 2012 年 10 月之前安装，试生产将在 2012 年第四季度期间进行，无氟氯烃生产将从 2013 年 1 月启动。Indusel 所需设备目前正在生产中，并将在 2012 年第四季度交付并安装。据预期，无氟氯烃生产将从 2013 年第一季度启动。

26. 在制冷和空调维修行业执行了以下活动：

(a) 针对制冷和空调技术人员的培训和资格认证课程已经开始，迄今为止，已有 312 名技术人员已经获得资格认证。举行了三次关于良好维修做法的讲习班，有 130 名技术人员参加并获得了有关回收和再循环业务；碳氢化合物制冷剂的安全处理和《蒙特利尔议定书》在哥伦比亚的执行情况方面的培训。2011 年 11 月，举行了与使用替代制冷剂有关的工业安全问题会议，有 43 位制冷教师参加了这次会议；

(b) 为来自制冷和空调维修车间和最终用户的 170 位代表举行了关于低全球升温潜能值替代制冷剂的研讨会；

(c) 为全国各地的维修车间提供技术援助，指导它们在安装和维护制冷和空调系统、替代性制冷剂和消耗臭氧层物质的安全处理方面采用良好维修做法；

(d) 国家臭氧机构访问了 31 个商业机构，以便收集有关国内正在使用的消耗臭氧层物质和非消耗臭氧层物质制冷剂的详细住处。这些访问也在帮助预防和控制消耗臭氧层物质非法交易方面发挥了作用；

(e) 为了淘汰冲洗制冷电路过程中产生的 HCFC-141b，已对替代方法进行了一次评估，以期采购维修工具。第一阶段包括 165 个受益人，有关选择这些受益人的职权范围已经确定；

(f) 为即将采购的设备确定职权范围的目的是要加强在各类氟氯化碳淘汰期间建立的制冷剂回收、再循环和再生网络。

27. 截止 2012 年 1 月 31 日，在已经核准的 6,071,483 美元的第一次付款中，有 2,523,251 美元已经支付或承诺支付。剩下 3,548,232 美元的余额将在 2012 年支付。

核查报告

28. 对 2010 年氟氯烃消费量的核查工作是由一位独立审计员进行的。报告结论认为，“由国家臭氧机构报告的关于消耗臭氧层物质进口情况的 2010 年数据完全可信；而且哥伦比亚正在按照商定的计划完成其内部消费目标。”该核查报告还建议针对违反消耗臭氧层物质进口条例者进行关于采取有效制裁措施可能性的评估；让公众了解，没收非法消耗臭氧层物质是当前限制其在市场上流通的一种机制；并且将国家臭氧机构的网页变成一种了解《蒙特利尔议定书》信息的方法。

氟氯烃淘汰管理计划第二次付款的年度计划

29. 下文表 1 介绍了拟于 2012 至 2014 年期间执行的主要活动。

表 1. 拟于 2012 至 2014 年在哥伦比亚执行的淘汰活动

预期产出	拟议活动	费用（美元）
泡沫塑料企业完全转换技术，并在 2013 年之前完全淘汰氟氯烃	淘汰家用制冷行业内生产绝缘泡沫塑料过程中所使用的氟氯烃	
减少制冷和空调行业内的氟氯烃消费	巩固和扩大回收、再循环和再生网络	80,000
	制冷和空调行业技术人员的培训和资格认证	235,000
	对制冷和空调维护行业及最终用户的技术援助	44,000
	消除冲洗制冷电路过程中使用的 HCFC-141b	25,000
消除排放用途中对 HCFC-141b 和 HCFC-22 的消费	对消除用作加工皮下注射器针头时的溶剂而使用的 HCFC-141b 的技术援助	63,000
	对淘汰用作电子设备的清洗剂的 HCFC-141b 的技术援助	
	对淘汰气雾剂行业中的 HCFC-22 的技术援助	
加强机构制定和执行氟氯烃淘汰政策的能力	加强消除氟氯烃的监管框架	45,000
	加强氟氯烃和使用氟氯烃技术的设备的交易管制	50,000*

预期产出	拟议活动	费用（美元）
	环境教育、信息传播和提高认识	30,000
加强负责氟氯烃淘汰管理计划执行和监测工作的技术团队	年度业务计划执行、监测和评价	28,000
合计		600,000

(*) 拟由环境规划署执行。

秘书处的评论意见和建议

评论意见

氟氯烃消费

30. 如下文表 2 所示，根据《蒙特利尔议定书》第 7 条报告的 2009 和 2010 年实际消费量，氟氯烃履约基准已被确定为 225.57 ODP 吨。确定的基准比核准《哥伦比亚氟氯烃淘汰管理计划》时估计的 223.40 ODP 吨多了 2.17 ODP 吨。

表 2：哥伦比亚的氟氯烃消费情况（第 7 条）

氟氯烃	2006 年	2007 年	2008 年	2009 年	2010 年	基准
公吨						
HCFC-22	1,147.17	855.16	1,221.20	1,358.99	1,226.19	1,292.59
HCFC-141b	871.69	1,431.58	1,250.36	1,203.48	1,555.44	1,379.46
HCFC-142b	-	1.01	0.86	5.39	9.61	7.50
HCFC-123	77.90	77.40	73.69	106.39	114.40	110.40
HCFC-124	-	2.33	0.14	2.88	0.68	1.78
共计（公吨）	2,096.76	2,367.48	2,546.25	2,677.13	2,906.32	2,791.73
ODP 吨						
HCFC-22	63.09	47.03	67.17	74.74	67.44	71.09
HCFC-141b	95.89	157.47	137.54	132.38	171.10	151.74
HCFC-142b	-	0.07	0.06	0.35	0.62	0.49
HCFC-123	1.56	1.55	1.47	2.13	2.29	2.21
HCFC-124	-	0.05	0.00	0.06	0.01	0.04
合计（ODP 吨）	160.54	206.17	206.24	209.67	241.47	225.57

31. 注意到四个制造企业的技术转换项目拟于 2013 年 12 月之前完成，并且考虑到该项目的执行工作已经处于后期阶段，秘书处询问提前实现技术转换的可行性。开发计划署解释说，技术转换工作的技术部分将在 2013 年初完成；但是，对使用非氟氯烃技术的制冷设备的生产以及对 HCFC-141b 和 HCFC-22 进口情况的核查工作将在 2013 年剩余时间内进行。

32. 关于核查报告中向哥伦比亚政府提出的建议，开发计划署指出，国家臭氧机构将针对海关人员和商业机构举行的关于消耗臭氧层物质的非法贸易和没收消耗臭氧层物质的讲习班列入氟氯烃淘汰管理计划第一阶段的第二次付款之中。国家臭氧机构还为海关部门提供指导，以便对制定消耗臭氧层物质非法贸易的制裁措施的可能性进行评估。国家臭氧机

构的网站已经包括关于已经开展以及目前正在执行的氟氯烃淘汰项目的信息。另外，也可以在该网站上找到已经编写的关于消耗臭氧层物质的出版物。

对氟氯烃淘汰管理计划协定的修改

33. 哥伦比亚的氟氯烃淘汰管理计划是在确定氟氯烃履约基准之前核准的。因此，在核准该氟氯烃淘汰管理计划时，除其他外，执行委员会还请秘书处用最高允许消费量数字来更新氟氯烃淘汰管理计划协定的附录 2-A（目标和供资），并且向执行委员会通报更新后的额度（第 62/55(e)号决定）。根据哥伦比亚政府在第 7 条之下报告的数据及其修改后的淘汰时间表，已对该协定的相关条款进行更新，并且新增了一项条款，以便说明更新后的协定将取代在第六十二次会议上达成的协定，如本文件附件一所示。修订后的协定全文将作为附件附于第六十六次会议的最后报告之中。

建议

34. 谨建议执行委员会：

(a) 注意到关于哥伦比亚氟氯烃淘汰管理计划第一阶段第一次付款执行情况的进度报告；

(b) 注意到基金秘书处根据已经确定的氟氯烃履约基准更新了哥伦比亚政府与执行委员会之间所签协定的附录 1-A （“物质”）第 1 款和附录 2-A（“目标和供资”），并且新增第 16 款，以便说明更新后的协定将取代在第六十二次会议上达成的协定，见本文件附件一所载；

(c) 注意到在修改后的氟氯烃消费中持续总体削减起点是 225.57 ODP 吨，这一数字是利用在《蒙特利尔议定书》第 7 条之下报告的 2009 和 2010 年实际消费量分别为 209.67 ODP 吨和 241.47 ODP 吨所计算得出的；和

(d) 核准《哥伦比亚氟氯烃淘汰管理计划》第一阶段的第二次会议以及相应的年度执行计划，总额为 647,750 美元，包括批给开发计划署的 550,000 美元外加机构支助费用 41,250 美元和批给环境规划署的 50,000 美元外加机构支助费用 6,500 美元。

附件一

拟纳入更新后的《哥伦比亚政府与多边基金执行委员会之间关于削减氟氯烃消费量的协定》之中的案文

（相关修改部分以黑体字书写，目的是便于参考）

1. 本协定系哥伦比亚（“国家”）政府与执行委员会之间关于依据《蒙特利尔议定书》削减时间表在 2015 年 1 月 1 日之前将附录 1-A（“物质”）中所列管制用途的消耗臭氧层物质削减到 203.01 ODP 吨的持续额度即《蒙特利尔议定书》削减时间表允许的 2015 年最高消费量的谅解。

16. 本次修订后的《协定》将取代哥伦比亚政府和执行委员会在执行委员会第六十二次会议上达成的协定。

附录 1-A：物质

物质	附件	组别	消费量的持续总体削减起点（ODP 吨）
HCFC-22	C	I	71.09
HCFC-141b	C	I	151.74
HCFC-142b	C	I	0.49
HCFC-123	C	I	2.21
HCFC-124	C	I	0.04
合计			225.57

附录 2-A：目标和供资

行数	细节	2010 年	2011 年	2012 年	2013 年	2014 年	2015 年	合计
1.1	附件 C 的《蒙特利尔议定书》削减时间表，第一组物质（ODP 吨）	暂缺	暂缺	暂缺	225.57	225.57	203.01	暂缺
1.2	附件 C 的最高允许消费总量，第一组物质（ODP 吨）	暂缺	暂缺	暂缺	225.57	225.57	203.01	暂缺
2.1	牵头执行机构（开发计划署）商定供资（美元）	6,021,483 *	0	550,000	0	150,000		6,721,483
2.2	给执行机构的支助费用（美元）	451,611 *	0	41,250	0	11,250	0	504,111
2.3	合作执行机构（环境规划署）商定供资（美元）	50,000	0	50,000	0	0	0	100,000
2.4	合作执行机构的支助费用（美元）	6,500	0	6,500	0	0	0	13,000
3.1	商定供资总额（美元）	6,071,483	0	600,000	0	150,000	0	6,821,483
3.2	支助费用总额（美元）	458,111	0	47,750	0	11,250	0	517,111
3.3	商定费用总额（美元）	6,529,594	0	647,750	0	161,250	0	7,338,594
4.1.1	商定拟根据本协定实现的 HCFC-22 淘汰总量（ODP 吨）							15.17
4.1.2	拟在先前核准的项目中实现的 HCFC-22 淘汰量（ODP 吨）							9.82
4.1.3	剩余符合条件的 HCFC-22 消费量（ODP 吨）							46.10
4.2.1	商定拟根据本协定实现的 HCFC-141b 淘汰总量（ODP 吨）							7.72
4.2.2	拟在先前核准的项目中实现的 HCFC-141b 淘汰量（ODP 吨）							46.20
4.2.3	剩余符合条件的 HCFC-141b 消费量（ODP 吨）							97.82

4.3.1	商定拟根据本协定实现的 HCFC-123 淘汰总量（ODP 吨）	0
4.3.2	拟在先前核准的项目中实现的 HCFC-123 淘汰量（ODP 吨）	0
4.3.3	剩余符合条件的 HCFC-123 消费量（ODP 吨）	2.21
4.4.1	商定拟根据本协定实现的 HCFC-142b 淘汰总量（ODP 吨）	0
4.4.2	拟在先前核准的项目中实现的 HCFC-142b 淘汰量（ODP 吨）	0
4.4.3	剩余符合条件的 HCFC-142b 消费量（ODP 吨）	0.49
4.5.1	商定拟根据本协定实现的 HCFC-124 淘汰总量（ODP 吨）	0
4.5.2	拟在先前核准的项目中实现的 HCFC-124 淘汰量（ODP 吨）	0
4.5.3	剩余符合条件的 HCFC-124 消费量（ODP 吨）	0.04

* 给开发计划署的 5,621,483 美元和机构支助费 421,611 美元是在第六十次会议上核准的，目的是淘汰家用制冷设备分行业中聚氨酯硬质绝缘泡沫塑料生产过程中使用的氟氯烃。

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Project Document

Government of Colombia

United Nations Development Programme

Funded by the Multilateral Fund (MLF) for the Implementation of the Montreal Protocol

Demonstration Project on "End of Life" ODS Management and Destruction

March 2012

COUNTRY:	**Colombia** **IMPLEMENTING AGENCY: UNDP**
PROJECT TITLE:	**Demonstration Project on End of Life ODS Management and Destruction**

PROJECT IN CURRENT BUSINESS PLAN:	**Yes**
SECTOR:	**ODS-Waste**
Sub-Sector:	**Refrigeration Servicing Sector**
PROJECT IMPACT (ODP targeted):	**114 Tonnes/year of CFC-12**
PROJECT DURATION:	**36 months**
PROJECT COSTS:	**US$ 2,750,000**
LOCAL OWNERSHIP:	**100 %**
EXPORT COMPONENT:	**0 %**
REQUESTED MLF GRANT:	**US$1,195,000**
IMPLEMENTING AGENCY SUPPORT COST:	**US$ 89,625 (7.5 %)**
TOTAL COST OF PROJECT TO MLF:	**US$ 1,284,625**
COST-EFFECTIVENESS:	**11.26 US$ /kg ODS (metric) based on complete destruction of currently available end of life (EOL) ODS stocks in Colombia (15 Tons), and an anticipated 65 Tons of CFC-11 and 34 Tons of CFC-12 recovered over the first two years of implementation of the national refrigerator replacement program undertaken in accordance with WEEE legislation now being enacted. An annual estimated destruction rate of 56 Tons of CFC-11 and 29 tons of CFC-12 is projected beyond the project life.**
PROJECT MONITORING MILESTONES:	**Included**
NATIONAL COORDINATING AGENCY:	**Ozone Technical Unit (UTO) within the Division of Sectorial and Urban Environmental Affairs in the Ministry of Environment and Sustainable Development (MADS)**

Brief Description.

The Ozone Technical Office of the Ministry of Environment and Sustainable Development in collaboration with UNDP has developed a project to demonstrate the environmentally sound, efficient and cost effective disposal of ODS refrigerants and blowing agents recovered from early retired refrigerators, from the servicing sectors and from some of the MLF investment and demonstration projects as part of broader national programs related to energy efficiency and the sustainable management of hazardous wastes and WEEE.

The project utilizes an existing stock of "end of life" ODS to qualify three domestic, modern, high temperature hazardous waste temperature incineration facilities to international standards. The project covers both the destruction of CFC-12 refrigerant and CFC-11 blowing agent, the latter in both pure form and contained in PU foam. Under the project, these facilities, as qualified, will destroy a more substantial quantity of EOL ODS that will be generated during the start phase of the above refrigerator replacement program now starting implementation. The

option of demonstrating destruction capability on such domestic facilities has been selected on the basis of it being the most cost effective route for Colombia relative other options available.

In terms of overall global demonstration value, the project offers a cost effect demonstration of what a middle income, industrializing Article 5 country can practically achieve in relation to EOL ODS destruction by integrating it into broader hazardous waste and WEEE management programs and energy efficiency initiatives while capitalizing on emerging domestic environmental management capability. It will also serves to demonstrate synergy with other multi-lateral international programs particularly management of POPs stockpiles and wastes, and contributes to the knowledge base on current issues under discussion by TEAP.

1. INTRODUCTION AND BACKGROUND.

In recent years it has become generally recognized that a significant bank of ODS remains in use, mainly as refrigerants and in foams, and that this ODS will be subject to atmospheric release at some point at the end of its useful life. As a consequence, the Parties to the Montreal Protocol have directed attention to the issue, particularly in developing countries where the major remaining banks of high ODP ODS (i.e. CFCs and halons) remain. Under Decision XX/7[1], the Parties requested ExCom to consider supporting demonstration initiatives in Article 5 countries as well as requesting TEAP to update its earlier guidance on ODS destruction[2] as adopted by the Parties[3]. In recognition of this, ExCom Decision 58/17[4] approved a set of interim guidelines for the funding of demonstration projects for the disposal of ODS and agreed that the Multi-lateral Fund (MLF) will fund demonstration projects. Preparation funding for a number of such projects, including the current project proposed in Colombia were subsequently approved at ExCom 59[5] (ExCom Decision 59/19). TEAP has also updated its guidance on destruction requirements and approved technologies for ODS destruction with inclusion of a current Task Force Report in its most recent Progress Report[6].

Currently, there are several demonstration projects under preparation or implementation worldwide using MLF funding. Additionally, it is understood that the Global Environmental Facility in its capacity as the financial mechanism for ODS in Countries with Economies in Transition (CEITs) is considering a parallel program on ODS destruction. Overall it is apparent that experience with a variety of ODS destruction technologies, program/business models will be accumulated over the next several years that can serve as a basis for future decision making and action on the issue by both countries and collectively by the Parties.

In this proposal, the Government of Colombia is requesting funding for a project to demonstrate and evaluate the safe disposal and environmentally sound destruction of "end of life" (EOL) ODS, the need for which is becoming increasingly apparent. Stocks of EOL ODS have begun to accumulate in the country from its now operational recovery, recycling and reclaim system and targeted phase out initiatives resulting in unused inventories and replaced refrigerant. The country's aggressive regulatory efforts are now preventing the release of this material and it is accumulating in secure storage as a regulated hazardous waste, something that is anticipated to steadily increase. Of greater long term significance is the anticipated dramatic growth in the immediate future with implementation of a program replacing domestic refrigerators as part of adopted national programs related to energy efficiency and management of waste electrical and electronic equipment (WEEE). The absence of cost effective demonstrated destruction capability represents a significant gap in that process and a barrier to its implementation.

[1] Montreal Protocol Handbook (8th Edition, 2009), Page 90 - http://ozone.unep.org/Publications/MP_Handbook/MP-Handbook-2009.pdf
[2] TEAP Task Force on Destruction Technologies Report – 2002 (Volume 3b of 2002 TEAP Report) - http://ozone.unep.org/Assessment_Panels/TEAP/Reports/Other_Task_Force/TEAP02V3b.pdf
[3] Montreal Protocol Handbook (8th Edition, 2009), Page 457-464 - http://ozone.unep.org/Publications/MP_Handbook/MP-Handbook-2009.pdf
[4] http://www.multilateralfund.org/sites/58th/Document%20Library2/1/5853.pdf
[5] http://www.multilateralfund.org/sites/59/Document%20Library2/1/5959.pdf
[6] May 2011 TEAP Progress Report – P65, http://ozone.unep.org/Assessment_Panels/TEAP/Reports/TEAP_Reports/TEAP_Progress_Report_May_2011.pdf

From the perspective of the MLF, ExCom and the Parties generally, the proposed project provides an opportunity within the overall global ODS destruction demonstration program to support the practical implementation of ODS destruction using existing domestic capacity as an integrated part of broader national environmental and sustainable development programs utilizing various economic instruments such as Extended Producer Responsibility (EPR) applied to a WEEE management program, energy efficiency incentives and potentially carbon financing, all undertaken in a medium size industrializing Article 5 country. The project will also serve to address several technical issues that have been raised in recent TEAP discussions and add to the technical knowledge base related to environmental performance requirements applied to ODS destruction. Finally, the project's timing affords an opportunity to achieve synergies with a Global Environmental Facility (GEF) project addressing elimination of PCB waste stockpiles and which would be implemented in parallel and under common institutional supervision.

2. PROJECT CONTEXT AND BACKGROUND

Colombia has been an active Party to the Montreal Protocol as an Article 5 country, having acceded to the Vienna Convention and Montreal Protocol in 1990 and 1993 respectively and subsequently to all amendments. Institutionally, the management of ODS issues within the government is assigned to the Division of Sectorial and Urban Environmental Affairs in the Ministry of Environment and Sustainable Development (MADS). Within the division, the Country maintains an Ozone Technical Unit (UTO) that has direct operational control responsibility for the ODS issue. The legislative and regulatory base developed and in force respecting ODS and the Montreal Protocol is summarized in Appendix 2.

Within the Division of Sectorial and Urban Environmental Affairs there are also units having responsibility for waste management generally and specifically hazardous waste which under Colombian legislation includes waste or EOL ODS. This institutional linkage is of importance to this project because it is coordinating national initiatives related to waste diversion, recycling and resource recovery including the planned WEEE program which includes refrigeration equipment, hence the capture and environmental sound management of refrigerants and foam plowing agents.

Since the mid 1990's but most aggressively since 2000, Colombia has been pursuing the phase out of Annex A and B substances, something that was achieved accordance with its obligations in 2010 for new consumption manufacturing applications, notably in domestic and commercial refrigeration, foam and solvent sectors. Similarly, Colombia has banned the imports of Methyl Bromide for non QPS purposes since 1996. The country has also developed a strong national refrigeration servicing sector operated by a network of well equipped technicians and private sector companies with 572 refrigerant recovery equipment sets distributed in recycling centers and 5 reclaim centers. The country is currently completing a number of Annex A and B substance final phase out initiatives including; i) a chiller demonstration project involving the elimination of CFC-11 at installations in the country in 2012-13; ii) Replacement of CFC-11 and CFC-12 at a medical aerosol manufacturer in Bogota (LABORATORIO CHALVER); and iii) elimination of CTC process agent used in Cali (QUIMPAC). Additionally, the country has also

initiated work on its HPMP with MLF support and anticipates an accelerated phase out program for HCFCs.

One consequence of the above work associated with Annex A and B ODS phase out all coupled with a strong regulatory control function is the generation of a stock of EOL ODS. The principal sources are: i) unusable CFC-12 and other HCFC and HFC based refrigerants from recycling and reclaim activities, noting that it is also anticipated that as the stocks of remaining CFC based equipment is retired, an excess of recovered higher purity material would also be generated; ii) residual inventories of ODS (typically CFC-11, and CFC-12) that remain after phase out or conversions to non-ODS technology; iii) stocks that may exist in closed or bankrupt enterprises; and iv) material confiscated by customs authorities. Colombian regulations require registration and monitoring of all such stocks under the authority of UTO within MADS. A summary of UTO's current inventory records of monitored EOL ODS (including some projected to be generated in 2012-13) is provided in Appendix 3. Of specific interest to this project as it will provide the test burn material used for demonstrating national destruction facilities is the current inventory of 5.7 t of CFC-12, and 4.1 t of CFC-11, along with an additional 4 t of CFC-11 that will be generated in 2012-2013 from a MLF financed chiller demonstrative replacement project currently under implementation.

However, the main rationale for the country to address the issue of EOL ODS is recognition that there remains substantial banks of ODS within operational equipment and products in the country, including priority banks of CFCs which would likely be released in the absence of a targeted effort to capture and destroy them. Additional incentives to address such banks and particularly those contained in refrigeration and air conditioning equipment arises because of the potential energy efficiency gains obtained by its accelerated replacement and by the avoided climate impacts obtained by both energy efficiency improvement and eliminating release of CFC-12 in particular due to its high GWP.

Interest in ODS Banks dates back to 2003-2004 when UTO coordinated a research project with the support of the domestic refrigerators manufacturers that are part of the National Businessmen Association of Colombia (Asociación Nacional de Empresarios de Colombia - ANDI), the National University of Colombia and University of Los Andes, with the objective of gathering the information on banks of CFC-based domestic refrigerators and the possibility of developing reverse manufacturing capability in the country. This was followed by research in 2004 on national capacities for ODS destruction done by the Ministry of Environment, and the National University. Two years later, the Energy and Mining Planning Office (UPME) of the Ministry of Mining and Energy hired a consultancy on energy consumption of air conditioners and domestic refrigerators in 4 Colombian cities. The latter led the identification of domestic refrigerator replacement as a core program of the national strategy of rational energy use (see below).

The physical processing of domestic refrigerators was piloted in 2008 in a four month project undertaken in Bogota and involving the replacement of a variety of operating CFC based domestic refrigerators of a variety of sizes, the manual extraction of refrigerant and foam, recycling of other material, and destruction of captured CFC-12 and CFC-11 containing foam. Participants included domestic refrigerator manufacturers and retailers, and waste management companies developing recycling and specialized capability, as well as MADS and UNDP. The

destruction of the CFC-12 was contracted for export destruction and the bagged foam was destroyed in a domestic commercial solid industrial waste incineration facility. The former has not yet been completed due to high cost and administrative barriers. The destruction of the foam, while successful operationally, did not involve any evaluation of destruction efficiency or emissions as a basis for qualification against international standards and specifically the applicable TEAP guidelines. Overall, this pilot project determined various parameters for use in the development of a large scale program, particularly things like representative CFC-12 and CFC-11 content, capture rates and indicative unit cost, as well as establishing the initial feasibility of using domestic incineration facilities at least for foam destruction and getting a better understanding of issues associated with export. A final substantial benefit is the interest created in developing this kind of business both among the producers and retailers of refrigeration equipment and among national waste management service providers, an number of whom are pursuing investment plans to establish commercial scale capacity as part of national waste diversion and materials recovery program implementation related to WEEE and hazardous waste streams under the framework policies described below.

On the basis of this initial work, the country has moved rapidly over the last several years on three related and coordinated policy initiatives now being implemented and which will result in generation of substantial amounts of EOL ODS requiring destruction.

- *Program for on the Rational and Efficient Use of Energy and Non-conventional Energy Sources*: The Ministry of Mining and Energy and its subsidiary bodies have been configuring the national framework program on energy efficiency and alternative energy sources. This has now been formulated into the 2010-2015 Indicative Action Plan of the Programme on the Rational and Efficient Use of Energy and Non-conventional Energy Sources that has been adopted as government policy in Resolution No. 180919 of June, 1st 2010. Within this framework, the substitution of domestic refrigerators has been identified as a priority activity given that initial studies have shown in a 20-year scenario analysis the savings on consumption would be of about 198 GWH per year. One specific project initiated within this framework is an Energy Efficiency Project in Buildings being undertaken with GEF funding and supported by the UNDP, a portion of which includes air conditioning and chiller conversions. Most recently (2011), a more detailed study was undertaken on steps for its implementation and specifically it's financing and is now serving as the basis for development of financial incentives that will support the replacement of old refrigeration equipment, particularly domestic refrigerators. The estimates of avoided GHG emissions emission over a ten year period through such program is 420,000 t CO_2 Eq. The schedule for implementation of an energy efficiency related financial incentive for refrigerator replacement is anticipated to be implemented in early 2013.

- *Environmental Policy for Integrated Hazardous Waste Management:* The Environmental Policy for the Integral Management of Hazardous Wastes was adopted in 2005. It sets out long term strategies based on the principles of integrated product life cycle management with the general objective is to prevent the generation of hazardous wastes and to promote the environmentally sound management of those being generated, with the purpose of minimizing the risks on human health and on the environment, thus contributing to sustainable development. The specific objectives of this Policy are: i) Preventing and

minimizing the generation of hazardous wastes; ii) Promoting the environmentally-safe management and handling of hazardous wastes; and iii) Implementing the commitments of the International Conventions ratified by the country, related with hazardous substances and wastes. This third objective refers to the harmonization, cooperation and application of strategies and actions towards complying with the implementation of the National Application Plan of the Stockholm Convention and the Phase Out Plan for Ozone Depleting Substances – ODS and their wastes according to the Montreal Protocol. In the Action Plan of the Policy, a goal for the period 2006-2018 has been established that would to achieve 40% elimination of hazardous wastes that are a priority under the international commitments (including ODS) with a current year goal having a program for the management and final disposal of ODS wastes. One concrete result of this policy generally has been the recent development of modern rotary kiln high temperature incineration facilities in the last several years, something that now provides a domestic option for destruction of EOL ODS chemicals, subject to their qualification to international standards.

- *National Policy on Waste Electrical and Electronic Equipment (WEEE)*: Division of Sectorial and Urban Environmental Affairs in MADS has been developing a policy and Action Plan on WEEE management since 2006. Previous work includes pilot studies such as described above for domestic refrigerators, as well as expanding programs on collection of cellular telephones, computers and other electronic equipment. The centre piece program under this policy is the early retirement of older domestic/commercial refrigeration and air conditioning equipment with a specific focus on domestic refrigerators that used CFC-11 and 12. The program will be funded at least in part by a national Extended Producer Responsibility (EPR) mechanism covering subsidized replacement with higher efficiency/non-ODS replacement equipment as well as the costs of collection, processing, and environmentally sound waste management of the resulting materials including destruction of refrigerant and foam. This policy has been formally approved by the government and the legislative basis for its implementation is currently before the national parliament. In parallel, the necessary regulatory and administrative measures for its implementation are under development. The schedule for the start up of the program is early 2013 with its full operation by 2015.

The above developments has resulted in the adoption of a national target of replacing 2.6 million CFC based domestic refrigerators over a ten year period beginning in 2013. Based on the data obtained in the 2008 pilot project this quantity of equipment is estimated to contain approximately 1,165 t of CFCs (420 t of CFC-12, 745 t of CFC-11)[7]. It is assumed that 300,000 units would be processed during a two year start up period (2013-2015) which would contain 134 t of CFC-11 and CFC -12. For purposes of estimating ODS destruction capacity the requirements based on conservative recovery efficiencies for manually extracted CFC-12 and CFC-11 containing foam[8] would result in a 10 years requirement to destroy 294 t of CFC-12, 10,640 t of CFC-11 containing foam (resulting in destruction of 560 t of CFC-11). For purposes of this project that would just cover the first two years, the material that could be destroyed

[7] Estimate based on data collected during 2008 trial processing with a representative unit containing 0.161 kg CFC-12, 4.092 kg of foam and at 7% retained blowing agent content, 0.286 kg CFC-11

[8] Calculations based on a 70% recovery rate for CFC-12 using convention servicing equipment and a 75% recovery rate for CFC-11 using manual dismantling and foam removal. Recovery rates approaching 95% are achievable with more sophisticated extraction technology which might ultimately be justified.

would be 34 t of CFC-12, and 1,228 t of CFC-11 containing foam (effective destruction of 65 t of CFC-11).

Other preparatory work relating to the proposed project involved assessing the various options in terms of processing and EOL destruction technologies that might be available to support the national requirements as anticipated under the above initiatives. The following summarizes the results of this work as inputs to the project design and scope:

- *Options for Refrigerator Disassembly and EOL ODS Recovery:* Two generic options for refrigerator disassembly have been identified and assessed, manual dismantling and automated reverse manufacturing facilities.

  a) *Manual dismantling:* This would involve the following main steps: i) extraction of refrigerant into ODS containers and compressor oil; ii) removal of the compressor, refrigeration piping for metals recovery; iii) separation of plastic door and cabinet liners; and iv) separation of PU foam from the metal door and cabinet panels with PU foam placed in bags. This process can be organized with various levels of sophistication in terms of an assembly line type operation to increase throughput and efficiency. It can also be tailored in terms of scale depending on the location and quantity available within an economic distance. As such, the country could be served by a number of such operations that might handle from a few thousand units per year in remote areas to up to 50,000 units per year in urban areas with the latter likely justifying more sophisticate CFC-12 extraction technology that would achieve >95% recovery efficiency rather than the basic refrigeration servicing equipment used in such operations. A number of interested contractors currently established in the waste management and scrap recycling business have expressed interest in such operations, often as physical extensions of their present operations that provide basic infrastructure and labor capacity. The process is labor intensive but can utilize relatively unskilled workers except for a requirement for qualified technicians handling refrigerant extraction. In environmental terms, the main limitation is the lower CFC-12 recovery efficiencies achieved in rapid excavation with conventional equipment, and loss of foam blowing agent that will occur during its manual removal. It is generally assumed that this would be approximately 25% of the originally retained volume. The initial capital investment entry barrier is low and suited to incremental development as the demand grows with developing programs. Based on initial experience from potential contractors undertaking this work for warranty and specialized product stewardship programs in Colombia, typical unit costs for manual disassembly and capture of refrigerant in cylinders and bagged foam is estimated to be US$3.5 to 4.0 per unit. Somewhat lower costs would be anticipated for larger operations.

  b) *Reverse Manufacturing Facility:* The second option examined was development of a reverse manufacturing facility specifically designed for refrigerators. These are commercially operated in some Western European countries, on a limited basis in North America, and are under development in several larger developing countries. Two such facilities have been commissioned in Brazil using bilateral capital funding but are not yet in commercial operation. As in manual dismantling these facilities manually extract refrigerant and compressor oils although in a production line setting and with

extraction/condensing equipment that facilitates rapid degassing of the complete refrigeration circuit. They then shred the remaining intact unit in a sealed environment and separate the metals, plastic, and PU foam solid fractions in a form available for sale into the recycled materials market. The emitted foam blowing agent is captured and condensed for containment and subsequent destruction with in excess of 95% capture efficiency. Some suppliers include destruction using a thermal process as an option that can be added to the facility. Estimating quotations applicable to Columbia for units of 300,000 and 400,000units/year require base equipment investment of US$4.4 and 4.9 million respectively exclusive of land, services, buildings, foundations and overall site infrastructure. An overall cost of US$21/unit would be applicable to such facilities operating at full capacity, excluding any revenues obtained from recovered material sales. Estimates at comparable facilities developed in Brazil – provided by these operators - were in the range of US$14/unit as a comparison.

The overall conclusion of this work was that, while ultimately Colombia may be able to sustain an automated reverse manufacturing facility this would not be justified at least during the start up of the refrigerator replacement program envisioned. It is recognized that there will be a start up period for the program where volumes of refrigerators collected will increase step by step, reaching a steady state level of 250,000-300,000 units per year over a two to three year period. However to make the level of investment required for economically scaled reverse manufacturing facilities, enterprises would have to have some assurance that these levels will be achieved and when. In that regard, the project has been following up the advances occurring in Brazil in this regard. In summary, the analysis undertaken suggests that it is advisable to take an incremental approach to investment in refrigeration equipment processing technology starting with manual operations scaled to local and region generation rates, while looking forward to capitalizing on the economies and higher environmental benefit efficiencies of more sophisticated CFC-12 extraction equipment first, and then if warranted modern automated reverse manufacturing technology. .

- *Options for EOL ODS destruction:* The various strategic and technology options for destruction of EOL ODS including CFC-11 containing foam have been reviewed as a basis for developing the project design and its detailed scope. In general, the menu of available technological options that would meet the destruction performance requirements set out by the Montreal Protocol is well known. These have been reviewed in the previous referenced TEAP documentation adopted by the Parties, including the most recent update in 2010 where a number of new innovative but as yet fully commercialized technologies were considered. Similarly, both the Basel Convention[9] and the GEF Scientific and Technical Assessment Panel (STAP)[10] have issued guidance documents on the selection of destruction technology for POPs which also provide relevant information given the similarities in requirements for environmentally sound destruction of chlorinated chemical wastes, including both so-called combustion and non-combustion technologies. Overall the strategic options considered for this project were: i) export to qualified facilities in countries party to the Basel Convention; ii) the development of new national facilities using imported technologies; and iii) utilization

[9] http://www.basel.int/Portals/4/Basel%20Convention/docs/pub/techguid/tg-POPs.pdf
[10] http://www.unep.org/stap/Portals/61/pubs/POPs_Disposal_Final_low.pdf

of existing national hazardous and industrial waste management capacity that could potentially be qualified to international standards. Each of these is discussed below.

a) *Export to qualified hazardous waste management facilities:* This option would essentially be applicable to the actual chemicals under the assumption that the cost of bulk export of any significant quantities of CFC-11 containing foam would be prohibitive. The export options considered available to Colombia are North America and Europe, noting that the United States status as a non-party to the Basel convention limits consideration of that destination directly. Facilities qualified and experienced in destroying EOL ODS exist in Mexico, the United States and Canada. These primarily employ high temperature incineration (HTI) although commercial plasma arc facilities employing PLASCON technology operate in Mexico and the United States. In Europe, to date HTI is the main available commercial option with a number of facilities existing that have destroyed EOL ODS. As part of the preparation work for this project, Colombia has initiated export of a small trial quantity of CFC-12 from the 2008 refrigerator processing trial to Finland for incineration. In general, facility gate market prices for EOL ODS destruction with HTI in North America range from approximately US$1.5/kg to US$3.0/kg and essentially mirror the market pricing for non-flammable halogenated waste. Destruction with plasma arc technology is reported to be somewhat higher. The European market is generally more expensive with gate destruction costs ranging from US$4-5/kg, although recent trends have shown that pricing in the general hazardous waste market in Europe to be dropping. Current pricing for POPs shipped from Eastern Europe is in the range of US$1.5-2.0/kg. It should be noted that all of these costs exclude Basel Convention transaction, local administration/supervision, local handling and sea container transportation. Based on quotations from the UNDP demonstration project in Ghana (overall destruction cost of US$12.3/kg) , reasonable estimates of these would be US$6/kg including US$3/kg for transportation and US$1/kg transaction costs for Basel documentation into the EU. Colombian experience for export of CFC-12 from its pilot program was US$11-12/k inclusive of transportation and transaction costs.

b) *Development of new national facilities using imported technologies:* The option of developing specialized facilities for destruction of EOL ODS has been evaluated, as well as consideration of possible utilization of such facilities for POPs as well. The two technologies evaluated were the Asada Plasma X unit and a PLASCON unit. The Asada unit with a capital cost of US$156,000 (excluding supporting infrastructure and permitting costs) and estimated annual operating cost of approximately US$30,000/year to destroy under 3 t of CFC-12/year was considered both prohibitively expensive (Estimated as US$22.8-25.9/kg) and inadequate in terms of capacity for Colombia's requirements. The PLASCON unit evaluated had a capacity of approximately 200 t/year (80 kg/hr feed rate) and was quoted with a basic capital cost of US$2.1 million excluding transportation from Australia, supporting infrastructure and permitting costs, An overall unit cost range of US$10.3-18.5/kg is estimated for this technology, noting that a cost of US$6.5/kg in Australia would apply at an operating commercial facility there. The assessment concluded that development of this technology in Colombia exclusively for EOL ODS destruction would not be viable as it was relatively high cost and oversized for the national requirement. However, it could be a fall back option under certain

conditions, namely it could also serve to destroy POPs and other priority high risk chemical wastes, and if less expensive qualified options were not available, specifically export and use of existing domestic facilities if qualified.

c) *Utilization of existing national hazardous and industrial waste management capacity:* This option involved re-examining the potential for existing domestic incineration facilities to be qualified to international standards, specifically those that could potentially be qualified to international standards as referenced above. This involved review of the present permitting and qualification protocols and standards in force in Colombia as applied to hazardous waste thermal treatment/incineration facilities as well as identify these facilities subject to this legislation and permitting process. The specific regulatory requirements in force under the Ministry of Environment and Sustainable Development that apply are as follows:

i) DECRETO NUMERO 4741(30 DIC 2005), "*Por el cual se reglamenta parcialmente la prevención y el manejo de los residuos o desechos peligrosos generados en el marco de la gestión integral*": This is the national hazardous waste regulatory act and provide for the environmental sound management of hazardous waste. In general it is a comprehensive document fully aligned and comparable to similar legislation in OECD countries.

ii) RESOLUCIÓN NÚMERO (909), *"Por la cual se establecen las normas y estándares de emisión admisibles de contaminantes a la atmósfera por fuentes fijas y se dictan otras disposiciones", 5 de junio de 2008:* This is the principle regulatory document covering air emissions for fixed sources and generally applies emission standards generally equivalent to US Clean Air Act standards. Chapter VII provides for an environmental license and environmental management plan. Chapter XII applies specifically to emissions from hazardous waste disposal in thermal treatment facilities, specifically incineration and cement kilns. It requires a supervised test burn on each hazardous was aggregate processed as a condition of permitting and inclusion of an operating continuous monitoring and recording system. Minimum operating conditions and air emission limits are also specified for both hazardous waste incinerators and cement kilns. These are summarized in Appendix 3. These generally meet or exceed those applied in North American and EU standards as well as the Basel, GEF STAP and TEAP destruction guidance standards. Of particular relevance is the universal adoption of the 0.1 ng ITEQ/Nm^3 requirement in 2012. This exceeds the current TEAP limit of 0.2 ng ITEQ/Nm^3 and is the same as that generally adopted in the other standards and guidance referenced.

iii) "PROTOCOLO PARA EL CONTROL Y VIGILANCIA DE LA CONTAMINACIÓN ATMOSFÉRICA GENERADA POR FUENTES FIJAS (Protocol for Control and Surveillance against the Atmospheric Contamination Generated by Stationary Sources)", Versión 2.0, OCTUBRE DE 2010 – This document sets out the monitoring and reporting requirements for stationary source air emissions and in Chapter 8, specifically sets out the procedural requirements applicable to the test burns required of hazardous waste

incineration/thermal treatment facilities specified in RESOLUCIÓN NÚMERO (909) above. This effectively provides the national baseline requirement for developing test burn specifications that would qualify facilities for EOL ODS destruction. It also defines the basic destruction performance requirement in the form of target destruction removal efficiency (DRE). This is set at 99.99%, a level lower that typically applied to chlorinated hazardous waste in OECD countries and the Basel and GEF STAP guidance documents (typically 99.9999%) but is consistent with the requirement in the TEAP guidance adopted by the Montreal Protocol.

In terms of available facilities in Colombia for the destruction of hazardous and industrial waste, there are 45 installations that are permitted or being permitted. This includes incineration facilities and cement kilns involved or considering waste co-disposal. The incineration facilities range from medical waste incinerators of various sizes, basic fixed hearth and vertical chamber industrial incineration facilities through to several modern rotary kiln incinerators recently commissioned to respond to the growing demand created by the increasingly strict national regulation of hazardous waste as well as the country's rapid industrialization. Screening of these facilities and their permitting status suggested that four facilities would potentially be capable of consideration for EOL ODS, two of which are operated by the same national hazardous waste management company. These are:

i) TECNIAMSA S.A – Barranquilla: This facility was commissioned in 2010 as part of an integrated hazardous waste management facility including a modern engineered hazardous waste landfill. It is located in a rural setting approximately 20 km from the port city of Barranquilla on the Caribbean coast. Overall the incineration facility contains all the current technology including a rotary kiln primary combustion chamber, high temperature secondary combustion chamber stack quenching unit and sequence semi-dry wet scrubbers and bag house filters, as well as continuous air emission monitoring and a modern automated control system. The rated capacity is 1,000 kg/hour but is planned to be able to double capacity by addition of a second rotary kiln. The facility currently handles liquid and solid waste with a dual feed system. It could be readily modified with an additional injection port for gaseous waste stream such as CFC-12 at released from pressurized cylinders. The facility is currently restricted in waste chlorine content but intends to extend its test burn qualification menu to include halogenated wastes with a potential interest in destruction of POPs (specifically PCBs). Test burn and regular testing done twice per year on current waste streams indicates very low PCDD/F emission levels (0.0005 ng- ITEQ/Nm^3) suggesting that it would have good potential to handle higher chlorine content waste.

ii) TECNIAMSA S.A – Bogota: This facility, located in an industrial area outside of Bogota, was commissioned in late 2011 is essentially the same technically as the facility described above in Barranquilla including capacity and licensing conditions, including classes of halogenated chemical wastes although not

including ODS. Given the recent commissioning of the facility full test burn qualifications are not yet completed, including for PCCD/F emissions. However, a reasonable expectation would be that it would have comparable performance to the Barranquilla facility.

iii) Protección Servicios Ambientales Rellenos de Colombia S.A. ESP - PROSARC S.A. ESP: This is a rotary kiln incineration facility located in Mosquera, Cundinamarca municipality which has been used to dispose of PU foam extracted from the pilot refrigerator replacement and processing project. The facility was established in 2006 for the handling and treatment of organic and inorganic hazardous waste. It has a single rotary kiln commissioned in 2010 with a capacity of 500 kg/hour equipped with a secondary combustion chamber and basic air pollution control system. It handles a wide range of waste ranging from medical waste to various industrial and consumer waste streams. It has limited experience with halogenated wastes. The most recent test burn results indicated PCCD/F emissions of 0.48 ng/m3 which exceed limits to be in force in mid 2012 and which would qualify the facility for EOL ODS destruction. However, the facility indicates that this will be improved.

iv) HOLCIM Colombia S.A.(Eco Procesamiento Ltda): Holcim Colombia S.A operates a large modern cement kiln located at Nobsa. The facility reflects current dry process technology and air pollution control facilities, and is generally viewed as the best facility in the country. Through a subsidiary involved in acquiring waste (Eco Procesamiento Ltda), they have been working with MADS on processing various wastes for a number of years, and have attempted to destroy various hazardous waste streams including PCBs and POPs pesticides. While technically this was likely feasible, they have dropped that direction due to public resistance. Subsequently they had expressed interest in processing EOL ODS, specifically PU foam wastes. However, the main limitation in relation to this is the inefficiency of handling and injecting a relatively small quantity of bulky low mass material into a facility of this scale. Consideration was also given to disposing of CFC-12 which likewise would likely be technically feasible but the capital investment to install the necessary injection ports and burners could only be justified on the small volumes involved if there was a viable carbon crediting or offset mechanism they could utilize corporately within the company's global system. This continues to be investigated but would not be available as an option to the current project.

Therefore, Colombia has a well established mature legal and regulatory system for the management of hazardous waste. The requirements and procedures in place and enforced by institutions and technical capability are generally aligned with those in developed countries. Similarly, the country has a rapidly developing and capable waste management service provider base that is investing in modern capability, both in the collection and handling of hazardous waste and in its environmental sound processing, treatment and disposal. In particular, it now has several thermal treatment and destruction facilities that should be capable of undertaking the destruction of EOL ODS. Subject to demonstration of this capability in accordance with

international standards, utilization of domestic destruction capability should be more cost effective than alternatives of export to qualified facilities elsewhere, or developing new purpose built facilities with alternative technologies.

In summary, Colombia is moving rapidly to implement the policy, regulatory and financial mechanisms that will to capture a substantial quantity of CFC based equipment subject to early replacement. It has piloted their processing up to the capture of the EOL ODS in the form of extracted CFC-12 and manually removed foam. Substantial interest exists among private sector waste management contractors already undertaking this kind of work as part of warranty and commercial refrigeration equipment replacements undertaken directly by equipment manufacturers and beverage producers. Subject to evolving global experience, and the program reaching the necessary economies of scale, it is anticipated that in the longer term one or more of these firms will incrementally invest in higher efficiency and potentially automated reverse manufacturing technology to maximize recovery of EOL ODS.

At present, the remaining gap in the operational capability needed to support the program is the identification of a cost effective and environmentally sound means to destroy the substantial quantities of EOL ODS, particularly high global impact CFCs. In fact, this represents a major current barrier to implementation of the refrigeration replacement programs that now have policy commitment and are developing the necessary financing mechanisms. The proposed project described below is designed to fill this gap.

3. PROJECT OBJECTIVES AND DESIGN

The overall project objective is to put in place a sustainable, environmentally sound and affordable capability for Colombia to destroy the "end of life" ODS that it is accumulating and which will rapidly increase with current policy energy efficiency and waste management initiatives involving the replacement of CFC based domestic refrigerators. Other objectives are to: i) integrate the management of EOL ODS into the countries overall hazardous waste management system; ii) to enhance synergies with initiatives related to meeting national obligations under the Stockholm Convention respecting the destruction of POPs stockpiles; iii) contribute to the technical knowledge base on destruction and environmental performance of technologies accessible to developing countries; and iv) demonstrate how a developing country can develop national capability to manage EOL ODS for broader replication as appropriate.

The proposed project design is based on the use of MLF funding to support the qualification of three domestic incineration facilities for the destruction of EOL CFC-12, CFC-11 and CFC-11 containing PU foam.

The strategic selection of existing domestic incineration facilities as the basis for the project is based on the extensive project preparation investigations of various options described above. While both export and development of purpose-built facilities, specifically those employing plasma arc technology, constitute options that are technically viable options, both are assessed as involving significantly higher unit costs for destruction than should be achievable by employing qualified domestic hazardous incineration facilities. Export to Europe or North America would be in the range of US$10-12/kg. Plasma arc facilities installed in Colombia are estimated to involve costs in the range of US$18-25/kg with scale limitations in relation to national requirements. However, it was concluded that the PLASCON technology package could be an option in the longer term in the context of its possible integration with a reverse manufacturing facility but also for use with other difficult to destroy liquid and gaseous hazardous waste. For this reason, some technical assistance funding is proposed to pursue more detailed evaluation of this option in support of the incremental development process.

In strategic terms, the election to demonstrate domestic options is also based in part on a policy position to avoid waste exports if possible given the country's policy of banning imports. The development of environmentally sound waste destruction capability is also generally consistent with the country's industrial infrastructure strategy and most immediately supports national management of persistent organic pollutants (POPs). The latter would be foster by ensuring the close integration of this project with the current GEF PCB management project being coordinated within a common institutional structure and potentially utilizing the knowledge base developed in the qualification of domestic destruction facilities to further achieving the objectives of both the Montreal Protocol and the Stockholm Convention.

The rationale behind qualifying destruction capability for both for CFC-11 containing foam and recovered CFC-11 in liquid form is so that two options are covered given the overall incremental approach adopted for developing domestic EOL ODS destruction capability. Recognizing the capital investment and cost barriers as well as risks in going directly to sophisticated reverse manufacturing capacity elsewhere, it is prudent to start off with a manual process that can be

incrementally scaled up as supply develops, notwithstanding the penalties in ODS recovery efficiency. The latter will be partially offset by provision in the project for introduction of more sophisticated high efficiency CFC-12 refrigerant recovery equipment employing de-gassing capability as refrigerator processing volumes increase. The pre-qualification of CFC-11 liquids serves to remove a possible barrier to the eventual investment in such high efficiency capability when economies of scale and financing mechanisms (particularly carbon finance) are in place. This incremental project design strategy should serve as useful and practical demonstration for broader replication elsewhere.

The qualification of the existing domestic incineration facilities will be accomplished through undertaking comprehensive test burns on not less than 5 t of each of these waste streams at least one facility. The required CFC-12 and CFC-11 as summarized in Tables 1 and 2 below currently exists and is under the regulatory control of the UTO. MLF funding will not cover the collection of this material, but rather only the centralized consolidation, storage, characterization and transport. Likewise, the CFC-11 containing foam used will have already been collected at metal scrap enterprises processing scrapped domestic refrigerators and MLF funding will support its extraction, storage, characterization and transport for destruction through arrangements with these enterprises. . In its second phase based on the qualification results, the project will then cover the destruction of CFC-12 and CFC-11 containing foam to be manually recovered from the initial 300,000 domestic refrigerators generated by the appliance replacement program. This will involve the destruction of an estimated 34 t of CFC-12, and 1,228 t of CFC-11 containing foam (effective destruction of 65 t of CFC-11). The project will also support the incremental development of key institutional and technical capacity through technical assistance related to regulatory measures, the practical implementation of the EPR and energy efficiency based financing mechanisms and potential future technology selection that could be introduced to optimize EOL ODS destruction efficiency when the refrigerator replacement program offers appropriate economies of scale. Provision is also made for development of a summary technical report reflecting the project's results, comparative analysis with other global experience and recommendations for use by ExCom and the Parties in advancing and replicating this experience.

As elaborated in more detail in Section 5 below, the project complies with the criteria established by Decision 58/19 and involves aspects that are not necessarily addressed by other pilot projects approved by ExCom. As such it should be of significant value in the broader context of demonstrating practical aspects of implementing a sustainable EOL ODS destruction program in comparable in Article 5 countries generally. More specifically the project includes the following features that should be of broader demonstration value:

- Provides an example of the ability of a country to manage its own EOL ODS issues on a cost effective basis without relying on export
- Develops an incremental approach to developing EOL capture and destruction capacity by utilizing and qualifying facilities and service providers in a manner that recognizes the need for intermediate steps involving manual processes and lower efficiency destruction capability for foam before implementation of highly sophisticated technologies for reverse manufacturing and destruction capability will be affordable or sustainable.
- Demonstrates the integration of EOL ODS management into a broader WEEE management program in a industrializing middle income Article 5 country such that it is

mainstreamed with both current global and developed country policy approaches to life cycle waste management generally and energy efficiency/carbon foot print reduction.

- Fosters synergies with Stockholm Convention by undertaking its implementation in close coordination with a current GEF Chemicals Focal area project managing national PCB waste stockpiles and contaminated sites such that common standard and methodologies for globally significant chemical wastes destruction are demonstrated and established, with associated economies of scale and a common service provider base.
- Inform current discussions within the TEAP ODS Destruction Task Force as reflected in the most recent TEAP ODS Destruction Task Force report referenced above regarding the equivalency of these two parameters used in assessing environmental performance of organic waste destruction facilities generally.
- Directly captures and destroys all currently available EOL ODS stocks including those directly resulting from other MLF funded ODS phase out projects which incorporated mandatory care and custody provisions for ODS that was being phase out (i.e. in refrigeration servicing, MDI and chiller projects).

The tables 1 and 2 show the summary of available and/or potential available EOL CFCs for destruction. Detailed information about sources can be found in the Appendices 3.

Table 1: Summary of Available and Potentially Available End of Life CFC-12 for Destruction Demonstration (kg)

CFC-12 and CFC-12 mixtures Totals	**5,674**
Available immediately	5,674

Table 2: Summary of Available and Potentially Available End of Life CFC-11 for Destruction Demonstration (kg)

CFC-11 Totals	**8,120**
Immediately Available	1,823
Availability being confirmed	2,297
Availability – end of 2012	900
Availability –end of 2013	3,100

4. PROJECT DESCRIPTION

The proposed project described below has been structured into three components. Component 1 (ODS Destruction Demonstration), Component 2 (Technical Assistance) and Component 3 (Project Management, Monitoring and Evaluation). Within each, a number of sub-components and discrete activities have been defined. These are summarized to the sub-component level with proposed financing and timing in Table 3 below. A more detailed and elaborated project framework matrix listing activities is provided in Appendix 5 and detailed schedule in Appendix 6. The following provides a detailed project description by Component, Sub-Component and Activity.

Component 1 – ODS Destruction Demonstration: This is the project's main component and covers the actual destruction demonstration work. The proposed activities are staged. The first stage (Sub-components 1.1 and 1.2) involve the assembly/consolidation/characterization of EOL ODS for the test burns, inclusive of current stocks of CFC-11 and CFC-12 (Tables 1 and 2 above), as well as extraction of sufficient CFC-containing foam from previously collected refrigerator carcasses at two or potentially three larger metal scrap yards. This would occur over a nine month period starting in mid 2012. The second stage (Sub-components 1.3 and 1.4) is the actual monitored test burns involving pre characterized packages of at least 5 t of material at up to three domestic rotary kiln hazardous waste facilities. This would be undertaken throughout 2013 with preparatory work in late 2012. The third stage Sub-Component 1.5) is the use of those facilities qualified to destroy the CFC-12 (estimated 34 t) and CFC-11 containing foam (estimated 1,228 t) derived from the first 300,000 refrigerators recovered in the start up phase of the national replacement program. The timing for this would be throughout 2014 and early 2015 as required. A more detailed description of each sub-component follows:

- *1.1 Consolidation/storage/characterization/transport of CFC-11 and CFC-12 EOL ODS:* As indicated in Tables 1 and 2 above the inventories of CFC-11 and 12 while secured under UTO regulatory control are widely distributed, of variable purity in some cases, and in relatively small containers for the most part. The activities in this sub-component cover the collection to centralized storage sites (not MLF funded), consolidating the material into larger containers (sizing anticipated to be at least 50 kg containers selected for compatibility with onward transport and incineration feed infrastructure), its characterization as to CFC content and contaminants, secure storage, and ultimately transportation to the test burn sites. It is envisioned that four centralized sites based on current recycling and reclaim operations will be involved. The locations tentatively selected are Bogotá, Medellín, Cali and Barranquilla which offer good national geographical and demographic coverage, and would likely be the locations where larger refrigeration dismantling capacity will develop. The initial collection stage up to the consolidation and storage sites will not be MLF funded but paid for by the current holders. In most cases this obligation is provided for as a condition of earlier CFC phase out project agreements requiring beneficiaries to be responsible for CFC stores. MLF grant funding is proposed for four sets of conventional refrigerant recover equipment (inclusive of tools, accessories and portable analyzers) and a quantity of larger multiple use cylinders and CFC-11 liquid containers with appropriate vapour locks and purging capability. The number will be determined based on compositions and suitability for transport and use at the incineration

Table3: Summary Project Framework and Cost Estimate

Component/Sub-Component/Activity	ODS (kg)	Cost Estimate (US$)			2012		2013				2014				2015	
		MLF	Other	Total	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
Component 1: ODS Destruction Demonstration		**830,000**	**1,235,000**	**2,065,000**												
1.1 Consolidation/storage/characterization/transport of CFC-11 and CFC-12 EOL ODS		100,000	50,000	150,000												
1.2 Consolidation/storage/characterization/transport of CFC-11 containing Foam for test burn demonstrations		100,000	-	100,000												
1.3 Test Burn demonstrations for CFC-11 and CFC-12 at a selected HW Incinerators	13,767	250,000	165,000	415,000												
1.4 Test Burn demonstration for CFC-11 containing foam at two selected Industrial/HW Incineration Facilities	1,249	135,000	80,000	215,000												
1.5 Destruction of EPR program start up volumes of CFC-12 and CFC-11 containing foams (Based on 300,000 units, 34 t CFC-12, 65 t CFC-11 in 1,228 t of foam)	99,000	245,000	940,000	1,185,000												
Component 2.0 Technical Assistance		**255,000**	**150,000**	**405,000**												
2.1 Legal and regulatory institutional TA		50,000	25,000	75,000												
2.2 Technical/business planning support for EOL ODS Management under the EPR system		75,000	100,000	175,000												
2.3 Public Consultation and Information		50,000	25,000	75,000												
2.4 Technical Oversight and Overall Project Technical Report		80,000	-	80,000												
Component 3.0 Project Management/Monitoring/Evaluation		**110,000**	**170,000**	**280,000**												
3.1 National Project Coordinator		60,000	60,000	120,000												
3.2 Project office administration		-	60,000	60,000												
3.3 Misc. contract services and travel		20,000	20,000	40,000												
3.4 M&E costs		30,000	30,000	60,000												
Totals	**114.016**	**1,195,000**	**1,555,000**	**2,750,000**												

facilities. Finally, a specific activity is identified to document and report on the origin, tracking, and verification of all the EOL ODS in accordance with procedures suitable for use under an international carbon crediting system if that were to apply. These activities would start in Q2 2012 and be completed by Q1 2013,

- *1.2 Consolidation/storage/characterization/transport of CFC-11 containing Foam for test burn demonstrations:* At present no CFC-11 containing foam is available for a test burn but substantial amounts are included in white goods metal scrap being continuously processed for use in each of Colombia's electric arc steel plants. Operators of these plants and several larger scrap yards feeding these have agreed to include a contracted segregation operation of incoming material (prior to shredding) that would allow accumulation of enough material for the test burn. This would be a simple manual process of removing block PU foam from refrigeration equipment carcasses. Hand held screening detection equipment will be used to separate CFC-11 and HCFC-141b based PU foam and both will be bagged for storage. A target accumulation of at least 10 and preferably 15 t of bagged foam will be accumulated. This process will be contracted competitively, likely to one of the national waste management service providers with current experience manually dismantling refrigeration equipment working in cooperation with the scrap processing enterprises. MLF funding including transportation to the test burn incinerators and analytical costs is proposed recognizing the demonstration value of qualifying a destruction option for manually extracted ODS based PU foam as an important step in an incrementally developed EOL ODS capture and destruction system. It is anticipated that this work will be undertaken during a period from Q4 2012 through Q 2 2013

- *1.3 Test Burn demonstrations for CFC-11 and CFC-12 at selected HW Incinerators:* It is proposed to undertake test burns at the two new rotary kiln incineration facilities operated by TECNIAMSA, one for CFC-12 and one for CFC-11. The test burn process will be utilize the national regulatory requirements and protocols described above, supplemented by an international standard, likely as issued by USEPA[11,12]. The initial activity will be technical assessment work undertaken jointly by an MLF funded consultant and the incinerator operator that will include a base line environmental audit of the facilities and current environmental management plan required under national regulations, development of a detailed test burn protocol and specification, and design for any modifications required for the test burn. A key part of this will be determination of an appropriate ODS feed rate and the waste stream to be co-disposed with ODS along with its compositional characterization.

  In terms of facility modifications required, these are anticipated to be relatively minor as provided for in the ExCom Decision XX/7. For CFC-12 it will involve installation of a new feed port in the front end of the kiln and setting up the feeding cylinder system with appropriate metering and automated record tabulation as well as a switching and purging capability for cylinders. For CFC-11, modifications may involve either a dedicated feed system but more likely simply a connection into the existing liquid feed system and burner

[11] http://www.epa.gov/osw/hazard/testmethods/sw846/pdfs/chap13.pdf
[12] http://www.epa.gov/osw/hazard/tsd/td/combust/pdfs/burn.pdf

nozzle, although for purposes of the test burn and integrity of input measurement a dedicated feed tank, pump, metering system and flow controls will likely be required.

On each facility/ODS chemical combination, there will be a baseline test burn with the normal waste stream to be co-disposed, and then a test burn with the ODS. In each case, the monitoring protocol will be followed covering operating conditions (i.e. combustion chamber temperatures, estimated resident times, stack outlet temperatures), the standard menu of regulated emissions including PCDD/F as well as mass balance inputs covering all residual release paths (solid, liquid and gaseous), analysis for key contaminants (including PCDD/F) in solid bottom ash, scrubber residuals) and any liquid residual streams. The intention is to determine both Destruction Removal Efficiency (DRE) and Destruction Efficiency (DE). This would serve to inform current discussions within the TEAP ODS Destruction Task Force as reflected in the most recent TEAP ODS Destruction Task Force report referenced above regarding the equivalency of these two parameters used in assessing environmental performance of organic waste destruction facilities generally. DE is generally considered more comprehensive since it covers all releases though DRE which only assesses releases to air is more generally used including in the TEAP guidelines. It is generally felt that gaseous or high vapor pressure CFCs would only be subject to air release but this should be validated. Likewise, analysis for PCDD/F and any recombinant CFC residuals in all release medium would likewise be useful contributions to the technical knowledge base.

The funding of the test burns is generally split between the MLF and the incinerator operators, the latter who will make substantial direct contribution to the actual testing through labor, modifications and lost business during tests (not accounted for in the cost estimates). Provision for independent supervision of the test burn by an expert consultant is provided for. This will include documentation and reporting, including verification protocols related to actual destruction, consistent with model carbon crediting protocols. In terms of timing, the technical development and planning work would be initiated in Q4 2012 with the actual test burns being undertaken sequentially in 2013 recognizing that some flexibility will be required to work around the regular business of the facilities and annual maintenance shut down schedules.

- *1.4 Test Burn demonstration for CFC-11 containing foam:* This sub-component will follow the same scope and proposed funding pattern as the test burns on the CFC chemicals except that the waste would not be co-disposed with other waste streams eliminating the need for a baseline reference test burn and facility modifications would be minimal and handled by the enterprises. Given that bulked bagged foam is being incinerated existing hopper/container feed systems that include weight scales and recording devices will be used. It is proposed to undertake these test burns at two facilities, likely one of the TECNIAMSA facilities and the PROSARC facility, noting that further investigation of the latter's emission performance will be made in advance. It should also be noted that a comparative assessment of impact on performance will also be undertaken on HCFC-141b based foam and a mixture of this and CFC-11 foam if material is available. This would be of practical value in the longer terms as it may be more efficient to simply destroy mixed foam as manually collected during actual operation of the system. It is anticipated that this work would be undertaken in the latter part of 2013.

- *1.5 Destruction of EPR program start up volumes of CFC-12 and CFC-11 containing foams*: This sub-component covers the destruction of CFC-12 (34 t) and CFC-containing foam (1,228 t containing 65 t of CFC-11) obtained from the dismantling of the first 300,000 refrigerators during the startup phase of the national replacement program. This will be done at domestic facilities qualified through the above work. The CFC-12 is assumed to be done at one or perhaps both of the TECNIAMSA facilities and the CFC-11 containing foam at TECNIAMSA and/or PROSARC with the selection being determined competitively. The destruction costs are indicative at this point but based on current market destruction costs for comparable wastes. The MLF funding is limited to a small portion of the destruction costs overall but will cover all the recovered CFC-12 destruction costs. Additionally, provision is made to apply MLF co-financing to the purchase of two high recovery efficiency plant based CFC -12 recovery units having degassing capability. These would be supplied at the point where the manual dismantling operations had reasonable economies of scale (approximately 50,000 refrigeration units per year) and would allow CFC-12 recovery efficiency to be increased to >95% and accommodate the higher production line scale through puts. The final activity in this component would be development of the overall ODS source through to destruction tracking, monitoring, destruction verification and reporting capability for the commercially scaled system. This will be established utilizing experience gained in Sub-component 1.3 and 1.4 above and will be designed and implemented with a view to being suitable for accreditation under an appropriate international carbon crediting mechanism should that financing option be developed at some point. It is anticipated that this sub-component will be undertaken throughout 2014 as material becomes available in commercial lots for destruction.

Component 2.0 Technical Assistance: This component covers technical assistance and related development work associated with evaluation, regulation and implementation of the ODS destruction demonstration project and in ensuring the legal, regulatory, technical and public acceptance tools are in place to sustain capacity so qualified. It has three sub-components as described below:

- *2.1 Legal and regulatory institutional technical assistance:* This sub-component provides limited MLF support, co-financed by MADS for regulatory enabling measures facilitating and regulating the capture and destruction of EOL ODS. This would include: i) legislation/regulation banning release of ODS and requiring its registered storage and environmentally sound destruction; ii) regulatory technical guidance in support of collection, storage, analysis, tracking, certified destruction and reporting requirements applicable to the management of EOL ODS; iii) legislation/regulation of the technical criteria and specifications for the facilities managing EOL ODS; and iv) legislation/regulation for the EPR system. This work would be undertaken early in the project beginning in Q3 2012.

- *2.2 Technical/business planning support for EOL ODS Management under the EPR system:* This sub-component supports technical and business planning capacity strengthening that will be required by both various stakeholder government agencies and the private sector service providers and investors in implementing the EOL ODS aspects of the overall refrigerator replacement and recovery program. This will include: i) training and technical

support related to operational EOL ODS management; ii) technology option assessment in relation to future EOL ODS processing and destruction technology investments including acquisition of reverse manufacturing capability and purpose built destruction capability; and iii) assessing the options available to development a sustainable carbon crediting mechanisms for EOL ODS

- *2.3 Public Consultation and Information:* This sub-component provides resource financed by both the MLF and government to support stakeholder and public consultations/awareness development on the national EOLODS management system development and its implementation. Given that ultimately any program of this type depends on voluntary participation of individual households and small business, this aspect is fundamental to the sustainability of the initiative. The work funded would take the form of production/dissemination of the normal range information products and use of public promotion vehicles including popular media, web based communication and social media. It would also involve support for a range of stakeholder workshops of both a technical and business nature.

- *2.4 Technical Oversight and Overall Project Technical Report:* This sub-component covers an international consultant having expertise in hazardous waste and WEEE management who will provide technical and business advisory services related to the project's overall implementation and specifically in relation to detailed scope definition and peer review of test burn design, and various technical assistance work above including refrigeration equipment processing and technology destruction evaluations, WEEE/EPR system implementation and introduction of carbon finance. It will also cover the preparation of a detailed technical completion report documenting project's results (facility baseline, kiln modifications, test burn procedures, performance against reference standards); life cycle tracking procedures and results; comparative analysis with other global experience and recommendations for use by ExCom and the Parties in advancing and replicating this experience report upon completion. The inclusion of this sub-component was included based on consultation with the MLF Secretariat and recognizes the broader demonstration value.

Component 3.0 Project Management/Monitoring/Evaluation: This component covers the normal project management costs associated with this kind of project which would be primarily funded by MADS. MLF funding would be associated with partial funding of incremental staffing costs in the form of a full time project coordinator, project documentation printing/translation costs and local project related travel. This component also provides for normal M&E costs also on a cost shared basis between the MLF and the government.

5. PROJECT JUSTIFICATION AGAINST FUNDING GUIDELINES

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 by way of direct response to the requirements as set out by the above mentioned Decision 58/19:

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

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

The overall project addresses the complete range of activities associate with ODS disposal. In its entirety provides demonstration across all activity categories and their integration. However, MLF support is limited to only transport, storage and destruction, and then only for purposes of consolidating current stocks of EOL ODS, undertaking their characterization , providing secure storage until demonstration of destruction is undertaken, and then transport for such destruction. The initial collection of demonstration materials is financed by the current holders or is undertaken by tapping into an established commercial collection system as is the case for CFC-11 based foam used for the test burn material of this type. More broadly, the larger scale demonstration obtained in the start up phase of the national EPR based refrigerator replacement program is entirely nationally financed with the exception of modest increment equipment additions to capitalize on economies of scale and optimize EOL ODS capture efficiency, and for payment of a minority portion of actual destruction costs.

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

Colombia is an active participant of all major chemicals multi-lateral agreements and initiatives, a number of which have current and future synergies with the proposed project. At a high level, it actively participates in activities associated with the International Conference on Chemicals Management and work under the SACIM framework promoting sound chemicals management.

Similarly it is a highly involved Party to the Basel Convention and a principle advocate of implementation of the Basel Ban Amendment endorsed at the last Basel COP which was held in Colombia. Linkage to the Basel Convention is significant in the context of this project given the strategic focus it has taken to utilize domestic destruction capability, as opposed to export of its wastes. It is also a strong policy motivator behind the countries broader national hazardous waste management policy and implementation of WEEE and waste derived resource recovery programs into which EOL ODS management is integrated (Section 2 above).

This project has a close linkage to the country's work implementing the Stockholm Convention through its National Implementation Plan. The recently approved GEF-5 PCB management project where arranging environmentally sound disposal of PCB stockpiles and wastes under

Article 5 of the Stockholm Convention has specific synergies respecting this project and enhancement of its demonstration value. As highlighted in Appendix 5, a number of specific activities in the project offer opportunities for complimentary synergy with the GEF project and potential to optimize long term economies associated with implementation of both the Montreal Protocol and Stockholm Convention. These include: i) the development of technical specifications, guidance materials and protocols governing the qualification of destruction facilities for complex halogenated chemicals; ii), facility upgrades and modifications; iii) baseline destruction facility performance testing; iii) consulting and supervision services; iv) regulatory development with a common waste management framework; v) public consultation and information; and vi) general project management support. These will be further developed during the PPG stage of the POPs project which has been approved for funding and is preparing for implementation. The linkage is further strengthened at a practical level by the common line institutional responsibility for implementation in the same division of MADS.

The final chemicals management aspect where such synergies exist are in relation to international initiatives related to climate change and green house gas reduction. The project itself will provide a significant avoidance of GHG release from the destruction of ODS alone (Estimated to be over 750,000 t of CO_2 Eq). The full implementation of the planned 10 years program to replace 2,600,000 domestic refrigerators would result in approximately 2.2 million t CO_2 Eq in GHG avoidance. During the same period, the preparation studies undertaken by the government suggest that implementation of the refrigeration program will result in GHG release reductions of 420,000 t CO_2 Eq. While no decisions on the incorporation of carbon finance mechanisms in the national program has been made, consideration is being given to development of a Kyoto Protocol CDM project and the potential for the use of voluntary carbon markets, both of which could be linked to possible GEF funding. In anticipation of these possibilities, this project has incorporated features to ensure development of appropriate source certification, tracking and destruction verification. These are elaborated generally below in relation to monitoring and verification procedures.

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

The amounts of ODS meant to be handled in the project are described in detail in previous sections and Appendix 3. Currently available end of life (EOL) ODS stocks in Colombia are 15 t, and an anticipated 65 t of CFC-11 and 34 t of CFC-12 recovered over the first two years of implementation of the national refrigerator replacement program undertaken in accordance with WEEE legislation now being enacted. An annual estimated destruction rate of 56 tons of CFC-11 and 29 t of CFC-12 is projected beyond the project life.

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

Currently available end of life (EOL) ODS stocks in Colombia are 15 t , and an anticipated 65 t of CFC-11 and 34 t of CFC-12 recovered over the first two years of implementation of the

national refrigerator replacement program undertaken in accordance with WEEE legislation now being enacted.

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

These are reviewed in Section 2 above and are based on the rapid implementation of policy and legislative measures to put in place an accelerated domestic refrigerator replacement program based on at least four large regional centres and smaller ones in lower population locations. The system is anticipated to begin initial operation in 2013 and reach a full annual capacity of 250-300,000 units per year in 2015. It will be financed by a combination of extended producer responsibility funds and energy efficiency incentive payments, with possible carbon finance at some future point.

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 primarily on the destruction of contaminated CFCs. However, during the course of implementation, opportunities to also destroy the small quantities of EOL HCFC, HCFC based mixtures, HFCs and CTC that currently exist (Appendix 3) and which will continue to accumulate, particularly as a result of the HPMP implementation will be explored. Halon stocks are being banked for use in the civilian aircraft sector, and no destruction requirements are involved in this work

5.2. Detailed information on issues required for project submission

i. Updated information for issues mentioned under project preparation: Provided in Sections 1 through 4 above

ii. Project Implementation: The project implementation will follow the estimated Timetable:

Table 5 – Overall Implementation Timeline

Activity	2012			2013				2014				2015	
	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
Project Start-up													
ExCom Project Approval													
Receipt of Funds													
Project/Grant Signature													
Management activities													
Progress Reports to ExCom													
Project Implementation													
Component 1: ODS Destruction Demonstration													
Component 2.0 Technical Assistance													
Component 3.0 Project Management/Monitoring/Evaluation													
Project Closure													
Final Report (Including Output of Sub-component 2.4)													
Certificate of Technical Completion													
Operational and Financial Closure													

iii. Other sources of funding.

The project is estimated to utilize US$1,555,000 in co-financing from other sources. These include budget and in-kind contributions from MADS and participating enterprises (holders of EOL ODS and waste management service providers), initial revenues and startup contributions from government and product manufacturers to the refrigerator replacement program. As noted above (Section 5.1 ii), there are a number of areas the current GEF POPs could contribute to this project. The details of this will be addressed in the PPG currently being initiated for that project, including areas where funding economies might exist. However, given the different nature of the project cycle and eligibility criteria, it is unlikely practical to have these as shared costs. In this discussion, it is emphasized that in this cost estimate there are no costs assigned for MLF funding that would be duplicated in the GEF project. The economies are primarily related to the effectives of the result and in the longer term sustainability of both initiatives.

iv. Concept for monitoring the origin of recovered ODS

The nature of the origin of all EOL ODS recovered for destruction is readily determined given that the currently available stocks are held by their original generators, are derived from well defined activities (customs seizures, refrigeration servicing activities and well documented phase out initiatives (i.e. chiller demonstrative project, MDI conversion, solvent phase out) where recovered material and excess stocks are covered by implementation agreements. These stocks have been and continue to be subject to regulatory monitoring by UTO. The EOL ODS recovered during the start up phase of the national EPR refrigerator replacement program will likewise be closely monitored as it is generated at source. In both cases the tracking of these materials through subsequent consolidation, characterization, storage, transport and destruction is explicitly provided for within the project including detailed documentation. There is no risk in this project or in the subsequent large scale recovery programs to inflate volumes managed with ineligible stocks such as might be generated for purposes of deriving revenues, given there are no such sources, namely production facilities, in Colombia.

While the detailed design of the required EOL ODS Monitoring/Tracking System is part of the proposed project itself and its documentation would in fact be a replicable output, a general outline of the principles and approaches to be applied is provided below:

- *Ensuring EOL ODS cannot be re-used:* In principle, a portion of the EOL managed by the project and the overall WEEE/EPR system can theoretically be re-used, namely any uncontaminated refrigerants and CFC-11 stocks. However, CFC-11 use is effectively banned in Colombia and CFC-12 use in existing equipment is rapidly declining and fully serviced by the present R&R infrastructure. HCFC-22, where recovered, would be re-used as long as a servicing requirement existed. CFC-11 and HCFC-141b in foam is unsuitable for re-use by definition.
- *Verification of source and onward tracking through to destruction – Current EOL ODS Stocks:* The EOL ODS that is earmarked for use in qualifying domestic destruction facilities is currently in the hands of originators, all who can demonstrate where it came from with appropriate documentation. Additionally it is held under the oversight monitoring and

regulatory control of UTO as a hazardous waste in accordance with national legislation. The steps of moving this from these locations through to consolidation/characterization/storage and onward to destruction facilities would involve standard hazardous waste tracking documentation (way-bills/manifests), in/out weighing at each step and analytical verification of consolidated stocks. This would have matching receipt weighting at the incineration facilities and matching against manifest with a final analytical characterization of lots as they were accepted for incineration. The facilities would have metered flow and associated recorders applied to the feed lines from container to primary combustion chamber entry port of the destruction unit as well as provision for purging and verification of containers being empty. This upgrading is specifically provided for in the project. This would definitively measure and allow verification and documentation of the actual amounts entering the process for destruction. By definition the test burn is designed to precisely demonstrate the destruction efficiency of the process by monitoring what is released by any potential path against what is put in.

- *Verification of source and onward tracking through to destruction – EOL ODS Extracted from Replace Equipment:* The source of this EOL ODS would be based initially on record keeping and tracking of collected equipment upon receipt at the dismantling facility through a inventory control system (likely based on bar code labeling applied at source) with the units tracked in the dismantling process. Such tracking would have to be in place in any event for purposes of administering payments under the system. Dedicated refrigerant extraction equipment and containers would be used with recovery containers being uniquely labeled, again with bar code based inventory tracking approach. Foam extracted manually would likewise be bagged and labeled for onward tracking. Shipment of refrigerant containers and bagged foam would be done using hazardous waste transport tracking documentation such as a manifest with receipt confirmation matched in terms of labels and shipping weights. A sampling protocol would also be applied at the incineration facility to verify content at a suitably established frequency which could if 100% in the case of refrigerant basic analyzers were used. Processing tracking would be monitoring at the feed point as described above with the agreed facility rated destruction facility applied, such destruction frequency being tested periodically as required by regulation.
- *Additional considerations associated with possible export and carbon finance arrangements:* The proposed project does not involve export but if it did the same process principles would apply with any additional provisions in terms of manifests, labeling and composition verification required under the Basel Convention and prior consent regulations of export, transit and receiving jurisdictions. The above practices generally meet the monitoring and tracking requirements of the current voluntary carbon credit protocols accepting ODS destroyed by rotary kiln incineration and where a specific commercial arrangement was entered into as may be the case in the future it would be enhanced to meet any specific requirements or procedures specified.

v Assurances that the amount of ODS mentioned will actually be destroyed.

Following from the above, the project provides for independent supervision and verification of destruction. This includes development and implementation of protocols for this which will be utilized in the future and will be designed to meet international practice, specifically those applied to carbon crediting arrangements. Assurance of actual effectiveness of destruction as

quantified in destruction efficiency parameters are a specific output of the project applicable to the destruction facilities being qualified, thus a direct validation of their effectiveness is provided.

vi Exploration of other disposal options for the used ODS.

Sections 2 and 3 above provide a discussion of the various strategic and technological destruction options considered for the project. These include the three generic options of export, development of new purpose built facilities and utilizing existing modern domestic hazardous waste management infrastructure in the form of rotary kiln high temperature incineration (HTI). During preparation, the complete range of potentially available technologies associated performance assessments as documented in the technical literature was reviewed, particularly recent publications by the GEF STAP and the most recent TEAP task force report, both referenced above. Preparation of the project also involved inputs from a TEAP Task Force member.

The result of this work supports the selection of both the option of utilizing existing facilities and conventional rotary kiln high temperature incineration technology. HTI remains the technology of choice worldwide for the destruction of halogenated hazardous waste, POPs and ODS. With the strict caution that its operation must be undertaken by competent and creditable operators and it is closely monitored, HTI generally achieves substantially higher destruction efficiencies and lower critical emission levels (i.e. PCDD/F) than required under the TEAP requirements adopted by the Parties and in fact the more strict requirements applied under the Stockholm Convention for POPs. Likewise HTI is generally the lowest cost technology available with destruction costs for chlorinated hazardous wastes in Colombia under US$2.0/kg and which should generally apply to EOL ODS once domestic HTI facilities are qualified. Other technologies that might practically be used in Colombia, namely plasma arc, appear to have substantially higher unit costs (US$12 to 27/kg). While these technologies theoretically might offer higher nominal destruction efficiencies this actually offers minimal actual increase in the amount of ODS destroyed. Notwithstanding the above analysis, the project technical assistance scope has included further technology assessment work related to plasma arc facilities to evaluate its applicability in a full scale refrigerator recovery program as an integrated part of a reverse manufacturing operation and as a possible technology that might also have application to POPs destruction as well as EOL ODS. In the technical reporting detailed in Sub-component 2.4, the technical, environmental and economic performance of the destruction options utilized will be document and compared to experience globally current at that time.

6. Appendixes

Appendix 1: Transmittal Letter

Appendix 2: Legal and Regulatory Framework for ODS in Colombia

Appendix 3: Current National Inventory of End of Life ODS

Appendix 4: Summary of Operating Condition and Environmental Performance Requirements for Hazardous Waste Incineration Facilities in Colombia

Appendix 5: Project Framework and Cost Estimate

Appendix 6: Overall Project Schedule by Component/Sub-Component/Activity

Appendix 1: Transmittal Letter

Appendix 2 – Legal and Regulatory Framework for ODS in Colombia

Colombia is a signatory to the Montreal Protocol on Substances that Deplete the Ozone Layer. The status of the ratification of this protocol and its Amendments is as follows:

Instrument	Congress Law
Vienna Convention (1985)	# 30, 5-Mar-90
Montreal Protocol (1987)	# 29, 28-Dec-92
London Amendment (1990)	# 29, 28-Dec-92
Copenhagen Amendment (1992)	# 306, 5-Aug-96
Montreal Amendment (1997)	# 618, 6-Oct-00
Beijing Amendment (1999)	# 960, 28-Jun-05

1. Control Measurements

In chronological order, the regulations that apply to ODSs are:

- **Law 99 of 1993** (Congress): The Secretary of Environment, *Ministerio del Medio Ambiente*, was created, and the National Environmental System was organized. Environmental licenses -issued by the Secretary of Environment- for the importation and production of substances controlled by international treaties were established.
- **Resolution 528 of June 18, 1997** (Secretaries of Environment and Foreign Trade): The use of CFCs (refrigerant and blowing agent) for the production of domestic refrigerators was banned.
- **Resolution 304 of April 16, 2001** (Secretaries of Environment and Foreign Trade): Imports of ODS listed in the Annex A, Group I, were regulated[13]. Annual quotas per company, defined according to the Country Programme and the import history, were established. NOU approval is required for the expedition of the environmental license.
- **Resolution 734 of June 22, 2004** (Secretaries of Environment -now *Ministerio de Ambiente, Vivienda y Desarrollo Territorial*- and Foreign Trade -now called *Ministerio de Comercio, Industria y Turismo*-): Resolution 304 was modified to take into account the adjusted Country Programme.
- **Resolution 874 of July 23, 2004** (Secretaries of Environment and Foreign Trade): Resolution 734 is expanded. Methodology to quotas allocation is defined.
- **Government Decree 423 of February 21, 2005**: Exports of substances listed in Annex A, Groups I and II, Annex B, Groups I, II and III, Annex C, Groups I, II and III, and Annex E, Group I, are regulated. They required the approval of the Secretary of Environment (UTO)[14].
- **External Resolution 21 of April 1, 2005** (Secretary of Commerce, Industry and Tourism): The approval of UTO (Secretary of Environment) for the imports of HCFCs and Halons is established. The duty positions that require NOU approval are listed: Annex A, Groups I and II, Annex B, Groups I, II and III, Annex C, Groups I, II and III, Annex E, Group I, substitutes for HFCs, refrigerant blends containing ODS and HFCs and blends based on Methyl Bromide.

[13] Unfortunately, substances listed in Annex A, Group II, were not included.

[14] In 2003 it was estimated that 12 % of the imported ODS were exported.

- **External Resolution 22 of April 1, 2005** (Secretary of Commerce, Industry and Tourism): The exports of substances listed in Annex A, Groups I and II, Annex B, Groups I, II and III, Annex C, Groups I, II and III, and Annex E, Group I are regulated. The Secretary of Environment (UTO) should established annual quotas per substance.
- **External Resolution 23 of April 7, 2005** (Secretary of Commerce, Industry and Tourism): The list of duty positions belonging to domestic refrigerators and freezers, whose imports require UTO approval, is updated.
- **Resolution 2188 of December 29, 2005** (Secretary of Environment): Exports are regulated with reference to Decree 423.
- **Resolution 901 of May 23, 2006** (Secretary of Environment): Imports of ODS listed in the Annex A, Group II, Halons, were regulated. Annual quotas per company, defined according to the Country Programme and the import history, were established. The use of halons in new installations was banned.
- **Resolution 902 of May 23, 2006** (Secretary of Environment): Imports of ODS listed in the Annex B, Group I, II and III, were regulated. Annual quotas per company, defined according to the Country Programme and the import history, were established. The use of halons in new installations was banned.
- Since 1999 HCFCs imports require environmental license.
- **Resolutión 2120 of October 31, 2006** (Secretary of Environment): Establish the measurements to control Annex C substances.

Since December 2005 Colombia has an overall policy for the management of hazardous waste, where ODSs are included. This policy is covered in the **Decree 4741 of 2005** based on the implementation of the Basel Convention.

Appendix 3 – Current National Inventory of End of Life ODS

Source	Quality	Ownership/Control	Location	Current Storage Condition	Quantity (kg)
CFC-11					
Phase 1(a) - Chiller replacement program – Q1/2 2012	Recovered CFC-11	- MLF project legal agreement obligation to hold for destruction - UTO monitoring	Cali	210 l drums	370
Phase 1(b)- Chiller replacement program – Q3/4 2012	Recovered CFC-11	- MLF project legal agreement obligation to hold for destruction - UTO monitoring	Medellín	210 l drums	530
Phase 2(a) - Chiller replacement program – Q1/2 2013	Recovered CFC-11	- MLF project legal agreement to hold for destruction - UTO monitoring	Medellín	210 l drums	500
Phase 2(b) - Chiller replacement program – Q3/4 2013	Recovered CFC-11	- MLF project legal agreement to hold for destruction - UTO monitoring	Medellín	210 l drums	2,600
LABORATORIOS CHALVER DE COLOMBIA (MDI manufacturer)	Pure CFC-11	- LABORATORIOS CHALVER DE COLOMBIA (MDI manufacturer) - MLF project legal agreement to hold for destruction/UTO monitoring	Bogota	57 kg cylinder	1,367
Excess Stocks in held by phased out users	Pure and recovered CFC-11	- Excess stocks at 5 users - Availability being confirmed	Bogota, Cali, Cartagena, Rionegro, Ibague	Various containers	456
Stocks at bankrupt former users	Pure and recovered CFC-11	- Excess stocks at 2 bankrupt users - Availability being confirmed	Espinal y Barranquilla	Various containers	2,297
CFC-11 Totals					8,120
Immediately Available					1,823
Availability being confirmed					2,297
Availability – end of 2012					900
Availability –end of 2013					3,100

Source	Quality	Ownership/Control	Location	Current Storage Condition	Quantity (kg)
CFC-12					
Regional Recover and Recycling Centers and Reclaim Centers	Contaminated reclaim/servicing residuals CFC-12 (separated)	- Held by 16 refrigeration service providers - UTO registration and monitoring - Supply to project committed	Regional Reclaim Centers - 10 locations	13.6 kg cylinders	236
Regional Recover and Recycling Centers and Reclaim Centers	Contaminated reclaim/servicing CFC-12 residuals (>70%)	- Held by 35 refrigeration service providers - UTO registration and monitoring - Supply to project committed	Regional Reclaim Centers – 18 locations	13.6 kg cylinders	1,142
National Customs – DIAN	CFC-12 and mixtures of CFC-12 seized	- Held by 5 regional customs offices	Regional customs offices – 5 locations	13.6 kg cylinders and 340 g cans	1,500
LITO	Contaminated reclaim/servicing CFC-12 residuals->70%	- Held or accessible by national service provider (LITO) - UTO registration and monitoring - Supply to project committed	LITO Storage Site - Bogota	13.6 kg cylinders	1,246
LABORATORIO CHALVER DE COLOMBIA (MDI manufacturer)	Pure CFC-12	- MLF project legal agreement to hold for destruction/UTO monitoring	Bogota	13.6 kg cylinders	1,550
CFC-12 and CFC-12 mixtures Totals					5,674
Available immediately					5,674

Source	Quality	Ownership/Control	Location	Current Storage Condition	Quantity (kg)
HCFC, HFC and mixtures of HCFC - HFC					
Regional Recover and Recycling Centers and Reclaim Centers	Contaminated reclaim/servicing residuals HCFC-22 (separated)	- Held by 15 refrigeration service providers - UTO registration and monitoring - Supply to project committed	Regional Reclaim Centers and end users - 9 locations	13.6 kg cylinders	336
Regional Recover and Recycling Centers and Reclaim Centers	Contaminated reclaim/servicing residuals HFC-134a (separated)	- Held by 11 refrigeration service providers - UTO registration and monitoring - Supply to project committed	Regional Reclaim Centers and end users - 8 locations	13.6 kg cylinders	204
Regional Recover and Recycling Centers and Reclaim Centers	Contaminated reclaim/servicing residuals mixtures of HCFCs and other HFCs	- Held by 7 refrigeration service providers - UTO registration and monitoring - Supply to project committed	Regional Reclaim Centers and end users- 3 locations	13.6 kg cylinders	379
HCFC, HFC and mixtures of HCFC - HFC Totals					919
Available immediately					919

Source	Quality	Ownership/Control	Location	Current Storage Condition	Quantity (kg)
CTC					
Pure CTC	MLF project legal agreement to hold for destruction/UTO monitoring		Cali	210 l drum	330
CTC Total					330
Available immediately					330

Appendix 4 – Summary of Operating Condition and Environmental Performance Requirements for Hazardous Waste Incineration Facilities in Colombia

Requirement	Capacity > 500 kg/hr	Capacity < 500 kg/hr
Combustion chamber temp. (^oC)		
Primary	> 850	> 1200
Secondary	> 800	> 1100
Secondary combustion chamber residence time (sec)	> 2 sec.	> 2 sec
Gas exhaust temp. (^oC)	< 250	<250
Air Emissions (O_2 reference @11%) – mg/m^3		
Particulate	Av. Day - 10 Av. Hr. - 20	Av. Day - 15 Av. Hr. - 30
SO_2	Av. Day - 50 Av. Hr. - 300	Av Day - 50 Av. Hr. - 200
NO_x	Av. Day - 200 Av. Hr. - 400	Av. Day - 200 Av. Hr. - 400
CO	Av, Day - 50 Av. Hr. - 100	Av. Day - 50 Av. Hr. - 100
HCL	Av. Day - 10 Av. Hr. - 40	Av. Day - 15 Av. Hr. - 60
HF	Av. Day - 1 Av. Hr. - 4	Av. Day - 1 Av. Hr. - 4
Hg	Av. Day - 0.03 Av. Hr. - 0.05	Av. Day - 0.05 Av. Hr. - 0.10
Total hydrocarbons	Av. Day - 10 Av. Hr. - 20	Av. Day - 10 Av. Hr. – 20
PCDD/F (ng – $ITEQ/m^3$)	0.1	0.1
Air Emission Heavy Metals (Reference Conditions 25^oC, 760 mm Hg) - mg/m^3		
Sum of Ca, Tl, and its compounds	0.5	0.5
Sum of As, Cu, Cr, Pb, Co, Ni, V, Mn, Sb, Sn	0.5	0.5
Destruction Performance		
DRE –Waste (%)	99.99	99.99
DRE – HCl (%)	99	99

Appendix 5: Detailed Project Framework and Indicative Cost Estimate

Component/Sub-Component	Activity Description	Cost Estimate (US$)			Timing/Remarks
		MLF	Other	Total	
Component 1: ODS Destruction Demonstration		830,000	1,235,000	2,065,000	
1.1 Consolidation/storage/characterization/transport of CFC-11 and CFC-12 EOL ODS		100,000	50,000	150,000	Q3/4 2012
1.1.1 Supply of extraction/transfer equipment and ODS analyzers	Four recovery machines with N_2 purge capability and associated tools. Four ODS analyzers	20,000	20,000	40,000	Q3 2012
1.1.2 Supply of bulk cylinders	Sufficient multiple use cylinders of size optimized for qualified destruction facilities.	15,000	15,000	30,000	Q3 2012
1.1.3 Collection/transport of distributed CFC- 11 stocks	Pick up of CFC-11 as currently stored from chiller sites, bankrupt enterprises, former user enterprises and LABORATORIO CHALVER for delivery to contracted project consolidation/storage site (s)	-	5,000	5,000	Q4 2012
1.1.4 Collection/transport of distributed CFC- 12 stocks	Pick up of CFC-12 as currently stored at reclaim center/national customs, LITO and LABORATORIO CHALVER and delivered to contracted project consolidation/storage site (s)	-	10,000	10,000	Q4 2012
1.1.5 Consolidation/storage of CFC-11 stocks	Screening analysis, consolidating into optimized cylinders for destruction and secure monitored storage at a contracted project site	10,000	-	10,000	Q4 2012
1,1.6 Consolidation/storage of CFC-12 stocks at contracted project storage site	Screening analysis, consolidating into optimized cylinders for destruction and secure monitored storage at a contracted project site	10,000	-	10,000	Q4 2012
1.1.7 Verification analysis of consolidated CFC-11 and CFC-12	Independent laboratory analysis of consolidated EOL ODS in each bulk cylinder.	20,000	-	20,000	Q4 2012
1.1.8 Transportation to incineration facility	Transport as required by test burn schedule	15,000	-	15,000	Q3 2013
1.19 Documentation and reporting	Assembly of auditable documentation on the origin, tracking and certified analysis of EOL ODS for test burns stocks in suitable for accreditation under an international carbon crediting mechanism.	10,000	-	10,000	Q4 2012-Q1 2013
1.2 Consolidation/storage/characterization/transport of CFC-11 containing Foam for test burn demonstrations		100,000	-	100,000	Q4 2012-Q1 2013
1.2.1 Test burn foam separation, and storage	Contractor set up to extract, and bag foam at scrap yards inclusive of secure onsite storage or	60,000	-	60,000	Q1 2013

Component/Sub-Component	Activity Description	Cost Estimate (US$)			Timing/Remarks
		MLF	Other	Total	
	other interim storage				
1.2.2 Transportation	Transportation to incineration facilities and interim storage as required	15,000	-	15,000	Q2 2013
1.2.3 Site screening of extracted foam.	Supply of ODS screening equipment for foam/Contracted service for screening	10,000	-	10,000	Q4 2012-Q1 2013
1.2.4 CFC -11 content analysis	Contracted verification analysis of CFC-11 content	15,000	-	15,000	Q2 2013
1.3 Test Burn Demonstrations for CFC-11 and CFC-12 at selected HW incinerators		250,000	165,000	415,000	Q3 2013
1.3.1 Test burn planning and design	Detailed test burn design, specification and proposal documents including baseline environmental audit for each (2) test burn facility.	20,000	30,000	50,000	Q3 2012-Q2 2013 Enterprise in-kind and co-finance of baseline EA Potential economies with GEF POPs project
1.3.2 Minor facility modifications	Material feed, control and measurement infrastructure at HW incineration facility - Primary combustion chamber port modifications for high vapor pressure liquid and/or compressed gas feed - Dedicated liquid feed from barrels or containers inclusive of weight scale, pump, fugitive emission containment, flow controls and flow metering - Dedicated gaseous feed from pressurized containers inclusive of weight scale, pump, fugitive emission containment, flow controls and flow metering - Container purging capability	30,000	10,000	40,000	Q2 2013 Enterprise in-kind Potential economies with GEF POPs project
1.3.3 Baseline feed selection/characterization	Selection/characterization of a representative baseline feed to be co-disposed with ODS	10,000	10,000	20,000	Q3 2013 Enterprise in-kind including characterization analysis.
1.3.4 Baseline test burn	Baseline test burn on representative normal feed mix	50,000	25,000	75,000	Q3/4 2013 Enterprise in-kind

Component/Sub-Component	Activity Description	Cost Estimate (US$)			Timing/Remarks
		MLF	Other	Total	
	- Incineration facility operating conditions - Stack analysis for regulated emissions including HF and PCCD/F - Bottom ash analysis - Scrubber waste water (as applicable) analysis				Potential economies with GEF POPs project
1.3.5 Test burn for CFC-11	Continuous metered injection of 5 t of CFC-11 at pre determined rates with monitoring and documentation of: - Incineration facility operating conditions - Stack analysis for regulated emissions plus HF and PCCD/F - Bottom ash analysis - Scrubber waste water (as applicable) analysis	60,000	45,000	105,000	Q3/4 2013 Enterprise in-kind for operational, permitting and result audit documentation costs
1.3.6 Test burn for CFC-12	Continuous metered injection of 5 t of CFC-12 at pre determined rates with monitoring and documentation of: - Incineration facility operating conditions - Stack analysis for regulated emissions plus HF and PCCD/F - Bottom ash analysis - Scrubber waste water (as applicable) analysis	60,000	45,000	105,000	Q3/4 2013 Enterprise in-kind for operational, permitting and result audit documentation costs
1.3.7 Test burn supervision	Independent supervisory/audit consultant(s) undertaking test burn oversight, data analysis and reporting.	20,000	-	20,000	Q2 –Q4 2013 Potential economies with GEF POPs project
1.4 Test Burn Demonstration - for CFC-11 containing foam at two selected Industrial/HW Incineration Facilities		135,000	80,000	215,000	Q2 2013
1.4.1 Test burn planning and design	Detailed test burn design, specification and proposal documents for test burns including baseline environmental audit.	20,000	20,000	40,000	Q4 2012-Q1 2013 Enterprise in-kind and co-finance of baseline EA .
1.4.2 Minor facility modifications	Material feed, control and measurement infrastructure at HW incineration facility (assumed existing bulk solid feed systems with minimal modification)	-	10,000	10,000	Q1 2013 Enterprise in-kind
1.4.3 Test burn on CFC-11 containing foam	Test burn on 5t of foam at two qualified facilities:	100,000	50,000	150,000	Q2 2013

Component/Sub-Component	Activity Description	Cost Estimate (US$)			Timing/Remarks
		MLF	Other	Total	
	- Incineration facility operating conditions - Stack analysis for regulated emissions including HF and PCCD/F - Bottom ash analysis - Scrubber waste water (as applicable) analysis				Enterprise in-kind
1.4.4 Test burn supervision	Independent supervisory/audit consultant(s) undertaking test burn oversight, data analysis and reporting.	20,000	-	20,000	Q4 2012-Q3 2103
1.5 Destruction of EPR Program Start up volumes of CFC-12 and CFC-11 containing foams (Based on 300,000 units, 34 t CFC-12, 65 t CFC-11 in 1,228 t of foam)		245,000	940,000	1,185,000	Q1 2014 –Q4 2014
1.5.1 EOL ODS collection, extraction, consolidation and transport	Collection, extraction, storage, consolidation, and transport of CFC-12 and CFC-11 containing foam to qualified incineration facilities	-	400,000	400,000	Q2 2013-Q3 201
1.5.2 CFC-12 destruction	Destruction of 34 t of CFC-12 @ commercial rate of $2,000/t	70,000	-	70,000	Q3 2014 Assume70% CFC-12 recovery
1.5.3 CFC-11 containing foam destruction	Destruction of 1,228 t of CFC-11 containing foam (assumed contain 45 t CFC-11) @ commercial rate of $ 500/t	100,000	465,000	565,000	Q4 2014 Assume 75% CFC-11 retained in destroyed foam
1.5.4 High efficiency CFC-12 recovery equipment	Supply of high efficiency CFC recovery unit with oil and refrigerant circuit de-gassing and multiple stations.	50,000	50,000	100,000	Q1 2014 Assume two large manual dismantling operations each with one unit 50% co-financed by MILF
1.5.5 Reporting of commercial ODS destruction under the EPR Program start up	Preparation of consolidated documentation and verification protocols for routine assembly of auditable documentation on the origin, tracking, certified analysis and destruction of EOL stocks in suitable for accreditation under an international carbon crediting mechanism	20,000	25,000	50,000	Q1 2015
Component 2.0 Technical Assistance		255,000	150,000	405,000	Q3 2012-Q1 2014

Component/Sub-Component	Activity Description	Cost Estimate (US$)			Timing/Remarks
		MLF	Other	Total	
2.1 Legal and regulatory institutional TA	Support for legal and regulatory enabling measures facilitating development and implementation of the national EOL management system - Legislation/regulation banning release of ODS and requiring its registered storage and environmentally sound destruction. - Regulatory technical guidance in support of collection, storage, analysis, tracking, certified destruction and reporting requirements applicable to the management of EOL ODS. - Legislation/regulation of the technical criteria and specifications for the facilities managing EOL ODS - Legislation/regulation for the EPR system	50,000	25,000	75,000	Q3 2012-Q2 2013 Potential economies with GEF POPs project
2.2 Technical/business planning support for EOL ODS Management under the EPR system	Support for technical/business planning and administration of the developing EOL ODS aspects of the EPR system - Training and Technical Support for Operational EOL ODS Management - Technology option assessment for future EOL ODS processing and destruction - Development of sustainable carbon crediting mechanisms for EOL ODS	75,000	100,000	175,000	Q3 2012-Q3 2013
2.3 Public Consultation and Information	Support for stakeholder and public consultations and awareness development on the national EOLODS management system development and implementation - Information products/public promotion - Stakeholder workshops	50,000	25,000	75,000	Q3 2012-Q1 2014 Potential economies with GEF POPs project
2.4 Technical Oversight and Overall Project Technical Report	Part-time international consultant with expertise in hazardous waste and WEE management to provide: - Oversight and technical advice on the overall project implementation - Critical review if technical assistance products, specifically processing and	80,000	-	80,000	Q3 2012-Q2 2015

Component/Sub-Component	Activity Description	Cost Estimate (US$)			Timing/Remarks
		MLF	Other	Total	
	technology destruction evaluations, WEEE/EPR system implementation and introduction of carbon finance; - A detailed technical completion report documenting project's results (facility baseline, kiln modifications, test burn procedures, performance against reference standards); life cycle tracking procedures and results; comparative analysis with other global experience and recommendations for use by ExCom and the Parties in advancing and replicating this experience report upon completion.				
Component 3.0 Project Management/Monitoring/Evaluation		110,000	170,000	280,000	Q3 2012-Q2 2015
3.1 National Project Coordinator	National expert on ODS, hazardous waste and WEEE management with overall responsibility for project coordination, reporting to UTO NOU, and working in close cooperation with GEF POPs project PMU	60,000	60,000	120,000	Q2 2012-Q1 2015 Full time 2.5 years
3.2 Project office administration	Project office administrative staffing, office and related overheads	-	60,000	60,000	Q2 2012-Q1 2015 Gov. in-kind Shared costs with GEF POPs project
3.3 Misc. contract services and travel	Project documentation,/translation and local project management travel	20,000	20,000	40,000	Q2 2012-Q4 2014 Gov. in-kind
3.4 M&E costs	Contracted national and international M&E costs	30,000	30,000	60,000	Q2 2012-Q2 2015
Totals		1,195,000	1,555,000	2,750,000	

Appendix 6: Overall Project Schedule by Component/Sub-Component/Activity

Project Component/Sub-Component/Activity	2012		2013				2014				2015	
	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
Component 1: ODS Destruction Demonstration												
1.1 Consolidation/storage/characterization/transport of CFC-11 and CFC-12 EOL ODS												
1.1.1 Supply of extraction/transfer equipment and ODS analyzers												
1.1.2 Supply of bulk cylinders												
1.1.3 Collection/transport of distributed CFC- 11 stocks												
1.1.4 Collection/transport of distributed CFC- 12 stocks												
1.1.5 Consolidation/storage of CFC-11 stocks												
1,1.6 Consolidation/storage of CFC-12 stocks												
1.1.7 Verification analysis of consolidated CFC-11 and CFC-12												
1.1.8 Transportation to incineration facility												
1.19 Documentation and reporting												
1.2 Manual processing- CFC-11 refrigeration equipment at scrap yards to produce 10-15 t of CFC-11 containing foam												
1.2.1 Test burn foam separation, and storage												
1.2.2 Transportation												
1.2.3 Site screening of extracted foam.												
1.2.4 CFC -11 content analysis												
1.3 Test Burn Demonstrations for CFC-11 and CFC-12 at selected HW incinerators												
1.3.1 Test burn planning and design												
1.3.2 Minor facility modifications												
1.3.3 Baseline feed selection/characterization												
1.3.4 Baseline test burn												
1.3.5 Test burn for CFC-11												
1.3.6 Test burn for CFC-12												
1.3.7 Test burn supervision												
1.4 Test Burn Demonstration - for CFC-11 containing foam at two selected Industrial/HW Incineration Facilities												
1.4.1 Test burn planning and design												
1.4.2 Minor facility modifications												
1.4.3 Test burn on CFC-11 containing foam												
1.4.4 Test burn supervision												
1.5 Destruction of EPR Program Start up volumes of CFC-12 and CFC-11 containing foams												
1.5.1 EOL ODS collection, extraction, consolidation and transport												
1.5.2 CFC-12 destruction												
1.5.3 CFC-11 containing foam destruction												

Project Component/Sub-Component/Activity	2012		2013				2014				2015	
	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
1.5.4 High efficiency CFC-12 recovery equipment												
1.5.5 Reporting of commercial ODS destruction												
Component 2.0 Technical Assistance												
2.1 Legal and regulatory institutional TA												
2.2 Technical/business planning support for EOL ODS Management												
2.3 Public Consultation and Information												
2.4 Technical Oversight and Overall Project Technical Report												
Component 3.0 Project Management/Monitoring/Evaluation												