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执行蒙特利尔议定书
多边基金执行委员会
第七十九次会议
2017年7月3日-7日，曼谷

关于具有具体报告要求的项目的报告

1. 本文件介绍以往会议要求提交具体报告的项目，以及请执行委员会注意的项目。文件包括以下各部分：

第一部分： 氟氯烃淘汰管理计划/氟氯烃生产淘汰管理计划

第二部分： 消耗臭氧层物质处置项目

第三部分： 冷风机项目

第四部分： 其他项目

2. 各部分包括简短的进展说明以及秘书处评论和建议。

第一部分： 氟氯烃淘汰管理计划/氟氯烃生产淘汰管理计划

3. 应向第七十九次会议提交关于亚美尼亚¹、智利²、中国³、古巴⁴、印度尼西亚⁵、伊朗伊斯兰共和国⁶和越南⁷的氟氯烃淘汰管理计划第一阶段的具体报告；以及关于中国的

¹ 第 77/41 号决定(e) 段。

² 第 76/45 号决定(b) 段。

³ 第 77/21 号决定(c) 段。

⁴ 第 77/50 号决定(b) 段。

⁵ 第 76/47 号决定(d) 段。

⁶ 第 74/43 号决定(e) 段。

氟氯烃生产淘汰管理计划第一阶段⁸的具体报告。仅提供了以下三个国家的报告：亚美尼亚、智利和中国。

4. 执行委员会不妨敦促相关执行机构向第八十次会议提交古巴、印度尼西亚、伊朗伊斯兰共和国和越南的尚未提交的关于氟氯烃淘汰管理计划第一阶段的报告。

退还销售为亚美尼亚的 SAGA 所购置设施所得余额（开发计划署）

背景

5. 已核准的氟氯烃淘汰管理计划第一阶段⁹中包括将 SAGA 使用 HCFC-22 和 HCFC-141b 的商用冰箱转为使用碳氢混合物的一个投资项目。该项目在第七十四次会议上被撤回，¹⁰原因是该企业在设备交付后破产。在第七十七次会议上，执行委员会请开发计划署在每次会议上报告为 SAGA 所购置设备的销售情况，直至设备的销售结束以及销售设备所得资金退还多边基金为止。¹¹

评论

6. 秘书处收到了开发计划署的报告，其中表示，设备的销售已经结束，设备销售的 95,479 美元的余额将于第七十九次会议上退还多边基金。

建议

7. 执行委员会不妨注意到退还的销售亚美尼亚氟氯烃淘汰管理计划第一阶段下为 SAGA 所购置设备所得的 95,479 美元的余额。

智利氟氯烃淘汰管理计划第一阶段（年度进度报告）（开发计划署）

8. 作为牵头执行机构，开发计划署代表智利政府向第七十九次会议提交了关于根据第 76/45(b)号决定(b)段执行与氟氯烃淘汰管理计划第四次和第五次付款相关的工作方案的进度报告。¹² 2015 年氟氯烃消费情况核查报告未与年度报告一道提交。

氟氯烃消费情况

9. 智利政府报告 2016 年的氟氯烃消费量为 63.33 ODP 吨，较 2016 年 78.75 ODP 吨的

⁷ 第 76/49 号决定(e)段。

⁸ 第 77/66 号决定(c)(二段)和第 78/5 号决定(c)段。

⁹ 第 62/40 号决定。

¹⁰ 第 74/23 号决定和 UNEP/OzL.Pro/ExCom/74/20 号文件。

¹¹ 第 77/41 号决定(e)段和 UNEP/OzL.Pro/ExCom/77/35 号文件。

¹² 氟氯烃淘汰管理计划第四次和第五次（亦即最后一次）付款在第七十六次会议上获得核准，金额为 199,299 美元，外加给开发计划署的 14,947 美元的机构支助费用和给联合国环境署的 8,856 美元的机构支助费用。

氟氯烃淘汰管理计划指标低 20%，较既定的 87.5 ODP 吨的基准低 27.5%。政府还承诺将提交 2016 年国家方案执行情况报告规定的行业消费数据，与根据第 7 条报告的数据一致。

关于氟氯烃淘汰管理计划第四次和第五次付款执行情况的进度报告

10. 政府继续致力于加强消耗臭氧层物质许可证制度，更新了《国家海关法》以便纳入对关税项目的修改和对氟氯烃、氢氟碳化合物以及含有氟氯烃和氢氟碳化合物的产品/项目的说明。这些变动已自 2017 年 1 月起生效。

制冷维修行业

11. 对总共 290 名技师进行了培训，内容包括：良好制冷做法（包括使用 HCFC-141b 进行冲刷的替代性流程和物质，如氮）、酸吸收和多重换油用的过滤器（压缩机）；162 名技师获得了认证；61 名技师通过技师认证财政支助系统获得了补贴，对 24 名准备最后认证的技师进行了维修技术的评价；签署了关于在两个超市（一个由气候和清洁空气联盟资助，一个由多边基金资助）使用跨临界二氧化碳的示范项目的协定；确定了回收中心的设备的企业及技术规格，采购工作和安装工作正在进行中；编制了制冷剂回收和再循环准则；提高认识活动在继续进行中。

项目执行和监测股 (PMU)

12. 项目监测和执行由国家臭氧机构实施，该机构继续致力于同执行委员会合作，支持氟氯烃淘汰管理计划活动的实施，办法包括组织同利益攸关方的协商会议；走访超市检查示范项目的进展情况；与智利制冷和空调商会合作支持技师认证工作。

资金发放数额

13. 如表 1 所示，截至 2016 年 2 月，在总共核准的 1,786,455 美元中，已发放 934,640 美元（占 52.3%）（开发计划署 779,130 美元，联合国环境署 155,510 美元）。

表 2. 智利氟氯烃淘汰管理计划第一阶段财务报告（美元）

机构	已核准（美元）	已发放（美元）	发放率（%）
开发计划署	1,497,966	779,130	52.0
联合国环境署	288,489	155,510	53.9
共计	1,786,455	934,640	52.3

评论

14. 秘书处注意到提交了展示氟氯烃淘汰管理计划第一阶段活动取得持续进展的全面报告。报告称维修行业的活动进展良好，关于两个超市使用超临界二氧化碳的示范项目将对该行业今后改造自身的商店产生影响。技师的培训和认证实施了一系列的活动，认证方案在全面实施后，即将成为一种强制性要求。

15. 秘书处关切地注意到，2015 年氟氯烃消费情况核查报告尚未提交，并要求开发计划署就此作出回复。开发计划署告知秘书处，2015 年和 2016 年消费情况核查报告将不晚于第八十次会议提交。

16. 各项活动正在按计划实施中，资金的总体发放率为核准资金的 52%。开发计划署确认，正如第七十六次会议所商定的，氟氯烃淘汰管理计划第一阶段的业务工作完成日期为 2017 年 12 月。

建议

17. 执行委员会不妨：

- (a) 注意到开发计划署提交的关于智利氟氯烃淘汰管理计划（第一阶段）执行情况的 2016 年进度报告；以及
- (b) 请开发计划署作为对氟氯烃淘汰管理计划第一阶段的要求的一部分，不晚于第八十次会议提交 2015 年和 2016 年氟氯烃消费情况核查。

中国氟氯烃淘汰管理计划第一阶段（开发计划署）

18. 根据中国政府和执行委员会关于削减氟氯烃消费的《协定》第 5 条(b)款(一)项，2016 年进行了对根据中国氟氯烃淘汰管理计划第一阶段工商制冷行业计划，DunAn Environment 公司的单体式空调和工商水冷却机（热泵）生产线由 HCFC-22 转型采用 HFC-32 技术的独立核查。该核查发现，DunAn Environment 公司在没有使用易燃制冷剂的空调机的国家安全标准的情况下，在一个已转型为 HFC-32 技术的生产线制造了使用 HFC-410A 的空调机。

19. 在第七十七次会议上，开发计划署通知执行委员会，DunAn Environment 公司已停止在已转型制造使用 HFC-32 的设备的生产线上制造使用 R-410A 的设备。执行委员会嗣后请开发计划署提供该企业出具的信函，表明该企业承诺确保：由多边基金资助的生产线将继续只使用供资已获核准的技术来制造设备（第 77/21 号决定(c)段）。

评论

20. 开发计划署提交了日期为 2016 年 12 月 21 日的信函，信中表示，所有已转型使用 HFC-32 的生产线将不从事利用氟氯烃、HFC-410A 或任何起全球升温潜能值高于 HFC-32 的其他制冷剂来生产空调设备。在国家安全标准 GB 9237 生效后，并在允许销售使用 HFC-32 的空调机后，该企业将尽最大努力从事生产和推广使用 HFC-32 的空调设备；该企业还接受对生产线进行监测与检查，以便履行其承诺。

21. 在收到提供补充信息的要求后，开发计划署通知说，当前对已转型生产线的监测将作为日常监测方案的一部分，由当地环保局进行，以确保该公司将生产使用 HFC-32 制冷剂或全球升温潜能值低于 HFC-32 的其他制冷剂的设备。

建议

22. 执行委员会不妨注意到由企业 DunAn Environment 公司通过开发计划署提交的承诺信函，其中保证多边基金资助的生产线将继续只使用供资已根据第 77/21 号决定(c)段获得核准的技术来制造设备。

中国氟氯烃生产淘汰管理计划第一阶段（世界银行）

23. 以下两项尽可能减少副产品 HFC-23 排放的不利环境影响的技术援助活动，已纳入中国氟氯烃生产淘汰管理计划第一阶段：

- (a) 对利用最佳做法降低副产品 HFC-23 的产出率进行调查，以便通过政策和技术性措施降低副产品 HFC-23 的产出率；以及
- (b) 对 HFC-23 转型/热解技术进行研究，以支持 HFC-23 转型技术的研发，找到成本效益更好的解决 HFC-23 处置的办法。

24. 在第七十七次和第七十八次会议上，执行委员会请中国政府通过世界银行向第七十九次会议提交关于上述研究的报告（第 77 号决定/66(c)(二)段和第 78/5 号决定(c)段）。

25. 关于 HFC-23 转型/热解技术的研究，世界银行表示，目前正在挑选顾问公司，并期望该公司能在 2017 年 6 月之前开始工作。该顾问将审查现行的政策框架，并建议采取管制措施通过最佳做法减排；将收集数据和审查目前的副产品产量、原材料损失、中间产品和最终产品以寻求提高流程效率的机会；将提供适合个别生产流程降低副产品 HFC-23 产出率的技术咨询，并评估各项技术措施的经济可行性和估计其费用。

26. 关于降低副产品 HFC-23 的产出率最佳做法的研究，世界银行表示，已向一个企业颁发了研究 HCFC-22 生产所产生的 HFC-23 的再循环和再利用的可行性的合同，该项研究将于 2017 年 9 月完成，最终报告将于 2017 年底提交。

评论

27. 鉴于技术援助活动的实施情况，并经进一步讨论后，世界银行表示，世界银行可以在第七十九次会议上提供一份关于该项工作现状的最新情况。

28. 执行委员会不妨注意到，关于中国氟氯烃生产淘汰管理计划下监测 HFC-23 的现行做法的简要说明已被纳入关于与副产品 HFC-23 控制技术相关的主要问题的文件。¹³

建议

29. 执行委员会不妨：

- (a) 注意到世界银行提交的关于 HFC-23 转型/热解技术的技术援助活动以及调

¹³ UNEP/OzL.Pro/ExCom/79/48。

查利用最佳做法降低副产品 HFC-23 的产生率的情况报告；以及

- (b) 请世界银行向第八十次会议提交一份关于实施 HFC-23 转型/热解技术的技术活动的现状的进度报告以及关于利用最佳做法降低副产品 HFC-23 产生率的研究的最终报告草案。

第二部分： 消耗臭氧层物质处置项目

30. 在第七十七次会议上，执行委员会请各双边和执行机构自第七十九次会议起直至项目完成之时，提交关于作为具有具体报告要求的所有消耗臭氧层物质处置试点示范项目的报告。¹⁴

背景

31. 如表 1 所示，在第五十八次和第七十三次会议之间，执行委员会核准了 16 笔项目编制资金，并因此全面制定了 11 个国家的消耗臭氧层物质废物管理和处置试点示范项目、两个区域项目和一个技术援助项目，总金额为 11,278,052 美元。这些项目根据第 58/19 号决定（消耗臭氧层物质废物处置项目的暂行准则）获得核准。

表 1. 核准的消耗臭氧层物质处置示范项目

国家	项目名称	机构	会议	资金 (美元)	现状
阿尔及利亚	关于消耗臭氧层物质废物管理和处置的试点示范项目	法国	72 次	250,000	持续进行中
		工发组织	72 次	375,059	持续进行中
巴西	关于消耗臭氧层物质废物管理和处置的试点示范项目		72 次	1,490,600	持续进行中
中国	关于消耗臭氧层物质废物管理和处置的试点示范项目	日本	67 次	900,000	持续进行中
		工发组织	67 次	1,227,885	持续进行中
哥伦比亚	关于报废消耗臭氧层物质废物管理和销毁的示范项目		66 次	1,195,000	持续进行中
古巴	关于消耗臭氧层物质废物管理和处置的试点示范项目		62 次	525,200	2015 年 10 月完成
格鲁吉亚	关于消耗臭氧层物质废物管理和处置的试点示范项目		69 次	55,264	2015 年 12 月完成
加纳	关于消耗臭氧层物质废物管理和处置的试点示范项目		63 次	198,000	2016 年 12 月完成
黎巴嫩	关于消耗臭氧层物质废物管理和处置的试点示范项目	工发组织	73 次	123,475	持续进行中
墨西哥	处置无用消耗臭氧层物质示范项目	法国	63 次	500,000	持续进行中
		工发组织	63 次	927,915	持续进行中
尼日利亚	处置无用消耗臭氧层物质示范项目	工发组织	67 次	911,724	持续进行中
土耳其	处置无用消耗臭氧层物质示范项目	工发组织	66 次	1,076,250	持续进行中

¹⁴ 第 77/8 号决定(e)(一)段。

国家	项目名称	机构	会议	资金 (美元)	现状
	目				
区域：欧洲	在欧洲和中亚区示范消耗臭氧层物质废物管理和处置区域战略	环境规划署	69 次	75,000	持续进行中
		工发组织	69 次	274,480	持续进行中
尼泊尔	处置无用消耗臭氧层物质示范项目	环境规划署	59 次	157,200	已完成

32. 如下所述，其中 3 个试点项目已经完成，并向第七十九次会议提交了供给执行委员会参阅的格鲁吉亚和加纳的最终报告以及联合国环境署（代表尼泊尔提交）的最终报告。报告全文年载于本文件的附件一。

格鲁吉亚：消耗臭氧层物质废物管理和处置试点示范项目（开发计划署）

33. 格鲁吉亚试点项目的目的是展示如何通过消耗臭氧层物质废物与持久性有机污染物储存之间的协同增效，以及处置业已收集并暂时存放在该国设施内的 2.13 吨无用消耗臭氧层物质，克服在销毁和管理无用消耗臭氧层物质方面的障碍。

34. 最终报告重点强调了以成本效益高的方式，与各地方共同处置废物流，联合开展的活动。为共同处置流程编制了职责范围和标书，以便确定处理废物的分包商，由其筹集、集中和包装过期的持久性有机污染物和消耗臭氧层物质废物，并将其运至法国的一处销毁设施。对有害废物管理政策框架进行了审查，以便以全面的方式考虑消耗臭氧层物质和持久性有机污染物废物。

35. 该项目取得成功的一个关键因素是在政府支助下，两项单独资助的活动之间进行密切的协调。采取一个联合招标、一个分包商和一个流程，随后并采取废物出口许可程序的联合项目管理做法，导致了全面的节省。此外，使废物流变小，今后消耗臭氧层物质废物就能继续从持久性有机污染物废物的联合出口中受惠，在这方面，根据《斯德哥尔摩公约》，国家有义务销毁此种有害废物。经验显示，实施这种联合项目，在筹备工作以及确定具有处理这两种废物的专门知识的公司方面，需要的时间会较长。这一项目能够让这种制度建立起来。

36. 该项目导致处置了 1.2 公吨的消耗臭氧层物质废物，这一数字低于原先的目标，其原因是储存氟氯化碳储存罐状况恶化，有可能造成气体的泄露。该项目确定了该国的消耗臭氧层物质废物的所有来源；在立法的支持下，这种收集工作今后还会继续。

37. 关于该项目的可持续性，格鲁吉亚目前正在建立国家环境中心，以便纳入从非法消耗臭氧层物质贸易的相关处罚中收集的资金。因此，这一资金有可能用于今后消耗臭氧层物质废物的更多的出口。

加纳：消耗臭氧层物质废物管理和处置试点示范项目()

38. 加纳的项目建议处置已收集和准备销毁的 1.8 吨 CFC-12，同时，制定措施支持该

项目的可持续性，办法是考虑其他根据全球环境基金（全环基金）资助的能效项目收集的可能的消耗臭氧层物质废物。

39. 最终报告详述了项目执行的情况、运营的启动，特别是试点示范项目与全环基金资助项目之间的协同增效，设备的购置（如来自德国的便携式回收机、实验室设备、制冷剂识别器、制冷剂钢瓶），以及销毁工作的结果。报告还显示，通过波兰（威立雅公司）的一个设施，总共 1.2 公吨的氟氯化碳和 5.2 公吨的甲基溴，另外一公吨的氟氯化碳出口至美利坚合众国（Tradewater 公司）进行销毁。因此，总共销毁的消耗臭氧层物质废物为 7.4 公吨。

40. 执行期间遇到的一些挑战包括：在以成本效益高的方式销毁对数量不足的废物方面遇到的困难；被视为让各国对出口销毁感兴趣的驱动因素的碳市场存在不稳定性；获得向波兰和美利坚合众国输出综合性废物（即持久性有机污染物、多氯联苯和消耗臭氧层物质）的许可的内部流程；以及解决所收集的并销毁含有储存物的泡沫塑料。

41. 从该项目中所吸取的一个主要经验教训是互补性项目之间的合作，这里指的是由全环基金资助的电器替换和退款计划以及由多边基金资助的试点废物示范项目。尽管这一办法十分复杂，但将这些废物流结合起来，带来了成本效益高的解决销毁问题的方案，节省了运输和销毁的费用。这也导致加纳的能源委员会 and 环境保护局——分别负责全环基金和多边基金项目的两个机构——之间的协作。

尼泊尔：消耗臭氧层物质废物管理和处置试点示范项目（环境规划署）

42. 尼泊尔的试点项目允许该国探讨采取两种选项销毁通过国家臭氧机构收集并储存的 10 公吨 CFC-12。所选择的办法是将消耗臭氧层物质出口到美利坚合众国予以销毁。这一工作在中介机构的协助下完成，该中介机构组织将无用消耗臭氧层物质运输至一持证销毁设施。这 10 公吨（107,000 二氧化碳当量吨）已于 2013 年 2 月销毁。此外，这一项目于 2013 年 3 月提交给气候行动储备金（CAR），并与嗣后列入该储备金，满足了气候行动储备金的最后核查要求，并获发了气候筹备吨位（CRTs）。

43. 该项目产生了 82,391 个单位的核实减排量，其中 22,000 个单位已出售；该国从销售中获得的份额（12,925 美元）已存入国家标准和度量局的账户，作为专门用于培训、创造就业能力建设和社区发展基金（重点是制冷剂管理、能效和环境可持续性）。

44. 该项目将消耗臭氧层物质的销毁同碳市场结合起来，并探讨了支持消耗臭氧层物质废物处置项目的其他财政机制。从该项目中吸取的经验教训已列入所提交的最终报告。

评论

45. 在审查每一报告时候，秘书处注意到第 58/19 号决定的以下问题已被纳入最终报告：

- (a) 项目最终销毁的消耗臭氧层物质的估计数量；

- (b) 对收集系统的说明，特别是多边基金项目同其他项目存在协同增效的系统；
- (c) 总体流程的详细步骤；以及
- (d) 进行试点项目时遇到的主要挑战以及如何克服和所吸取的经验教训。

建议

46. 执行委员会不妨：

- (a) 满意地注意到开发计划署为加纳和格鲁吉亚提交以及联合国环境规划署为尼泊尔提交关于消耗臭氧层物质废物管理和处置试点项目的最终报告；
- (b) 邀请各双边和执行机构在今后设计和执行类似的项目时，酌情注意到上文(a)分段所述试点性消耗臭氧层物质处置示范项目吸取的经验教训；以及
- (c) 请各双边和执行机构提交尚未完成的消耗臭氧层物质处置试点项目的最终报告，并将未向第八十次和第八十一次会议提交报告的项目的未动用余额退还第八十二次会议。

第三部分： 冷风机项目

背景

47. 在第七十七次会议上，执行委员会请各双边和执行机构，自第七十九次会议起直至项目完成之时，提交关于作为有具体报告要求的所有持续进行对话冷风机项目的报告。¹⁵ 目前，有 4 个持续进行的冷风机项目；表 2 概述了这些项目的结果。

表 2. 关于现行冷风机项目的情况报告

国家	项目名称	机构	会议	核准资金 (美元)	计划完成日期	进展情况
巴西	离心式制冷器次级行业综合管理示范项目，重点是将使用氟氯化碳的制冷器改为使用高能效的无氟氯化碳技术		47次	1,000,000	2017年1月	开发计划署自全环基金调动 1,350 万美元，并调动了 6,400 万美元联合融资。该项目所有实质性活动均已完成。目前，正进行与该项目相关的出版物印刷工作。开发计划署计划到 2017 年底从财务上结清该项目。
非洲区域	第 5 条国家（喀麦隆、埃及、纳米比亚、尼日利亚和苏丹）氟氯化碳冷风机加快转型战略示	法国	48次	360,000	2017年12月	该项目的冷风机委托工作预期于 2017 年最后一季度设备改造完后随即完成。2016 年 12 月的所剩余额为 249,519 美元。
		日本	48次	700,000	2017年12	

¹⁵ 第 77/8 号决定(e)(二)段。

国家	项目名称	机构	会议	核准资金 (美元)	计划完成日期	进展情况
	范项目				月	
全球	全球冷风机替换项目	世界银行	47次	6,884,612	2017年12月	<p>该项目包括中国、印度、印度尼西亚、约旦、马来西亚、菲律宾和突尼斯；项目的现状如下。</p> <p>阿根廷：2016年期间，项目协调单位 UEPRO 同 Fundación Favalaro - Hospital Universitario y de Investigación Médica 签署了一项转赠款协定，涉及各为 350 制冷吨（TR¹⁶）的两个冷风机，以及与一建筑物所有者协会签署的 400 制冷吨的冷风机。350 制冷吨冷风机中的一个和一个 400 制冷吨的冷风机因发生氟氯化碳泄露和受到破坏，并与 2016 年替换。另一 350 制冷吨冷风机的替换已推迟至 2017 年，原因是设备交付出现拖延，而且夏季需要空调。2017 年初，UEPRO 开始讨论其他两个冷风机的替换。UEPRO 将于 2017 年 4 月提出呼吁替换冷风机的建议。</p> <p>印度：该项目于 2016 年 12 月 31 日完成；替换了 34 个冷风机，回收并储存大约 7 公吨的氟氯化碳。制冷 1 制冷吨的功率要求为 0.63 千瓦，而项目原规划目标为 1 千瓦。</p> <p>约旦：替换了所有氟氯化碳冷风机；其中 15 个得到多边基金的部分赠款；回收了 4 公吨氟氯化碳并储存于政府场地等待处置。能源节省在 17%至 24.4%之间。</p> <p>菲律宾：该项目于 2016 年 12 月 31 日完成；替换了 72 个冷风机。</p> <p>印度尼西亚：因未能获得全球环境基金（全环基金）认可，该项目已被撤回，为认可的原因是替换的冷风机有可能使用氢氟碳化物制冷剂。</p>

¹⁶ 一个制冷吨大约相对于 3.5 千瓦的制冷能力。

国家	项目名称	机构	会议	核准资金 (美元)	计划完成日期	进展情况
						关于中国、马来西亚和突尼斯项目的信息无法获得，因此，该信息未予报告。 根据上述项目承付的总资金为 3,735,556 美元，所报告的节省为 3,149,056 美元，除去了中国、马来西亚和突尼斯冷风机项目、印度尼西亚的冷风机能效项目的未划拨金额以及约旦项目的节省。

评论

48. 秘书处注意到，4 个现行项目取得了进展，有些项目接近完成。

建议

49. 执行委员会不妨重申第 77/8 号决定(e)(二)段，并请各双边和执行机构向第八十次会议提交关于所有作为具有具体报告要求的现行冷风机项目的报告；并不晚于 2018 年 6 月提交项目完成情况报告以及不晚于 2018 年 12 月退还资金的余额。

第四部分： 其他项目

50. 应提交但尚未提交第七十九次会议的有关以下项目/活动的进度报告/最终报告包括：

- (a) 3 个国家利用非实物技术的可行性研究：¹⁷
 - (一) 解决 Punta Cana 的区域制冷的可行性研究（开发计划署）；
 - (二) 解决埃及的区域制冷的可行性研究（联合国环境署和工发组织）；
 - (三) 对科威特中央空调使用的 3 种非实物技术的全面分析（联合国环境署和环境规划署）；
- (b) 中国淘汰甲基溴生产行业计划（工发组织）；¹⁸
- (c) 利用多边基金所提供的氟氯化碳生产行业的资金进行的研发项目。¹⁹

¹⁷ 第 77/27 号决定(e)段。

¹⁸ 第 73/56 号决定。

¹⁹ 第 77/26 号决定(b)段。

建议

51. 执行委员会不妨重申执行委员会的相关决定，并敦促各相关执行机构向第八十次会议提交以下具体报告：

- (a) 关于多米尼加共和国（Punta Cana）、埃及和科威特使用非实物技术的可行性研究；
 - (b) 中国淘汰甲基溴生产的行业计划；以及
 - (c) 利用多边基金所提供的氟氯化碳生产行业的资金进行的研发项目。
-

Annex I

Pilot Demonstration Project on ODS- waste Management and Disposal in Georgia

Summary report

Prepared by NOU-Georgia and UNDP

May, 2017

GLOSSARY

CFCs - Chlorofluorocarbons

GARCAE - Georgian Association of Refrigerating, Cryogenic and Air Conditioning Engineers

GEF - Global Environment Facility

HCFCs - Hydrochlorofluorocarbons

LVC countries - Low-Volume Consuming countries

MLF –Multi-lateral Fund

MoENRP - Ministry of Environment and Natural Resources Protection of Georgia

NOU - National Ozone Unit

ODSs –Ozone Depleting Substances

PIU - Project Implementation Unit

POPs – Persistent Organic Pollutants

R&R - Recovery and Recycling Centers

UNDP - United Nations Development Programme

1. Introduction

The purpose of the Summary Report is to analyze the effectiveness of the Pilot Demonstration Project supported activities on ODS-Waste Management and Disposal in Georgia. The project was funded by the Multilateral Fund (MLF) for the Implementation of the Montreal Protocol and implemented by the United Nations Development Programme (UNDP).

The analysis of compliance of expected and achieved results is the main focus of the Summary Report with a special emphasis on cost-effectiveness of the selected joint project implementation modality.

The Summary Report is based on the data obtained during the implementation of the MLF/UNDP Pilot Demonstration Project on ODS-Waste Management and GEF/UNDP project “Disposal of POPs pesticides and initial steps for the containment of the dumped POPs pesticides in Georgia” (POPs project) documents and progress reports as well as required interviews with direct implementers of the programmes at UNDP-Georgia, the Project Implementation Unit (PIU), National Ozone Unit (NOU) and the Ministry of Environment and Natural Resources Protection of Georgia (MoENRP), and a selected sub-contractor waste management company (waste sub-contractor).

The Report also includes conclusions and recommendations for future similar activities which could be of interest to other countries in similar conditions.

2. Background

The Ozone Depleting Substances (ODSs) belong to a group of chemicals featuring ozone-layer reactions with resulting impacts on the environment and human health.

ODSs are not produced in Georgia and can only be obtained by import, which is regulated by the Government. The phase-out of the consumption of ODSs in Georgia was started after the country became the Party to the Montreal Protocol in 1996. As a result, over the last 15 years the decrease in the use of ODSs has been observed. Currently, Georgia consumes ODSs defined by the Montreal Protocol as temporarily allowed substances.

To address the national ODS phase-out commitments, since 1999 Georgia has implemented a number of activities aiming at reduction of the consumption of ODSs on one hand, and collection of unwanted ODSs on the other one. The decrease in the consumption of ODSs at national level was achieved through introducing stringent regulatory mechanisms and conducting a number of awareness raising, and capacity building and investment programs for Customs officers, technicians and the refrigeration servicing sector as a whole.

At the same time, the collection of the ODSs related waste started since 2003-2004 and over the period of 9 years 2,133 kg of ODSs had been collected in total (1,767 kg of CFCs and 366 kg of HCFCs). Two existing Recovery and Recycling (R&R) Centers and 15 small and medium enterprises in commercial/industrial/transport refrigeration sectors participated in this process.

Although the progress with respect to phasing out the use of ODSs as well as collecting the unwanted ODSs at national level has been tangible, the safe disposal and destruction of accumulated unwanted ODSs was a challenge for Georgia like the other Low-Volume Consuming (LVC) countries. To respond to the needs of the LVC countries, on request of the Twenty-First Meeting of the Parties to the Montreal Protocol, in 2011 the Executive Committee made a decision to set a funding window for ODSs waste destruction for LVC countries (Decision 63/5 (c)). This decision opened an opportunity for Georgia to get such financial support from the Multilateral Fund (MLF) for the Implementation of the Montreal Protocol in addressing this problem at national level.

Further to that, Georgia also faced a national problem of safe and sound disposal of obsolete pesticides of the Persistent Organic Pollutants (POPs) group, controlled under the Stockholm convention. In that respect, a number of GEF-funded and bilateral project activities were implemented during the recent years or are still ongoing in Georgia aiming at collection, safe disposal and destruction of abandoned obsolete POPs pesticides in the country. One of these projects was funded by GEF and implemented by UNDP which has been recently completed and originally aimed to prepare for export and disposal around 230 tons of obsolete POPs pesticides from the main Iagluja dumpsite.

With support of UNDP, the Government of Georgia prepared and, in April of 2013, submitted a project document to the MLF requesting funding for starting up a pilot project on destruction of collected unwanted ODSs in the estimated amount of 2,133 kg in a joint cooperative manner with the above mentioned GEF/UNDP POPs pesticides programme where both waste streams could be co-disposed to identify related cost-savings and report back to the MLF Secretariat on such achievements and lessons learned which could be of use to other LVC countries. No similar approach has been previously tested or applied by this type of MLF approved pilot projects. Besides that, the project aimed to develop an unwanted ODS waste collection and financial disposal scheme, expected to be generated in future in Georgia. In other words, the project focused on achieving the results in a most cost-effective way on one hand and developing sustainable mechanism for future disposal and handling of ODSs waste on the other one.

Project proposal was approved by the Executive Committee in 2013 and the budget of US\$ 55,264 was allocated for its implementation during 2014-2015.

The actual project implementation started after it was endorsed by the Ministry of Environment and Natural Resources Protection (MoENRP) and UNDP in April 2014. The main beneficiary and the

implementing institution of the project is the MoENRP, acting through its established National Ozone Unit (NOU) which has carried out the project in close cooperation and with the technical support from UNDP.

3. Project implementation analysis

Two main objectives of the MLF/UNDP ODSs project were (i) to identify synergies and ensure cost-effective co-disposal (destruction) of 2,133 kg of collected unwanted ODSs in combination with the obsolete POPs pesticides under a parallel GEF/UNDP project; and (ii) to design the scheme for accessing and handling other unwanted ODSs in the country that can be generated in future.

Objective 1 - Cost-effective destruction of collected unwanted ODSs

Procedural activities

Currently, there are no special companies/facilities with necessary technical capacity and means for the national disposal of unwanted chlorinated ODSs wastes within Georgia, apart from cement kilns. The main reasons for that are (i) the lack of any regulatory mechanism requiring safe disposal and destruction of ODSs waste; (ii) the small amount of ODSs waste being generated throughout the country (Georgia belongs to LVC countries with small HCFC consumption); and (iii) the high capital costs needed to equip local cement kiln facilities with relevant technical means for waste disposal and emission controls, to be able to provide destruction services. Therefore, the only possibility for safe destruction of collected ODSs waste was to export it to the country with relevant capacities. Due to small amounts of collected ODSs waste of about 2 tons, the management, transportation abroad and destruction costs were expected to be also very high. Therefore, the co-disposal of the ODS wastes with the ongoing project GEF/UNDP POPs pesticides project was seen as a solution which could achieve a cost effective destruction of ODSs.

In order to achieve the final destruction of estimated 2,133 kg of unwanted ODSs it was necessary to prepare that ODS waste for export to qualified disposal facilities. The initial inventory of collected and temporarily stored unwanted ODSs located in various storage facilities throughout the country was carried out about 2 years before the actual project's start-up.

The project was supposed to be launched in 2012 after its approval by the 64th meeting of the Executive Committee in parallel to an ongoing GEF/UNDP POPs pesticides project. However, implementation of the project started only immediately after the project document's signature with the Government in April 2014 which was due to a new national project review procedure adopted by the Government of Georgia applied to all new international programmes.

In line with the project document the planned preparatory activities were aimed at transporting ODSs from different storages to the Georgian Refrigerant Recovery and Recycling Center in Tbilisi (capital); testing the composition by gas-chromatograph as the information on the ODSs composition was a necessary precondition before it could be accepted for destruction at qualified hazardous waste facility; and transferring the accumulated ODSs wastes in new containers meeting the modern safety standards as the waste gas was stored in deteriorating tanks to enable their further export.

With the purpose to implement the abovementioned tasks and prepare ODS wastes for exporting, UNDP concluded a contract with the Georgian Association of Refrigerating, Cryogenic and Air Conditioning Engineers (GARCAE). This organization unites more than 200 members from the service sector throughout the country and has over 15 years of experience in addressing ODSs related challenges at the national level, and plays an important role in promoting new internationally accepted standards and practices in this sector in Georgia. The agreement included specific activities to be implemented by GARCAE to support the project.

For the waste co-disposal purposes, a consolidated Terms of Reference (ToR) was elaborated in the framework of the GEF/UNDP POPs pesticides disposal project with the assistance of an international expert who was then hired and was assisting in parallel the MLF/UNDP ODS waste project.

Prior to announcing the joint international tender for the disposal of the POPs pesticides and ODS waste gas, a market research was conducted to identify experienced and internationally based hazardous waste management companies. All those interested companies which were identified were then invited to participate in the tender commissioned in August 2013. Four such international service providers had expressed the willingness to participate in the consolidated tender and were invited to a pre-bid conference. Based on tender results, a waste subcontractor was selected to excavate and repack obsolete POPs pesticides under the parallel GEF/POPs programme and transport them abroad along with the ODS waste gas to specialized hazardous waste destruction facilities in the EU.

Implementation activities

Under circumstances with lacking legal obligations on safe handling and storage of ODSs waste, it was important to re-confirm the previously reported inventory of ODS waste.

While conducting the complementary inventory of the already collected unwanted ODSs, GARCAE found out that instead of recorded 2,133 kg of ODSs, only 1,050 kg were remaining in stock at the Kutaisi Regional Recycling Center and the Georgian Refrigerant Recovery and Recycling Center in Tbilisi. This discrepancy in the amount may be explained by the absence of legal regulations and lack

of technical capacities (such as containment tanks of sufficient size) for storing such unwanted ODSs. Therefore, part of ODSs waste stock most probably ventilated out due to deteriorated condition of aging gas cylinders where part of those simply might have been lost due to mishandling.

In order to ensure safe storage and transportation of the ODS waste gas from the Kutaisi R&R center to Tbilisi, as well as preparation of the whole amount of the collected ODS waste for transportation abroad and final disposal, GARCAE had purchased two new containers fitting this purpose. The ODS waste was transferred into the new large capacity cylinders and the composition of ODSs was tested by means of the gas chromatograph, purchased previously in 2008 under other Montreal Protocol programmes, and then calibrated in the scope of the ODS pilot demonstration project to ensure proper readings of the ODS waste gas content.

Despite the initial perceived shortage of ODS waste gas as compared to the original project's targets, further, during the project's implementation period, some mislabeled ODS containing substances were identified and confiscated by Customs, and placed for storage in the Georgian Refrigerant Recovery and Recycling Center in Tbilisi. In total, more than 400 kg of additional unwanted ODSs waste from the Customs' confiscate was added to the re-confirmed 1,050 kg of ODSs for final disposal.

Finally, all ODS waste from the Kutaisi Recycling Center, the Georgian Refrigerant Recovery and Recycling Center in Tbilisi and the newly detected mislabeled substance, which was identified as the blend of HCFC-22, CFC-12 and HFC-134 (and not HFC-134a as it was labeled), amounting to 1,467 kg, were transferred into two new containers (750 kg and 717 kg charge capacity each respectively) and prepared for the Basel convention's export and transit procedures. All these activities were carried out by GARCAE in line with approved work plans.

For sustainability purposes, as part of its assignment, GARCAE organized trainings of staff responsible for the operation of gas-chromatograph in the Georgian Refrigerant Recovery and Recycling Center. Two technicians have been trained in gas-chromatography related operational processes as well as in the design and functional capacities of this SRI 8610C model. The training course included both theoretical and practical exercises.

All preparatory activities were completed by end of April, 2014. As a result, the ODS waste gas was sent in two cylinders to a dedicated disposal facility in France. All required export and transit documentation were obtained by the waste sub-contractor with assistance from the Government.

Exporting procedures and activities have been synchronized between these two GEF/UNDP POPs and MLF/UNDP ODS waste projects, and demonstrated a good level of cooperation in one lead

implementing agency - UNDP. Such practical experience at the national level equipped the Government with strengthened skills for future hazardous waste disposal operations for these two waste streams, and specifically the ODS waste gas in particular.

The table below summarizes all planned and implemented steps as outlined in sub-contracts with GARCAE and the waste sub-contractor.

Table 1. Activities undertaken by GARCAE and waste sub-contractor

Activity	Implementer	Status of implementation
Conduct complementary inventory and verification of ODS wastes originally listed in the Pilot Demonstration Project	GARCAE	Done on time 1,050 kg identified instead of original estimate of 2,133 kg
Purchase of two ISO containers and ancillary equipment for the ODS waste aggregation	GARCAE	Done on time Two containers purchased
Transport already collected ODS waste to the R&R Centre in Tbilisi	GARCAE	Done on time
Calibrate the gas chromatograph	GARCAE	Done on time
Train staff responsible for gas - chromatograph operating	GARCAE	Done on time 2 R&R technicians trained
Transfer collected ODS from the old containers to the newly purchased containers and test them by gas-chromatograph	GARCAE	Done on time 2 new containers were filled in with ODSs
Formulate a national scheme for accessing other unwanted ODSs (about 0.5 tons annually)	GARCAE	Done on time Draft provided to NOU
Excavate POPs pesticides from Iagluja Dumpsite	Sub-contractor	Done on time
Repack the excavated 230 tons of pesticides into safe packaging ready for export	Sub-contractor	Done with a short delay due to weather conditions
Transport prepared ODSs and POPs abroad for safe disposal	Sub-contractor	Done on time Exported to France and to Belgium

Cost Savings - At the project preparation stage, it was planned that the new demonstration MLF/UNDP project may benefit from coordinating its activities with the GEF/UNDP POPs pesticides disposal project that was already starting during that time. Specifically, savings were achieved through cost sharing, or, in other words, with minimal expenses induced to the MLF/UNDP ODS waste project: in the revision of legislative frameworks related to hazardous waste management, procedural implementation of one joint tender process for waste disposal, joint launch of waste export notification through the governmental departments, handling the wastes by selected waste management company and taking awareness raising measures on health and environmental risks posed by hazardous wastes.

According to estimates provided by the waste sub-contractor (see the Table 2 below), the cost saving from the joint implementation of the ODS waste project together with the POPs waste project is estimated to be US\$ 9,000 and these savings relate only to the sub-contractor's (international) part of work.

Table 2. Estimated costs savings¹

Cost item (USD)	Est. costs \$ for POPs (230 tones) as if only POPs	Est. costs \$ for ODS (~1,5 tones) as if only ODSs	Joint implementation est. costs \$ (POPs/ ODSs)	Est. savings for MLF project
Preparation during Tendering	3,000	1,500	3,070	1,430
Participation to the inception workshop	3,000	1,000	3,070	930
Equipment Delivery	44,000	-	44,000	0
On site Repackaging Works	59,000	-	59,000	0
Inland Transportation	23,200	1,500	23,560	1,140
Maritime Transportation	82,000	5,400	82,900	4,500
Disposal	252,000	5,900	257,900	0
Management cost by sub-contractor (insurance, license, travel, off site personnel etc)	47,200	2,500	48,700	1,000
TOTAL	513,400	17,800	522,200	9,000

At the same time, if looked at from a perspective of national level's savings, the following Table 3, based on financial expenditure data, indicates overall savings in the amount of US\$ 20,800.

Such detailed break-down by activity, based planned and real costs, as well as savings, is provided below in the Table 3.

¹ Line-Activity 6 of Table 3 where data is more accurate as coming from a financial system

Table 3. Project savings by activity

Activity type	Planned Costs US\$ (2 ton of ODS)	Actual Costs \$US (1,5 tons of ODS ²)	Savings
1.Purchasing two ISO container (950 kg each) and ancillary equipment	6,000	4,000 ³	2,000
2.Inception workshop for stakeholders involved in ODSs destruction	2,500	2,000	500
3.Transportation of ODSs from different locations to a centralized location in Tbilisi (16 locations)	3,200	3,000	200
4.Aggregation, calibration/certification of gas-chromatograph, and testing of the stocks before export	5,000	5,000	0
5.Training of staff and technicians	2,000	2,000	0
6. Transportation abroad and actual destruction incl. inland and maritime transportation, participation in the inception workshop, and management and logistics costs of sub-contractor, as per the Table 2)	17,564	8,800	8,764
7. Project management (part time 25% - 24 months times US\$ 500/month)	12,000	6,664	5,336
8. Pilot project summary report preparation and, printing costs	7,000	3,000	4,000
Grand total	55,264	34,464	20,800

As visible from Table 3, some savings were achieved **in activities 6, 7 and 8** as a direct result of the joint tendering procedure for co-disposal of ODS and POPs waste, joint management of these two projects as well as savings during the final assessment report preparation stage.

Also it needs to be indicated that the ISO containers were purchased with the lowest price – US\$ 1,000 / per tank. These containers and the ancillary equipment were purchased by the GARCAE from China under a contract with UNDP. Based on the information from the waste sub-contractor on the costs of this equipment return from France at a cost of US\$ 3,500, the containers were not requested

² As it was mentioned in the paragraph *Implementation activities*, in the scope of the demonstration project 1.5 tons of ODSs were collected, exported and distracted in the framework of the project.

³ From the indicated US\$ 4000, US\$ 2,000 was spent for the ancillary equipment and US\$ 2,000 for two new containment cylinders (US\$ 1000 for each container).

for shipment back to Georgia after the operation on ODS waste destruction was completed as it is more cost-effective to purchase new such tanks next time.

Other savings were made through the cost sharing because of joint management of these two projects.

As per the table 3, after implementation of the project, the costs for the transportation and destruction is US\$ 5,800 for 1 ton of ODS waste gas which is, according to the waste sub-contractor, double the average costs for 1 tons of POPs pesticides.

Further, based on feedback from the sub-contractor, the management costs for a low quantity of ODSs or any other hazardous waste is usually quite high as it includes both transportation costs in individual sea-freight containers⁴ and export/transit/import transactions (Basel Convention permitting) for a given low quantity of wastes with same amount of effort as for a larger cargo. Other related costs, like travel and accommodation cost of the sub-contractor, local transportation, personnel supervision, additional sub-contracting of certified personnel from abroad to handle gaseous substances as well as export and port handling fees would have to be considered case-by-case and would relate to the split of responsibilities with local partners. All these would make the destruction of such a small quantity of the collected ODS waste much more expensive.

In this particular case, according to the contract conditions, the sub-contractor had the responsibility only for the export and destruction of the ODS waste. Other activities connected with ODS waste's preparation for the export procedures were handled by GARCAE, which in terms of the cost and time saving was considered a better option. As said, the value of the contract would have been much higher if all required activities would have been implemented solely by the sub-contractor, therefore bringing the average ODS waste disposal substantially higher than the currently reported figures.

After the detailed analyses of the ODS project implementation, it should be emphasized as a conclusion that the joint implementation of these two projects (MLF/UNDP and GEF/UNDP) proved the feasibility of relatively sizeable cost-savings despite small scale.

Objective 2 – Development of scheme for handling unwanted ODSs

The second important objective of the project was to develop a sustainability scheme for collection and destruction of ODSs expected to be accumulated in Georgia in future. Specifically, it was planned to develop the scheme for accessing other unwanted ODSs and proposing financially sustainable

⁴ Hazardous waste cannot be transported with other cargo, which means that higher costs for a whole 20/40 foot container would be necessary.

scenarios for their destruction in Georgia. The scheme was also based on experience acquainted in GARCAE. Development of such a system was scheduled as one of GARCAE's assignments under the main contract under this project with UNDP (see Table 1).

GARCAE formulated and submitted a draft scheme within the planned implementation timeframes. The scheme development methodology included a study on the ODS wastes generation and accumulation rates, interviews with key end-users on these respective matters, and analysis of existing national regulatory framework controlling ODS waste management as well as existing technological capacities for ODSs waste destruction, locally and internationally, and best international practices as applicable. The draft scheme was prepared in close collaboration with NOU and MoENRP and a number of meetings were held with the relevant stakeholders during its drafting and consultation processes.

While developing the scheme, GARCAE identified all major sources of ODSs waste generation, specifically listed below:

- Refrigerant Recovery and Recycling Centers,
- Service centers providing services to the air conditioning and refrigerator equipment (around 50 such centers),
- Importers and vendors of the refrigerants,
- Scrap metal collecting services as well as
- End-users who do not use CFCs any more but still keeping CFC12 in old containers in storages.

Based on information from the above mentioned potential ODS waste generating facilities, it was reconfirmed that about 500 kg of unwanted ODSs can be accumulated annually in Georgia if the adequate legislation requiring that and technical storage capacity is in place.

To ensure the financial sustainability of ODSs waste's destruction process, the draft scheme proposes three scenarios based on international expertise and national practice:

1. Imposing/use fees for importers/users of refrigerants to be paid to the state budget which would then be allocated for disposal operations of the accumulated wastes via the Ministry of Environment from the central budget.
2. Introducing incentive mechanisms through the taxation policy, encouraging companies to become "greener" improve equipment maintenance practices, reduce refrigerant leakages/emissions, and ensure waste minimization which will all be supported by certain legal improvements with monitoring mechanisms on compliance. In this case, a "softer"

taxation policy would be applied to those companies which cover the costs of disposal of unwanted ODSs. This difference between the regular tax and reduced tax would be accumulated in the state budget, and then made available to the Ministry of Environment for handling ODS waste disposal in future.

3. Establishing a special fund, voluntarily uniting all companies operating in this sector. A governing board will be created and attached to the operations of this fund, and the fund will be capitalized by the participating companies to cover the costs of ODS waste management and disposal.

According to the draft scheme, Option 3 was found to be more feasible and streamlined as it will require the least interventions from the state side into the private sector activities, and is more convenient for both private companies and the Government to operate to address project opportunities and requirements under the Montreal Protocol.

It also defines how the ODSs destruction can be achieved at national level, which will save transportation costs for the ODSs to be exported for destruction. Cement plants, with possible need of modernization, are identified as potential facilities for the ODSs waste destruction in Georgia.

4. Conclusions and recommendations

Based on review of the projects' related documents, reports and interviews with the main beneficiaries of the GEF/UNDP POPs and MLF/UNDP ODSs projects, it can be concluded that the implementation of the Demonstration Project on ODS-Waste Management and Disposal in Georgia is a great success as it has achieved its major objective – ODS waste co-disposal along with POPs wastes. Specifically, synergies between the MLF/UNDP ODS waste and GEF/UNDP POPs projects were demonstrated as possible and a cost-effective destruction of unwanted ODSs was achieved via the co-disposal with POPs materials. The project also assisted the Government and the NOU in formulating a draft national scheme for facilitating future collection and handling of ODSs waste and therefore, sustainability of ODSs management process in Georgia. This draft scheme was shared with the NOU.

Close coordination between the two projects, NOU, MoENRP and other participating partners, coherent implementation of exporting activities and joint management of the projects can be emphasized as key factors for the success of the MLF/UNDP ODS waste management project. The joint management of these two projects, one consolidated tender, one sub-contractor and related local and international waste export/transit/import permitting procedures resulted in certain savings of US\$ 20,800 compared to the originally approved budget.

Being smaller in scope and the amount of work as compared to the GEF/UNDP POPs programme, the MLF/UNDP ODS wastes project had benefited much more in terms of savings and has also demonstrated practical feasibility and rationale of this approach, as well as contributed to better communication between these two focal areas in a Government setting as other waste management departments were involved in the ozone-related work.

The project's achievements is a proof that two different funding mechanism (GEF and MLF) can collaborate in a financially transparent and mutually beneficial manner if project planning/approval cycles can be aligned to the extent possible – e.g. if the GEF regularly funds POPs disposal programmes in ongoing 4-year cycles, then the MLF in matters not required for compliance such the ODS waste management operates on the basis of funding windows, and the selection of future project countries would much depend on planned or ongoing GEF/POPs programmes in those countries. Further, successful implementation of this pilot project has demonstrated the effectiveness of the selected project operation modality and can be replicated in other LVC countries which, what is also important to note, have access to sea routes for the export of wastes, as land-locked countries might experience waste transit issues.

It is also recommended to disseminate the information about implemented activities and share lessons learnt with other countries in the region to encourage and facilitate replication of the applied

synergistic approach in case there are any ongoing activities regarding export/destruction of POPs and/or other relevant hazardous waste.

Referring to the experience gained through the synergetic implementation of GEF/UNDP POPs and MLF/UNDP ODSs projects, it is also recommended to pay due attention to the following points while replicating this approach in other LVC countries:

- Time constraints should be considered in announcing the consolidated tender as procedures for the preparation of the consolidated international tender may take more effort and have longer advertisement times to attract suitable and qualified sub-contractors;
- Preliminary market research is important as it will facilitate identification of the companies with the robust experience in POPs and ODSs management;
- Close cooperation with the Ministry of Environment or/and other relevant public authorities is essential for the implementation of planned synchronized activities in a timely manner.

5. Further project's activities.

Considering the importance of the issue, as well as primary objective of funds allocated by MLF for Georgia, in further consultations with the Government and stakeholders it was recommended to capitalize on current achievements and attempt to maximize the project's benefits to the country in the following manner:

- Prepare a survey and composition tests (via the GC approach) of other unwanted ODSs identified and also those reported by the Ministry of Agriculture of Georgia⁵;
- Explore technical opportunities for destruction of unwanted ODS within the country through conducting detailed feasibility study identifying existing technical capacities, legal requirements, willingness of the existing potential facilities to invest in gas feed mechanisms, expensive air pollution control (APC) and ash residue monitoring equipment, national laboratory capabilities for environmental monitoring etc.;
- Purchase two containers for the Recovery and Recycling Centers for future collection and safe disposal of unwanted ODSs.

⁵ While preparing the Summary Report, in the framework of the interview with the NOU, it was revealed that the Ministry of Agriculture had identified and informed the MoENRP about the existence of certain amount of Methyl Bromide stored in an unsafe way. Thus, the idea of conducting a detailed survey for this substance would be a step towards the safe disposal and handling of other unwanted ODSs at national level.

UNDP-Ghana EPA
Pilot demonstration project on ODS
waste management and disposal

Final report to the
Multilateral Fund Secretariat

Prepared by Mr. Kweku Ofori-Bruku
Reviewed by Ghana EPA and UNDP

Updated report – May 2017

Summary of the project details as per the approval:

COUNTRY:	Ghana	IMPLEMENTING AGENCY:	UNDP
PROJECT TITLE:	Pilot Demonstration Project on ODS-Waste Management and Disposal		
SECTOR:	ODS-Waste		
Sub-Sector:	Refrigeration Servicing Sector		
Date of Approval	April 2011		
PROJECT IMPACT:	8.8 Metric Tons of CFC-12		
PROJECT DURATION:	36 months		
LOCAL OWNERSHIP:	100 %		
EXPORT COMPONENT:	0 %		
REQUESTED MLF GRANT:	US\$ 198,000		
IMPLEMENTING AGENCY SUPPORT COST:	US\$ 17,820 (9%)		
TOTAL COST OF PROJECT TO MLF:	US\$ 215,820		
COST-EFFECTIVENESS:	US\$ 22.5/kg ODS (metric)		
NATIONAL COORDINATING AGENCY:	Ghana-EPA		

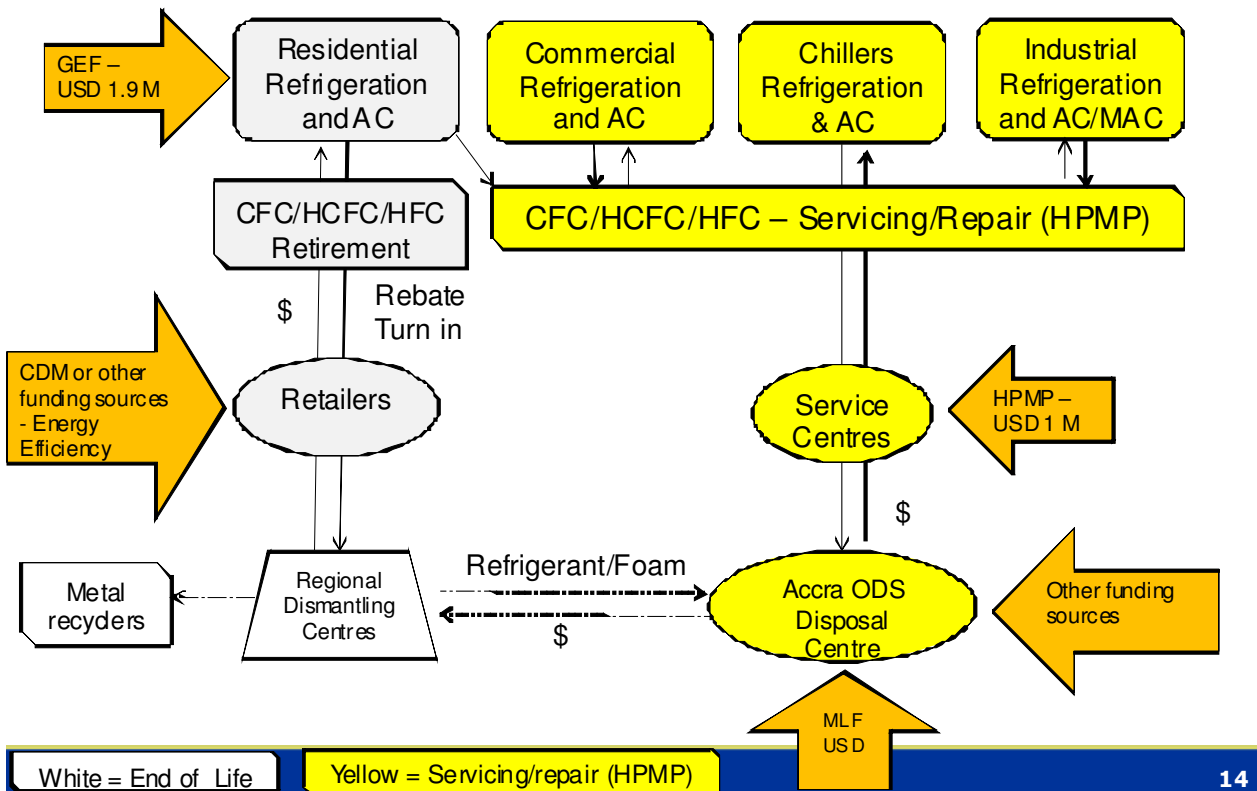
Brief Description of the Project

UNDP Ghana in collaboration with the Environment Protection Agency (EPA), Energy Commission of Ghana and the Center for Rural and Industrial Research (CRIR) had developed an overarching strategy to provide climate and ozone benefits through the Integrated Plan for Energy Efficiency, Climate Mitigation and ODS Reductions for the Refrigeration Sector as shown in Figure 1. This integrated plan brings about the convergence of 3 synergistic interventions to combine and sequence financing for: (i) the phasing out of HCFC based appliances (MLF); (ii) the promotion of energy efficient refrigerators through Market Transformation (GEF) and (iii) the complimentary pilot project for the recovery and disposal of ODS (MLF). The ultimate objective of this plan is to bring economic, social and environmental benefits to the people in Ghana through the scaling up of energy efficient appliances with low global warming potential (GWP) and zero ozone depleting potential (ODP) for the mainstreaming of ozone and climate benefits into the national development plan.

This 'learning by doing' pilot sought to demonstrate how the technical, financial, regulatory and institutional barriers and risks could be overcome to set up an ODS management-disposal facility. The project aimed to demonstrate the management and disposal of ODS refrigerants recovered from old stocks (1.8 t) and subsequent early retired or end of life (EOL) refrigerators/freezers, air-conditioners as well as from the servicing sectors. Waste-ODS would be transported from the refrigerator dismantling centers to be set up with the assistance of the GEF-project (for end-of-life equipment) as well as from the Recovery Centers to be set up through the MLF-funded HPMP (for functioning equipment being serviced). The ODS thus collected would be transported and destroyed overseas. Opportunities to monetize the ODS destroyed as carbon credit for the voluntary market will be explored so that alternative sources of funds may be tapped into once this MLF-

funded demonstration project will be completed. In addition to the carbon market, other financial modalities will also be explored: bilateral grants and auction from the European Union Allowance (EUA). This should ensure sustainability of the operation beyond the duration of this demonstration.

Figure 1: Integrated Plan for Energy Efficiency, Climate Mitigation and ODS Disposal Management



1. Introduction and Background

This pilot project sought to develop an efficient and cost effective logistic framework for the harvesting, canning, transportation, decanting, storage of ODSs collected from refrigerators, freezers and air conditioners in Ghana, prior to shipment to Europe for safe destruction.

This pilot project was a crucial part of the overarching strategy that was formulated as an Integrated Plan for Energy Efficiency, Climate Mitigation and ODS Reduction for the Refrigeration Sector in Ghana.

Therefore, this pilot project was closely integrated with the recently completed GEF-funded UNDP Energy Efficiency (EE) project (“Promoting Appliance Energy Efficiency and Transformation of the Refrigerating Appliances Market in Ghana”)¹ through which End-of-Life (EOL) and early retired energy inefficient refrigerators and freezers were collected and dismantled in regional depots for ODS recovery. The GFE-funded UNDP project was being implemented by the Energy Commission of Ghana, assisted by the Environmental Protection Agency, Ghana.

The primary objective of that project was to improve the energy efficiency of appliances marketed and used in Ghana through the introduction of a combination of regulatory tools such as Minimum Energy Performance Standards and Information Labels (S&L), and innovative regulatory tools including a total ban on the importation of used refrigerators and freezers into Ghana, effective 30th June 2013, and the outright seizure and dismantling of such equipment not complying with the law.

Incentive schemes in the form of rebates were given for turned-in refrigerators at Ghana Cedis (GHC) 200.00, in exchange for the purchase of a one or two star-rated refrigerator or freezer (as per the energy-efficiency star-rating), and GHC 300.00 for the purchase of any sized refrigerator or freezer of three-star rating and above.

2. Setting-up of the operations of the project

2.1 Contractors for collection of refrigerators

Revenue was generated for the private operators of the dismantling facilities, which have a convention with the Ghana EPA, and receive no fee for their services. They collect revenues from the dismantled equipment (selling of scrap metal). In that sense, the value of the dismantled equipment is put back in the system.

2.1.1. First contractor: City Wastes and Management Company (CWMC) and setting-up the National ODS centre

The Refrigerator Incentive/Rebate scheme was officially launched in September 2012.

A contract was signed by Ghana EPA with the City Wastes and Management Company (CWMC) to collect the rebated refrigerators for destruction in their facility in Kwabenya, Accra. The CWMC imported a mobile ODS degassing plant from Germany that would be able to recover refrigerants from any refrigerator or freezer from any part of the country.

¹ <https://www.thegef.org/project/spwa-cc-promoting-appliance-energy-efficiency-and-transformation-refrigerating-appliances>

This equipment, which was assumed to be the first of its kind in Africa, was commissioned in November 2012.

In January 2013, the National Ozone Unit (NOU) of the Ghana EPA assisted by UNDP, acquired a 40-footer container; rebuilt and reshaped it for use as both an office, laboratory and storage facility as a National ODS Collection Centre. This National ODS Centre was situated within the CWMC yard in Kwabenya, Accra.

By April 2013 the laboratory equipment, tools and computer, printer and communication equipment were acquired for the National ODS Collection Centre and the facility became functional. Additionally, 50 units of 12kg empty refrigerant recovery cylinders were procured for the project.





Between May 2013 and January 2014, the total refrigerators dismantled by the CWMC staff with some ODS in them was 7,056.

By January 2014, the EPA had established the full-functioning National ODS collection center which included a storage facility for the receipt of the ODS, as shown above.

Unfortunately, in February 2014, the project team was informed by the management of CWMC that their premises in which the National ODS Collection Center was situated, were temporarily not accessible due to a rent dispute that the CWMC had with their landlord. The Centre could not be used or visited until November 2014.

During that period, equipment such as refrigerant analyzers, recovery machines, scales and refrigerant transfer tools, as well as office equipment, were stolen. This was reported to Ghana EPA and UNDP Ghana while a police investigation was launched. Only some cylinders were left behind. This made the operation of the centre impossible after February 2014. However, activities continued under the project as described below.

2.1.2 Second Contractor: the Presank Company

To accelerate the dismantling of seized refrigerators from importers that did not abide with the new Law banning imports of second-hand refrigerators, a second company, PRESANK Ltd., was contracted in March 2014 to assist the CWMC in the degassing and the dismantling of the seized refrigerating equipment. The National ODS waste

Consultant visited the site of the Presank Company at Afienya on a weekly basis to train the technical staff of Presank, Ltd for this purpose.

The national consultant also ascertained that the Presank staff safely recovered and handled the ODS harvested from the dismantled refrigerating equipment cautiously.

The Presank Company mainly degassed and dismantled the seized refrigerators and freezers, while the CWMC was collecting, and storing the rebate refrigerators in their new yard in Afiamang for future degassing.



Staff at the Presank facility

As second-hand refrigerators are still being caught by customs, a 3rd degassing and dismantling Company to augment the degassing and dismantling might still need to be engaged in the future.

2.2. Training of Salesmen, Shop Assistants and Technical Staff

As of 2013, it became clear that both the refrigerator salespersons, shop assistants and the recipients at the CWMC needed to be trained to know how to effectively test working refrigerators. The national project consultant had to prepare training manuals and train the personnel involved both in the classroom and later follow up into the field to ascertain their competency.

The consultant also had to train the CWMC and later Presank technical staff to know how to safely handle the refrigerators prior to harvesting the ODSs, and in handling the ODSs after retrieving them.

Additionally, between April and June 2014, the National ODS waste Consultant trained shop assistants and technicians of appliance retail shops in the PZ Company, who were selected to participate in the turned-in refrigerator rebate scheme, on the testing of refrigerators prior to acceptance. Indeed, refrigerators had to be proved to be still functioning for eligibility to the rebate scheme. This was aimed to enable the proper disposal of all the ODS contained in this old refrigerating equipment.

In July 2014, a new company, Hisense Appliance Co., with several retail-shops in Accra-Tema, was appointed to participate in the turned-in refrigerator rebate scheme. The National ODS waste consultant had to train the salesmen and technicians of this new company on how to receive, inspect and test refrigerators under the rebate scheme

Between August and September 2014, the National ODS waste Consultant led a team of Technicians as part of an inventory work, to visit facilities, hospitals, hotels, mines and motels in major towns, in all the regional and most of the district capitals in the country. This was to investigate the extent of HCFCs, HFCs, HCs and other refrigerants usage in the country. This enabled the ODS Consultant to visit appliance retail shops in the Volta, Northern, Upper East, Upper West, Brong Ahafo, Ashanti, Western, Central and Eastern regions of Ghana, to find out how the shopkeepers and local technicians, who were trained in Accra, applied these skills to receive and test the refrigerators under the rebate scheme, prior to delivery to Accra. The results were generally positive as most shop assistants seen were applying the knowledge and skills appropriately.

In total, the following training was delivered through the project:

Over 300 sales personnel (a majority of women) were trained on:

- how the refrigerator works.
- how to explain the operation and safe use of the refrigerator and the freezer to their customers.
- safe ways to handle and deliver these appliances to their customers.
- courteous ways to receive and test the rebate refrigerators and deliver them for degassing and destruction.

The CWCM staff was trained on the safest ways to test and handle the rebate refrigerators prior to and after the removal of the refrigerant.

The Presank staff was trained on:

- how to use locally-devised tools to harvest good quality ODS,
- work under adverse and stressful conditions.

The ODS Decanting Staff (see section 3) was trained on:

- how to safely deal with both high-pressure and low-temperature ODS,
- how to avoid freeze burns, explosions and other gaseous accidents.

3. ODS waste export operations

3.1 Cooperation with the “Capacity Building for PCB Elimination” in Ghana

From 2014 onwards, a cooperation was developed with another GEF-funded UNDP Project, “Capacity Building for PCB Elimination” in Ghana. The project aimed to dispose of hazardous chemicals - PCBs and obsolete pesticides - through exporting these abroad in an authorised facility, for destruction as per BAT/BEP. There was an obvious opportunity to add ODS waste to this operation to achieve economies of scale, and thus with a reduced price for the disposal operation. As Ghana EPA was also in charge of the implementation of that project, the coordination was ensured within the agency, with technical support from UNDP.

Veolia UK was selected after an international competitive bidding process and in June 2015, the ODS waste project team had the opportunity to export some of the ODSs collected to date to Europe for destruction. The destruction facility was located in Poland.

It has to be noted, as was reported through the UNDP progress reports and the 2015 MLF evaluation of ODS waste projects, that the quantities of refrigerants collected have been less than anticipated in the project document. The project has however demonstrated some adaptability in that regard. Thus, considering that the CFC quantities would be less than anticipated, four cylinders of Methyl bromide that were temporarily stored at a Government pesticides storage facility and could present a risk of leaking, were identified by Ghana EPA in cooperation with the GEF-funded UNDP PCB project. It was agreed to add these chemicals to the exports of obsolete chemicals that was to be undertaken.

3.2 First and main operation of disposal of ODS

Because the National ODS collection centre had been shut down (see section 2.1.1), the project team had to improvise a temporary ODS Decanting and Export Centre within the National Refrigeration & Air Conditioning Centre of Excellence in the Accra Technical Training Centre (funded by the Ghana HPMP). There, all the cylinders containing ODS from Ghana EPA, Accra (refrigerants collected during the TPMP), as well as the ODSs collected by Presank in Afienuya and some from the ODS collection centre in Kwabenya were taken for decanting and preparation for export. The ODSs were decanted, checked and weighted at the Centre of Excellence, to prepare for the shipment.



Below is a picture of ODSs delivered to the Shipper's Warehouse in Pokuase, on July 11, 2015



In addition to CFC-12, some adulterated refrigerants were also included in the exports for destruction.

Total number of refrigerants (with a vast majority of CFC12) shipped out for destruction via the Veolia UK Company to Europe was 1,272.66 Kilograms. 406.37 Kg were collected through the rebate scheme and 866.29 kg were collected from the stored refrigerants from the TPMP.

In Annex are copies of the Certificates of Incineration of the ODSs and other chemicals submitted by the Sarpi Veolia Company. As indicated in the certificate, when weighted at arrival for destruction, the certified total quantity of refrigerants destroyed was 1,200 Kg. In addition, 5,200 kg of Methyl Bromide were also destroyed through the same operation.

3.3 Second and complementary operation of ODS disposal (2017)

Some quantities of R12 refrigerants had remained under custody of the CWMC company since 2015 and the company had committed for their disposal through voluntary carbon market.

This was confirmed and completed in 2017.

Ghana EPA received in January 2017 a letter of intent of export seeking from Ghana EPA an authorization for export of R12 intended for destruction. The letter was received from Tradewater LLC company in the USA, which worked in in cooperation with CWMC. The

quantities of R12 set for export in an authorised facility in the US amounted to 1 tonne. Besides the 469 kg recovered R12 obtained and detained through the dismantling process, which CWMC kept for the voluntary market option, additional 531 kg were procured from stocks of a dealer (remaining unused R12) to make up for the 1 tonne for shipment. Ghana EPA confirmed that the export occurred in April 2017. Voluntary Carbon markets were used to finance this operation, at no cost for the project. It is anticipated that Tradewater will come for the residual stocks from the dealer should they be granted an import permit by the US EPA in future.

3.4 The issue of foam collected from the refrigerators

Much as the two companies collecting refrigerators were quickly getting rid of the steel and non-ferrous parts of the dismantled refrigerators, the disposal of the huge mass of Polyurethane insulation and plastic materials from the dismantled refrigerators was creating a storage problem on their sites.

The foam extracted from the collected refrigerators could not be included in the two shipments sent for destruction, in Europe and in the US.

Thus, the volume of foam collected became substantial and created a challenge for the dismantling operation. A solution needed to be found for their disposal in an environmentally-sound manner, in accordance with Montreal Protocol's requirements. In the meantime, the project team advised the companies to pack the insulation materials from the dismantled refrigerators into sealed plastic bags and stock pile them while an environmentally acceptable procedure for destroying the insulation materials was being sought.

Collaboration was developed between the project, Ghana EPA and GIZ/Proklima, through GIZ's project "Management and destruction of Ozone Depleting Substances banks (ODS banks)". This was meant ensure the sustainability of the results of the MLF-funded ODS disposal project, and to find a joint solution for the remaining quantities of foams collected from the refrigerators.

Currently, under the GIZ project, the procurement of a cross flow chopper with an integrated foam blowing agent absorption system that uses an active carbon storage is in process. An expression of interest to operate the facility has already been published and three companies have been shortlisted (this is as well in process).

Additionally, though the rebate scheme has now ended, there is a substantial number of refrigerators and freezers to be dismantled and degassed and thus a remaining amount of refrigerants to be collected for destruction.

3.5 Total ODS disposed and destroyed

Total quantities that have been collected / destroyed are the following:

Refrigerants destroyed (in high majority R12):

- 1.2 MT through the disposal at Sarpi Veolia's incineration plant (Poland)
- 1 MT of R12 through the CWMC/Tradewater disposal in the USA
- Foam collected from the refrigerators (not yet destroyed) – quantities cannot be assessed in comparable figures. They are to be destroyed through the GIZ Proklima project.

Methyl bromide destroyed:

- 5.2 MT through the disposal at Sarpi Veolia (Poland). With an ODP of 0.7 for Methyl Bromide, this represents 3.64 ODP tonnes.

Total quantities disposed of (not including foam): 7.4 MT.

Assuming an ODP of 1 for the refrigerants destroyed, the total ODP disposed of amount to $3.64 + 1.2 + 1 = 5.84$ ODP Tonnes.

Considering that some of the adulterated refrigerants that were exported had an ODP below 1, it can be assumed that ca. 5.5 ODP tonnes have been destroyed (not including the quantities of foam still to be destroyed).

4. Lessons learnt

4.1 Technical challenges and solutions

- The compressors on most of the refrigerators seized by customs (over 70%) had been chopped off, hence there were no refrigerants in them. This is one of the reasons for the lower amounts of CFCs collected as compared to initial estimates.

- The few refrigerators and freezers with compressors on them had their refrigerants leaked out hence the entrance of non-condensable gasses into the ODSs that were collected. Indeed, the project team noticed from the analysis of the refrigerants/ODSs recovered that the ODSs contained some amounts of non-condensable gasses in them.

This is important to note as, during decanting prior to export, pressures of the ODSs went up very high within a short time. This sudden rise in operating pressure could be very hazardous if not carefully watched due to the presence of non-condensable gases.

- Standard refrigerant cylinder heaters are required to accelerate the transfer of ODSs from cylinders to cylinders during the collection and decanting of the ODSs for export. Portable water heaters were improvised to accelerate the decanting procedure.

- A portable refrigerant re-claiming machine is required to restore the refrigerants/ODSs collected to an acceptable standard for possible reuse and the expected carbon credits from destruction.
- The project team needed portable hand-held refrigerant identifiers to ascertain the refrigerant/ODSs in every refrigerator before recovery and to prevent cross contamination.

4.2 General lessons learnt

- Synergy with other projects can bring solutions to challenges unforeseen at the project conceptualization phase
- Carbon markets instability are a challenge for this type of projects. Though an operation could be eventually launched in 2017, this did not have the scope that was initially envisaged at the start of the project.
- There is a confirmed interest of the private sector to get involved in such operations (and to continue exploring the carbon financing options), as was demonstrated in 2017 by the export to the USA of some remaining quantities of ODSs
- It is a complex but useful approach to combine with other waste streams' disposal processes (in that case, PCBs and pesticides)
- It was a good strategic approach to also combine with a rebate scheme. Another stream of old refrigerators comes from the seized refrigerators by customs, due to the ban on 2d-hand refrigerators entering the country.
- Addressing the stocks of collected foam represents a major technical challenge in this type of projects.
- It has been difficult in this project to determine the cost per tonne destroyed, due to the nature of the export for destruction operations. Ghana EPA charged a pro-rata agreed amount internally to the project budget for the disposal of refrigerants and Methyl Bromide. There has been no cost to the project for the export to the USA in 2017 or for the future destruction of collected polyurethane foam.
- As regards export transportation, this took time and considerable joint efforts to get the consent of the importing authority, due to the complex nature of the waste (mix of PCBs, pesticides, ODSs) being exported for destruction.

ANNEX 1 – Certificate of incineration – SARPI VEOLIA – Including Ozone-Depleting Substances



Date: 27 October 2015

Certificate of Incineration

Veolia Job No: FSJT0667

We hereby certify that the waste described below has been delivered to/destroyed by high temperature incineration at Sarpi Dabrowa Gornicza:

Container Number :	As per attached annex
TFS Number :	As per attached annex
Material :	As per attached annex
Delivery Date(s) :	As per attached annex
Delivery By:	Geodis Calberson

CERTIFIED BY :
TITLE :
for and on behalf of:


Judith Hunt
Customer Services Manager
Veolia ES Field Services Limited
Unit 1, Heol Crochendy
Parc Nantgarw
Cardiff. CF15 7QT



Veolia ES Field Services Limited
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A SARP Industries Limited Company
Registered office: Unit 1 Heol Crochendy, Parc Nantgarw, Cardiff, CF157QT
Registered in England 7816723



EMPLOYER/EXPORTER ENVIRONMENTAL PROTECTION AGENCY OF THE REPUBLIC OF GHANA

SERVICE PROVIDER VEOLIA ES FIELD SERVICES LIMITED

CONTRACT NAME PROVISION OF SERVICES FOR THE FINAL DISPOSAL OF PURE POLYCHLORINATED BIPHENYLS (PCBs), PCB CONTAMINATED WASTES, OBSOLETE PESTICIDES AND OZONE DEPLETING SUBSTANCES FROM GHANA

Container Number	Waste Type	TFS Shipment Number	Arrival Date	Waste Received Weight (Kg)	Completion Date
MEDU 2882261	Pesticide Solid	GH603391 / 01	11-Sep-15	750	19-Oct-15
MSCU 5032780	Pesticide Solid	GH603391 / 02	09-Sep-15	12,886	19-Oct-15
MSCU 5896350	Pesticide Solid	GH603391 / 03	09-Sep-15	4,661	19-Oct-15
MEDU 4128245	Pesticide Solid	GH603391 / 04	09-Sep-15	7,235	19-Oct-15
MEDU 3994121	Pesticide Solid	GH603391 / 05	11-Sep-15	2,980	19-Oct-15
MEDU 2166694	Pesticide Liquid	GH603392 / 01	11-Sep-15	13,280	19-Oct-15
MEDU 2882261	Pesticide Liquid	GH603392 / 02	11-Sep-15	10,850	19-Oct-15
MSCU 5896350	Pesticide Liquid	GH603392 / 03	09-Sep-15	10,961	19-Oct-15
MEDU 3994121	Pesticide Liquid	GH603392 / 04	11-Sep-15	4,050	19-Oct-15
FSCU 7423560	Pesticide Liquid	GH603392 / 05	14-Sep-15	15,900	19-Oct-15
GLDU 3808441	Pesticide Liquid	GH603392 / 06	14-Sep-15	13,800	19-Oct-15
MEDU 2832595	PCB Liquid	GH603393 / 01	20-Aug-15	15,800	08-Sep-15
MEDU 3440032	PCB Liquid	GH603393 / 02	18-Aug-15	15,400	08-Sep-15
GLDU 3808441	PCB Liquid	GH603393 / 03	14-Sep-15	800	19-Oct-15
MSCU 0243769	PCB Solid	GH603394 / 01	18-Aug-15	3,640	08-Sep-15
MSCU 4660570	PCB Solid	GH603394 / 02	18-Aug-15	14,900	08-Sep-15
MEDU 4128245	MeBr	GH603395 / 01	09-Oct-15	5,200	19-Oct-15
MEDU 4128245	ODS	GH603396 / 01	09-Oct-15	1,200	19-Oct-15
TOTAL TONNAGE				154,293	

SIGNED
 JUDITH A. HUNT (Mrs)
 CUSTOMER SERVICES MANAGER



ANNEX 2 – Letter requesting license to export R-12 for destruction – Tradewater / City Waste.



12 January 2017

Sent via Email

Environmental Protection Agency
Mr. Emmanuel Quansah
Head Environmental Climate Change Ozone Unit
P.O Box MB326
Accra - Ghana
e-mail: emmanuel.quansah@epa.gov.gh

Dear Mr. Quansah:

As you know, Tradewater, LLC, is working closely with you and Mr. Jürgen Meinel of City Waste Recycling, Ltd., to transport to the United States certain chlorofluorocarbon refrigerants. The refrigerants to be transported include approximately 469 kilograms of recovered R-12 and approximately 531 kilograms of unused R-12. We are transporting the refrigerants from Ghana to the United States for destruction in a permitted facility.

Tradewater has applied to the United States Environmental Protection Agency (US EPA) for permission to import the material to the United States. Upon approval by the US EPA, Tradewater (in conjunction with Mr. Meinel) will then need to seek from you and the Ghana EPA an export license granting permission for the refrigerants to be exported from Ghana.

This letter confirms our intent to seek the Ghanaian export license and your authority to issue that export license when Tradewater and Mr. Meinel submit the necessary information for application.

Please let me know if you have any questions or concerns.

Sincerely,

A handwritten signature in blue ink that reads "Timothy H. Brown".

Timothy H. Brown
President

Cc: Robert Burchard, U.S. Environmental Protection Agency (odspetitions@epa.gov)
Jürgen Meinel, City Waste Recycling (recycling.ghana@gmail.com)
Gabriel Bankier Plotkin, Tradewater (gplotkin@tradewater.us)

**FINAL PROGRESS REPORT ON
NEPAL ODS DISPOSAL PROJECT SUBMITTED TO
THE 79TH EXECUTIVE COMMITTEE**

BACKGROUND

The project for Nepal was approved by the Executive Committee at the 59th meeting to allow Nepal to explore two options for destroying a small amount of unwanted ODS that had been collected and stored through the national ozone unit.

In the year 2004, 74 ODP tonnes of CFCs were confiscated in Nepal. Most of these stocks were consumed for domestic purposes following MOP decision XVI/27 (Annex. 1) made at the Sixteenth Meeting of the Parties. As of 1.1.2010, out of this initial stock of 74 tonnes approximately 10 MT (metric tonnes) of CFCs were in stocks at Birgunj, Nepal. In the 20th Meeting of Parties, Nepal requested guidance from Parties on continued use of these CFCs post 2010. In this context, Nepal proposed to consider options for destruction of this quantity of CFCs. If destroyed, it would also achieve twin benefits of compliance with the Montreal Protocol and Green House Gas (GHG) emission reduction; otherwise the ODS would slowly be released into the atmosphere from the cylinders in which they were stored or potentially be used in the future if consumption limits were revised.

Such a scenario in Nepal is a good example of a Low Volume Consumption Country (LVC) in the Asia and the Pacific region, where there is no clear guidance from the Montreal Protocol on how to treat such unwanted CFC stocks (collected or seized). UN Environment submitted a request for a pilot ODS disposal project for Nepal in line with decision 58/19 that laid out the guidelines for developing a limited number of demonstration projects for disposal. This pilot project was proposed to design an approach for the final disposal/destruction of the remaining amount of approximately 10 MT of CFCs as of 1.1.2010.

Based on the guidance of the Meeting of Parties to the Montreal Protocol on encouraging ODS destruction in Article 5 Parties, the Multilateral Fund (MLF) approved a pilot project on destruction of Nepal ODS stock at its 59th meeting. UN Environment spearheaded the Nepal ODS Destruction Project as an important step to explore various options for destruction of small stocks in LVCs. The project has been completed and it has provided a model for replication for other LVCs.

The pilot project sought to generate data and experience on options for disposal of the current volume of ODS available for destruction as of 1.1.2010. UN Environment was advised to consider two options: (1) the use of a mobile destruction facility that could be rented and shipped back to the country of origin once the ODS is safely destroyed, or (2) transporting the waste ODS to a recycling facility outside the country. The cost of the project as approved was US \$157,200 plus support costs and covered interim storage of cylinders, costs for the transport of

the materials to the facility, as well as the operationalization of the destruction process including monitoring and reporting the final quantities destroyed. The pilot aspect would be demonstrating the use of this equipment, the results of which would be useful to LVC countries and provide cost effective options for countries that have small volumes of unwanted ODS that require destruction.

During the review of the project during the 59th Excom., one Member expressed the hope that, in the development of the project, the implementing agency and the country would ensure that it was truly a demonstration project, i.e. that it would demonstrate how the activity would be sustained and how, under relevant circumstances, it could access sustainable funding for climate activities. The project should also be designed to show how portable destruction technology could meet the needs of the country, as well as its value for similar LVC countries when dealing with unwanted ODS. Another Member said that UN Environment should make sure that the first phase of the project included a comprehensive cost-effectiveness analysis of the two options: (i) use of a portable destruction facility; and (ii) transporting the waste ODS to a recycling facility. In the second phase of the project, the most cost-effective of the two options should be used and implementation should be done in partnership with another agency.

PAST PROGRESS REPORTING

UN Environment submitted, on request of the MLF Secretariat a progress report to the 70th Meeting of the Executive Committee that met on 1-5 July 2013 which detailed the process of destruction of 9.03 MT of CFC 12 in a facility in USA and provided details on the use of the draft guidelines for ODS disposal projects. At that same meeting, UN Environment had provided a report on the overall implementation process of this project. This report can be seen in Document UN Environment/OzL.Pro/ExCom/70/54, dated 5 June 2013. UN Environment provided an update on the progress of the implementation of the Nepal project, where specific timelines and target outputs achieved were listed. The selected approach that the destruction project used was to export the ODS for destruction to the United States of America. This was done through a partner, EOS Climate, who organised the transfer to a licensed facility for destruction. UN Environment reported that the shipment reached the United States of America in November 2012, and subsequently has been reported as destroyed as of February 2013. The amount of ODS handled in this project was approximately 10 ODP tonnes (107,000 CO₂-equivalent tonnes). For the preparations of the 72nd ExCom in April 2014 and 76th Excom in May 2016, extensive information specifically in regard to carbon credits and their sale was provided to the Secretariat.

UNEP further reported that in March 2013, the Nepal project was submitted to the Climate Action Reserve (CAR). This has subsequently been listed in CAR with a reserve project identification number of CAR955. Upon further verification with the CAR website, the Secretariat noted the project has now changed status with CAR as registered, as of 24 May 2013.

It has met final verification requirements of the CAR, and Climate Reserve Tonne (CRTs) have now been issued¹.

UN Environment's partner *EOS Climate* had obtained the first carbon credits in 2013 by destroying 9.03 MT of CFC 12. Since the 72nd Meeting, most of the work has been related to registration of the credits in the voluntary carbon market obtained by destroying the CFCs and efforts to sell them. The voluntary carbon markets have experienced an all-time decline in potential worth of the credits and prospective buyers of the same. As a result, the credits have still not been completely sold.

Under the Nepal project 82,391 Verified Emission Reductions (VERs)² have been generated. All of these are being offered for sale. The state of the carbon voluntary market is such that it is likely that more than one buyer will be involved, rather than a single buyer who wants all of the VERs at once. Under this project Climate Reserve Tons (CRTs)³ were generated because the Climate Action Reserve Article 5 ODS Protocol was used. CRTs are one type of VERs. *EOS Climate* has been seeking buyers and in June 2014 established a marketing agreement with *The Carbon Neutral Company*, a leading retailer of voluntary carbon credits.

EOS Climate is currently vetting prospective purchasers for the offset credits that resulted from the project. Partners in this project remain optimistic they will find a buyer(s) willing to make a commitment to this new type of credit. The current price for voluntary credits is in the order of

¹ Project developers submit a project by uploading the necessary forms and supporting documents to the Climate Action Reserve online software. The Reserve staff pre-screen projects for eligibility. Eligible projects are posted on the Reserve site with a status of "listed." The next step is verification by an independent, accredited verification body. Once completed, Reserve staff review the verification documentation, and if the project passes this final review process, it is labeled "registered" and CRTs are issued. Project developers submit a project by uploading the necessary forms and supporting documents to the Reserve online software. The Reserve staff pre-screen projects for eligibility. Eligible projects are posted on the Reserve site with a status of "listed." The next step is verification by an independent, accredited verification body. Once completed, Reserve staff review the verification documentation, and if the project passes this final review process, it is labeled "registered" and CRTs are issued.

² VERs is a generic term for offsets. There are three main market drivers for demand in the voluntary market. Firstly, as a key component of a company's marketing strategy linked to corporate social responsibility. Secondly, as a profit-making enterprise where financial participants build portfolios of VERs in order to obtain returns on capital employed. And thirdly, as a valuable learning exercise for forward looking companies and investors who anticipate future participation in the compliance regime. Verified Emission Reductions are derived from project-based emissions reductions from a wide range of technologies and project types.

³ CRTs are offsets unique to the Climate Action Reserve. VERS is a generic term for offsets and CRTs are offsets unique to the Climate Action Reserve. Under this project CRTs were generated because the Climate Action Reserve Article 5 ODS Protocol was used. CRTs are one type of VERS.

approximately range of US \$0.55 per tonne and partners are seeking a higher price given the high quality of the project and the credits.

In December 2014, *EOS* closed a transaction to sell 22,000 of the carbon credits generated from the Nepal project. They will continue to work to find a buyer(s) for the remaining 60,391 credits. As an innovative approach under this project, it has been agreed that a portion of the revenue from the sale would be committed to the Government of Nepal to support local sustainability initiatives. The Agreement between the UN Environment partner and UNOPS specified that the revenue returned to Nepal would be paid into a fund established by the Government of Nepal in consultation with UN Environment, dedicated to training, job creation, capacity building, and community development focused on refrigerant management, energy efficiency, and environmental sustainability. This is not a typical structure for offset projects but partners believed it would enhance the project's appeal and establish a good model for future ODS projects and hence the UNOPS contract with *EOS Climate* included a provision whereby a portion of the revenue be shared with Nepal even though sale of credits was not an objective or an output of the approved project. This approach also highlighted that sale of credits, if possible, could make the project sustainable to some extent. The share of credit sales revenue that will be transferred to Nepal is specified in the December 2011 Agreement with UNOPS:

- 10% of the Gross Revenue up to US \$1.50 per credit; and
- 25% of the Gross Revenue thereafter.

Following this the Nepal share of US \$12,925 from the sale of 22,000 credits were remitted to NBSM bank account on February 15, 2017. Some of the key areas which are being explored for utilisation of these funds in consultation with the Government are:

1. Strengthen the agreed activity with private partnership. Explore possibilities of involving OEMs that are introducing air conditioners based on HCFC and HFC alternatives in the Nepal market;
2. Focus on flammable refrigerants and country needs to address flammable refrigerants
3. Build capacity of local technicians (master trainers) on handling flammable refrigerants through a training programme conducted with private partners as part of south-south cooperation.
4. Build capacity of local technicians (master trainers) on handling flammable refrigerants through a training programme conducted in Nepal in collaboration with NREMA and OEMs
5. Mainstream the module on handling flammable refrigerants in the curriculum of training institute in Nepal through the HPMP funds
6. Develop a certification scheme for certifying technicians to handle flammable refrigerants.

The state of the carbon markets has drastically changed since 2010 when the project was initially conceived, adding a challenge to sale of the credits. The partners remain intent on following

through on the final step to work with numerous parties involved in the global carbon markets in efforts to find a buyer for the remaining 60,391 credits and demonstrate to the Parties that carbon finance is a viable mechanism to address remaining ODS banks. There is no way to predict the timing.

In summarizing the demonstration value of the Nepal project, the work on this project provided an opportunity to link ODS destruction to the carbon market and explore the possibility of other financial mechanisms to support ODS destruction activities. The project's registration with the CAR is a good example for other countries who are pursuing this track for their ODS disposal projects. UN Environment also reported that one of the challenges that was faced during project implementation was the lengthy process to get approval for the export of the ODS to the United States of America, because of the legal impediments that required Parliamentary clearance. However, this was also an important lesson learned for the project as it allows UN Environment to use the same approach for similar issues in the future.

The project was a pilot project with demonstration capabilities. This project handled the destruction of the ODS according to strict standards and should serve as a model for international ODS offset projects and corporations that want to invest in international ODS projects. There are implications of this project for Article 5 countries on leveraging carbon-finance with their collected or potential ODS waste. The project demonstrated how unwanted ODS can be disposed of safely and cost-effectively in collaboration with the private sector, leveraging state-of-the-art technologies, operational systems, and when the credits are ultimately sold, carbon finance. This single project prevented emissions equivalent to over 107,000 tonnes of carbon dioxide. It helped establish for the international community a sustainable model of securing carbon finance for management and disposal of CFC stocks in developing countries, while delivering significant environmental and economic co-benefits. Some of these lessons learnt for LVCs from this demonstration project can be seen at **Annex. 2** to this document.

Annex. 1

Decision XVI/27. Compliance with the Montreal Protocol by Nepal

1. To note that Nepal ratified the Montreal Protocol and the London Amendment on 6 July 1994. Nepal is classified as a Party operating under paragraph 1 of Article 5 of the Protocol and had its country programme approved by the Executive Committee in 1998. The Executive Committee has approved \$453,636 from the Multilateral Fund to enable compliance in accordance with Article 10 of the Protocol;

2. To recall that in its decision XV/39, the Fifteenth Meeting of the Parties had congratulated Nepal on seizing 74 ODP tonnes of imports of CFCs that had been imported in 2000 without an import license, and on reporting the quantity as illegal trade under the terms of decision XIV/7;

3. To recall that, in paragraph 5 of decision XV/39, the Parties had stated that, if Nepal decided to release any of the seized quantity of CFCs on to its domestic market, it would be considered to be in non-compliance with its obligations under Article 2A of the Montreal Protocol and would therefore be required to fulfil the terms of decision XIV/23, including submitting to the Implementation Committee a plan of action with time-specific benchmarks to ensure a prompt return to compliance;

4. To clarify the meaning of paragraph 5 of decision XV/39 to mean that Nepal would only be considered to be in non-compliance if the amount of CFCs released on to the market in any one year exceeded its permitted consumption level under the Protocol for that year;

5. To note further that Nepal's baseline for CFCs is 27 ODP tonnes;

6. To note with appreciation Nepal's submission of its plan of action to manage the release of the seized CFCs, and to note further that, under the plan, Nepal specifically commits itself:

(a) To release no more than the following amount of CFCs in each year as follows:

- (i) 27.0 ODP tonnes in 2004;
- (ii) 13.5 ODP tonnes in 2005;
- (iii) 13.5 ODP tonnes in 2006;

- (iv) 4.05 ODP tonnes in 2007;
- (v) 4.05 ODP tonnes in 2008;
- (vi) 4.00 ODP tonnes in 2009;
- (vii) Zero in 2010, save for essential uses that may be authorized by the Parties;

(b) To monitor its existing system for licensing imports of ozone-depleting substances, including quotas, introduced in 2001, which includes a commitment not to issue import licenses for CFCs, in order to remain in compliance with its plan of action;

(c) To report annually on the quantity of CFCs released pursuant to paragraph 6 (a) above;

(d) To ensure that any quantities of CFCs remaining after 2010 are not released on to its market except in compliance with Nepal's obligations under the Montreal Protocol;

7. To note that the measures listed in paragraph 6 above will enable Nepal to remain in compliance;

8. To monitor closely the progress of Nepal with regard to the implementation of its plan of action and the phase-out of CFCs;

Annex. 2

EXPERIENCE AND LEARNINGS FOR OTHER LVCs

The experience in Nepal has helped build the framework for developing a work plan for the NOUs for development of the projects for destruction of unwanted ODS in their countries. The salient features of such actions would include:-

1. Get started with inventorisation of the stock immediately
 - Locate the various stocks of ODS distributed all over the country
 - Quantify the stock
 - Collect the stock in a single location and ensure that it is kept in an environmentally protected condition
 - Proper documentation of the origin of the stock
 - Arrange for testing of the stock, and establish the purity

2. Consult with the relevant Ministry with regard to advanced funds, collection and distribution of revenues
 - Determination of possibilities of linkage for other projects in the country
 - If linkage is established, then explore possibilities for funding from such programs with the help of the concerned ministries

3. Identify any legal limitations for the Ministry of Environment, Ministry of Commerce and Customs Department for facilitating the project
 - Policies and regulations regarding the establishment of destruction facilities in the countries
 - Establishing of roles and accountability of the various ministries and departments
 - Arrange for training and awareness programs for the personnel of the concerned ministries regarding harmful effects of ODS and the necessity of their destruction programs
 - Establish a proper network for coordination among all these ministries and departments

4. Identify existing legal procedures pertaining to the export of collected ODS
 - Any ban on the export of the ODSs should be relaxed for the purpose of ODS export for destruction
 - Establish necessary administrative framework to facilitate the process
 - Prepare proper documentation for providing framework to the process if the export is to be done more than once
 - Any exemption given for ODS export should be monitored with close coordination with all concerned parties

5. Review existing legal procedures in relation to the following
 - Disposal of hazardous wastes
 - Import and export of hazardous wastes (if unwanted ODS is considered as hazardous wastes)
 - Fee structures for government permits and clearance
 - Prepare proper documentation for the same, specifically for ODS

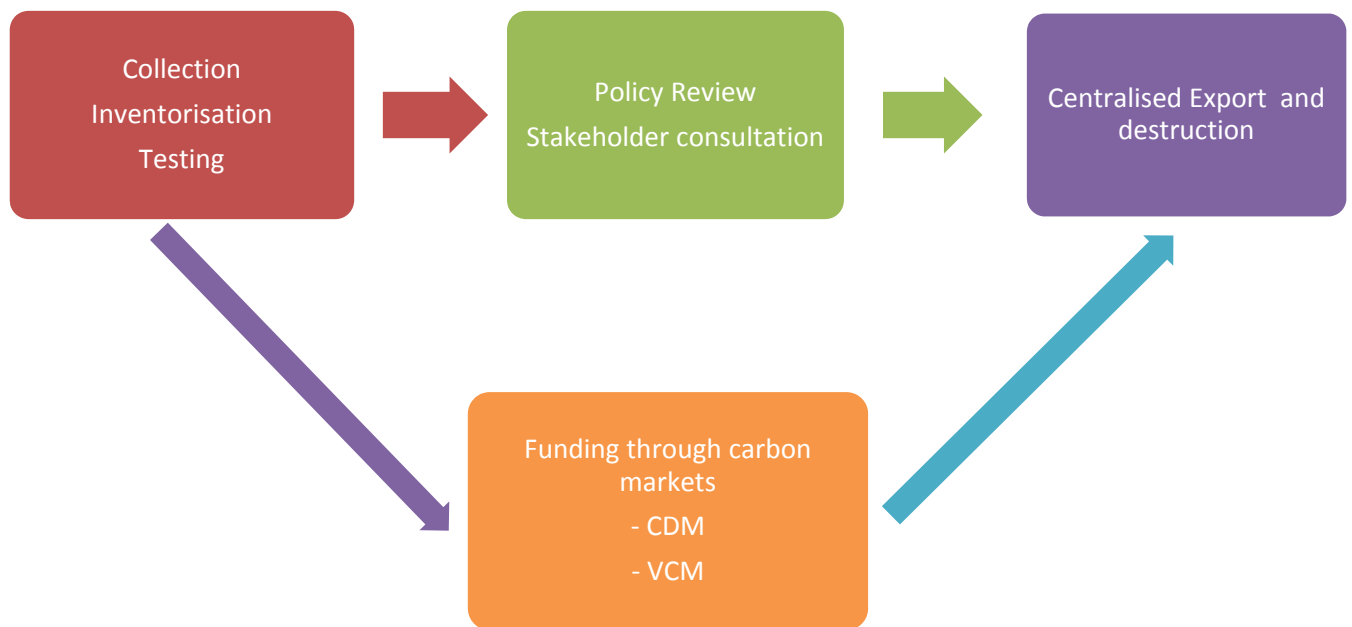
6. Involve with CDM Designated National Authority (DNA) for applicability of CDM/VCM for this project
 - If destruction facilities are established in the country, then determination of the CDM/VCM eligibility of the project should be determined from the DNA
 - Establish proper policies and guidelines for the same
 - Arrange for administrative framework for facilitating the process

7. Conduct a detailed stakeholder consultation and survey
 - Identify the stakeholders – Some of them are listed below:-
 - Government of the LVC concerned
 - National Ozone Unit, Ministry of Environment

- Ministry of Energy
 - Department of Customs
 - Ministry of Commerce
 - Climate Change Focal Points
 - Private Sector
 - Importers & retailers of RAC equipment
 - Transporters, container companies, freight forwarders
 - Pesticide suppliers and manufacturers
 - Industry Associations
 - Transport and freight carriers
 - Hospitality sector
 - Refrigeration & Air-conditioning Training Centres
 - Define roles and contributions of the stakeholders for the project
 - Establish accountability of the stakeholders for the same
8. Education and public awareness is vital for the success of the program
- Develop a training manual for the technicians involved in the sectors in which ODSs are used
 - Organise awareness campaigns and workshops across the country on ODSs and their harmful effects for the general public
 - Similar campaigns should be organised for all stakeholders to raise their awareness
9. Absence of any infrastructure for recollection of ODSs
- Equipment which are scrapped and which have reached their end of serviceable life can become sources of ODSs
 - Programs can be launched for the collection of ODSs from such equipment
 - Funding sources should be considered for the programs, which can actually be instrumental in making the projects more economically viable
 - Quality analysis and testing facilities should be established for such recollected ODSs
10. Options for ODS destruction for an LVC like Nepal
- Bring a mobile destruction unit and destroy the ODS in situ - an expensive proposition (fixed cost of 0.2 million USD plus variable cost of 5-7 USD per kg)
 - Destroy the ODS in cement kilns within the country in the long term
 - Export the ODS to the United States or Japan for destruction

NEPAL MODEL FOR LVCs

The following figure graphically explains the replicable Nepal model for other LVCs. The process starts with Collection, Inventorisation and Testing of the ODS stocks bifurcating into Funding Review and Policy Review (With Stakeholder Consultation). After these jobs are done, the next exercise would be to export the stock and destroy it.



Additional funding for replacement and collection of ODS in LVCs could be obtained in form of Utility subsidies, Manufacturer/Retailer discounts

Fig 1 – Nepal Model for LVCs – ODS Destruction Project for LVCs