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

项目提案：加纳

本文件包含基金秘书处对以下项目提案提出的评论和建议：

销毁

- 消耗臭氧层物质废物管理和处理试点示范项目 开发计划署

项目评价表－多年期项目

加纳

项目名称	执行机构
消耗臭氧层物质废物管理和处理试点示范项目	开发计划署

国家协调机构：加纳-环境保护局

最新报告的项目所涉消耗臭氧层物质消费数据

A: **第 7 条数据（ODP 吨，2009 年）**

附件一，氟氯化碳	3.4		

B: **国家方案行业数据（ODP 吨，2009 年）**

消耗臭氧层物质名称	次级行业/数量	次级行业/数量	共计
氟氯化碳			3.4

本年度业务计划：供资总额 281,000 美元　　淘汰总量 8.8ODP 吨

项目名称

企业的消耗臭氧层物质用量		暂缺
将淘汰的消耗臭氧层物质		暂缺
将使用的消耗臭氧层物质		暂缺
现有业务计划项目		是
行业		消耗臭氧层物质废物
次级行业		制冷维修行业
项目的影响		8.8 公吨 CFC-12
项目的期限		36 个月
地方所有权		100%
出口部分		%
申请的多边基金赠款	美元	198,000
执行机构支助费用（9%）	美元	17,820
多边基金的项目总成本	美元	215,820
成本效益	美元/公斤	22.5 消耗臭氧层物质（公制）
项目监测指标		包括

秘书处的建议：	供单独审议

项目说明

导言

1. 在第六十二次会议上，开发计划署代表加纳政府首次提交了一项供资总额为 377,677 美元的加纳消耗臭氧层物质废物管理和处理试点示范项目提案。在讨论该项目时，考虑到与维修拟议销毁设施有关的问题，以及缺乏在试验阶段结束后继续实施该项目的综合业务模式（第 62/28 号决定），执行委员会除其他外决定，推迟至委员会第六十三次会议审议开发计划署提交的这一试点示范项目。

2. 开发计划署代表加纳政府再次向第六十三次会议提交供资总额为 219,776 美元的加纳消耗臭氧层物质废物管理和处理试点示范项目订正提案，供其审议。该项目是根据第 58/19 号决定提交的，将处理销毁该国 8.8 公吨消耗臭氧层物质废物的问题。加纳政府正请求第六十三次会议核准该项目。

3. 在第五十七次会议上，执行委员会为开发计划署提供了资金，以帮助加纳编制一项消耗臭氧层物质试点示范项目。这次会议决定，考虑编制消耗臭氧层物质处理试点项目，以落实缔约方第二十次会议第 XX/7 号决定，该决定规定，此类试点项目可涵盖收集、运输、储存和销毁消耗臭氧层物质的活动，并以全球变暖潜能净值高的组合储备及各地区第 5 条国家中具有代表性的样本为重点。成员还强调消耗臭氧层物质处理示范项目应该可行，且应纳入有效利用共同筹资的方式。加纳是根据这一标准选出的国家之一。

背景

4. 执行委员会第五十八次会议讨论了选择消耗臭氧层物质处理项目的标准和准则，并通过了第 58/19 号决定。该决定为审查与核准消耗臭氧层物质处理示范项目奠定了基础。秘书处根据该决定和第 62/28 号决定确立的原则开展了审查。秘书处适用了该决定第(a)(二)a 分段，该分段明确规定，在这次审查中，不会向消耗臭氧层物质的收集提供任何资金。第五十八次会议报告的附件载有收集消耗臭氧层物质的定义，该附件题为“为消耗臭氧层物质处置示范项目供资暂行准则所包括的活动的定义”。加纳的试点项目将涵盖已收集的消耗臭氧层物质，以及将在推广节能冰箱项目下另行收集的消耗臭氧层物质，此项目将通过由全球环境基金资助的市场转型来实施。

5. 该试点项目力争通过出口在加纳建立一个用于运输、储存和销毁消耗臭氧层物质的高效和具有成本效益的物流框架。如上所述，该试点项目与全球环境基金资助的一个拟议的节能项目密切相关。在该节能项目中，将报废和提前停止使用的耗能冰箱收集到地区仓库，并进行拆卸，以回收消耗臭氧层物质。在全球环境基金资助的节能项目下制定了激励机制（折扣、交还和碳信用额），以鼓励消费者购买节能冰箱/冰柜。上述努力得到了与维修现有制冷设备的回收业务相关的现行结束性淘汰管理计划和氟氯烃淘汰管理计划的补充，维修制冷设备也会产生消耗臭氧层物质废物，且这部分废物量无法再利用。详细的项目提案见本文件附件一。

项目说明

6. 该试点项目最初将处理已收集和待销毁的 1.8 吨 CFC-12。同时，该试点项目将出台措施，支持针对现有消耗臭氧层物质废物的项目的可持续性，将通过目前供全球环境基

金核准的节能方案下出台的全国收集制度收集这些废物。国家政府还通过出台国家条例为方案提供了政策支助，国家条例不鼓励出口消耗臭氧层物质废物，除非通过正在拟议的指定处理中心，但提倡从相邻的西非国家经济共同体（西非经共体）进口消耗臭氧层物质废物，以此作为一种地区进口模式。预计在三年内实施销毁消耗臭氧层物质示范项目。

7. 该项目计划提议将消耗臭氧层物质废物出口到第 2 条国家，用其合格的销毁设施进行销毁。

将处理的消耗臭氧层物质估计量

8. 用于销毁的消耗臭氧层物质来源于现有储备、制冷剂回收方案和西非经共体国家的进口。目前，加纳有 1.8 公吨的 CFC-12 储存量有待处理。将通过尚未核准的全球环境基金节能方案回收的制冷剂估计量还包括，以 80%的回收率、三年收集 72,500 台计算，被处理冰箱产生的 5.8 公吨 CFC-12。估计数值见表 1。

表1：该项目将使用的消耗臭氧层物质废物估计数值

	数量	**吨数**
储存（已收集）		1.8
来自全球环境基金节能方案	72,500	5.8
来自目前和将来的回收和再循环方案	10,345	1.2
从西非经共体进口的消耗臭氧层物质废物		待处理
		8.8

项目的财务管理

9. 该提案设想将多边基金的供资用于支付该试点项目三年的执行费用和经营费用。该提案还设想可利用碳信用额逐渐扩大项目，但一切取决于试点活动的结果。每年至少需要从全球环境基金节能方案交还 3 万台，才能回收 2.4 吨 CFC-12，以实现 22,500 吨二氧化碳当量的确认减排量，并至少达到 3 美元/吨二氧化碳当量的确认减排量。其前提条件是，全球环境基金项目全面运作，并且多边基金予以供资。

10. 在全球环境基金和多边基金提供援助的三年期结束时，并根据上文所述，该项目将把回收的其他消耗臭氧层物质转化为碳信用额，从而使该设施可以持续下去。加纳打算在十年中交还 100 万台旧冰箱。这相当于每年交还 10 万台，但更保守的估计是每年 3 万台冰箱，相当于回收 2.4 吨或更多的 CFC-12。这是最佳情况下以供将来销毁的可能值。

销毁技术的选择

11. 确认的处理消耗臭氧层物质的可能的选择为：一）水泥窑销毁；二）开发一项当地销毁设施，以及，三）出口到第 2 条国家，用其合格的销毁设施。水泥窑销毁在加纳不可行，因为经专家证实，加纳没有水泥窑（所有水泥产品都利用进口的熟料粉末制成）。

12. 第二个选择是在执行委员会第六十二次会议上提出的方式，即借助一个由日本开发的小型等离子弧机器设计该项目。但被证实难以确定这种方式的成本效益，而且设施管理及其可持续性方面存在一些问题。

13. 经过审议并最后选定的第三个选择依据的是，将消耗臭氧层物质废物出口到非第5条国家，进行危险废物焚烧，并利用可能具有商业规模的设施进行销毁。这种方式可以降低销毁成本。在这种情况下，位于特马港口的处理中心将收到来自全国多个拆卸和维修中心的含有消耗臭氧层物质废物的小汽缸，确认消耗臭氧层物质的种类，并用较大的集装箱（按照其种类）运到经确认的国外销毁设施。已订约的消耗臭氧层物质销毁公司负责管理从特马港口到销毁设施的运输。将通过竞标将处理中心的业务分包给现有的制冷剂进口商或经销商。该中心的其中一项任务将是鼓励将少量消耗臭氧层物质运到某个地点，在此将这些物质并入较大的集装箱，并为此维护一个详细记录收到和出口制冷剂数量的数据库。该数据库至关重要，因为它有助于将来申请获得碳信用额，示范项目一旦结束，碳信用额将使得能够可持续开展业务。

14. 该提案还指出，在遵守《巴塞尔公约》方面，该公约将不会阻止消耗臭氧层物质在其缔约国之间的流动。至于消耗臭氧层物质废物的运输，将需要载入工作人员事先同意和对其进行适当培训的规范的《巴塞尔公约》文件。该项目顾问将负责根据这些要求培训拆卸中心的工作人员。

销毁的监测与核查

15. 为了确保所有消耗臭氧层物质都能得到适当的监测和说明，将密切监测这一过程，并在拆卸中心和处理中心记录这些数据。将出台严格的监测与核查计划，以避免重复计算和出现其他错误。将开发可追踪性和监管链，以确保进行透明和负责的监测。例如，拆卸中心收集的数据应包括被处理设备的序列号、关于设备每一部分收集量的标注，以及与将使用的汽缸编号的联系。处理中心将记录汽缸的编号，以与收集阶段的信息保持匹配。透明的监测程序将使得以对销毁的消耗臭氧层物质进行独立的外部核查，以认证碳信用额。

项目成本

16. 据估算，最初提交的项目的总成本为 219,776 美元，如下表所示。

表 2：拟议项目成本

预算	单位	美元
A. 资本成本		
标识符、汽缸、杂项等		20,000
计算机和数据库监测软件		2,000
小计		22,000
B. 运输成本		
从拆卸与维修中心运往特马港口的处理中心	1.00 美元/公斤	
国外运输	8.08 美元/公斤	
用于销毁的倾卸费用	4.19 美元/公斤	
小计	8,800 公斤 13.27 美元/公斤	116,776
C. 运转设施的分包成本		
三年一名技术人员		21,000
一项现有设施三年涉及的空间、安全、电力、用水和空调费用		6,000
三年中负责消耗臭氧层物质废物数据库/监测的兼职人员		6,000
小计		33,000
D. 技术支助和监督		
兼职国家顾问		24,000
兼职国际顾问（含 2 次访问加纳）		24,000
小计		48,000
总计		219,776

秘书处的评论和建议

评论

17. 秘书处根据对第 58/19 号决定中规定的标准进行的审查，就该提案向开发计划署提出了一些评论和意见。秘书处还指出，尽管已进入核准前的最后阶段，但为收集其他消耗臭氧层物质废物提供基本收集制度结构的全球环境基金节能项目尚未得到全球环境基金的核准。

18. 关切的是，是否具有充足的消耗臭氧层物质废物，保证项目的成功实施和可持续性。该试点项目的销毁目标是 8.8 公吨，但目前该国现有和已收集的数量只有 1.8 公吨。秘书处指出，虽然核准编制该项目是基于已收集的 1.8 公吨消耗臭氧层物质废物做出的，但为使这个方案营利，需要建立一个能够稳定供应废物的系统。开发计划署回应时表示，随着全球环境基金节能项目的全面实施以及即将更换该项目目标数量的冰箱，必然会定期供应更多的废物流。此外，尚未考虑其他国家的消耗臭氧层物质的废物，这些废物也会被收集存储，以便于通过拟议的处理设施进行出口。开发计划署还提到，至少在最初的六个

月内，它们将会组织与处理设施相关的活动；因此，它们假定，到第二年，将能够获得超过 1.8 公吨的消耗臭氧层物质废物。

19. 秘书处要求开发计划署对“处理设施”的定义做出澄清，这是否是一个即将建立的用来存储和管理消耗臭氧层物质废物的中央储存设备。开发计划署证实，该处理设施不仅能实现临时存储，而且能够决定哪些消耗臭氧层物质适合回收和再利用，哪些可以出口用于销毁，并为此维护一个数据库，所以“处理设施”是更适合描述该设备的术语。因此，这也澄清了该处理设施不包含原地销毁。

20. 秘书处还想了解更多关于提案中所设想的处理中心计划业务的信息。开发计划署表示，此中心将成为一个由国家指定和管理的靠近港口的中央处理设施，全国各种拆卸和维修中心的消耗臭氧层物质废物会在港口集中存放。该设施将作为一个用来收集大量消耗臭氧层物质废物的中心仓库，并能负责鉴定收到的消耗臭氧层物质及其纯度，在可能的情况下回收制冷剂，并把消耗臭氧层物质废物出口到非第 5 条国家进行销毁。

21. 秘书处还要求开发计划署澄清该中心通过分包做法将薪酬与业绩相挂钩的依据，以及如何得到每公斤 3 美元这样一个处理该中心消耗臭氧层物质的成本值。开发计划署解释说，这是根据中心所需房屋费用加上支付员工的薪水等开销的估计数额除以这个中心应该能够处理掉的消耗臭氧层物质废物的数量，得到的约每公斤 3 美元的开销。开发计划署表示，这样的薪酬将鼓励分包商成为我们的全面合作伙伴，确保实现该目标（处理量）。

22. 此外，根据第 62/28 号决定，秘书处要求开发计划署澄清，缺乏在试点阶段结束后继续实施项目的综合业务模式的事项，因为它指出，该提案并未明确阐释该事项。开发计划署在回应时表示，该项目的能否营利和可持续将取决于这一初步阶段是否成功。开发计划署进行了一项敏感度分析，比较了每年的冰箱台数（20,000 至 90,000 台，80 克/台）、年消耗臭氧层物质 CFC-12 量（1.6 至 7.2 吨）和确认减排价格（2 至 5 美元/确认减排量）。如果再考虑到将由全球环境基金节能项目收集的目标冰箱，通过出口进行的处理在确认减排量方面将是营利的，并可用于维持今后的项目。开发计划署还提到，加纳在淘汰耗能白炽灯过程中获得经济、社会和环境惠益的经验，坚定了该国政府对淘汰耗能效设备的承诺。开发计划署称，这一国家承诺将成为该项目的驱动力。

23. 秘书处提请开发计划署注意，该项目的总成本和每公斤被销毁的消耗臭氧层物质对应的费用，并指出，由于方法发生了变化，现有提案的资本成本大幅减少，但每公斤的费用（25.0 美元/公斤）高于向第六十二次会议提交的最初提案中的费用。开发计划署表示，这是由于目前提交的提案涉及的将淘汰的消耗臭氧层物质数量较少。秘书处请求开发计划署审查这些费用，以考虑在何处做出调整，特别是顾问费用，以及可能涉及的运输费用。调整的结果是，每公斤的费用为 22.4 美元，高于第 58/19 号决定允许的最高值——每公斤 13.2 美元，但鉴于加纳是一个低消费量的国家，所以该国不受该决定具体内容的制约。

24. 经议定，该项目的最终费用为 198,000 美元，外加支助费用。具体安排概括如下表：

表 3：项目的议定成本

预算	单位	美元
A. 资本成本		
标识符、汽缸、杂项等		20,000
计算机和数据库监测软件		1,560
小计		21,560
B. 运输成本		
从拆卸与维修中心运往特马港口的处理中心	0.6 美元/公斤	
国外运输	6.6 美元/公斤	
用于销毁的倾卸费用	4.1 美元/公斤	
小计	8,800 公斤 11.3 美元/ 公斤	99,440
C. 运转设施的分包成本		
三年一名技术人员		21,000
一项现有设施三年中涉及的空间、安全、电力、用水和空调费用		6,000
三年中负责消耗臭氧层物质废物数据库/监测的兼职人员		6,000
小计		33,000
D. 技术支助和监督		
兼职国家顾问		22,000
兼职国际顾问（含 2 次访问加纳）		22,000
小计		44,000
总计		198,000

建议

25. 谨建议执行委员会考虑：

(a) 赞赏地注意到加纳政府提交的销毁总量 8.8 公吨的消耗臭氧层物质废物的消耗臭氧层物质废物管理和处理试点项目；

(b) 原则上核准加纳的消耗臭氧层物质废物管理和销毁试点项目，供资总额为 198,000 美元，外加给开发计划署 17,820 美元的支助费用，但条件是在全球环境基金资助的节能项目获得核准之前，不向该国发放资金；以及

(c) 在此次会议上核准 198,000 美元的供资，并指出，核准的条件是今后不再向加纳实施任何消耗臭氧层物质处理项目提供更多资助。

Project Document

Government of Ghana

United Nations Development Programme

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

Pilot Demonstration Project on ODS-Waste Management and Disposal

18 Feb 2011

COUNTRY:	**Ghana**	**IMPLEMENTING AGENCY: UNDP**
PROJECT TITLE:	**Pilot Demonstration Project on ODS-Waste Management and Disposal**	

PROJECT IN CURRENT BUSINESS PLAN:	**Yes**
SECTOR:	**ODS-Waste**
Sub-Sector:	**Refrigeration Servicing Sector**
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)**
PROJECT MONITORING MILESTONES:	**Included**
NATIONAL COORDINATING AGENCY:	**Ghana-EPA**

Brief Description.

UNDP Ghana in collaboration with the Environment Protection Agency (EPA), Energy Commission of Ghana and the Center for Rural and Industrial Research (CRIR) has 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 seeks 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 will 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 will 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.

*: Throughout the document, the word "dispose" is used to mean "to get rid of". Indeed, after a previous submission found that local destruction of the waste in Ghana would not be feasible, the country has agreed to utilize the export-option to get rid of the waste. As such, the words "destroy" and "destruction" were replaced by "dispose" and "disposal" throughout this project document.

1. INTRODUCTION AND BACKGROUND.

The Government of Ghana is requesting funding for the starting up of a pilot project to evaluate and demonstrate on the safe disposal of ODS. The project complies with the criteria established by Decision 58/19 and it will focus on specific aspects not previously addressed by this type of pilot projects. This 'learning by doing' project will be the first of its kind in the West African region, and will demonstrate how the technical, financial, regulatory and institutional barriers can be overcome for the mainstreaming of ODS management and disposal project. This project will generate valuable information about possible models to establish a long term self-sustaining system to collect ODS from the banks and dispose of them. Furthermore, this information could also be helpful to other ECOWAS countries interested to undertake similar approaches to manage their ODS banks. As there is no ODS destruction technologies or equipment in West Africa, there is great potential to collect, recover and dispose of ODS in banks and in old inventory stocks, which justifies the investment.

The case of Ghana has the following unique features:

- This project seeks to demonstrate the viability or otherwise of a national management and ODS disposal facility, noting that this is part of a larger strategic approach by UNDP to demonstrate a range of options in the projects it is currently assembling for a range of country specific situations.

- Ghana is a developing country with no ODS destruction facilities in place. This is the situation of many countries in the region, which makes this pilot attractive as the information generated and lessons learnt could be shared with other countries with comparable characteristics. The destruction of CFC-11 contained in foam will not form part of this pilot-project, unless a solution can be found to handle its disposal within the existing budget.

- ODS waste from Ghana will be exported. If found feasible, ODS waste from the neighbouring ECOWAs countries will be contemplated as well. The risks and barriers (economic, legal, Basel and Rotterdam conventions stipulations, etc.) for such interventions will be identified and means for mitigation will be formulated.

- This pilot project seeks to develop an efficient and cost effective logistic framework for the transport, storage and shipment of ODS in Ghana. As such, this pilot project is closely integrated with the GEF funded Energy Efficiency (EE) project where End-of-Life (EOL) and early retired energy inefficient refrigerators will be collected and dismantled in regional depots for ODS recovery. Incentives schemes (rebate, turn in and carbon credits) are developed under the GEF EE project to incentivize consumers to purchase EE refrigerators/freezers. These efforts would be complemented by existing TPMP and HPMP related recovery operations for the servicing of existing refrigeration equipment, which also will generate volume of ODS waste that can no longer be re-utilized.

- The disposal center* will be operated by a sub-contractor through a performance based bidding process. The sub-contractor will be guided by a comprehensive operation and a stringent monitoring plan to be supervised by a national consultant.

- The opportunity to leverage market based finance mechanisms and other innovative modalities (bilateral grants and EUA auctions) will be explored for the monetization of environmental services of avoided ODS emissions into carbon assets. Means for mitigating the technical, regulatory and financial risks will be discussed.

*** Note: Throughout the document, the term "disposal center" is used to mean a centralized facility near the port where the ODS-waste would be temporarily stored, coming from the various dismantling and servicing centers throughout the country. It would have the function of encouraging the transport of small quantities of ODS-waste to its location. It would also identify the ODS-waste received and its purity, recycle refrigerants when possible, and arrange for its export if non-recyclable. The amounts disposed by the center would correspond to the sum of ODS-waste recycled plus ODS-waste exported.**

2. OVER-ARCHING STRATEGY AND PROJECT OBJECTIVES

The Multilateral Fund (MLF) has for over fifteen years supported ODS phase out projects. By and large this support has been focusing on the so-called Annex-A substances from which CFCs constitute the main group. A Terminal Phase out Management Plan (TPMP) is nearing completion in Ghana which addresses the CFC phase-out. As a follow-up, an HCFC Phaseout Management Plan (HPMP) which tackles the control and phase out of HCFCs, has recently been approved in July 2010.

UNDP in collaboration with EPA, Energy Commission and the Center for Rural Industrial Research (CRIR) has 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: (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). Opportunities to convert the environmental services into carbon credits and assets offered by these programs will be explored. 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.

The TPMP and HPMP phase out project only target the servicing sector where functioning refrigerators are being repaired. Whilst the TPMP and HPMP programs are targeted at the accelerated phase out of ODS in the servicing sector, the ODS disposal project seeks to reduce potential ODS and carbon emissions from the ODS bank. This proposed ODS disposal pilot project with MLF funding seeks to address both the early refrigerator retirement program through rebate and turn in as well as the End-of-Life program when old refrigerator reach the end

of their life and are beyond repair. It is evident that some of the actions undertaken would address the objectives of both the Montreal Protocol and the Kyoto Protocol.

The proposed Integrated Plan would address all subsectors (residential, commercial, industrial refrigeration, air-conditioner [AC], mobile air-conditioner [MAC], chillers) and all types of refrigerants (CFCs, HCFCs and HFCs) as shown in the following diagram.

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

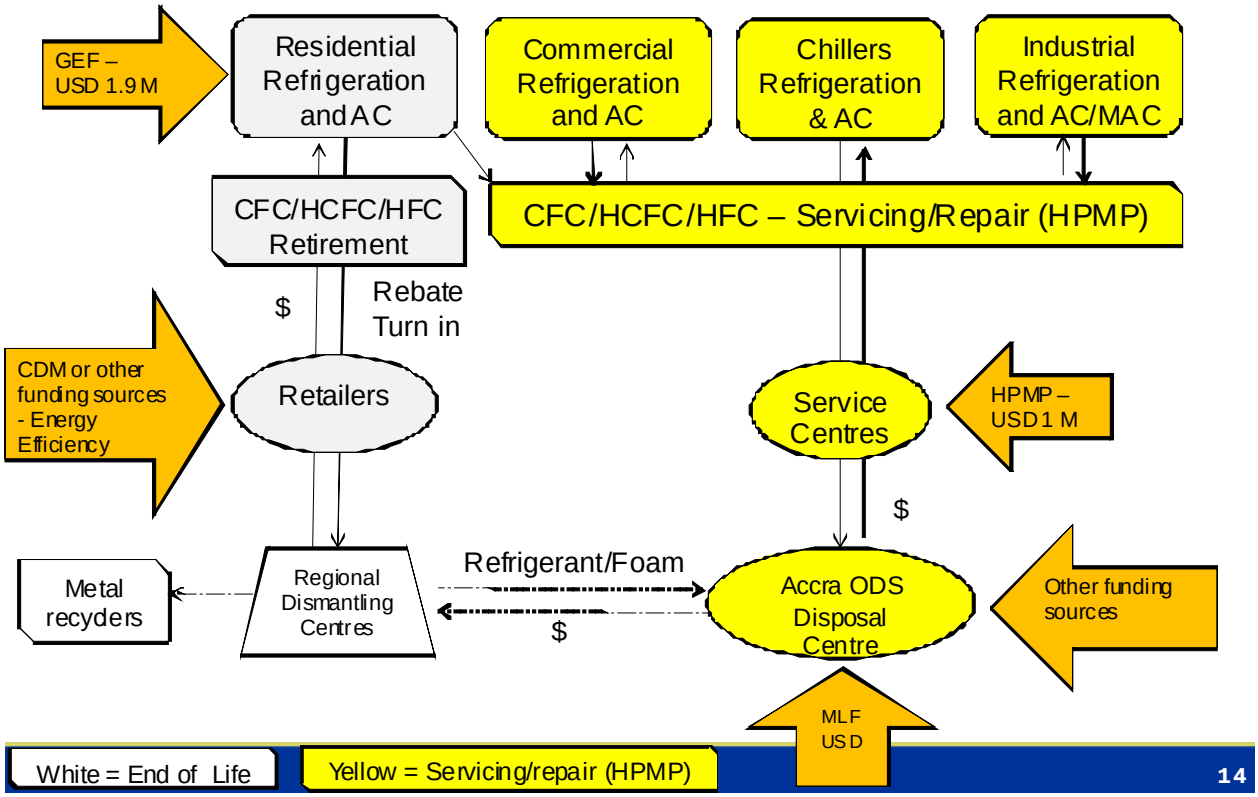


Figure 1 provides an overview of how the proposed Integrated Plan would work. Boxes in white represent the GEF-funded End-of-Life "Market Transformation for Energy Efficiency" programme, while the yellow boxes represent ODS management projects for the servicing sector financed by the MLF. Through the End-of-Life Scheme, equipment would be collected by trained retailers or NARWAO workshops owners scattered across Ghana.

The refrigerators would be stockpiled and then transported to Regional Dismantling and Recovery Centres. The recovered refrigerants would be stored safely in refillable cylinders and the foam packaged as bale would be sent to a central ODS Disposal Centre to be located in Port Tema. As proposed in this project, all the unusable ODS refrigerants would be exported for final

disposal. The opportunity for initial ODS recycling or reuse will be explored. TPMP and HPMP activities would involve servicing operations on existing equipment, which would be supported by the MLF.

The brown arrows relate to the expected influx of funding from the GEF/MLF and other potential sources. Downward arrows in the diagram represent the process by which refrigeration equipment/refrigerant is delivered to the Regional Dismantling and Recovery Centre. Upward arrows represent resources required to make the programmes operational and MLF and GEF funding (or funding from other grants) is needed to help developing countries and enterprises (especially Small-Medium Sized Enterprises) cover the necessary upfront investments. Without these funds they would not be able to cover these costs. As such GEF and MLF funding would play a critical role in kick-starting the above-mentioned scheme in Ghana during the first couple of years.

GEF funds would initiate the Early Retirement as well as End-of-Life scheme for the domestic refrigeration sector. The MLF's previous TPMP efforts and upcoming HPMP funds would help establish a refrigerant recovery scheme and collection centre, while the MLF's ODS waste pilot project would help fund ODS disposal operations, or the transhipment of ODS waste for destruction abroad. The legislative framework required to help sustain the operations will be established.

Once the model has been tested and proven, it is anticipated that other sources of finance, including carbon finance, would generate the necessary funding that would allow the cycle to continue and to become self-sustainable. The ODS Disposal Centre would contribute to the provision of reliable information regarding the reclaimed/disposed ODS amounts, which in turn would facilitate obtaining approval for these alternative funding sources.

The objective of this MLF-funded demonstration project will be to demonstrate the viability of an efficient and cost effective framework/infrastructure for the transport to the central facility, storage of recovered/aggregated ODS and an approach to transport these ODS for destruction abroad.

3. JUSTIFICATION FOR THE ODS-DISPOSAL PILOT PROJECT

The Executive Committee, at its 58th Meeting, has approved a set of interim guidelines for the funding of demonstration projects for the disposal of ODS in accordance with paragraph 2 of decision XX/7 of the Meeting of the Parties. The followings described in detail how the project complies with the Decision 58/19:

3.1. Updated and more detailed information for all issues required to obtain project preparation funding.

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

The collection of refrigeration equipment will be carried out under the GEF funded Energy Efficiency project (Figure 1) where a grant of USD 1.72 million will be used to establish Regional Dismantling Centres for the recovery of CFC-12 and HCFC-22 refrigerants from early retired or End-of-Life (EOL) domestic refrigerators/freezers. The GEF EE project is in an advance stage of responding to comments received from GEF CEO and has been resubmitted in February 2011 for final CEO-endorsement.

Other ODS streams will be coming from the commercial sector covered under the MLF-funded TPMP and HPMP programs for the phase out of CFCs and HCFCs. Hence, this pilot project would thus not deal with the collection/dismantling of refrigeration equipment, but solely with the transport, storage and disposal of the unusable ODS that would be resulting from the GEF, TPMP and HPMP programmes.

ii. An indication whether disposal programmes for chemicals related to other multilateral environmental agreements are presently ongoing in the country or planned for the near future, and whether synergies would be possible.

National Programme on Energy Efficiency:

A GEF-funded Full-Size Project on energy-efficiency in Ghana to be implemented by UNDP would allow Ghana to introduce minimum energy performance standards (MEPS) for refrigerators in addition to air-conditioners and compact fluorescent lamps which already have MEPS approved in 2005. The banning of used and second hand refrigerators will prevent the importation of obsolete and energy guzzling appliances which place a heavy burden on the already strained national power supply. Much as the Government of Ghana has approved energy labels for air conditioners with a minimum of EER 2.8 for single star air conditioners two years ago, the Parliament of Ghana has in October 2009, approved an act effective within six months, establishing energy Standards and Labels (S&L) for all new refrigerators and freezers imports into the country. This ODS-Waste pilot project will complement the effort to be undertaken by GEF EE project for the scaling up of energy efficiency appliances via market based mechanism to incentivize behavior change.

To reduce energy demand, ozone depletion, and global climate impacts, it is critical that the older and inefficient refrigerators are permanently removed from homes, offices and other locations and properly disposed of so that environmentally-harmful refrigerants and foam blowing agents are captured and recycled or destroyed. Given the large number of refrigerated appliances expected to be taken out of service under the market transformation, the environmental impacts of removing and properly disposing of old appliances can be significant

The GEF project would set up regional equipment-collection and dismantling centers. The MLF-current pilot project on ODS-waste would tie into this effort by assuring transportation of the refillable cylinders to a centralized ODS-waste centre in Port Tema that would focus on the final disposal of these ODS.

Ghana - Capacity Building for PCB Elimination: Polychlorinated Biphenyls (PCBs) are not regulated in Ghana. PCBs have been found in significant quantities in equipment in the electrical power network in Ghana. Approximately 2 % of the transformer population is filled with pure PCB oils and some 12% are contaminated with PCBs due to maintenance practices. In addition 147 capacitors (7.5 tons) of PCB containing capacitors have been inventoried. The GEF-funded project implemented by UNDP-UNITAR is aimed at strengthening the capacities and capabilities of government officials and stakeholders outside of government to address PCB identification, manage existing sources of PCBs as well as their elimination. The project develops and describes a strategy, and the required steps, from the current unsustainable management of PCB-containing equipment to sound management and disposal practices. This GEF project will focus on capacity building and PCB destruction in addressing not only Ghana's PCB-related obligations under the Convention, but also related to wider chemicals management issues. The economic and legal feasibility to combine the export of ODS-waste with PCB for destruction overseas will be explored in this MLF-funded pilot proposal. In this regard, it can be anticipated that Ghana will propose a PCB stockpile elimination project for GEF funding and likewise is a participant in the multi-agency Africa Obsolete Pestide Stockpile project, both of which could offer synergies for the destruction of ODS along with other chlorinated EOL chemicals.

Hazardous Wastes: In response to the global mandate for the environmentally sound management of hazardous, solid, radioactive and electronic waste (e-waste), Ghana has among other things, embarked on a life cycle approach to address chemicals and other hazardous wastes management in an integrated manner. This involves a broad range stakeholder institutions and organizations including non-governmental organizations. In 1997, a comprehensive National Chemicals Management Profile was prepared by the EPA with the assistance of United National Institute of Training and Research (UNITAR) and the Inter-organization Programme for Sound Management of Chemicals (IOMC). Other programmes, which are being undertaken, include the framework for Integrated Coastal Zone Management.

The issue of waste management has become a subject for research in many stakeholder institutions. The management of plastic waste is receiving attention. Some technologies have been developed to assist in the recycling of waste. A number of small-scale plastic waste recycling plants have been set up in the Greater Accra Region. There are plans to set up similar ones in other metropolitan, municipal and urban areas of the country. The management of other solid and hazardous waste is also being researched at the Ghana Atomic Energy Commission and the Council for Scientific and Industrial Research (CSIR). Exogenous technologies are also being studied for their appropriate adoption and transfer for local use. This proposal will develop sound management and infrastructure for the safe disposal of metals and scraps from the de-manufacturing processes of retired refrigerators.

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

Information included in following paragraph.

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

The project will start by disposing the 1.8 t of CFC-12 that NOU has collected in store. But given that there is only 1.8 t of CFC-12 stock in Ghana (Table 2), one of the risks identified in this project is the sustainable supply of enough ODS for disposal. In order to overcome these uncertainties, steps are being taken to ensure the sustainable supply of ODS for disposal, including: i) ensuring strong political will and buy-in to support the program to replace energy inefficient refrigerators (through a GEF funded EE programme); ii) discouragement for the export of ODS except through the dedicated disposal center and iii) encouragement for importation of ODS-waste from neighboring ECOWAS countries. The Minister of Environment of Ghana has issued a letter of transmittal to support this approach (see Appendix 1). The Basel Convention would not prevent the movement of ODS between countries in the region that have ratified the Basel Convention. For shipment of ODS-waste to Ghana, the normal Basel documentation including prior consent and proper training of the staff would be required.

The amounts that will be available for disposal described below:

Table 1: Estimated quantities of ODS-waste that will be used in the project:

	Units	Tons
In storage already		1.8
From GEF EE Programme	72,500	5.8
From ongoing and future R&R schemes	10,345	1.2
From ECOWAS imports of ODS-Waste		Tbd
		8.8

It is important to understand the urgency of the Ghanaian government to execute this ODS disposal project to complement the GEF EE and HPMP project. The government of Ghana has experienced the economic, social and environmental benefits of legislating pragmatic and sound energy demand side management policy (Minimum Energy Performance Standard) for the promotion of energy efficient appliances as a mean to curb national energy demand. The distribution of six million free Compact Fluorescent Lamps (CFL) in exchange for incandescent lamps in 2007 resulted in a saving of 124 MW of power by the end of the first quarter of 2008 and energy cost savings in excess of US$33 million per annum.

Having seen and tested such life saving benefits and success, the Ghanaian government is keen once again to introduce 72,500 ‘Star rated’ energy efficient refrigerators (average savings from 600 to 950 kWh/year per unit) over a period of three years to further reduce national energy demand under the GEF EE project.

Hence there is already in place a strong political will, financial incentives and institutional support to replace 1 million old and energy guzzling refrigerators to provide further savings in power as a follow up to the GEF EE project. Indeed, the daily opportunity cost is too high for

any delay in the replacement of the 1 million energy inefficient refrigerators which is draining both personal and national incomes. To expedite this urgency, a Public Notice was advertised in August 2010 in the national daily newspaper (Appendix 2) by Ghana's Energy Commission on '**Energy Efficiency Standards for Refrigerating Appliances and the Prohibition of the Manufacturing, Importation and Sale of Used Refrigerators and Freezers'.** This is enacted under the legislation approved in Nov 2009 (Energy Efficiency Standards and Labeling (Refrigerator, Refrigerator-Freezer and Freezer - Regulations, LI 1958). Incentives will be provided as turn in rebate coupons from GEF funding as detailed in Appendix 3. Financial modalities to sustain the project beyond the pilot phase will be explored (e.g. market based carbon credits from CDM on energy gain and ODS destruction credits, bilateral grant and EUA auctions).

Table 2 shows the phased approach in the GEF-funded rebate programme. A conservative volume of 5.8 t of CFC-12 ODS could be collected from the 72,500 refrigerators to be turned in under the GEF EE project over the first three years. In addition to this, however, there will be the amounts of ODS-waste collected from the servicing centers established during the TPMP and those that will be created by the soon-to-be established HPMP. Furthermore, ODS in cylinders from neighboring countries may also be imported to Ghana for disposal.

Table 2: Action plan for the GEF/Govt refrigerator turn-in program in Ghana

Year	2011	2012	2013	2014	2015
Program	GEF EE to turn in 72,500 refrigerators over three years with rebate incentive scheme (Manufacturing, importation and sale of used refrigerators/freezers are banned in May 2010)			Ghana National Turn In Program to replace 1 million refrigerators over 10 years (@ 100,000 units/yr)	
Funding sources	Combine and sequence GEF fund for ODS collection and MLF fund for ODS disposal			Ghana government and voluntary carbon finance	
Refrigerators turned in per year	7,500	25,000	40,000	72,500	60,000
CFC-12 recovered (t)*	0.6	2.0	3.2	4.0	4.8
Old CFC-12 Stock (total 1.8 t)	1	0.8	0	0	0
Other ODS sources	TPMP and HPMP programs (1.2 t) and possible import from ECOWAS region.				
Total ODS to be disposed of	1.6	2.8	3.2	4.0	4.8
* 80% recovery of 100 g/unit = 80 g/unit					

v. For collection activities, information regarding existing or near-future, credible collection efforts and programmes that are at an advanced stage of being set up and to which activities under this project would relate.

Relatively large amounts of refrigerants (CFCs, HCFCs, HFCs and HCs) and potentially in the future will be collected from various ongoing GEF EE and CFC/HCFC phase out and future programmes. There is a substantial bank of HCFC mixtures (HCFC-22/142b and HCFC-406a) in HCFC based equipment that would not be directly recyclable but warrant disposal. The ODS waste stream will come from the following sources:

- The proposed GEF-funded FSP related to the proposed end-of-life programme in the domestic refrigeration sector;
- Any future expansion to other sectors of this end-of-life programme;
- Continuation of previous Recovery/Recycling schemes (mostly based on CFCs) in refrigeration and MAC and possible cylinders of un-usable refrigerants that resulted from such past programmes;
- Previous recovery-schemes created during the RMP and TPMP efforts;
- New Refrigerant Recovery schemes that will form part of the upcoming HPMP funded by the MLF; and
- HCFC-related efforts which may indirectly result from the above-mentioned Recovery/Recycling programme

It might also be necessary to elaborate on the commercial relationship between the regional centers, the servicing sector generally and the central disposal facility that is also at least theoretically acting as a central clearing house for the return of recycled material to the market place.

In view that the success of this ODS pilot is dependent upon the successful collection and recovery of ODS from the GEF EE project and the servicing sector, it is crucial that full commercial relationships, synergies, and coordination are forged with the GEF EE and HPMP project coordinator to overcome the following challenges in:

(a) **Locating and securing old refrigeration appliances and equipment** – the procedures for the GEF EE turn in program for the collection and recovery of ODS is described in detail in Appendix 3. To ensure better coordination for the collection, recovery and disposal of ODS, the operation of the ODS disposal center will be sub-contracted out to the existing importer or distributor with suitable recovery facility as elaborated in more detail in Section 3.2 (iv).
(b) **Enforcement Considerations:** reducing the technical, financial and regulatory risks for the enforcement of ODS collection, recovery and disposal with strong buy in from all stakeholders.
(c) **Coordination of project implementation schedules –** the implementation of the demonstration disposal project substantially depends on the generation of EOL ODS from the GEF project and the HPMP so the development of the physical disposal capability has to match this. Likewise, the provision of arrangements for transportation and storage as part of this project needs to be in place as EOL ODS is generated.

The setup of an ODS-waste disposal centre now as opposed to a delay of one or two years would have the following strategic advantages:

- The concerted impact of starting all three converging projects around the same time (GEF EE and MLF's HPMP and ODS) will help to demonstrate the synergistic value of combining and sequencing MEA funding in bringing ozone and climate benefits to the people of Ghana and around the wider ECOWAS region;
- The start of this ODS disposal project now to complement the GEF EE and HPMP will send a strong signal to the industrial sector that the ODS-waste collection and recovery means "serious business". Without this clear signal, the risk is high that ODS-waste collection will never get started and ODS leakage may remain high;
- The development of the ODS disposal facility in Port Tema in step with the GEF project now will help to strengthen the institutional and infrastructure capability for the collection and recovery of ODS;
- The ODS disposal facility could be used as a training center to train technicians locally on the economic, social and environmental benefits of maximizing ODS recovery and to minimize leakage for demonstrating best practices; and
- The Ghana project provides one of four current projects being undertaken by UNDP for submission at ExCom 61 and ExCom 62. The others (Brazil, Cuba, Columbia) will demonstrate other options tailored to specific country needs and will provide a useful menu of options for replication purposes.

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

This project will focus exclusively on the disposal of contaminated CFCs and HCFCs and no CTCs or halons will be involved in this pilot project.

3.2. Detailed description of the foreseen management and financial set-up.

Currently abandoned domestic refrigerators/freezers are dismantled by individuals in unregulated scrapyards where the used refrigerant is vented, foam is either burned openly or thrown in the river and Korle Lagoon and recycled metals sold to scrap dealers. This project will help to reduce health hazards and address the safety issue of the current practices whilst creating employment in the district areas. This section includes details such as the total cost of the disposal activity.

i. Collection Centers. Early retired or End-of-Life (EOL) refrigerators will be collected by trained retailers or NARWOA workshop owners in exchange for rebate coupons as an incentive for consumers to replace their old refrigerators for new energy efficient refrigerators (5 star) which has low GWP and zero ODS to be co-funded by the GEF EE project. The turn in program is described in Appendix 3 and the GEF EE PIF and the price of the rebate coupon is yet to be determined (possibly in the range of USD 30 to 50 per unit against a price of USD 130 for new refrigerators). Upon collection, these refrigerators will be transported to the regional dismantling and recovery centres. This decentralized system has the advantage of avoiding the transportation of the old refrigerators with dead weight over a long distance to a central area in Port Tema.

ii. Dismantling and Recovery Centers.

A senior highly trained technician will be hired to manage each center to be supported with two shredders or packers. 72,500 units of refrigerators will be collected and dismantled over the first three years. In addition, 4,000 commercial and domestic air conditioners will also be dismantled. Upon receipt, data for each appliance will be recorded, verified and entered into the computer (Figure 3). The ODS from each refrigerator will be recovered by the technician using special equipment according to best practices, labeled and stored in H4499 refillable cylinders (max ODS weight – 10 kg). Each refrigerator will be dismantled taking out the compressor and stripping out the door and wall.

The foam insulation will be segregated from the metal door and wall. Metal, plastic and wires will be sorted and sold to scrap metal dealers. Given the low volume of foam that is available in Ghana, it may not be viable for an expensive vacuum system to be deployed in order to avoid CFC-11 emissions during the dismantling process. The insulation foam will be stockpiled safely for transport and future exports/destruction.

The dismantling and recovery activities will help to create some local employment.

iii. Transport from Regional Collection-Centers to ODS Disposal Centre in Port Tema.

Once ODS cylinders have been stockpiled, these will be transported to the Disposal centre in Port Tema and this cost will be covered under the proposed MLF budget. The technician will record and verify all the data. A budget for transport is foreseen in this project (see budget section below). The monitoring and tracking procedures are explained in Section 3.4.

iv. ODS Disposal Centre

The potential options for ODS disposal were identified as i) cement kiln destruction; ii) developing a local destruction facility and iii) export to a qualified destruction facility in an Article 2 country.

With regards to the first option, consultation with local experts in late-December 2010 has confirmed that there is no cement kiln in Ghana (all cement production is based on grinding of imported clinker) and it is not cost effective to modify the only one cement kiln in neighboring Togo for the destruction of ODS waste from Ghana.

The second option was the one preferred by the Government and a proposal was submitted to this effect to the 62nd meeting of the Executive Committee in early December 2010. The project was designed around a small-scale Plasma-Arc machine developed in Japan. However the cost effectiveness of such a unit was found to be border-line. Risks were found to be high that the operation would not function in a sustainable manner, even if used it on a 2 eight-hour shift basis to make it more cost-effective. The Committee requested UNDP to propose a different approach (as elaborated below) and further to a visit to Ghana in late-December, this message was conveyed to the Government, which agreed to try the third option.

It should be noted that the Basel Convention would not prevent the movement of ODS between countries that have ratified the Basel Convention. For shipment of ODS-waste, the normal Basel documentation including prior consent and proper training of the staff would be required. Training to the staff of the dismantling center on these requirements would form a part of the tasks of the consultants.

The third option is based on the export of the ODS-waste for destruction at hazardous waste incineration and potentially commercially scaled facilities in non-article-5 countries abroad. Lower destruction costs can be achieved by this method. In this case, the disposal centre in Port Tema would just receive the small safe cylinders of ODS-waste from the various dismantling and servicing centers throughout the country, identify the ODS and ship it (by ODS) abroad in larger containers. The transshipment from Port Tema to the destruction facilities abroad will be managed by the contracted ODS destruction company.

To reduce the overhead cost and for efficient coordination, the operation of the disposal center will be sub-contracted out to an existing importer or distributor of refrigerant through a performance based bidding process (see TOR in Appendix 4). One of the tasks of the centre would be an active campaign to encourage the transport of the small quantities of ODS to its location and maintain a detailed database of amounts of refrigerants received and amounts exported. This database would be essential to facilitate any future application to obtain carbon credits which should enable the operation to continue in a sustainable manner once the MLF-demonstration project is over.

The subcontracted sum will be paid under the MLF ODS pilot project (Table 4). Where possible, the HCFC-22 (and also CFCs) from the commercial and domestic air-conditioners will be recycled for re-use. Heavily contaminated ODS however will be exported. To allow for this, refrigerant-identifying equipment, a recycling unit and a set of storage cylinders will be purchased and their budget is shown below in Table 4.

Figure 1 above (see overarching strategy), clearly shows the place of the disposal center within the overall strategy-framework in Ghana. The dismantling and servicing centers will be scattered throughout the country and will not be able to substitute the task that is expected from the centralized dismantling centre.

A performance-based subcontract arrangement will be utilized to kick start the project at the location of an existing refrigerant distributer or similar facility (private or public). While an initial payment will be made upfront to allow the start-up of the centre, further bi-yearly payments would be based on the amounts of ODS-waste that can be recycled or exported. For more information, see appendix 4 for the detailed TOR for the subcontract with the disposal center and its mandate.

(v) Efforts beyond the demonstration-phase of the project.

The MLF funding will coverthe implementation and operation of the pilot project for 3 years. Thereafter carbon credit could be used to scale up the project. The impact of ODS volume recovered from different refrigerator units recycled and potential Voluntary Emission Reductions (VER) carbon prices on project profitability is shown in Figure 3. To breakeven, at least 30,000 units would need to be turned in annually for the recovery of 2.4 t of CFC-12 to give a VER of 22,500 tCO2e and to fetch at least USD 3/tCO2e (VER).

At the end of the three years of GEF and MLF funding, it is hoped that whatever ODS that can be recovered from the continuation of the Ghana project will be converted into carbon credits. Ghana intends to turn in 1 million old refrigerators over 10 years. This would translate into 100,000 refrigerators per year, but to take a more conservative estimate of 30,000 refrigerators per annum = 2.4 t or more CFC-12 per year, which would be as a follow up to the GEF project.
It should also be noted that the CFCs would gradually be complemented with HCFCs and HFCs, all of which would be eligible under either the Kyoto Mechanism or Voluntary Market mechanisms.

USG Umweltservice GmbH has recently submitted a methodology (Greenhouse Gas Emission Reductions by Recovering and Destroying Ozone Depleting Substances (ODS) from Products) for the destruction of ODS (CFC-12 refrigerant and CFC-11 blowing agent in insulation foam) for approval by VCS. This methodology has been opened for public comment from 5 May 2010 till 3 June 2010 (http://www.v-c-s.org/methodology_ggerrdods.html). Once approved, the Ghana project could use this methodology for claiming carbon credits. Due to monitoring and verification issues, the Climate Action Reserve (CAR) at present would only accept a project where the ODS are destroyed in the USA under a stringent monitoring protocol.

Eligibility for accessing these carbon funds would only start after the MLF-demonstration would be completed (due to the "additionality" issue), and this, further to the fact that the sustainability of the operation will have been demonstrated thanks to this demonstration project, which includes a robust and reliable ODS monitoring system (needed when trying to access carbon funds).

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.

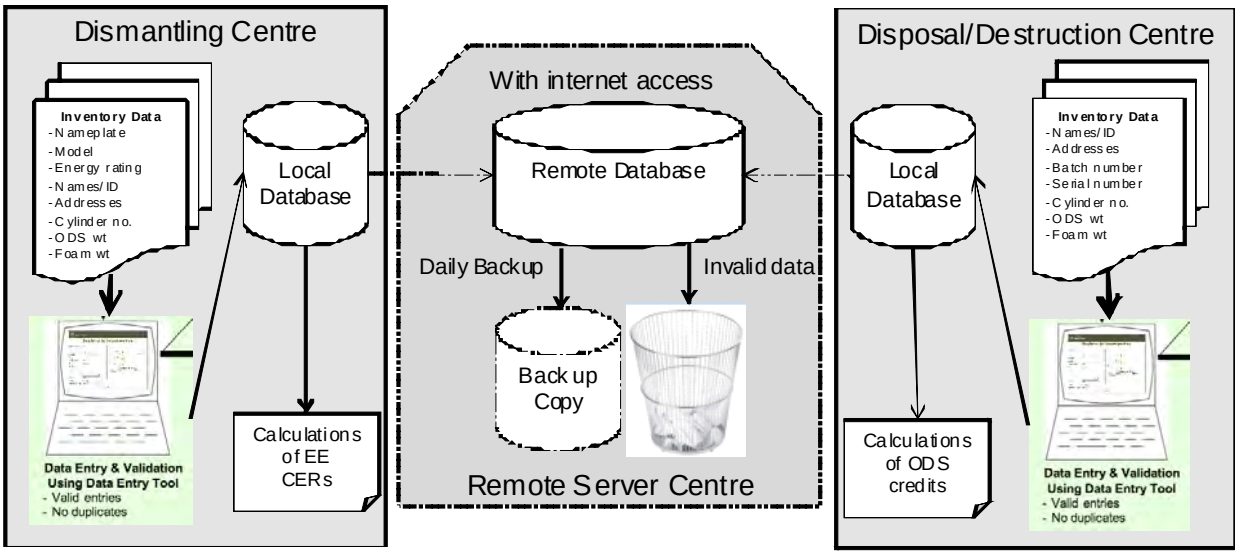
3.3. Concept for monitoring the origin of recovered ODS

The objective of this monitoring is to discourage perverse incentive in the declaration of virgin ODS as used ODS for disposal. The transparent monitoring procedures will allow for external verification of the amounts disposed of, and the costs for its operation should be covered sustainably.

With the intention that the ODS recovered and disposed of could be monetized as carbon credits, a stringent detail monitoring and verification plan for both dismantling and disposal centres will be developed according to approved carbon protocol (e.g. CAR or VCS) so that all the baseline and project data and information captured and recorded can be validated and verified by independent third parties. A transparent and robust tracking system will be developed to cover the following facets: record on collection, transportation, storage at the 6 regional dismantling centres will be kept by the GEF EE project coordinator. Being the first of its kind of technology in Ghana, the national consultant and technicians will work in close collaboration with the international consultant and the technology provider to ensure that the monitoring and servicing plan and data collection are executed with high accuracy and in close supervision.

The technicians will record the volume of refrigerator, metal, foam and ODS recovered from the dismantling process. To ensure high Quality Assurance/Quality Control for carbon projects, technicians will be trained to record the number of ODS provisions to ensure that data acquisition and transcription are carried out consistently and with precision. Excellent chain of custody data will be developed to avoid the perverse incentive of virgin ODS being disposed and to avoid double-counting of ODS destruction credits. For ODS to be exported: relevant data will be captured for verification purposes, the full chain of custody from departure from origin country through to final disposal will be documented, and the methodology for analysing the composition of the ODS will be developed.

Figure 4: Monitoring and verification plan



Attempts to provide these valid assurances and verification as transparent Certificates of Destruction are covered in Item (iv) above and in Figure 4 to ensure traceability, integrity and transparency. The computer data source with a good backup system will allow third party validation and verification deemed essential for developing high quality carbon projects. Such

high integrity and transparent tracking system will allow all stakeholders to put good governance and accountability into practice.

3.4. Exploration of other disposal options for the used ODS.

Relatively large amounts of refrigerants (CFCs, HCFCs, HFCs and HCs) will be collected from various ongoing GEF EE refrigerator replacements and TPMP/HPMP servicing centers. Where possible, ODS will be recycled for reuse to reduce the need for import. In the transition to a full disposal scheme, the opportunity to recycle and reuse the ODS as an initial alternative to disposal according to international best practices will be considered by taking into account the following considerations.

- Market opportunities for recycled ODS
- Minimum quality standards required for recycling or reuse
- Selling price. Factors that will favour decisions for re-use or recycling:
    - Purity of available substance;
    - Equipment age and condition;
    - Existing equipment relying on specific substance without low cost retrofit;
    - Lack of immediate replacement technologies;
    - Likely future demand for the substance
    - Social/Economic impact of refrigerant shortage
- Factors that will favour decisions for ODS destruction:
    - Mixture of ODS or significantly contaminated substance;
    - Desire to accelerate technology transition;
    - Linkage with wider waste programme at product/equipment level;

The technical and economic feasibility to establish a reclaim center will be assessed. Through the distillation of mixes of refrigerants, the reclaim centre would be able to separate out various refrigerants and make them available in a quasi-virgin state. The amounts would therefore be used to avoid imports of equivalent amounts of refrigerants. There may, however, still be certain quantities of refrigerants that cannot be processed and these will be disposed of.

4. PROJECT COSTS

Table-4: Project Budget

	Unit	Tons
ODS stock in storage (with Ghana-EPA)		1.8
ODS from the GEF EE Programme	72,500 refrigerators	5.8
From ongoing and future R&R schemes	10,345 refrigerators	1.2
From ECOWAS imports of ODS-Waste	(see remark 1)	tbd
Total ODS		**8.8**

Budget	**Remark**	**US$**
A. Capital cost		
Identifier, Cylinders, Miscellaneous, etc		20,000
Computer and Database Monitoring Software		1,560
Subtotal		**21,560**
B. Transport cost		
Transportation from Dismantling and Servicing Centres to Disposal Centre in Port Tema	0.6 US$/kg (see remark 2)	
Transport abroad	6.6 US$/kg (see remark 3)	
Gate fee for destruction	4.1 US$/kg (see remark 3)	
Subtotal	11.3 US$/ kg for 8,800 kg	**99,440**
C. Sub-contract cost to operate the facility		
One technician over 3 years	(see remark 4)	21,000
Space, security, electricity, water, AC in an existing facility over 3 years	(see remark 4)	6,000
Part-time person for database on ODS-waste / Monitoring over 3 years	(see remark 4)	6,000
Subtotal		**33,000**
D. Technical Support and Supervision		
Part-time National Consultant		22,000
Part-Time International Consultant (incl 2 visits to Ghana)	(see remark 5)	22,000
Subtotal		**44,000**
Grand Total		**198,000**
Project Cost Effectiveness (USD/kg)		**22.5**

Remark 1: There is a possibility that some neighboring countries (especially landlocked countries to the north) would export their ODS-waste through the Disposal Centre in Ghana, but as this cannot be confirmed today, so no tonnage is being accounted for this at this time.

Remark 2: In December 2010, an estimate was made based on the cost to transport cylinders of LPG from Port Tema to various cities. As the number of dismantling and servicing centres are large and spread around the country (distances ranging from 50km to over 600 km from Port Tema), it was found difficult to come up with a comparable cost for what the local transportation of 8.8 tonnes of ODS-waste might cost, especially as the quantities involved are contained in small cylinders. Including handling, it was estimated that the average cost would come to around US$ 1/kg. However it is thought that costs can be reduced to US$ 0.6/kg.

Remark 3: Several quotes were requested to export the ODS-waste to Europe, USA, South Africa. Only two quotes were received of which Tredi (France) would come to the cheapest solution. Its quote is summarized as appendix 5. As can be seen, the per kg cost is estimated at US$ 12.27 /kg. UNDP however believes that it would be possible to reduce this cost to US$ 10.7 US$/kg. It should be noted that an official bidding exercise will be conducted by UNDP during the implementation of the project.

Remark 4: These three budget-lines are indicative and given for estimation-purposes only, as they will be part of a performance-based subcontract (see draft TOR in appendix 4).

Remark 5: The consultants will devote part of their time to assist Ghana to find funding that would be needed beyond the 3-years duration of this project, as described elsewhere in this document.

The requested grant for this project amounting to: **US$ 198,000 (excludes 9% support costs).**

5. IMPLEMENTATION/MONITORING

Table-5: Implementation Schedule

TASKS	2011				2012				2013			
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
Phase I - Project Start-up												
MF Project Approval	X	X										
Receipt of Funds	X	X										
Grant Signature		X	X									
Procurement arrangement		X	X									
Performance based Subcontract		X	X									
Recruitment Consultants		X	X									
Phase II – Operation & Completion												
Operation for 30 months				X	X	X	X	X	X	X	X	X
Monitoring by local consultant				X		X		X		X		X
Identification of alternative funding mechanisms to ensure continuation beyond pilot-stage									X	X	X	X
Final report												X

Table-6: MILESTONES FOR PROJECT MONITORING

TASK	MONTH*
(a) Project document submitted to beneficiaries	1
(b) Project document signatures	2
(c) Procurement, Subcontracting, Recuitment	2,3
(d) Phase II - starts operation	6
(e) Phase II project closure – final reporting	24-36

* As measured from project approval

6. ANNEXES

Appendix 1: Letter of Transmittal by the Minister of Environment

Appendix 2: Public Notice by the Energy Commission on Energy Efficiency Standards and the Prohibition of the Manufacturing, Importation and Sale of Used Refrigerators in Ghana

Appendix 3: GEF EE Turn In Program to collect old refrigerators for ODS recovery

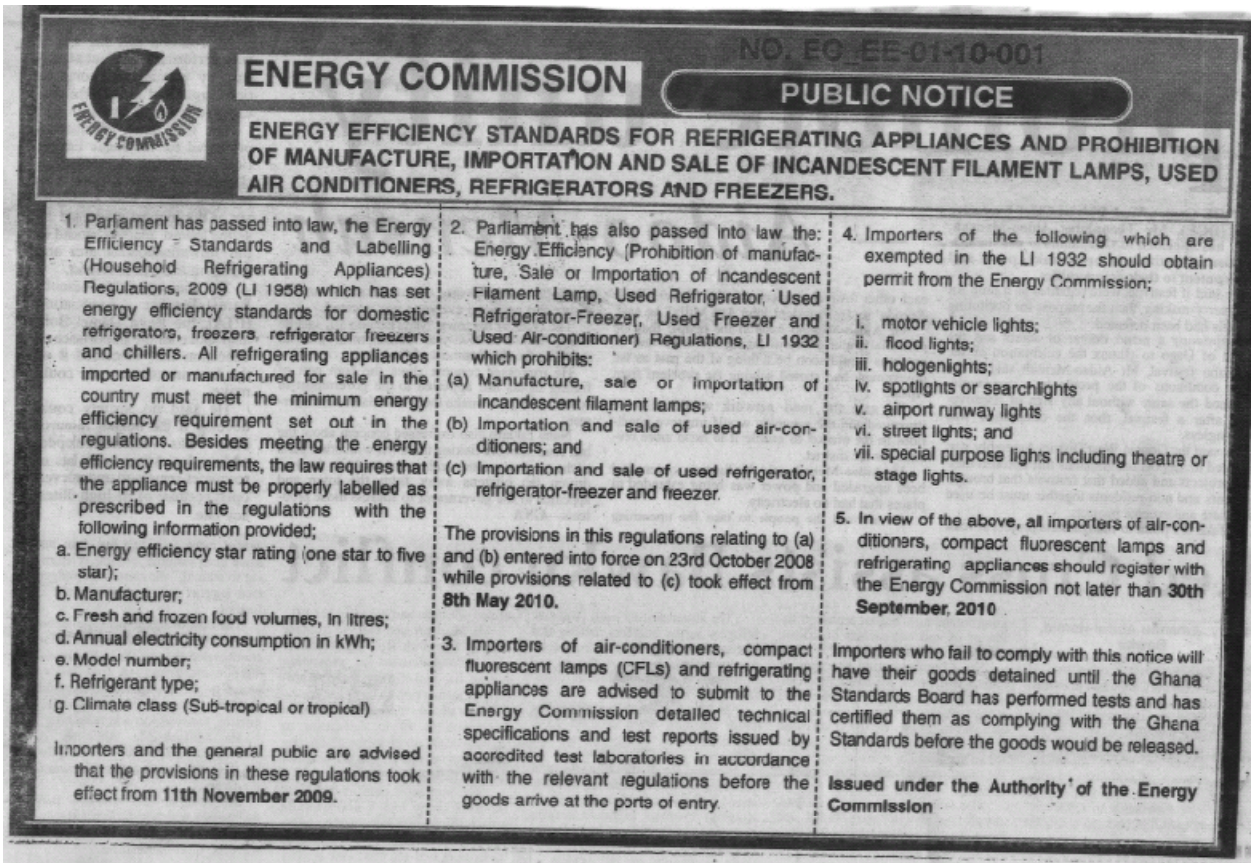
Appendix 4: Terms of Reference for a Sub-contractor to operate and dispose of ODS wastes in Ghana

Appendix 5: Quotation from Tredi (France) for export – destruction of ODS waste.

Appendix 6: Ghana ODS Destruction Pilot Annex- Legal Framework

Appendix 1: Letter of transmittal by the Minister of Environment

Appendix 2: Public Notice by Energy Commission on the Energy Efficiency Standards and Prohibitions (as advertised in national newspaper in August 2010)



NO. EC/EE-01-10-001

ENERGY COMMISSION

PUBLIC NOTICE

ENERGY EFFICIENCY STANDARDS FOR REFRIGERATING APPLIANCES AND PROHIBITION OF MANUFACTURE, IMPORTATION AND SALE OF INCANDESCENT FILAMENT LAMPS, USED AIR CONDITIONERS, REFRIGERATORS AND FREEZERS.

1. Parliament has passed into law, the Energy Efficiency Standards and Labelling (Household Refrigerating Appliances) Regulations, 2009 (LI 1958) which has set energy efficiency standards for domestic refrigerators, freezers, refrigerator freezers and chillers. All refrigerating appliances imported or manufactured for sale in the country must meet the minimum energy efficiency requirement set out in the regulations. Besides meeting the energy efficiency requirements, the law requires that the appliance must be properly labelled as prescribed in the regulations with the following information provided;

a. Energy efficiency star rating (one star to five star);
b. Manufacturer;
c. Fresh and frozen food volumes, in litres;
d. Annual electricity consumption in kWh;
e. Model number;
f. Refrigerant type;
g. Climate class (Sub-tropical or tropical)

Importers and the general public are advised that the provisions in these regulations took effect from **11th November 2009.**

2. Parliament has also passed into law the: Energy Efficiency (Prohibition of manufacture, Sale or Importation of Incandescent Filament Lamp, Used Refrigerator, Used Refrigerator-Freezer, Used Freezer and Used Air-conditioner) Regulations, LI 1932 which prohibits:

(a) Manufacture, sale or importation of incandescent filament lamps;
(b) Importation and sale of used air-conditioners; and
(c) Importation and sale of used refrigerator, refrigerator-freezer and freezer.

The provisions in this regulations relating to (a) and (b) entered into force on 23rd October 2008 while provisions related to (c) took effect from **8th May 2010.**

3. Importers of air-conditioners, compact fluorescent lamps (CFLs) and refrigerating appliances are advised to submit to the Energy Commission detailed technical specifications and test reports issued by accredited test laboratories in accordance with the relevant regulations before the goods arrive at the ports of entry.

4. Importers of the following which are exempted in the LI 1932 should obtain permit from the Energy Commission;

i. motor vehicle lights;
ii. flood lights;
iii. hologenlights;
iv. spotlights or searchlights
v. airport runway lights
vi. street lights; and
vii. special purpose lights including theatre or stage lights.

5. In view of the above, all importers of air-conditioners, compact fluorescent lamps and refrigerating appliances should register with the Energy Commission not later than **30th September, 2010**

Importers who fail to comply with this notice will have their goods detained until the Ghana Standards Board has performed tests and has certified them as complying with the Ghana Standards before the goods would be released.

Issued under the Authority of the Energy Commission

Appendix 3: Turn In Program of the GEF EE project for the collection and storage of ODS

Registration of importers

The process starts with registration of importers refrigeration appliances by the Energy Commission. All importers and future manufacturers of refrigeration appliances will have to comply with the minimum energy efficiency requirements; this is mandatory. However, compliance with higher energy efficiency standards is voluntary.

For the purposes of clarification, an importer is the person or company that imports the appliances. The dealer is the retailer. It is worthy of note that in Ghana, most importers have retailer outlets as well. The importers will be needed to submit test reports to assure the Commission that the appliances meet the required minimum standards. It is the importer who the Commission will deal with in the release of coupons.

Certification and labeling regime

With the introduction of labeling and certification regime, all imported refrigerators that are properly labeled and accompanied by certificates will be immediately released by the Ghana Standards Board. Appliances without labels will be detained until the technical details have been provided and the efficiency level determined. A printing firm will be pre-qualified to print labels to be affixed on the appliances that meet the minimum requirements. Those that do not meet the requirements will have to be re-exported.

Participation in the rebate scheme

Participation in the refrigerator rebate scheme is voluntary. Importers that opt to deal in higher efficiency appliances will register with the Commission and they will be given certificates and special stickers to be displayed in front of their shops. The importers of higher efficiency appliances will submit test reports from accredited test laboratories to the Energy Commission who will in conjunction with Ghana Standards Board, determine the efficiency level. Coupons will then be issued corresponding to determined efficiency levels with predetermined rebate values to the importer.

The Table below gives an estimated average annual consumption and saving for each star rating.

Star Rating	Annual Energy Consumption of Refrigerator, kWh	Annual Energy Savings of Refrigerator, kWh
5 star	250	950
4 star	350	850
3 star	400	800
2 star	500	700
1 star	600	600

Administration of the Rebate

The Energy Commission will appoint a participating bank where the rebate funds will be lodged. Security-enhanced coupons will be issued in quadruplicate by the Energy Commission and entered into a data base; one copy each of the coupon will be put on the records of the Commission and that of the participating bank. The remaining two copies of the coupon will be issued to the participating importer, and they will be completed at the time of purchase by the buyer, and then signed and stamped by the dealer. The dealer will retain one of the coupons whilst the buyer will keep the other coupon and use its value as part payment for the refrigeration appliance by submitting it to the participating bank for redemption. The bank will honour the coupon after having satisfied itself of the authenticity of the coupon (i.e. serial number, security features etc).

Checks against fraud

In order to ensure the scheme against fraud, the participating bank will redeem coupons from only registered importers after it is satisfied that the serial numbers are correct and that there is an Energy Commission stamp duly affixed. Buyers may be visited at random to certify that the refrigeration appliances are indeed at the buyer's premises.

Appendix 4: TERMS OF REFERENCE FOR A SUBCONTRACTOR TO DISPOSE OF ODS WASTE IN GHANA

The services of a subcontractor are being sought under the framework of the ODS-Waste Disposal Programme for Ghana, to be funded by the Multilateral Fund for the Implementation of the Montreal Protocol and implemented by the United Nations Development Programme (UNDP) in collaboration with Ghana-EPA. The National Ozone Unit at Ghana-EPA and UNDP wishes to retain the services of company XXXX represented by Mr. YYYY, with the following address and email-contact:

ZZZZZZZZZZZZ, Ltd
ZZZZZZZZZZZZZZZZZZZZ Street
ZZZZZZZZZZZ, Ghana
YYY.YYYY@ZZZZ.COM

Definitions:
The term "disposal center" is used to mean a centralized facility near the port where the ODS-waste would be temporarily stored, coming from the various dismantling and servicing centers throughtout the country. It would have the function of encouraging the transport of small quantities of ODS-waste to its location. It would also identify the ODS-waste received and its purity, it would recycle refrigerant when possible, and arrange for its export if non-recyclable. The "amounts disposed of" by the center would correspond to the sum of ODS-waste recycled plus ODS-waste exported.

The specific objectives of this subcontract are as follows:

1) The subcontractor will provide space, electricity, water and human resources to operate the ODS-waste Disposal facility that will form part of this project. Peripheral equipment that would be purchased by UNDP separately (not part of this contract) would include the following:

Recycling Unit (or Reclaim)
ODS Identifier
Cylinders, Miscellaneous equipment to handle various refrigerants
Computer, database software for monitoring of ODS-waste received and disposed of

2) The subcontractor in close collaboration with the national and international consultants will commit to provide high quality and professional services for

- Contacting the refrigerator dismantling and servicing centers throughout the country to ensure that the cylinders of ODS-waste are being sent to them for disposal. Undertake any other awareness related activities to stimulate the receipt of ODS-waste. The budget for transportation of the cylinders would not form part of this subcontract.
- Accept additional ODS-waste from neighboring Ecowas countries if found feasible.

- Receiving of ODS-waste contained in small cylinders coming from all parts of the country (refrigerator dismantling and servicing centers).
- To identify the contents of the cylinders, and when found that the ODS may be re-used, recycle and store for selling on the market. Most of the contents is however expected to be un-usable, and would be stored by refrigerant in larger cylinders, ready for export abroad.
- Ensure administrative steps to arrange for export of un-usable ODS. Transport cost to a facility abroad will be covered by the project but will not form part of this subcontract.
- Maintain a database recording all amounts of ODS received at the facility (on a monthly basis), all amounts that was recycled, and all amounts that were sent for destruction abroad. This information will be kept by refrigerant (CFC-12, HCFC-22, HFC-134a, other).

3) The subcontractor will prepare 6-monthly reports about the daily activities that were performed at the disposal centre, including information about the quantities of each ODS consignment that were received, recycled and disposed of during the period concerned, Six-monthly payments will be based on these reports as elaborated upon below.

Monitoring

The National and International Consultants of the project (outside the scope of this subcontract) will have the task to verify that the quantities claimed to be received, recycled and disposed of are truthful. Special action will be taken to avoid any risk of the perverse incentive whereby virgin refrigerant would be soiled and sent to the disposal centre as ODS-waste. This monitoring will also be conducted by the consultants.

Duration of the subcontract

This subcontract will last until the target amount of ODS-waste stipulated below has been disposed of (recycled or exported). It is anticipated that this may take up to 2 to 3 years.

Remuneration

a) The subcontract is performance-based, which means that the subcontractor will get an initial 6-month advance of US$ 6,000 upon signature of the contract to allow for the start of the operations, but that further 6-monthly payments would be based on the quantities of ODS-waste disposed of during the preceding 6 months, which would be calculated as US$ 3 per kilogram of ODS-waste recycled or disposed of.

b) The 6-monthly payments would continue till the maximum ceiling of US$ 33,000 (including the initial payment) is reached. As such, the amount of ODS-waste that would have been recycled or disposed of at the end of the subcontract arrangement would amount to (US$ 33,000 – US$ 6000) / 3 US$/kg = 9 metric tons which more or less corresponds to the overall objective of the demonstration-project.

c) As mentioned above, and except for the initial payment, further payments would be based on 6-monthly reports by the subcontractor which will be verified by the independent National Consultant, and further endorsed by the NOU and UNDP-Accra.

Signed by NOU	**Signed by UNDP-Accra**	**Signed by the Subcontractor**
----------	----------	----------
Date :	Date :	Date :

Appendix 5: Quote from Tredi for the export and destruction of ODS-Waste

Quotes for the import of CFC-12 by Tredi from Port Tema in Ghana for destruction in France				
Description	Conditions	Tariff (Euro)	USD	USD/kg
1 x 20 footer - Gross weight =	11,500 kg	Exchange rate	1.37	
Net CFC-12 weight	6,020 kg			
1 x 20 footer = 602 x M4499 cylinders				
A. Cost from Port Tema to Tredi				
1. Administrative cost for Basel Convention compliance	Permit will last one year	4,500	6,165	1.02
2. Sea freight – 1 x 20' from Port Tema to Marseille	1 x 20'	13,500	18,495	3.07
3. Handling and packaging material with field tools	Gross weight 11,500 kg	5,000	6,850	1.14
4. Field crew – Supervisor	Gross weight 11,500 kg	6,000	8,220	1.37
5. Supervisor Travel expenses	Gross weight 11,500 kg	6,500	8,905	1.48
6. Gate fee for the Destruction of CFC-11 and CFC-12 cylinders	Gross weight 11,500 kg	18,400	25,208	4.19
Sub-Total (Port Tema to Tredi)	**6,020**	**53,900**	**73,843**	**12.27**

Appendix 6: LEGAL FRAMEWORK

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

Multilateral Environmental Agreement	Date of Ratification	Date of Entry into Force for Ghana
Ozone-related		
Vienna Convention on the Protection of the Ozone Layer	24 July 1989	22 October 1989
Montreal Protocol on Substances that Deplete the Ozone Layer	24 July 1989	22 October 1989
Montreal Amendment	24 July 1992	22 October 1992
Copenhagen Amendment	9 April 2001	8 July 2001
Montreal Amendment	8 August 2005	6 November 2005
Beijing Amendment	8 August 2005	6 November 2001
Climate-related		
United Nations Framework Convention on Climate Change (UNFCCC)	6 September 1995	5 December 1995
Kyoto Protocol	30 May 2003	16 February 2005