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执行蒙特利尔议定书
多边基金执行委员会
第三十八次会议
2002 年 11 月 20 日至 22 日，罗马

项目提案：菲律宾

本文件是基金秘书处对下述项目提案的评论和建议：

淘汰

- 全国 CFC 淘汰计划 世界银行/瑞典

项目评价表
菲律宾

行业： 淘汰 本行业使用的 ODS(2001 年)： 2,049.3 ODP 吨
次行业成本效益阈值： 无

项目名称：

(a) 全国 CFC 淘汰计划

项目数据	CFC **淘汰计划**
企业消费量（ODP 吨）	2,017.60
项目影响（ODP 吨）	2,017.60
提议的项目期限（月）	84
原申请经费数额（美元）	4,059,458
最后项目经费（美元）：	
增支资本费用(a)	
酌处资金(b)	
增支经营费用(c)	
项目费用总额（a＋b＋c）	13,396,579
地方所有权（％）	100%
出口比重（％）	0%
申请经费数额（美元）	4,059,458
成本效益值（美元/公斤）	6.64
对应出资是否已经确认？	
国家协调机构	环境和自然资源部
执行机构	世界银行/瑞典

秘书处的建议：	
建议供资额（美元） 项目作用（吨 ODP） 成本效益值（美元/公斤） 执行机构支助费（美元）	
多边基金的费用总额（美元）	

项目说明

目标

1. 世界银行代表菲律宾政府向第三十八次会议提交了一份全国 CFC 淘汰计划。该计划的目标是，协助菲律宾政府按照《蒙特利尔议定书》规定的淘汰时间表，淘汰其 CFC 消费。将共淘汰 2,049.3 ODP 吨。这个数字包括通过已经核准但仍未执行的项目处理的 31.7 ODP 吨 CFC－11，通过该计划提议的新措施处理的 2,017.6 ODP 吨。提交的计划所提议新措施总的成本效益为每公斤 6.64 美元。

执行战略

2. 本文件附有一份全国 CFC 淘汰计划。

3. 该计划将利用投资项目和非投资活动以及综合使用政策和管制支助措施，管理 CFC 的供应和需求。现在已经制订立法，根据这项立法，菲律宾环境和自然资源部颁发 CFC-11 和 CFC-12 进口配额。现在已经禁止进口其他 CFC、哈龙、三氯乙酸和四氯化碳。此外，还制订了立法，使环境和自然资源部可以管制使用 CFC 的二手设备的进口。提议的削减 CFC 消费时间表符合《蒙特利尔议定书》管制时间表，将促进在 2010 年实现彻底淘汰 CFC。项目文件英文第 89 页显示了该计划提议的年消费限制量。

全国 CFC 淘汰计划的组成部分

4. 通过配额管制允许进入该国的 CFC 数量。

5. 为了减少需求，该计划提议：

(a) 在 2002 年完成多边基金资助的泡沫塑料行业仍在开展的投资项目(31.7 DOP 吨)；
(b) 根据基金规则，为新投资活动提供资金，在泡沫塑料行业制造活动中彻底淘汰消费，在制冷和气雾剂行业淘汰数量不大的剩余消费量；
(c) 为制冷行业技术培训、维修设备、汽车空调制冷剂回收/再循环设备和再生设备提供资金；
(d) 资助甲撑二苯基二异氰酸酯行业技术援助活动(菲律宾不制造甲撑二苯基二异氰酸酯)；
(e) 资助一个项目管理股。

6. 该计划由世界银行协调。计划的投资部分由世界银行编制，制冷设备维修部分由瑞典政府根据其双边合作方案编制。两个机构将继续与菲律宾政府合作，执行全国 CFC 淘汰计划各自负责的部分。瑞典政府将要求，执行该计划制冷设备维修部分若干项目的年度拨款

应该列入核准资金年度的双边合作资金。

全国 CFC 淘汰计划的费用

7. 原申请的执行全国淘汰计划总费用为 13,396,579 美元，其中包括投资项目(3,864,598 美元)、设备维修行业(8,156,981 美元)和项目管理股(1,375,000 美元)。项目文件英文第 86 至 88 页显示了各项目的各组成部分。

计划的执行和管理

8. 提议设立一个项目管理股，向政府提供必要的支助，以开展该计划提议的活动，监测执行情况。项目文件英文第 84 和 85 页显示了提议管理股开展的活动。项目管理股将直接负责所有项目执行、大众宣传和监测活动。管理股的提议费用为 1,375,000 美元，为项目活动费用的 11.4%。

供资和支付

9. 菲律宾政府要求原则上核准申请总额，并且提议，从 2002 年起，到 2008 年止，按七个年度支付，条件是实现全国 CFC 消费年度目标和其他效绩指标。政府还要求获得最大灵活性，从而在执行过程中可以根据需要调整或修改战略。项目文件英文第 99 页显示了每年支付资金额、提议的 CFC 年消费限制量和其他具体效绩指标。

稽查和监测

10. 菲律宾政府将通过项目管理股：

(a) 管理/指导泡沫塑料行业特别工作组，监测泡沫塑料行业 CFC 和 HCFC-141b 的消费、使用和分销；
(b) 建立一个网站，登录一个进口商清单，列出其年度配额和本日历年度已经实际进口的数量；
(c) 每季度更新一次实际进口 CFC 数量资料，讨论/澄清所有观察到的与 CFC 有关的不正常现象；
(d) 监测 HFC-134a、HCFC-22 和 HCFC-141b 的进口；
(e) 如果可能，检查 CFC、HCFC 和 HFC－134a 进口商的仓库，以确定库存量和常见做法；
(f) 报告任何非法进口 CFC 的事件，为采取执法行动提供便利；
(g) 对根据该计划开展的所有项目进行安全和技术稽查。

支助费用

11. 申请的支助费用为，执行投资项目和非投资活动费用的 9%，项目管理股费用的 5%。

秘书处的评论和建议

评论

12. 秘书处审查了该计划，向世界银行提出了详细的初步评论意见。下文是提出的问题和世界银行关于这些问题的立场的摘要。

消费

13. 秘书处指出，该计划提议提供资金的 CFC 消费淘汰总数(2,017.6 ODP 吨)远远低于根据第 35/57 号决定计算的菲律宾选择 1 或选择 2 的消费量。

14. 在泡沫塑料行业，淘汰计划显示，2001 年 CFC-11 的剩余总消费量为 499.47 ODP 吨，仍然在执行的最后项目将淘汰其中的 31.7 ODP 吨，因此，仍然有 467.77 ODP 尚未处理。涉及的企业中，两个非常大(CFC-11 消费为 73 吨和 80 吨)，六个是在 1995 年设立的(六个企业中，有四个是在 5 月或 6 月设立的)。

15. 对菲律宾政府报告的 1999 年消费数据进行分析后发现，泡沫塑料项目将淘汰的 CFC-11 消费量比报告的消费量多出约 125 ODP 吨。菲律宾政府向基金秘书处报告的 2000 年消费数据显示，这一年，泡沫塑料行业没有消费任何数量的 CFC-11。

16. 此外，根据菲律宾国家方案报告的泡沫塑料行业历史，早在 1991 年，聚胺脂泡沫塑料生产就已经使用了二氯甲烷，在该国，这“比 CFC-11 便宜近 50%”。鉴于多边基金在菲律宾大众宣传方面作了相当大的投资，鉴于执行机构参与了各投资项目，现在，大型企业仍然使用大量 CFC-11 似乎是不寻常的。此外，还需要澄清那些在非常接近合格截止日期投产的企业的开始日期。

17. 世界银行指出，在拟定该计划时进行的调查比过去进行的调查严格许多，发现泡沫塑料行业消费的 CFC 数量比以前报告的多。计划中提出的数据是对化学和原料供应商进行一系列采访和实地考察后得出的，而以前通过国家方案执行情况进展报告提供的数据是根据当时所能了解的情况得出的。世界银行认为，该计划提出的行业数据与以前向执行委员会提出的数据之间的差别不应该成为排除这些剩余泡沫塑料企业合格性的理由。

18. 秘书处要求更加明确地澄清泡沫塑料行业提议的合格消费量，世界银行没有提出新的数据，仅仅表示，根据执行委员会现行指导原则，已经提供了提交计划之前一年的消费数据。世界银行表示，已经进行努力，以保证该计划包括的各企业是在 1995 年之前建立的，

并且提供了关于 Primefoan 和 Dongshin Phils 建立日期的资料。另两个 1995 年企业的资料尚未提出。

19. 关于现有企业可能使用二氯甲烷替代 CFC-11(国家方案表示，这是菲律宾泡沫塑料行业的一个特征)的问题，世界银行指出，二氯甲烷的现行价格比 CFC-11 价格低约 50%，但是，其供应量只有 CFC-11 供应量的约 30%。世界银行还指出，许多较大的泡沫塑料厂家报告说，它们的泡沫塑料注入设备不能使用二氯甲烷。秘书处没有遇到过这种不能兼容的情形。已核准软质泡沫塑料项目的经验是，各企业既可以使用二氯甲烷，也可以使用 CFC-11，视需要的泡沫塑料类型、经济因素和化学剂供应量而定。此外，二氯甲烷价格低，这与报告的短缺情形似乎完全相左。

20. 截至拟定本文件时为止，秘书处尚未收到政府必须提交的关于 HCFC-141b 使用情形的来信。

增支费用的计算

21. 虽然秘书处对报告的泡沫塑料行业消费情形是否符合供资资格持有保留意见，但它仍然审查了提议的该行业增支费用。秘书处指出，增支费用的计算没有依据每个次级行业的平均成本效益，而依据平均成本效益计算已经成为核准行业和全国淘汰计划的既定做法。世界银行根据这种做法修订了增支费用。该行业订正增支费用为 2,010,000 美元，比原申请数额少约 1,540,000 美元。

22. 其他制造行业剩余微量消费的增支费用计算符合有关指导原则和阈值。

23. 在设备维修行业，若干个别活动与现在已经核准的马来西亚和泰国全国淘汰计划的个别活动类似,增支费用的计算方法相同。设备维修行业总的成本效益值为每公斤 4.97 美元，与巴西、马来西亚和泰国国家计划的供资水平相似。

24. 提议的项目管理股供资额(1,375,000 美元)占项目活动增支费用的 11.4%，巴西为 11.25%，马来西亚为 15.7%，泰国为 11.5%。

资金支付

25. 秘书处指出，该计划要求在头两年里支付申请资金总额的近 75%。世界银行表示，资金流动是根据需要立即采取的行动清单决定的，之所以需要立即采取这些行动，是因为要使菲律宾分别于 2005 年 1 月 1 日和 2007 年 1 月 1 日实现减少消费 50%和 75%的目标。正如该计划所述，为了实现这些目标，必须减少设备维修行业的 CFC 消费。为了在设备维修行业大量减少消费，必须尽早投入资源，保证在期限之前建立技术能力和其他有关基础结构，为许多利益方服务。

执行和监测的责任

26.项目文件详细叙述了项目管理股的责任，但没有叙述执行机构 (世界银行和瑞典政府)的责任。世界银行表示，它已经被指定为主导机构，将负责报告和效绩核实。瑞典政府是共同执行机构，将负责向菲律宾提供援助，开展设备维修行业制订政策、培训和大众宣传活动。世界银行表示，协定草案将规定世界银行和瑞典的具体责任。

年度执行方案和协定草案

27. 2002 年 10 月 21 日，在编制本文件之际，世界银行向秘书处提交了第一个年度执行方案和协定草案。目前正在审查该方案和草案，将与世界银行讨论这些文件并酌情进行修订。将根据有关规则和决定，将这个进程的结果和分发的其他文件通知执行委员会。

业务计划

28. 秘书处指出，世界银行 2002 年业务计划为菲律宾提供的资金额约为 450,000 美元，而申请支付的第一笔资金约为 4,000,000 美元。世界银行指出，由于其业务计划其他部分做了调整，可以在其 2002 年业务计划总额范围内支付申请的资金总额。

29. 秘书处还指出，瑞典 2002 年双边业务计划没有包括为菲律宾提供的资金。

总结

30. 正如上文所述，关于秘书处在审查中提出的问题，秘书处收到了详细的答复。但是，截至拟定本文件时为止，没有机会与世界银行讨论审查所涉及的问题，没有机会讨论世界银行的答复。

31. 审查显示，除泡沫塑料行业外，该提案所有其他方面似乎都符合供资资格。提议的增支费用与其他国家 CFC 淘汰计划核准的增支费用是一致的，拟议开展的活动和执行模式也相似。

32. 关于泡沫塑料行业，该国泡沫塑料行业的历史、核准项目的历史和官方报告的行业消费格局(零)以及四家企业建立日期含糊不清，所有这一切都使人对泡沫塑料行业申请费用的资格感到怀疑。秘书处指出，第 35/57 号决定限制条款 B 明确要求，必须在所有方面都遵守基金关于项目资格的现行指导原则，因此，秘书处认为，该项目增支费用应该是除泡沫塑料行业以外的所有其他活动的申请增支费用，而泡沫塑料行业的增支费用应该仅限于向以前没有发现的剩余小型合格消费者提供象征性的技术援助资金。

33. 在这个基础上，菲律宾全国 CFC 淘汰计划合格增支费用总额约为 10,050,000 美元，支助费用为项目和活动费用的 9%和项目管理股费用的 5%。

34. 秘书处对申请核准的头两年资金占项目资金总额的比率——这个项目为 74%——感到关注。据了解，执行机构要求在执行该计划具体内容之前得到足额资金，在这些内容涉及投资活动时尤其要求得到足额资金。但是，在技术援助和非投资活动比率较大的行业或国家淘汰计划中，应该可以将申请资金的时间与提议的活动更加密切地联系在一起。

35. 例如，如果一项大型培训活动将持续若干年，那么，这项活动可以分若干阶段进行，可以逐年提供资金。提交供核准的行业和国家淘汰计划数日益增加，这些计划要求在今后两年提供的资金总数额非常高，采取上述办法可以减少今后两年提供的资金总数额。就菲律宾而言，秘书处将就重新安排供资时间问题与世界银行进行讨论，以大幅度减少年度供资申请前重后轻的程度。这符合第 UNEP/OzL.Pro/ExCom/37/66 and Corr.1/Rev.1 号文件的要求。

双边部分

36. 在申请的 13,396,579 美元资金中，瑞典政府提议，开展设备维修行业活动的总费用为 474,000 美元。瑞典政府在第三十八次会议上申请的第一笔资金数额为 152,000 美元，支助费用为 11,280 美元。双边合作文件 UNEP/OzL.Pro/ExCom/38/16 讨论了瑞典双边合作方案 1999-2002 三年期内提供这笔资金的能力问题。

建议

37. 待定。

PROJECT COVER SHEET

COUNTRY: Philippines

IMPLEMENTING AGENCY: The World Bank (lead); Sweden (lead on specific non-investment activities for the servicing sector)

PROJECT TITLE:	Philippine National CFC Phaseout Plan
PROJECT(s) IN CURRENT BUSINESS PLAN:	Yes
SECTOR/SUB-SECTOR:	Multi-sector
TOTAL CFC USE:	(2001): 2,049.3 ODP MT (Annex A, Group I)
PROJECT IMPACT	Annex A, Group I: 2,017.6 ODP MT
PROJECT DURATION:	84 Months
PROJECT COSTS:	
Investment Activities	
Incremental Capital Cost	US$18,13,628
Contingency (10%)	Included above
Incremental Operating Cost	Included above
Subtotal	US$18,113,628
Non-investment Activities	US$3,329,080
Total Project Cost	US$21,442,708
LOCAL OWNERSHIP:	100 %
EXPORT COMPONENT:	0
TOTAL REQUESTED MLF GRANT:	US$13,396,579
Investment:	US$10,751,499
Non-investment:	US$2,645,080
IMPLEMENTING AGENCY SUPPORT COST:	US$1,150,692
TOTAL COST OF PROJECT TO MLF:	US$14,547,271
OVERALL COST-EFFECTIVENESS:	US$6.64/kg ODP
STATUS OF COUNTERPART FUNDING:	Submission requested by the Government of the Philippines
PROJECT MON. MILESTONES INCLUDED:	Yes
NATIONAL COORDINATING AGENCY:	DENR–EMB/POD/LandBank

PROJECT SUMMARY

The National CFC Phaseout Plan (NCPP) will phase out the remaining consumption of 2,017.6 ODP MT of Annex A, Group I chemicals during the period of 2003-2010. To achieve this target, a series of investment, non-investment, technical assistance, and other support activities will be undertaken. The NCPP will enable the Philippines Government to enforce a ban on the importation of equipment (new and used) designed to use exclusively CFCs and totally eliminate the use of CFCs in the manufacturing sector by Jan 1, 2005 and the use of CFC (other than banked supplies) in the servicing sector by 2010.

This NCPP has been prepared by the Government of the Philippines (DENR/POD) with assistance from the World Bank and the Government of Sweden in a cooperative undertaking. By way of this report, Sweden is reporting to MLF on the project designed to assist the Government of the Philippines in formulating a strategy for phasing out the consumption of CFC in the refrigeration servicing sector (ExCom Dec. 36/5).

The Government of the Philippines is requesting financial support of US$13,396,579 from the Multilateral Fund (MLF) to cover part of the phaseout costs over a period of eight years. With 31.7 ODP MT to be phased out from the one remaining ongoing MLF-approved and funded project, this proposed funding request will contribute to the phaseout of an additional, total 2,017.6 ODP MT of Annex A, Group I chemicals.

IMPACT OF PROJECT ON COUNTRY'S MONTREAL PROTOCOL OBLIGATIONS
The project will enable the Government of the Philippines to meet the CFC phaseout obligations.

Prepared by: The Government of the Philippines, the World Bank; the Swedish International Development Cooperation Agency
August 26, 2002.

PHILIPPINES NATIONAL CFC PHASEOUT PLAN

Prepared jointly by:

The Philippines Department of Environment and Natural Resources (DENR)
The Philippines Ozone Desk – Environmental Management Bureau (EMB)
The Technical Working Group (Inter-Agency representation)
The Resources Groups (private sector representation -- RMP accreditation; certification and MAC Controls)
The Philippines multi-stakeholder community
The World Bank
The Swedish International Development Cooperation Agency/Stockholm Environment Institute

For Presentation to the 38th Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol

TABLE OF CONTENTS

EXECUTIVE SUMMARY

This National CFC Phaseout Plan (NCPP) was prepared by the Government of the Philippines (Department of Environment and Natural Resources (DENR)/Philippines Ozone Desk (POD)) with assistance from the World Bank and Sweden in a cooperative undertaking as per Executive Committee Dec. 36/5 which ensures coordination among agencies in terminal phaseout plans. The World Bank, as the agency receiving approval to assist the Philippines prepare a national CFC phaseout plan at the 35th Executive Committee Meeting, and, as per the request of the Philippines Government, has taken the lead in the coordination of preparation of this overall CFC phaseout plan. The Government of Sweden has focused on formulating a strategy for phasing out the consumption of CFCs in the refrigeration and MAC servicing sectors of which funding for the development of this strategy was approved at the 32nd Executive Committee Meeting. The NCPP and the strategy to reduce and eliminate the use of CFC refrigerants for servicing in the Philippines have been combined whereby the World Bank pays particular attention to the remaining phaseout of CFCs in the manufacturing sector and Sweden will address the servicing sector.

The objective of this NCPP is to enable the Government of the Republic of the Philippines to phase out its CFC consumption in accordance with the phaseout schedule stipulated by the Montreal Protocol on Substances that Deplete the Ozone Layer. The average consumption level of all Annex A, Group I chemicals from 1995–1997 inclusive, was 3,018 Ozone Depleting Potential (ODP) MT (3,031 MT of Ozone Depleting Substances (ODS)). In accordance with the provisions of the Montreal Protocol, this average consumption level is being used as the baseline for establishing the freeze level and the respective interim reduction requirements during 1999–2010.

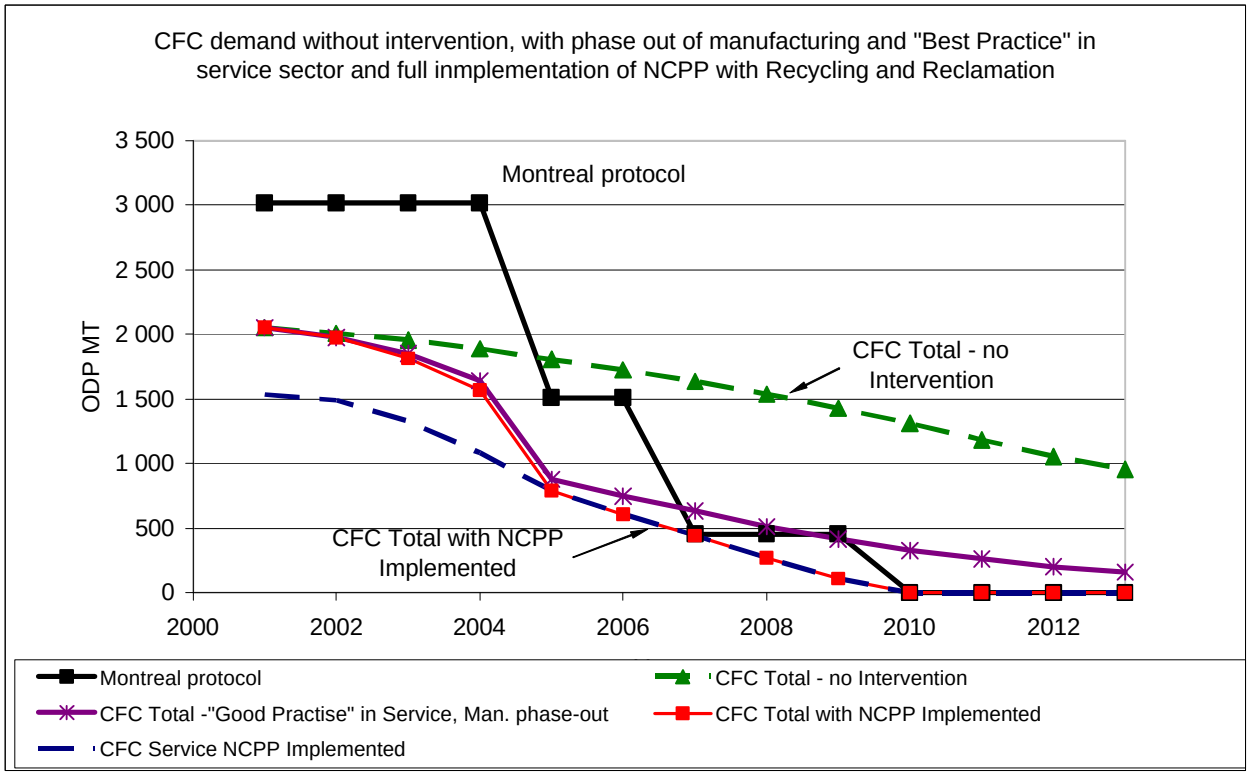
Based on 2001 data, the total consumption of Annex A, Group I chemicals was 2,049.3 ODP MT which is 968.7 ODP MT less than the freeze level. The total consumption of this group of chemicals is expected to decline to 2,017.6 ODP MT by the end of 2002 when the final ongoing Multilateral Fund (MLF) manufacturing sector project is completed and assuming no other measures that may cause reductions are introduced during this period. The following table shows the breakdown of the 2001 consumption for CFCs, the CFC-115 component of R-502, as well as the very small remaining use of CTC. There was no consumption of 1,1,1 TCA recorded in the Philippines in 2001.

CFC and CTC Consumption in the Philippines in 2001

	CFC-12	CFC-11	R-502	CTC	Total	Ongoing	To Phase Out
MT 2001	1,378.3	668.6	4.1	0.05	2,051.0	-31.7	2,019.3
ODP	1.00	1.00	0.60	1.10			
ODP MT 2001	1,378.28	668.6	2.46	0.06	2,049.4	-31.7	2,017.7
ODP MT 2001 (excl. CTC)	1,378.3	668.6	2.5		2,049.3	-31.7	2,017.6

The Overall CFC Situation

Based on current consumption trends, the Philippines will need to reduce its consumption of 2,049.3 ODP MT by at least 537.3 ODP MT during the period 2001 to 2005 to meet its Montreal Protocol-50 percent reduction requirement (1,509 ODP MT) and another 1,056.3 ODP MT between 2005 and the end of 2006 to ensure its compliance with the 85 percent reduction target (452.7 ODP MT) by 2007.



With no additional intervention from the Government or the MLF, the Philippines will not meet the 50 percent reduction requirement and thus will likely not be able to meet the subsequent interim phaseout targets. By removing the CFC-11 consumption from the entire remaining CFC-based manufacturing sector prior to January 1, 2005 and by introducing best practices in the servicing sector, the Philippines can meet its 2005 obligation but will still need a concerted effort in the servicing sector to meet the challenges posed by the January 1, 2007 and January 1, 2010 Protocol obligations. The last two crucial obligations will have to be met by restricting supply and reducing demand through, *inter alia*, retrofits, premature replacement of existing equipment, establishment of a system to reclaim and reuse the currently installed stock of CFCs and improved service practices to reduce emissions. The introduction of the measures above will be supported by incentives to affect the market in favour of improved service practices. Targeted information, in order to improve the level of knowledge among the equipment owners on the advantages to direct businesses towards service companies that have the best skills and are in compliance with the law, is a key element proposed in this NCPP. In addition, the whole effort will be supported by a comprehensive overhaul of the legal framework to ensure that it can drive the market in the right direction. Proposed regulatory measures to this effect are also discussed in detail in this proposal.

The inventiveness and ingenuity of the people of the Philippines to keep equipment "up and running" long past its normal useful life presents a special challenge since approximately 75 percent of the remaining consumption of CFCs is in the servicing sector. The NCPP, however, sets out a plan that will enable the Philippines Government to curtail all uses of CFCs in the entire manufacturing sector by 2005 and the use of CFCs in the servicing sector by 2010.

The NCPP stipulates that CFC reduction and elimination programs need to be implemented immediately in both the manufacturing and the servicing sectors. Actions in the servicing sector require a considerable lead time before the necessary reduction of CFCs can be achieved, and therefore a series of activities will have to be initiated as soon as possible. These include investment and non-investment activities aimed at changing behaviour of end-users and service technicians. For these reasons, the cash-flow requirements are weighted more heavily in the early years.

This work cannot be implemented without the creation of a dedicated and accountable body. Therefore, the NCPP recommends the creation of a program management unit (PMU) and resources have been requested to empower this body to ensure implementation of the required measures. The specific functions and responsibilities of the PMU are described in this proposal.

The total cost for the Philippines to phase out 2,019.3 MT or 2,017.6 ODP MT of CFC in accordance with this NCPP is US$21,442,708. The Government of the Philippines is requesting financial support of US$13,396,579 from the Multilateral Fund to cover part of the CFC phaseout costs to the Philippines for phasing out the 2,017 ODP MT. It is known from import data that the actual consumption is likely larger than 2,049.3 ODP MT. However, with these allocated funds, the Government of the Philippines will undertake the phaseout of all remaining CFC consumption which includes that from SMEs.

This requested amount will be allocated to the Philippines over a period of seven years. The overall cost-effectiveness of this National CFC Phaseout Plan is US$6.64/kg.

CHAPTER 1

1. Introduction

1.1. Program Scope and Objective

The objective of this National CFC Phaseout Plan (NCPP) is to assist the Government of the Republic of the Philippines to completely phase out its CFC consumption in accordance with the phaseout schedule stipulated by the Montreal Protocol. A total consumption of 2,017.6 ODP MT of Annex A, Group I chemicals will be phased out under this program over the period of 2003–2010 with the intent to eliminate all CFC consumption in the manufacturing sector by January 1, 2005.[1] This figure (2,017.6 MT) was derived from the total consumption in 2001 of CFC-11, CFC-12, CFC-115 and CTC (2,049.4 ODP MT minus 31.7 ODP MT for an ongoing Multilateral Fund (MLF) project minus 0.05 ODP MT of CTC). There was no consumption in 2001 of CFC-113, CFC-114 and 1,1,1 TCA. Table 1-1 displays the consumption data.

Table 1-1. ODS consumption in the Philippines 2001 -- CFC-11, CFC-12, R-502 and CTC

	CFC-12	CFC-11	R-502	CTC	Total	Ongoing	To Phase Out
MT 2001	1,378.3	668.6	4.1	0.05	2,051.0	-31.7	2,019.3
ODP	1.00	1.00	0.60	1.10			
ODP MT 2001	1,378.28	668.6	2.46	0.06	2,049.4	-31.7	2,017.7
ODP MT 2001 (excl. CTC)	1,378.3	668.6	2.5		2,049.3	-31.7	2,017.6

To achieve this objective, the NCPP proposes to utilize a combination of policies, regulations, and financial incentives to subsidize the phaseout cost of the industrial sector, and to promote refrigerant recovery and recycling, training, and technical assistance activities to minimize and eventually eliminate the import of CFCs and consumption of virgin materials. The NCPP includes relevant technical assistance components for strengthening the capacity of both industry and the Government.

In November 1999, the MLF approved funding for the project "Preparation of a Government Strategy to Reduce and Eliminate the Use of CFC Refrigerants for Servicing in the Philippines". The Refrigeration Management Plan (RMP) includes a comprehensive strategy to control and reduce demand of CFC refrigerants that will enable the Philippines Government to meet its obligations under the Montreal Protocol in an orderly and cost-effective manner with a minimum of disruption to the economy. It should be noted that the text regarding the servicing sector (RMP) in this NCPP serves as the reporting to the Executive Committee (ExCom) on the progress of this MLF project.

To achieve this target, a series of investment, non-investment, technical assistance, and capacity building activities will be carried out. Considering the multi-faceted approach required, it is crucial that flexibility is given to the Philippines Government to adapt or modify its strategies during implementation of this plan as problems needing remediation or other needs arise. Due to the extent, the complexity and the dynamic nature of SMEs in the Philippines, proposed strategies or approaches to deal with CFC phaseout in this sector will need to evolve over time. This is

[1] For the purposes of this proposal, all Annex B chemicals are excluded.

necessary to ensure that the agreed phaseout targets will be met and results achieved will be sustained.

The Government of the Philippines is requesting financial support of US$13,396,579 from the MLF to cover part of the phaseout costs to the Philippines. This requested amount will be allocated to the Philippines over a period of eight years. The total cost for the Philippines to phase out 2,017.6 ODP MT of ODS in accordance with this NCPP is US$21,442,708. The overall cost-effectiveness will be US$6.64 per kg.

1.2. Background

The Philippines is not a producer of substances controlled under the Montreal Protocol, nor of any of their substitutes, thus the total demand for Annex A, Group I chemicals is being met through imports. The average consumption level of all Annex A, Group I chemicals from 1995–1997 inclusive, was 3,018 ODP MT, which, in accordance with the provisions of the Protocol, is used as the baseline.

The first Philippines Country Program for the phaseout of ODS which was prepared in May 1993, specified schedules and laid out the plans, programs, and activities expected to facilitate a phaseout. The Philippines, as an Article 5 country (having an annual ODS consumption of less than 0.3 kg per capita), has been provided with financial assistance from the MLF for ODS conversion projects. Agencies actively involved in assisting the Philippines with its efforts to phase out ODS are the United Nations Development Program (UNDP), the World Bank, the United Nations Environment Programme (UNEP) and the Swedish International Development Cooperation Assistance (Sida) (via the Stockholm Environment Institute (SEI)).

The Philippine Department of Environment and Natural Resources (DENR) was appointed by the Government to act as the national coordinator for the implementation of Philippine programs under the Montreal Protocol in the early 1990s. To implement the 1993 Philippines Country Program, the Government, through its Philippine Ozone Desk (POD), developed and implemented a wide range of policy and support activities including: institutional and regulatory measures, educational programs and awareness raising, investment advice, ODS-related technical assistance, and data collection and import monitoring. To date, there have been 33 investment and 15 non-investment projects approved by the MLF ExCom for the Philippines. The completed investment projects have, in total, phased out approximately 1,605.87 ODP MT of ODS. There is one remaining ongoing MLF-approved investment project. This UNDP-implemented project is expected to phase out 31.7 ODP MT of CFC-11 in rigid foam manufacturing by October 2002. In October 1999, the Government utilized its resources to update the Country Program with a new phaseout schedule. Corresponding priority measures were identified to achieve revised targets.

At present, and in addition to the NCPP proposal, there are two major activities underway to address some remaining institutional needs. Under the Philippines' Institutional Strengthening Project (ISP), a study was conducted entitled "Strengthening the Monitoring and Control of ODS and ODS-Using Equipment." (The report was completed in April 2002 but the supporting database is still under review.) This study aimed to provide a complete and comprehensive understanding of the extent to which new and second-hand ODS-using equipment enters into the Philippines for domestic sale and to identify, evaluate and formulate appropriate policies and guidelines.

The second activity, "Training for Customs Officials and Other Key Stakeholders," is a UNEP-implemented project that was approved at the 35th Executive Committee Meeting because, despite existing policies and regulations, a more organized and efficient system was needed to monitor and control the imports of CFC or CFC-containing equipment. At present, customs officers and other stakeholders involved in the monitoring and control of ODS imports are not trained to identify or verify shipments of chemicals entering the country. This training activity is thus designed to support existing policies and regulations while assisting in the creation of an improved monitoring system. It aims to train customs officers and other key stakeholders to enable them to identify controlled substances under the Montreal Protocol and imported refrigerators, freezers and other refrigeration equipment using CFCs and to provide CFC-detection equipment for major customs entry points in the country.

The Government of the Philippines also takes part in regional customs–ozone cooperation efforts in the South-east Asia and Pacific region which is supported by Sweden and the MLF through UNEP. It aims to strengthen both national and regional cooperation in the control of trans-boundary movements of ODS by providing a platform for informal networking and information exchange on ODS trade in the region. Information gathered through this network is utilized to develop regional and national risk profiles and enforcement tools to enables the Bureau of Customs (BOC) and other customs officers in neighbouring countries efficiently target ODS shipments.

As an Article 5 country, the Philippines has entered the compliance phase of the Montreal Protocol with the first control measure already in place – the 1999 freeze on production and consumption of Annex A, Group I chemicals. The country is legally bound to comply with the subsequent Article 5 country obligations: 50 percent consumption reduction by 2005, 85 percent reduction by 2007 and complete phaseout by 2010.

Based on 2001 data, the total consumption of Annex A, Group I chemicals was 2,049.3. ODP MT which is 968.7 ODP MT less than the required freeze level. The total consumption of this group of chemicals is expected to decline to 2,017.6 ODP MT by the end of 2002 when the final MLF investment project is completed. Without further interventions (other than completion of the ongoing project), however, it is seen that the total demand for CFCs in 2005 will exceed the 50 percent reduction target of 1,509 ODP MT. It also appears that with no additional intervention from the Government or the MLF, the Philippines will also not be able to meet the subsequent phaseout targets.

Because it appears that the Philippines will not achieve its 2005 reduction obligations, it cannot afford to be complacent at this stage. The achievement in reductions to date was assisted by a large number of MLF projects and also, ironically, by the Asian financial crisis that began in 1998 (resulting in a decreased demand for products). The Philippines has not fully recovered from the impact of this downturn in the economy. In fact, it is well known that a significant part of the production capacity of the Philippines industry has been idle since the crisis. Furthermore, the informal sector, if not controlled through appropriate demand-side tools or interventions, can, and will undoubtedly, create compliance problems.

Urgent action is thus required to provide both "carrots" and "sticks" to current CFC users, and a level playing field must be created to pre-empt back conversion by those enterprises that have

already converted to non-ODS technology through stiff laws and penalties. The Government of the Philippines intends to step up measures to assist remaining CFC-consuming enterprises to convert to non-ODS technology and, at the same time, to further enforce and clarify the bans or prohibitions on the use of CFCs in the manufacturing sector and the importation of equipment designed to operate exclusively using CFCs (new and used). However, it requires assistance to do so given the varied challenges involved in this feat. Failure to do so will undermine the achievement attained in the past and will jeopardize the Government of the Philippines' ability to comply with future Montreal Protocol obligations.

The Philippines will need to reduce its current consumption of 2,049.3 ODP MT by at least 540.3 ODP MT during the period 2001 to 2005 and another 1,056.3 ODP MT between 2005 and the end of 2006 to ensure compliance. The 2005 reduction will have to be achieved by eliminating CFC-11 use in the foam manufacturing sector and through some consumption reductions in the servicing sector. The 2007 reductions will have to come solely from CFC-12 use in the servicing sector. To achieve significant and sustainable phaseout of CFCs in the servicing sector, and as these types of activities require a long lead time before substantial reduction of CFCs can be achieved, a series of activities will, however, have to be undertaken immediately. These include investment and non-investment activities aimed at changing the behaviour of end-users and service technicians.

The CFC consumption reductions achieved thus far have, for the most part, been achieved as a result of the investment and non-investment activities supported by the MLF and DENR's own policies and interventions to reduce the import quota of Annex A, Group I chemicals by 5-25 percent a year. However, DENR is aware that the existing policies and interventions focusing primarily on a pre-programmed reduction on the supply-side through import quotas are not sufficient to curb use. Further reduction in the supply of CFCs without new and innovative policies and interventions to mitigate demand could likely lead to illegal imports of CFCs. This has prompted DENR to develop a comprehensive strategy to examine the actual demand for CFCs in the country with a view to identifying possible additional interventions (including the possible use of economic instruments) and policy and regulatory measures to ensure that the demand will also be reduced in accordance with the reduction schedule on the supply side.

1.3. Institutional Considerations

When the Montreal Protocol entered into force in January 1989, DENR was designated the national coordination agent for the implementation of environmental treaties in the Philippines. In 1992, the DENR "Montreal Protocol Secretariat" (an Ozone Desk) was created per Special Order (S.O.) No. 685, which has since been amended several times. In 1998, members of this Secretariat were reconstituted as a functioning body under the auspices of the "Philippine Ozone Desk" (POD). Under this new regime, the POD project manager (functional and daily operations head) reports to the Director of the EMB of the DENR.

In August 2001, the DENR structure was reorganized and two undersecretaries were designated as National ODS Phaseout program coordinator and co-coordinator, respectively. They were both assigned oversight responsibility with respect to POD. The revised and current line and staff composition of POD is found in Annex II.

In recognition of the value and importance of consensus and partnerships in achieving environmental program targets and objectives, a Montreal Protocol Inter-agency Technical

Working Group (TWG) was created in August 1996 via DENR S.O. 96-1261 (this was amended in 1999 via DENR S.O. 99-957). Because of the need for multi-stakeholder input, a "Resources Group" (RG) was also created, with three associated but specialized sub-groups for RMP accreditation, certification and MAC control. The composition of these various groups is found in Annex III.

1.4. Regulation of ODS Consumption and Use

The Philippines has undertaken a number of exemplary initiatives to control ODS and pave the way for compliance with Montreal Protocol requirements. Initially, import and use restrictions were based directly on the Hazardous Substances Act, RA 6969, but more recently they have been supported by the Chemical Control Order (CCO) for Ozone Depleting Substances (ODS) which includes references, among others, to accreditation requirements for dealers, retailers and service providers, legal requirements on ODS importers in the form of import permits, a ban on installation of new equipment and products with CFCs and strict control on importation to assist in reductions for an eventual total phaseout. However, due to the economic downturn that impacted SMEs in particular, the Government could not afford politically to enforce the ban to date. Under the current economic conditions, the Government of the Philippines can only implement fully its policies and regulations and eliminate the default grace period given to enterprises when an appropriate funding level to help financing conversion costs can be made available to the private sector.

The phaseout schedule in the CCO applies to Annex A and B substances and requires a gradual reduction in consumption including a reduction compared to 1996 consumption figures with 50 percent by January 1, 2005 and 85 percent by January 1, 2007. Annex C and E substances were exempt from the phaseout schedule. The Philippines' Senate has now ratified the Copenhagen Amendment, thus, the revised CCO will consider a provision to phase out Annex C and E substances. Import clearances for monitoring purposes of Annex C substances are already a requirement under the CCO. In the case of Annex E (Methyl Bromide), the Fertilizer and Pesticides Authority of the Department of Agriculture issues the import clearance.

The accreditation requirements set out by the CCO are not yet implemented, as further details will have to be decided within the framework of this project. A more detailed description of the CCO, its antecedents and a number of other regulations that have, or will have, an impact on ODS phaseout in the Philippines can be found in Chapter 5.

CHAPTER 2

2. CFC IMPORTS AND DISTRIBUTION

2.1. Sources of ODS Supply and Import Considerations

The Philippines has historically imported CFCs primarily from developed counties but in recent years the major suppliers have been China and India. Importers that have received import clearances from DENR are listed in Annex IV.

2.2. Corroborating Consumption Data

In order to establish the level of ODP phaseout which is eligible for funding, three data sources were employed - import clearance and customs data were utilized to extrapolate and cross-check historical consumption trends and survey data were used to verify 2001 consumption data.

The first source of data is derived from DENR through its import clearance system. This system of import clearances, based on quotas established by the CCO, is described in detail in Section 5.2.1. Historically, consumption data has been estimated based on the pre-shipment importation clearance forms submitted by the importers to POD. Import clearances issued are valid for six months because of the time needed for processing orders and shipping varies. An import clearance issued in the latter part of one particular year can thus be used into the following year but no later than February. Before a new clearance can be issued, the amounts imported under the prior import clearance (IC) are to be reported back to the POD by the importer.

Table 2-1 summarizes ODS data as obtained from ICs granted and from the Philippines Bureau of Customs (BOC). There are some known anomalies with these data sources, however, on an aggregate, average level the two data sources do not diverge significantly (2,115 MT versus 2,004.5 MT). The likely reason for the difference is that the new importers´ clearances for 2000 were not fully used.

The inverse relationship depicted in the table between the IC and BOC data from year to year is because of the aforementioned policy of allowing import clearances to overlap into the following year. Because requested clearances are not always exercised it is not until later, in a following year, that importers report actual IC utilized. Thus, a significant number of the ICs issued for 2000, for example, were used in early 2001 resulting in a peak of import in the 2001 BOC data opposed to that in the IC data for the same year. In addition, the difference in consumption from 2000 to 2001 in BOC data is due, on the most part, to the fact that importers, as a group, did not use their 2000 ICs until they realized they were about to lose them on the February 2001 expiration date and were not certain about the future level of quotas, given the recent signals sent by the Government to tighten controls.

The ongoing UNEP customs training project is expected to address any existing data collection and reporting gaps by the BOC and a recently signed memorandum of understanding between BOC and DENR will ensure a greater level of cooperation so that their two systems operate in synchronization and data differences decrease year to year.

Table 2-1. Historical CFC Imports (MT)

ODS	1999	2000	2001	Average (MT) 1999-2001
	(MT)	(MT)	(MT)	(MT)
Total Annex A *(From Import Clearance system)*	2,093	2,904	1,347	2,115
Total Annex A *(From BOC Database)*	1,951	1,676	2,384	2,004

ODS consumption in MT as reported to the Ozone Secretariat is shown up until 2000 only. 2001 was not yet reported when this table was compiled.

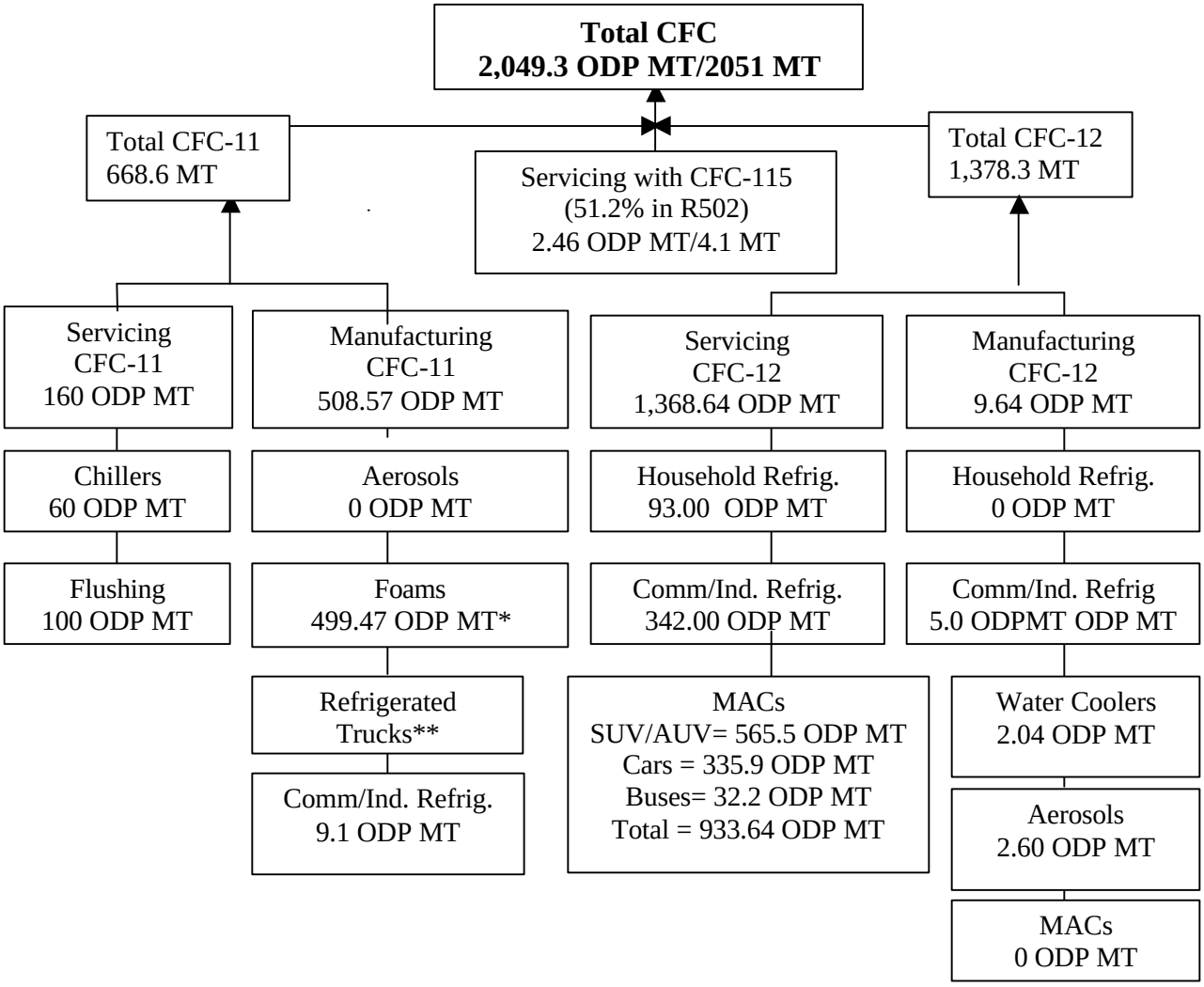
2.3. Consumption Data

For the preparation of the NCPP, a comprehensive survey was conducted to verify consumption of CFCs in the country. The results of this survey are shown below by sector in Table 2-2 and in the 2001 consumption data "log-frame" (Figure 2.1). The data in Table 2.2 was derived by the sector-by-sector survey conducted during 2001 and 2002 as part of the RMP, as preparation for this NCPP and to supplement and clarify data of the past years. Consideration of past sector consumption, phaseout activities and existing conditions in relation to this survey data is reported in Chapters 3 and 4 of this report.

Table 2-2. Consumption Data by Sector – 2001

CFC Constituent		MT by Sector	Total (MT)
CFC-11			
Consumption			668.6
	Aerosol	None	
	Foam	467.77	
	Refrigeration Equip. (Mfg.)	9.1	
	Chillers	60.0	
	Flushing	100.0	
CFC-12			
Consumption			1,378.3
	Aerosols	2.6	
	Refrig. Equipment Mfg.)	7.04	
	Household Refrig(Servicing)	93.0	
	Industrial Refrig (Servicing)	342.0	
	MAC (Servicing)	933.64	
CFC-113			
Consumption			0
CFC-114			
Consumption			0
CFC-115			
Consumption			2.46
TOTAL			2,049.3

Figure 2-1



* Foam figure includes consumption by the beneficiary under MLF/UNDP conversion

** 3 ODP MT foams from revamping refrigerated trucks are included in the total for foams above

2.4. CFC Consumption Considerations

The total verified consumption for the Philippines of 2,051 MT (2,049.3 ODP MT), as shown above, is based on extensive field work and data obtained from actual consumers in the manufacturing sector and service providers in the service sector. This level of consumption is below the total recorded imports, according to BOC data, of Annex A, Group I, chemicals in 2001 of 2,384 MT. The difference of 333 MT (16 percent) between the two sets of data is primarily due to the inability to capture all consumption in the service sector and the normal fluctuations over time. The Philippines is requesting funding only for the identified demand per the survey data, i.e., 2,017.6 MT. It is judged to be a conservative figure as it only represents 80-90 percent of the registered import with the BOC for 2001. The amount of consumption being claimed in this plan for compensation is much less than what is stipulated under Executive

Committee Decision 35/57 for both Options 1 and 2, which are 2,527.4 MT and 2,854.6 MT (latest consumption: 2000) respectively.

Through the implementation of MLF investment projects (during 1994-1998), a significant part of CFC-11 and CFC-12 consumption in the manufacturing sector was eliminated. Some CFC consumption in the refrigeration equipment, aerosol and, notably, the foam manufacturing sectors does remain, however. As illustrated in the above log-frame, a significant amount of CFC consumption in the Philippines is in the servicing sector.

Based on equipment life expectancy and survey results, as confirmed in discussions with trade representatives in each sector, the demand for CFCs can be predicted to stay reasonably flat with only a slight decline due to natural attrition. Future demand (without intervention) must, however, take into consideration variables such as sudden economic growth or decline or losses resulting from the handling of CFCs, such as from the use of cylinders – especially the predominantly-used, disposable cylinders (DACs), which cannot be totally emptied before they are disposed of (resulting in losses of 2-5 percent). This level demand will soon be problematic in relation to achieving the country's Montreal Protocol targets if no action is taken immediately.

CHAPTER 3

3. Baseline Consumption of CFC in the Manufacturing in the Philippines

3.1. Introduction and Overview

The ODS manufacturing sector in the Philippines can be historically characterized by the following: production of aerosol (including MDI products), foam and plastics products; using ODS solvents in the pharmaceuticals and garments/textiles sectors; electronics manufacturing (CFC-113); and, production of refrigeration equipment (domestic refrigerators, commercial refrigeration equipment, refrigerated trucks, and water coolers).

Through the assistance of the MLF, the downturn in the economy and the fact that cheaper garments from India and China have reduced output from the garment sector, most CFC-based manufacturing has been eliminated, the exception being, the manufacturing of foams and a very small amount of aerosol products and commercial/industrial refrigeration equipment. The electronics manufacturing sector no longer uses CFC-113 or 1,1,1 TCA and there is currently only a very small laboratory use of CTC.

With the exception of foams and a small amount of industrial/commercial refrigeration equipment manufacturers, the remaining CFC consumption in the manufacturing sector is from very small enterprises including SMEs. There remains some small consumption associated with the manufacture (revamping) of refrigerated trucks, a small consumption associated with the production of water coolers and small display counters/upright freezers. A transition plan to move away from CFC-based MDIs is currently under consideration. Additionally, an analysis of the current CFC and ODS solvent situation in the Philippines follows.

3.1.1. The Production of Aerosol Products

There have been no MLF-approved aerosol projects for the Philippines. Most industrial CFC-based aerosols have readily available alternatives and the consumption of CFCs in the aerosols sector has decreased dramatically over the last decade. CFC-12 consumption was estimated at 40 MT in 1994 and remained roughly at the same level in 1995. From 1996 to 2001, consumption in this sector almost disappeared because member companies of the Chamber of Cosmetic Industries in the Philippines (many being multinationals) initiated a voluntary phaseout of CFC-12 in their operations.

Efforts were made to track down and quantify the small amount of remaining consumption through back-tracking the raw material supply chain and consultations with experts and users. There are two suppliers of aerosol cans in the Philippines: Aero-Pack and Philippine Aerosol Container Corporation (PACC). These two companies are also the largest contract fillers in the Philippines. PACC converted to hydrocarbons in the early 1980s. It has about 70 customers with only a small number for non-halon applications. (Beginning July 1999, no new halon fire extinguishers are allowed in the domestic market. Control measures were implemented by the Bureau of Product Standards of the DTI. The Philippines has also completed a halon recovery and recycling project (UNDP) which aims to bank Halon-1211.)

Since so many of PACC's customers purchase only aerosol cans, valves, seals and gaskets (PACC supplies 146,000 cans annually), it is possible that a few of these companies may still be using CFCs as propellants. PACC provided a list of its customers that are buying its aerosol cans and it has indeed been confirmed that nine enterprises are manufacturing tear gas and are using CFC-12 as a propellant. The combined consumption of these nine enterprises is 2.6 MT (number of cans produced multiplied by the CFC-12 content per can). The major producer is St. Pancratius Industries, which was established in 1992 and has an annual consumption of 1.44 ODP MT of CFC-12.

The other major player, Aero-Pack, no longer fills products with CFCs as propellants. The list of aerosol manufacturing enterprises and corresponding consumption has been verified by industry and local experts, thus, the only remaining application is in the production of tear gas. In sum, it has been concluded that CFC-11 consumption via such aerosol producers is now zero and CFC-12 consumption is 2.6 ODP MT.

3.1.2. Metered-Dose Inhalers

New formulations of Metered-Dose Inhalers (MDIs) without CFCs are normally based on HFC-134a and require a complete change of equipment. The Philippines does not manufacture any MDIs. However, they imported about 1.2 million units of MDIs in 2001. These MDIs included those containing salbutamol, beclomethasone and budesonide as active compounds. The products are marketed by representatives of the following MDI manufacturers: GlaxoSmithKline, Biomedis/United Laboratories Inc., Schwarz Pharma, One Pharma, Otsuka, Cathay Drug Co. Inc., Boehringer Ingelheim, Astra Zeneca and Novartis Servipharm, which have already introduced non-CFC MDIs since 1999. There are also alternative dispensing devices for depositing these medications in the lungs, the principal being "dry powder inhalers" (DPIs). The main driving force for the introduction of non-CFC alternatives is the corporate policy of the MDI manufacturers.

Asthma is a serious illness, and in extreme cases, is life threatening. Patient tolerance of substitutes is therefore critical. Whereas non-CFC MDIs have captured the MDI market share, the CFC-MDIs are reportedly "more sellable" than the non-CFCs because patients are not used to alternative products due to a different taste and cooling effect. The level of acceptance for non-CFC MDIs is still low as there has been no existing program on the part of the Government to increase awareness of patients and specialists in regards to non-CFC MDIs. As noted by a TEAP expert, any strategy that tries to limit imports without considering patient tolerance will not work and will be dangerous. A non-CFC MDI strategy, sensitive to these issues, is therefore needed that in addition, will not only sustain the current market share of non-CFC MDIs but also, take over the market with a view to the total elimination of CFC-based MDI products, especially considering that the demand for MDIs in the Philippines is increasing every year due mainly to the hot temperatures and recorded high levels of suspended particles in the air.

To successfully introduce non-CFC MDIs, the strategy will need to focus on: patient needs; and educating medical doctors who are prescribing these products. The Bureau of Food and Drug regulates MDIs in the Philippines. It has been agreed that the development of a strategy to phase out CFC MDIs requires the full and active participation of the medical community. The pharmaceutical industry, doctors and relevant government agencies will be invited to be part of the strategy development process. The Bureau of Food and Drug has provided budgetary inputs (development of a strategy) that are reflected in this plan. This activity is crucial because the

number of asthma patients and demand for CFC MDIs is increasing in concert with rapidly diminishing air quality. It is also important to ensure that non-CFC MDIs are included in the list of approved prescription drugs for health insurance coverage purposes. The ability to follow through on the plan will be contingent on the funding available.

3.1.3. Production of Foams

CFCs are, or have in the past, been used as blowing agents in the Philippines in the production of various types of foams: polystyrene/polyethylene; rigid polyurethane foam; flexible slabstock; and, integral skin foam. Flexible slabstock and rigid foam uses now predominate. It was determined and validated by experts that the consumption of CFC-11 in 2001 was 668.57 ODP MT with 508.57 MT coming from foam-related manufacturing.

The Philippines cannot possibly meet its 2005 compliance requirement (consumption reduction to 1,509 ODP MT) without the total elimination of the use of CFC-11 in the manufacturing sectors. This means not only the total elimination of CFC-11 use in the manufacturing of foams and foam products but also the elimination of the small consumption in relation to insulation production for small display cases, 4-door upright freezers and refrigerated trucks.

MLF-approved investment projects to assist in conversion to non-CFC foam production were provided to most of the larger CFC users in the Philippines. From 1995 through 2002, fourteen UNDP and four World Bank investment projects in the foam sector were funded by the MLF. One project to phase out 31.7 ODP MT of rigid foam at Prescon Construction and Development under UNDP is ongoing and expected to be completed in October 2002.

Alternative technologies employed by the various MLF-funded projects include methylene chloride (MeCl), liquid carbon dioxide (LCD) and low index additive (LIA) for slabstock, and HCFC-141b or water-blown technology for other applications. Table 3-1 summarizes the assistance received to date from the MLF in this sector. A detailed breakdown of the cost-effectiveness of these foam projects (historical average) by sub-sector is shown in Table 3-2.

Table 3-1. MLF-Approved Foam Sector Projects

Agency	Total No. of Projects	No. Ongoing	MLF Funding Level (US$)	ODP Tons Eliminated	Cost-Effectiveness US$
UNDP	14	1	3,940,470	452.5 MT CFC-11 49 MT CFC-12	7.86
World Bank	4	0	3,914,000	352.2 MT	11.11*
TOTAL	18	1	7,854,470	853.7 MT	9.20

*These four projects represented the foam components of refrigeration enterprise conversions.

Table 3-2. Historical Average of Cost-Effectiveness of UNDP and IBRD Foam Projects for the Philippines

Sub-Sector	No. of Projects	ODS Eliminated (MT)	Total Cost US$	Historical Cost-Effectiveness (US$/kg)
Flexible Slabstock	2	170	402,000	2.37
PS/PE Foam	3	84	1,310,000	15.59
Integral-Skin Foam	1	20	326,750	16.34
Rigid Foam	11	509.7	5,165,720	10.14
Multiple Sub-Sectors	1	70	650,000	9.29
Totals	18	853.7	7,854,470	
Average Cost Effectiveness				**9.20/kg**

It was determined that foam sector consumption of CFC-11 arises mainly from the larger foam manufacturers (six firms), and individual small foam blowers (20 firms/groups), and perhaps, some very small users. The product types and dates of establishment of the latter group could not be confirmed so it will not be included in the financial request in this proposal, however, it will nonetheless, be addressed by the phaseout plan. The entire consumption from the first two foam groups is 467.77 ODP MT annually. There is another 9.10 ODP MT associated with the manufacture of refrigerated equipment for a total of 476.87 ODP MT. The listing for the foam manufacturers follows:

Table 3-3. CFC Foam Manufacturers – For Individual Phaseout

Company	Date Established	Product Type	Consumption ODP MT	Eligible Consumption ODP MT
Primefoam	June 1995	Slabstock foam Flexible molded foam	40	40
Qualifoam	January 1995	Slabstock foam Flexible molded foam	40	40
Maxfoam	January 1996	Slabstock foam Flexible molded foam	20	--
Style Foam	1980	Slabstock foam	73	73
Salem Oceanic	1976	Slabstock foam	87	87
United Foam	June 1995	Slabstock foam	40	40
Totals			**300**	**280**

The many (but smaller) foam-blowing enterprises that are still using CFC-11 as a blowing agent are set out at Table 3.4.

Table 3-4. CFC Foam Blowers – For Grouped Phaseout

Company	Date Established	Product Type	Total CFC-11 Calculated or Supplied (MT)	Eligible CFC-11
Versatemp	1980	Rigid Foam	0.82	0.82
Rigid Foam Insulation Contractor	1976	Rigid Foam	1.40	1.40
Dongshin, Phils	May 1995	Rigid Foam	36.00	36.00
Pioneer Specialty	1990	Rigid Foam	4.00	4.00
PDC Coatings	1998	Rigid Foam	2.00	---
Space Saver	1986	Rigid Foam	2.00	2.00
Michigan Enterprise Corp	1986	Rigid Foam	47.30	47.30
Chong Hwa Ind. Corp	1997	Rigid foam	30.90	---
RGM/Tri-Asian	Mar. 1995	Rigid foam	4.40	4.40
Trenchless Tech	1998	Rigid Foam	1.30	---
Grasso Kab Phil	May 1995	Rigid foam	1.00	1.00
Daikin-Alen	1998	Rigid foam	0.80	---
INSUPHIL	1987	Rigid Foam	0.50	0.50
CJC REF	1982	Rigid Foam	0.20	0.20
MAUNLAD	1989	Rigid Foam	0.30	0.30
SEAGOLD/MEGA Fishing	1987	Rigid Foam	0.50	0.50
DANCAN Industries	Oct. 1995	Rigid Foam	14.00	---
PHIL. Kingford, Inc.	1992	Rigid Foam	5.00	5.00
Tempsys/Tel-Equip	1994	Rigid Foam	12.35	12.35
Orient Cold Storage	1984	Rigid Foam	3.00	3.00
Totals (20 total-15 eligible)			**167.77**	**118.77**

Foam Blowers

The total CFC-11 consumption for these two consumption categories (26 firms in total) is 300 MT (large foam manufacturers) plus 167.77 MT (foam blowers which includes 3 ODP MT from refrigerated truck revamping – Orient Cold Storage) and 9.10 MT from the manufacture of refrigerated equipment (see below); the grand total being 476.87 ODP MT.

The 26 foam enterprises and the many very small and very low consuming enterprises have not received any assistance from the Multilateral Fund. These 26 firms are all fully Philippines-owned, as are all of the very small enterprises. Five of the six larger foam-manufacturing firms and 15 of the 20 foam blowers were established before July 25, 1995.

Without assistance to convert remaining non-CFC foam production, enterprises will be encouraged to prolong their use of CFCs due to marketing/pricing pressures. Moreover, enterprises that have already phased out CFCs may be forced to revert to CFC-use by the same pricing pressure. To attain complete phaseout of CFCs in the foam sector and to ensure sustainability of all existing conversions, it is crucial that a level-playing field be created and maintained. To achieve this, further control measures are being brought forward to preclude the use of CFCs in foam production, and to prohibit sales of CFC pre-mixed polyol, and sales of CFCs to polyol suppliers or system houses. To support these policies, conversion of the remaining 21 foam enterprises plus the SME informal sector should receive high priority. Providing that assistance is received, no new use of CFCs in the foam sector will begin and growth in demand for CFCs by the micro-users will also be curtailed. With assistance, the

demand for, and consumption of, CFC-11 in this sector (including the two foam components of the refrigeration enterprises) is anticipated to decrease by 476.87 ODP MT before January 1, 2005.

3.1.4. Solvents and the Electronics Manufacturing Sector

CFC-113

CFC-113 has been used as a solvent in electronic assembly plants, precision cleaning, metal degreasing and in other industrial areas in the Philippines. Historically, total CFC-113 importation and estimated consumption had been roughly the same. Current import data suggest that there has been no import of CFC-113 for the last three years. In fact, the only solvents imported to the Philippines was CTC and in very small quantities (less than 100 kg in total).

Generally speaking, the electronics industry in the Philippines has been relatively fast in phasing out ODS. The speed was due, at least in part, to the sector being predominated by a large number of multi-national companies which voluntarily phased out their ODS use, the pressure from foreign export markets for firms to comply with international standards and technical and financial assistance from the MLF. The sector, for the most part, now uses water-based solutions in place of CFC solvents.

Nonetheless, to confirm cessation of consumption and/or remaining uses and to investigate the accuracy of CFC-113 import data, an industry survey was carried out. The result of the survey confirmed a complete phaseout in this sector. Visits were also made to the regular technical meetings of SEIFI, the electronic industry technical association that has more than 100 member companies. Copies of an earlier CFC-use survey were re-distributed to this group and no additional CFC-113 use was identified. Cessation of CFC-113 use in this sub-sector was again confirmed at the data workshop held May 8-9, 2002.

1,1,1 TCA

1,1,1 TCA was used in the Philippines as a solvent and in a myriad of other applications. In the past, it was used as an active ingredient or solvent in the propelled liquid of many aerosols. It has also been used as a mold-releasing agent for plastic sign production, product manufacturing (syringes) in the pharmaceutical industry and assorted laboratory uses. There is no evidence of any current consumption of 1,1,1 TCA. (This finding has been corroborated through dialogue with former importers.) This cessation of use of 1,1,1 TCA was also confirmed with the importer's clients.

UNDP implemented an umbrella project to eliminate the consumption of CFC-113 and 1,1,1 TCA. The project reportedly phased out 48.8 MT of both CFC-113 and 1,1,1 TCA. The compendium of MLF-sponsored projects in this sector is set out in Table 3.5.

Table 3-5. MLF-Approved Solvent Sector Projects

Agency	Total No. of Projects	No. Ongoing	MLF Funding Level (US$)	ODP Tons Eliminated
UNDP	2	0	977,400	35.7 MT CFC-113 13.1 MT TCA 20.8 MT CFC-12
World Bank	3*	0	1,930,000	97 MT CFC-113 7.3 MT TCA
TOTAL	**5**	**0**	**2,907,400**	**173.9 MT**

*Two additional projects were approved under the World Bank but cancelled. Phaseout is therefore not counted.

CTC

There are just two known importers of CTC: Mount Sinai Scientific Supply and Dispo Phil Inc. The reported and best estimates of consumption in this sector for 2001 is 50 kg. There are three major applications of CTC for this small use: testing the quality of activated carbon; coating medicine tablets (however, there is no evidence of this use currently) in the pharmaceutical industry; and, CTC use in university and industry laboratories. These are the only known uses in the Philippines.

It is believed that it is too premature to totally phase out the small remaining uses of CTC in laboratories by applying a complete ban as a complete understanding of the current applications and technically and economically viable alternatives in laboratory practices are not available. A more comprehensive study of current use is needed before any proposal or government interventions can be made.

Current Situation in the Solvents and the Electronics Manufacturing Sector

As noted above, CFC-113 use in the Philippines has been eliminated. CTC use is also virtually eliminated with only a small remaining consumption for laboratory equipment use. The total cost to the MLF of the ODS phaseout to date in the solvent sector was US$2,907,400 with an average cost-effectiveness of US$16.72/kg.

3.2. Refrigeration Equipment Manufacture

Historically this sector included the manufacture of domestic refrigerators and industrial and commercial refrigeration equipment, the revamping of trucks for refrigeration and limited assembly and/or manufacturing of water coolers. However, many instances of industrial equipment are "created" on site (for example, at a supermarket) and this is normally not considered manufactured output and is therefore captured under the servicing rubric.

3.2.1. Household Refrigerators

All of the major manufacturers of household refrigerators in the Philippines have been MLF grantees and CFC phaseout was facilitated through this assistance. Furthermore, the use of ODS in the manufacturing of domestic/household refrigerators has been banned in the Philippines since January 1, 1999.

3.2.2. Production of Industrial/Commercial Refrigeration Equipment

There have only been two commercial refrigeration projects that eliminated both CFC-11 and CFC-12 and one umbrella project that eliminated CFC-11, CFC-12 and R-502 that were funded

in this sector. The two projects (Table 3-6) targeting CFC-11 and CFC-12 phased out a total of 48.4 ODP MT at a cost-effectiveness of US$28.64.

Table 3-6. Projects Targeting CFC-11 and CFC-12

Company	IA	Status	Scope	MLF Funding US$	ODP Tons	Cost-Effect. US$/kg
Unimagna Philippines Inc	UNDP	Completed	CFC-11 CFC-12	1,015,700	CFC-11= 23 CFC-12= 6.5	34.43
Azkon Refrig. Inc.	Germany		CFC-11 CFC-12	370,258	CFC-11= 15.7 CFC-12= 3.2	19.59
Totals				**1,385,958**	**CFC-11= 38.7 CFC-12= 9.7 = 48.4 MT**	**Avg. cost effect. = $28.64**

3.2.3. Refrigerated Counters and Freezers

LowTemp Corporation, established in 1993, manufactures small refrigerated display cases and 4-door freezers and chillers using CFC-12 and CFC-11. CFC-12 consumption is estimated at 5 ODP MT per year for manufacturing and 7 ODP MT per year for servicing. CFC-11 consumption for insulation of refrigerated units is 7 MT per year and another 2.1 ODP MT for production of insulated panels, and, around 3 MT per year for servicing the units. Total CFC-11 consumption is thus 9.1 ODP MT and CFC-12 consumption is 5 ODP MT.

3.2.4. Production of Water Coolers

There are only two known firms in the Philippines that produce water coolers: Kooler Industries (established in 1972) and Greenpole Industrial Trading Corp (established in 1990).

Only Kooler Industries consumes CFCs directly. It manufactures 700 to 1,000 units of water coolers per year under leased contract by industries. CFC-12 consumption is estimated at 8 oz. per unit and there are around 8,000 existing units produced. With Greenpole, the amount of CFCs charged to its 1/8Hp compressors is approximately 8 oz. per unit as well. The average life of a water cooler is reportedly three years. Greenpole, however, also buys water coolers from foreign suppliers and sells approximately 150 new units per year. These units are reportedly equipped with HFC-134a compressors as the firm shifted to HFC-134a compressor coolers in the year 2000. The owner has reported that, due to the high cost of HFC-134a compressors, however, he supplies the lower costing CFC-12 compressors for the after-sales market (this practice is not contrary to any current laws). The owner indicated that he cannot remain in this line of business if he tries to do otherwise. Water cooler manufacturing consumption of CFC-12 is estimated to be 2.04 ODP MT per year.

3.3. The Miscellaneous Manufacturing Sector

3.3.1. Tobacco Preparation

The major CFC "miscellaneous" manufacturing sector in the Philippines was tobacco preparation, where CFCs were used for fluffing tobacco. CFC consumption was eliminated

through a project funded by the MLF at a cost-effectiveness of US$13.48/kg. Table 3-7 provides the details.

Table 3-7. Status of MLF-Approved Miscellaneous Sector Projects

Company Name	Lead Agency	Project Status	Project Scope	MLF Funding	Date Completed	ODP tons eliminated
Fortune Tobacco Corp.	IBRD	Completed	CFC-11 (tobacco fluffing)	4,720,000	March 1996	350.0

3.3.2. Production of Refrigerated Trucks

Filipinas Thermoking installs in the order of 125 to 200 new refrigeration units in trucks per year. It has been using HFCs on all new vehicles since 1998 and has retrofitted a number of units to HFCs for large corporations such as McDonalds and Philippine Airlines. Carrier Transicold also installs new units. Some refrigerated trucks also come into the Philippines as used refrigerated trucks (rather than being manufactured locally) and the cooling systems are repaired or upgraded in the Philippines. One such production and servicing company (used-truck upgrading) still using CFC-11 is Orient Cold Storage (established in 1984). It produces some polyurethane insulating foam using CFC-11 through hand pouring techniques and it has indicated its intention to convert this foam production to HCFC-141b when it is financially feasible. Its CFC-11 consumption for 2001 was reported to be about 500 kg per truck with six trucks outfitted for an annual consumption of 3 ODP MT. This firm is referenced here because it is part of a distinct subsector but its activity is the same as the other small rigid foam blowers so its consumption is included in Table 3-4.

3.4. Summary of Remaining CFC Consumption in the Manufacturing Sector

Table 3-8. Summary of Consumption in the Manufacturing Sector

Category	Company	CFC-11 from all firms (ODP MT)	CFC-11 from eligible firms (ODP MT)	CFC-12 from all firms (ODP MT)	CFC-12 from eligible firms (ODP MT)
Aerosols		---	---	2.6	2.6
Foams -Foam mfg	See Table 3.3	300	280	---	---
Foams* -Foam blowers* (includes the refrigerated truck referenced below)	See Table 3.4	167.77	118.77	---	---
Foams -UNDP ongoing project	Prescon	31.7	---	---	---
Refrigerated Trucks * foam component is included	Orient Cold Storage	(3.0)*	(3.0)*		
Ind Equip Mfg - Foam Component - Refrigerant Component	Low Temp	9.10	9.10	5.0	5.0
	Kooler Industries	---	---	2.04	2.04
Total		**508.57**	**407.87**	**9.64**	**9.64**

* This figure (3.0) is included in the foam total because it is hand poured foam used in truck revamping. A separate entry is shown because this subsector is discussed elsewhere in the report.

CHAPTER 4

4. Baseline Consumption of CFCs in the Servicing Sector in the Philippines

4.1. General Overview of the Service Sector

The refrigeration and air-conditioning service sectors have the largest demand for CFC-12, also a significant demand for CFC-11 and a small demand for R-502. The demand for CFC-12 and R-502 for servicing of refrigeration and air-conditioning systems in stationary, as well as automotive/mobile equipment, is calculated based on available statistical data and interviews with stakeholders in each sector. CFC-11 is used to service large centrifugal chillers and for flushing all types of refrigeration and air-conditioning systems to clean them from acids and other contaminants after compressor failures or other problems. The consumption of CFC-11 is based on analyses of the chiller sector and interviews with stakeholders in all sectors of the industry. Collected data has been discussed and verified with the trade representatives in the Resource Group during several sessions of the data gathering and analysing process.

The common practice in all service sectors is to release (vent) the refrigerant in the system during most types of service and repairs. The practice of using recovery or recovery/recycle equipment is not well-established in the Philippines as the price of CFC-12 has been relatively low and the supporting infrastructure (e.g., reusable cylinders) is currently only available to a limited number of service enterprises. As there are no regulations prohibiting the release of refrigerants to the atmosphere and no capability to analyse or clean refrigerants that cannot be reused on site, recovery of refrigerants is rare in stationary refrigeration and air-conditioning installations and only from large installations such as CFC-11 chillers when it does occur. Enterprises that have recovered CFC-11 report problems in identifying where to send the recaptured refrigerant for reclaiming. This has resulted in a storage problem for these companies.

Only a limited number of service shops in the automotive sector are using recovery/recycling equipment as there has been no customer demand for it and, again, the CFC-12 price has been low. As there are no requirements and customers are often only interested in quick and cheap repairs, the motivation for service enterprises to invest in equipment is low. They note that it would be difficult to compete with service shops that continue to offer quick recharge or repair. The potential for long-term savings achieved with recovery/recycling equipment are not yet recognised by the local market.

Within the program for vocational training administrated by the Technical Education and Skills Development Authority (TESDA), there are courses offered on the servicing of domestic refrigerators, automotive air-conditioning and commercial refrigeration/air-conditioning. However, most service technicians active today in the Philippines have not received formal training. TESDA produces training manuals and exams. These are then administered by accredited schools. TESDA operates regional and provincial training centres but private schools can also offer training and certification.

The Philippines has an existing requirement for accreditation of all service providers which is administered by the Department of Trade and Industry (DTI). This system currently covers 1,705

companies accredited for service of automobiles or refrigeration/air-conditioning systems. Due to regional autonomy, the implementation of this requirement has been carried out more stringently in some regions than in others. In some regions accreditation is required to obtain a business permit. The existing accreditation incorporates requirements on qualifications certified by TESDA and particular (specified) service equipment. These requirements do not presently include any requirements related to ODS issues, leak prevention, service methods or use of alternative refrigerants. The requirement for accreditation included in the current Chemical Control Order (CCO) (administered by DENR) has not, as yet, been implemented or integrated into the existing system.

Since servicing of units with alternative refrigerants such as HFC requires a higher skill level, most service technicians are not equipped with proper equipment and knowledge for handling the new lubricant for HFC which is much more humidity-sensitive than mineral oil. In addition, the significant price differential between CFC-12 and HFC-134a has proven to be a major reason for service technicians to charge the repaired units with CFC-12 without any consideration as to whether the units were originally designed for, and suitable for use with CFC-12.

Automotive air-conditioning is the dominant user of CFC-12 in the Philippines and due to the technological differences and the trade structure, the service in this sector, is to a significant extent, separate from stationary refrigeration although there is a significant number of firms operating in both the automotive and stationary sector. The use in the different stationary sub-sectors is more integrated in the same business structures, even if there is a significant number of enterprises specialised in different sub-sectors, the separation is based more on customer need than differences of technologies. The largest consumption besides the MAC sector is from the commercial and domestic refrigeration sub-sectors but several other sectors are, in spite of being small, important for the food supply chain.

Several existing databases have been used to survey the service enterprises to establish the number of enterprises. There are 1705 service shops classified as automotive (1,206) or stationary refrigeration (499) service providers in the current database. As this and other DTI data, only cover the accredited enterprises and data is not specific for the type of work done and the number of employees active in air-conditioning, a targeted survey was performed on 402 enterprises in all 16 regions.

The survey of 402 service enterprises carried out by DENR's regional staff in 2002 determined that these enterprises use, on average, 320 kg CFCs per year and have a total of 922 technicians active in servicing CFC systems. Their CFC use represents 8 percent of the total CFCs used for servicing in the Philippines. Of the surveyed companies, 58 percent are active in the automotive sector, 44 percent in servicing domestic appliances and 39 percent in servicing stationary air-conditioning and commercial refrigeration systems (the latter two overlap to a large extent). A majority of the service enterprises is active in more than one of the three sectors (24 percent were active in both MAC and stationary refrigeration/air-conditioning). Of the companies surveyed, 75 percent were accredited by DTI whereas 90 percent had business permits issued by the Local Government Units. The survey also showed that the variations between different regions were significant. There were regions where only 10 percent of the enterprises had DTI accreditation at the same time that all enterprises in other regions had this accreditation. The enforcement of the Business Permits system was stronger but the coverage varied between 53-100 percent in the

different regions. The average number of employees working with the servicing of CFC systems in these companies was 2.8.

With the average CFC-12 use as identified in this survey and the established consumption of CFCs in the servicing sector, there would be a total of 5,057 service enterprises in the Philippines of which 2,931 would work with automotive air-conditioning, 2,201 in domestic refrigeration and 1,975 in commercial refrigeration. There is, as noted above, an overlap as companies are working in several sectors.

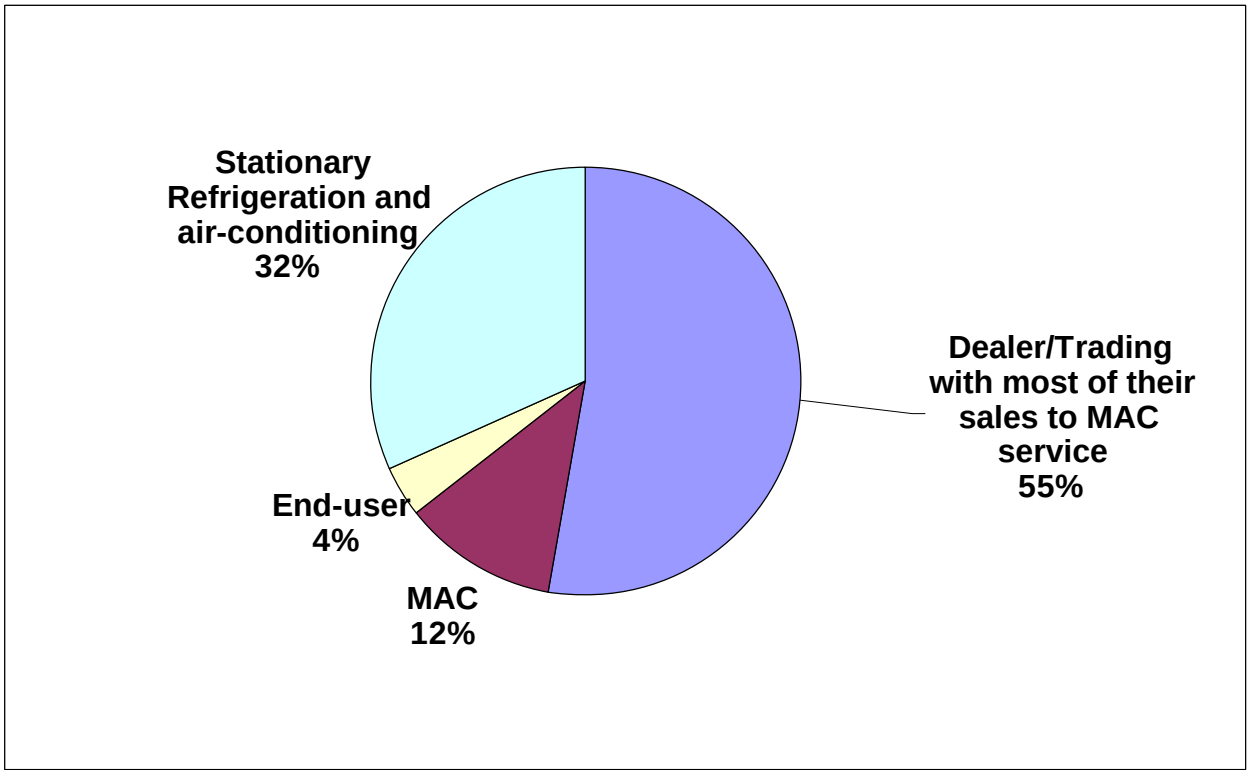
Compared to enterprises registered by DTI, it can be concluded that the surveyed companies are larger (2.8 employees) than the average of 2.4 employees in the larger database. This could be expected as the survey conducted by local DENR representatives would have more difficulty to identify small service providers that might not even have a business address or companies that service refrigeration/air-conditioning only as a minor part of their business. The data above will thus be a conservative estimate of the number of enterprises.

Based on the data in the existing databases and the survey described above, it is calculated that the number of service enterprises in the Philippines exceed 5,000, of which more than 2,900 (58 percent) are active in the MAC sector and more than 2,200 (44 percent) are active in stationary refrigeration. (As there is an overlap, this report assumes that 2,800 are classified as mainly MAC servicing while 2,200 have been classified as being focused on stationary refrigeration and air-conditioning).

4.2. CFC-12 Supply to the Service Sector

Within the context of the RMP project, detailed discussions to analyse the market have been carried out with the refrigerant importers/distributors both as participants in the Resources Group (RG), with their trade organisation as well as with individual companies. Detailed sales information from several importers has, on a customer-by-customer level, been analysed to identify the use per sector. This data shows the distribution of CFCs in the Philippines' market. This information has been used to verify the sector information received from manufacturers, import data and interviews with trade representatives. As the information from the importers/distributors are detailed and cover a large part of the market, it gives good information about the market. Graph 4-1 shows the distribution of sales per sector and shows the importance of the MAC service sector but also that stationary refrigeration and air-conditioning cannot be neglected. Sales to end-users represent sales directly to equipment owners, e.g. hotels, supermarkets and industry.

Graph 4-1. Sales of CFC-12 to Various Sectors.



4.3. Mobile Air-conditioning

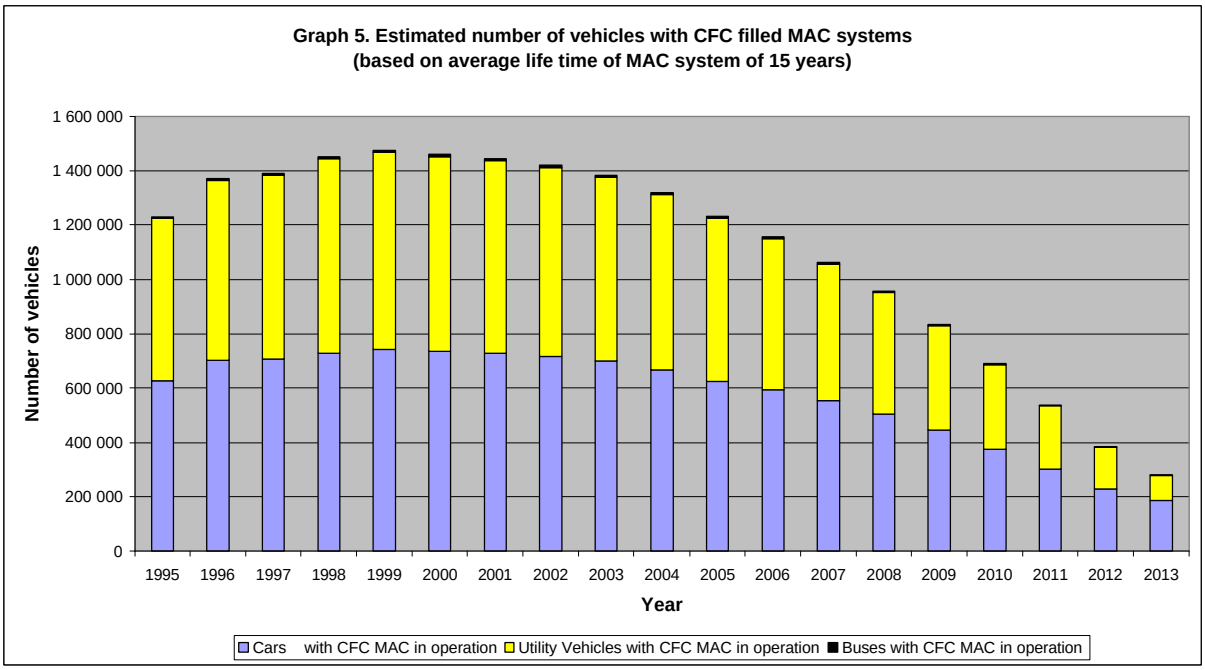
CFC importers report that the mobile air-conditioning (MAC) sector is the largest user of CFCs. Importers estimate that it represents 60 to 80 percent of the CFC-12 market. Analyses of detailed sales statistics of three importers show that 67 percent was sold directly to MAC service shops or to resellers selling mostly to this sector. DTI data show that most of the MAC service shops are very small, with only between 1 to 14 technicians performing MAC servicing along with other standard maintenance and repairs. Based on analyses of 205 companies in the DTI accreditation system, service shops in this sector have 2.2 employees on average. Of these, 65 percent have just one or two employees. Very few of the more than 2,900 shops are equipped with refrigerant recovery and recycling equipment, and the normal practice when servicing a MAC is to vent the refrigerant to the atmosphere. The MAC sector is projected to continue to have significant demand for CFC-12 for the next ten years due to the long lifetime of vehicles in the Philippines. Retrofitting of existing CFC-12 MACs to use HFC-134a is extremely rare due to the high cost of both the retrofit and HFC-134a. An ODS-use survey indicated that the cost of HFC-134a is 2.5 to 4 times higher than CFC-12.

Based on this information, the automotive sector would use 67 percent or 923 MT of the total consumption of 1,378 MT of CFC-12. However, there is overlap between the companies categorised as automotive and stationary, as mentioned earlier. The automotive companies can perform servicing on stationary equipment and vice versa but it was determined that this would not significantly change the conclusions.

4.3.1. CFC Use in the Mobile Air-conditioning (MAC)

In countries with a hot climate, the largest use of CFCs is often to service MACs in vehicles. Graph 4-2 shows estimated number of vehicles with MAC systems filled with CFCs and the phaseout of vehicles expected, due to retirement of 15 year-old vehicles.

Graph 4-2. Vehicles with MAC Systems Charged with CFCs.



The data in Graph 4-2 is based on the Land Transportation Office (LTO) statistics of renewals and newly registered vehicles. According to information provided by the Chamber of Automotive Manufacturers of the Philippines, Inc. (CAMPI), the changeover of MAC systems from CFC-12 to HFC-134a in new vehicles was finalised in 1998. Phaseout of CFC use in cars is based on an average life of the MAC system in vehicles of 15 years, as given by CAMPI. It is estimated that all cars sold up until 1998 had a CFC MAC system. Sport utility vehicles (SUVs) are estimated to have had CFC MACs fitted to 60 percent of the fleet and 25 percent of all buses are calculated to have CFC MACs. The Philippines have a large local manufacturing/assembling of private vehicles and so called "Jeepneys" (vehicles assembled from scavenged or used parts) that are not included in the above figures for cars. These vehicles are normally only partly covered and do not have enclosed windows or air-conditioning. The service providers for the MAC sector participating in the Resource Group reported that around 5 percent of the vehicles serviced were not included in the above classifications or are not properly registered and this has been taken into account below.

The large number of locally assembled cars without air-conditioning results in an unusually high proportion of larger, more exclusive vehicles among those with air-conditioning. Because buses and SUV/LCVs have a larger refrigerant charge, 8 kg and 1.9 kg respectively, compared to 1.1 kg in cars, the larger vehicles have a significant influence on total consumption in this sector. The demand is calculated based on the number of vehicles with MACs, average refrigerant charges and leakage rates given by trade representatives and from discussions with and field visits to

service shops. The leakage rates are comparable with data for older CFC-MAC systems in other countries.

Table 4-1. CFC-12 Consumption in Automotive Air-conditioning in the Philippines

Vehicle Type	Number of Registered Vehicles	Average charge/vehicle (kg)	Average emissions/year %	CFC-12 Consumption (MT/year)*
Passenger cars with CFC 12 air-conditioning	**727,153**	1.1	40	335.94
Sport utility vehicles (SUV) Asian utility vehicles (AUV) Light commercial vehicles (LCV) with CFC 12 air-conditioning	1,181,131	1.9	40	565.53
Buses	7,659	8	50	32.17
Total	**1, 915, 943**			**933.64**

* Includes 5 percent for unregistered vehicles.

The calculated use of 934 MT of CFC-12 for automotive air-conditioning is very close to the amount of 923 MT based on imported sales data. Based on this data, the CFCs used for the MAC servicing sub-sector is 934 MT which is 68 percent of the total estimated demand.

4.3.2. Demand Projections for Automotive Air-conditioning

As the use of cars in the Philippines is long, based on the registration data, and due to the hot climate, owners often tend to keep the MAC system operating, until the car is very old or must be scrapped. The life-time for the MAC system in the vehicles is 15 years based on manufacturer information. The demand for CFC-12 will therefore continue even after the total CFC ban according to the Montreal Protocol if no interventions are implemented. In 2005, the demand is expected to be 797 MT and in 2007, the expected demand of over 600 MT will exceed the total number of allowable imports. The large number of vehicles placed on the market between 1994 and 1998 explains the large remaining use of CFC in MAC systems through the whole phaseout period.

Table 4-2. MAC Sector CFC Demand Projections

Year	Cars (MT)	SUV+ AUV (MT)	Buses (MT)	Total demand for CFC for MACs* (MT)
2001	335.94	565.53	32.17	933.64
2005	288.74	478.27	29.76	796.76
2007	255.58	401.35	25.56	682.49
2010	173.63	247.80	16.29	437.72

* Including 5 percent for unregistered vehicles.

In conclusion, because of the large number of vehicles with MAC systems, the relatively large refrigerant charge and the inherently high leakage rates of MAC systems, the automotive sector is a key and priority sector that needs to be addressed in the RMP-NCPP.

4.4. Refrigeration and Air-conditioning

Second in size to MAC servicing is the refrigeration and air-conditioning servicing sector, including both domestic and commercial refrigeration. Thousands of such companies are in operation to perform servicing of a wide variety of equipment, including: domestic refrigerators, commercial refrigeration units of all sizes, refrigerated transport units, room air-conditioners and building chillers. The majority of these servicing companies are small and operate as road-side shops employing less than five technicians. Based on a survey of 1,074 service shops they have, on average, 2.4 employees and 64 percent have just one or two employees. Refrigerants, compressors, and other materials are imported by a limited number of importers selling directly to service providers but also through local resellers especially outside the major cities and to the smaller servicing enterprises.

4.4.1. CFC Use in Commercial Refrigeration

In the Philippine Country Program Update (not directly funded by the MLF), the CFC consumption for the commercial refrigeration sub-sector was based on the number of installed units and projected to be 326 MT in the year 2000 based on production and import figures of CFC containing systems. The major applications in the commercial service sector include: supermarkets, restaurants/bars, hotels and cold storage areas. These applications in the Philippines, are, to a large extent, using systems with self-contained display cases and cabinets of the plug-in type. Larger installations use condensing units connected to single, or sometimes a few, display cases or cold rooms. The number of larger centralized systems in the Philippines is low. There are several local manufacturers of display cases that have changed to CFC-free manufacturing, but a significant part of the market is covered by imported display cases. Condensing units and compressor assemblies and compressor for on-site assemblies are imported. Since 1995-98, the commercial refrigeration sector in the Philippines has been making a transition to using HCFC-22, HFC-134a and HFC-404A as the refrigerants in new equipment.

The use of CFCs in this sector is made up of CFC-12 and R-502 (a component of which is CFC-115). R-502 has always been a low volume product in the Philippines due to its high price, and also supply shortage – from time to time the consumption has decreased to below 10 ODP MT. The high price of this product is caused by the small global production of CFC-115 and the fact that this component is not produced by the refrigeration manufacturers in the region. R-502 used in manufacturing and imported equipment has been replaced by CFC-12, HCFC-22 and HFC-404A. Retrofits are not unusual as the availability and high price forces customers to replace R-502. The major consumption for R-502 is for low temperature display cases of the plug-in type and display cases with remote condensing units found in supermarkets. Some consumption also goes to low temperature transports and a small number of cold rooms. A total consumption of 8 MT is reported.

Larger cold storage facilities are traditionally built to use ammonia systems or, at times, systems using HCFC-22.

The dominant refrigerant for commercial refrigeration is CFC-12, used widely for most applications in this sector. The consumption in this sector is by nature difficult to establish on the basis of installed units as a significant amount is for on-site installation performed by service companies. The import statistics for equipment in this sector is not accurate since equipment is not often declared in detail. The importation of equipment using CFCs is performed by a large number of stakeholders, either on a regular basis by distributors or on a project-by-project basis

for larger projects by contractors or end-users. The import of second-hand equipment is also significant and often not declared in detail. The historical use of CFC-12 for manufacturing of commercial refrigeration equipment and import statistics for this type of equipment has been used to establish an installed amount in this sector to validate the Country Program Update's consumption data (326 MT) based on manufactured and imported units. Based on reported use of CFC-12 by the domestic manufacturers and statistics of imports of display cases, water coolers, chest freezers and similar equipment, this type of equipment is serviced for 15 years. The installed stock of CFCs in commercial refrigeration equipment is 775 MT. Service enterprises claim that an additional 10 percent of the units are assembled on-site and that the average charge of these built-on sites are 5 kg resulting in an additional installed quantity of 113 MT. The total installed amount of CFCs in this sector is 888 MT.

The life expectancy of CFC compressors in the commercial refrigeration sector is to be two to four years, reported by Chee Puck, a local manufacturer with in-house service operations. This data has been supported by the service enterprises in the Resource Group. When the compressor fails, it is replaced with a new compressor but the unit is normally not changed. This time frame is low by world standards. The short life-time of compressors, lack of recovery equipment and the practice of topping-up after leaks without proper leak detection and subsequent repair, results in a reported leakage rate of 33 percent of the charge per year.

The short life expectancy of compressors can be explained by a lack of understanding of good practice during manufacturing, installation and service. As an example, it is not common practice to use protection gas (nitrogen) to avoid internal oxidation during brazing. Also, evacuation of systems with vacuum pumps is often not employed, instead, additional CFCs are vented through the system to eliminate the moisture. This short life-time increases the service demand and causes a significant increase in CFC emissions. The new non-ODS refrigerants and new oils are more hygroscopic (moisture absorbing). If they are exposed to the atmosphere, they absorb unacceptable amounts of moisture. If the service methods are not upgraded, the failure rate of equipment using HFCs will increase even further with an even higher cost as a consequence. The increase in failure rate with alternative refrigerants is already an issue under discussion in the market and can, if not altered, be an obstacle in introducing ODS-free technologies in new, as well as existing equipment.

The demand for CFCs for the servicing of commercial refrigeration equipment (293 MT) is based on the above information. This data has also been compared with detailed sales information from refrigerant suppliers showing that 32 percent of their total sales of CFC-12 is sold to stationary refrigeration. Based on the total demand of 1,378 MT, this would indicate that 441 MT was sold to the "stationary service sector" which would include, besides the commercial refrigeration sector, the domestic refrigeration (93 MT) and the smaller niche sectors described below with a total demand of 49 MT. As the identified, combined use in the stationary service sector of 435 MT is 32 percent of the total 1,378 MT, it correlates well to the importers' sales statistics. That the numbers match closely should be considered more a coincidence, however, as there is a significant interaction between all sectors. Companies frequently work in several sectors and reselling of CFCs between companies is also common. Local, small enterprises frequently buy from a larger service establishment that are not direct competitors, to avoid freight charges especially in remote areas. Also, many larger enterprises are reported to use smaller independent contractors for larger projects. In the Philippines Country Program Update, the corresponding number for use of CFCs in the stationary sector was 567 MT which is a higher figure but which

can be explained by the problematic economic situation in the region. The demand for CFC-12 in the commercial refrigeration sector is therefore established as 293 MT.

4.4.2. CFC Use in Domestic Appliances

The official statistics for refrigerators in the Philippines shows that during the last 15 years, 4.5 million refrigerators have been sold of which only 124,921 have been imported. This data is not considered to reflect the actual number of refrigerators on the market. According to the 2000 census, there are 15.27 million households in the Philippines. The official data would indicate that less than 30 percent of households have refrigerators (this does not take into account domestic refrigerators used in offices and other workplaces). It is estimated by the Resource Group that 70 percent of the households have, however, access to refrigerators. As 78.5 percent of the households had electricity already in 1995 (when the Household Energy Consumption Survey was performed) and the electrification program for non-powered villages targeted to be finalised in 2004 (and is said to be 85.6 percent complete in March 2002), it is judged that the use of domestic appliances in 70 percent of the households is a good base for the demand calculation in this sector. Taking into account that HFC-134a was used in local manufacturing after 1997 and that a significant part of the import was second-hand with CFCs, this would lead to assumptions that there were 11 million CFC refrigerators/freezers in operation in the Philippines in 2000. If 1,996 reported production and import would be used as annual demand for twenty years (only 7,500 registered), the volume of refrigerators would be 12 million.

The traditional design of CFC-12 refrigerators and freezers contains (according to the manufacturers in the Association of Home Appliances Manufacturers (AHAM)) on average, 150 grams CFC-12. With 85 percent of the installed refrigerators still containing CFC-12 in 2001 (production shifted before 1999), there were 9.3 million refrigerators with a total installed stock of CFC of 1,400 MT. The leakage rate in this sector is low (1-2 percent) but service of these systems is done with release of the total charge, and repairs are often followed by a burst of CFC-12 blown through the system to remove air and moisture before the system is fully charged. The result is that each service involving work in the refrigeration circuit results in an emission of more than the original charge of the unit. The average service interval in this sector is reported by AHAM to be 10-15 years. The emissions in this sector are close to 7 percent or 93 MT, with a service interval of 15 years.

The total service demand of this sector is thus calculated to be 93 MT.

4.4.3. Industrial Refrigeration

CFCs are used in the food-processing industry as well as in many other industry segments. In addition, other refrigerants, especially the non-ozone depleting ammonia, are common in large applications. The measures required to phase out CFC consumption in this sector are similar to those for commercial refrigeration. However, because each system represents a large value and is built on-site for the specific application, knowledge of each system's special operating conditions will be important to achieve good reliability. CFC-use in the Philippines, based on leading contractors in this sector, is low due to the use of ammonia and HCFC-22. Based on interviews with contractors and the Resource Group, CFC use is calculated to be 10 MT per year.

4.4.4. Transport Refrigeration

CFCs such as CFC-12 and R-502 are commonly used in refrigerated trucks and trailers as well as in containers. These systems often have higher leakage rates than stationary systems due to the

use of rubber hoses, strong vibrations and severe ambient conditions. The measures required for this sector are similar to those for commercial refrigeration. Retrofit to HCFC blends and HFCs are common both internationally and in the Philippines. One of the market leaders, Filipinas Thermo King, is selling between 120 and 200 new units a year and services 120 units per month using 800 kg CFCs for servicing, and 765 kg of CFC-11 for flushing. There is an estimated total of 2,000 to 3,000 refrigerated trucks in the Philippines. The annual use of CFCs for the servicing of transport refrigeration, based on interviews and discussions with the market-leading enterprises, is calculated to be 14 MT of CFC-12 and 2 MT of R-502.

Refrigerated containers are used both for import and for internal transport as well as short and even long-term storage. Second-hand containers are frequently used as cold rooms for smaller businesses. The consumption in this sector is based on discussions with trade representatives and calculated to be 10 MT.

4.4.5. Refrigeration and Air-Conditioning on Board Ships

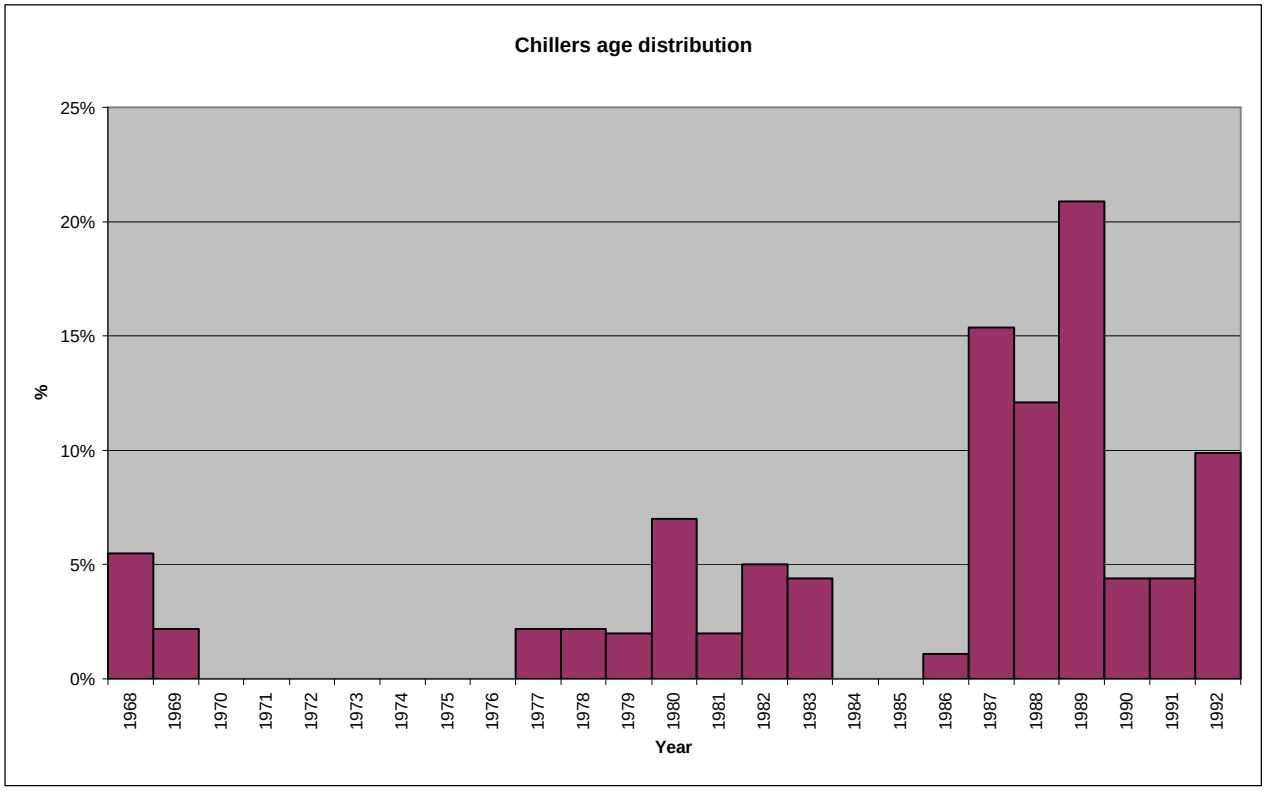
Refrigeration is used on fishing vessels and ships used for cold transport, but it is also used on almost all ships for storing food for crew and passengers and for container transport. CFC-11 has also been used on ships in air-conditioning systems on larger passenger-carrying vessels, especially cruise ships. Cruise ships involved in international traffic have moved away from CFCs as they are visiting harbours in countries where CFCs are already banned. On military vessels, CFCs are frequently used both for food storage, but also for specialised applications requiring special attention due to specific technical requirements. The measures required for this sector are similar to those for commercial refrigeration, but the specifics for this sector must be understood. The use in this sector is estimated to be 10 MT per year.

4.4.6. Stationary Air-Conditioning with CFC-11 and CFC-12 Chillers

Chillers are used mainly in larger building complexes such as hotels, commercial buildings, industrial complexes and government buildings. Since 1992, all installations have used HCFC-22, HFC-123 or HFC-134a. A survey of all of the leading chiller manufacturers has identified 193 chillers using 50-60 MT CFC-11 for servicing annually. The average size of these centrifugal chillers is 500 RT (1760 kW). The component of the chiller industry that uses CFC-11 consists of a limited number of large companies, most of whom are American (Trane, York, Carrier, Westinghouse, McQuay) along with a few Japanese companies (Daiken, Hitachi). York and Trane have been the dominant players in the CFC-11 chiller market. There are 193 known chillers in operation in the Philippines with a total cooling capacity of approximately 96,000 RT (338 MW).

There is also a number of small and medium-sized CFC-12 chillers with a total installed capacity of 12,000-14,000 RT based on information from Chee Puck, a local manufacturer of refrigeration equipment including chillers. These chillers are mainly used to cool process equipment in the industry and have an average charge of 2 kg CFC-12 per RT resulting in a total installed charge of CFC-12 of 22-28 MT. As these chillers are compact and more regularly serviced, their leakage rates are lower than in the commercial sector and estimated to be approximately 5 MT per year.

Graph 4-3. Age Distribution of CFC-11 Chillers in the Philippines.



These chillers contain around 100 MT of CFC-11 and have leaks from the air-purging equipment of 50-70 kg per year per unit. This results in emissions of 10-14 ODP MT of CFC-11. Additional CFC-11 is required for regular maintenance and failures. After equipment failures affecting the quality of the refrigerant, the full refrigerant charge is replaced and during maintenance/service smaller quantities are released. CFCs are also used as a cleaning agent/flushing in connection with repair of these chillers. The service companies report that 60 MT is used to compensate for the purge emissions and service in this sector. 15 ODP MT was determined to be the "real demand" for servicing during 2001 and 45 MT was likely consumed in 2001 for the purposes of stockpiling and flushing.

4.5. Flushing

Flushing systems with CFC-11 during servicing is common practice in the refrigeration and air-conditioning service sector in the Philippines today. Flushing is done to clean a refrigeration air-conditioning system after a malfunction or failure that may have caused oil or refrigerant to decompose or contaminants to enter the system. CFC-11 is used, because it is a low-pressure refrigerant with good solvent properties. Field visits with service companies and information supplied by trade organizations and importers show that the consumption for flushing is significant. Most companies report using CFC-11 for flushing and it is not uncommon that they use as much CFC-11 for flushing as refrigerants. A survey of six companies in different sectors (with service of buses, cars, transport refrigeration, chillers, commercial refrigeration and domestic refrigeration) using significant amounts of CFC-11 identified an annual use for flushing of more than 8 MT. Another survey of 22 companies showed that they used 0.11 kg CFC-11 for

each kilo of CFC-12 refrigerant they used. If this would be representative for the whole CFC-12 market, it would indicate a use of 130 MT. As the practice is not used by all service enterprises, discussions with trade representatives concluded that perhaps as much as 100 MT was used for flushing.

CHAPTER 5

5. Policies and Regulations Already Implemented

5.1. The Current Regulatory Framework

When the Senate of the Philippines ratified the 1987 Montreal Protocol and its amendments, these legal instruments became the mainstay for ODS policy development by the Philippines' Government by setting the targets for restrictions on the importation and use of ODS.

The Philippines has adopted a number of regulations to control consumption of ODS in the country. In addition, the NCPP has identified a number of laws that do not deal with ODS specifically but can nevertheless provide a supportive structure for the phaseout of CFCs in the servicing sector. A summary of these different regulations are set out in Table 5-1 and described in more detail in Sections 5.1.1 to 5.1.13 below.

Table 5-1. Summary of Regulations

Title	Effective Date	Relevance to ODS Phaseout Targets	Agency
Montreal Protocol 1987	July 17, 1991	The international agreement that represents the Philippines commitment to ODS phaseout.	DENR
The London Amendment to the Montreal -Protocol	August 9, 1993		
The Copenhagen Amendment to the Montreal Protocol	June 15, 2000		
Republic Act No. 6969 (Toxic Substances and Hazardous and Nuclear Wastes Control Act)	1990	This law regulates and controls importation, manufacture, processing, sale, distribution, use and disposal of chemicals or their mixtures, including ODS.	DENR
DAO 92-29	1992	The implementing rules and regulations of R.A. No. 6969	DENR
DAO 98-58 (Priority List of Chemicals)	1998	Priority list of chemicals that are under the regulation and control by the DENR. Included herein are ODS.	DENR
Notice to the Public	1998	Declared the ban and phaseout schedule of identified ODS.	DENR
DAO 2000-18 (Chemical Control Order for Ozone Depleting Substances) (CCO for ODS)	2000	This regulation establishes the framework for controlling the import and use of ODS in the Philippines. Parts of the CCO are on hold and awaiting the implementation structure to be developed under the NCPP.	DENR
Republic Act No. 4109, Executive Order No. 913 & Republic Act No. 7394	1964, 1983, 1992	The Bureau of Product Standards relies on these laws for its standards and regulation making power. This power or authority is and could be used in the monitoring and phasing out of ODS.	DTI (BPS)

Presidential Decree No. 1464, Tariff and Customs Code of the Philippines	1978	Tariff and custom code of the Philippines. Authorizes the Collector of the Bureau of Custom to implement the requirements of the law for the importation of certain items or goods or implement its ban, as required by law.	DOF (BOC)
Presidential DecreeNo.1572	1978	Decree requiring service providers to be accredited.	DTI
Ministry Order No. 32 (Rules and Regulations on the Accreditation of Service and Repair Enterprises)	1985	Rules and regulations under P.D. 1572 on the accreditation of enterprises engaged in the service and repair of motor vehicles, heavy equipment, engine and engineering works, electronics, electrical, air-conditioning and refrigeration.	DTI -BTRCP
Executive Order No.226	1987	This Omnibus Investment Code of the Philippines can be used to encourage use of non-ODS equipment.	DTI (BOI)
Republic Act No 7394,	1992	The Consumer Protection Act of the Philippines, requiring service shops working with consumers to be accredited.	
Republic Act No. 8749 "Clean Air Act"	1999	Formulates a holistic national program on air pollution. Includes ODS as one pollutant under its control.	DENR
Republic Act 4566; (Contractor's License Law); Presidential Decree 1594 (Revised Guidelines for Registration and Classification of Contractors)		This law and decree regulates the classification and categorization of contractors including categories for refrigeration and air-conditioning.	DTI (PCAB)
Republic Act No. 7160 (Local Government Code)	1991	Decentralizes certain tasks, giving local government more power, including the right to issue business permits.	Local Government Units (LGUs)

5.1.1. Republic Act 6969

Republic Act. No. 6969 is an act to control toxic substances and hazardous and nuclear waste. It empowers and authorizes DENR to regulate, restrict or prohibit importation, manufacture, processing, sale, distribution, use and disposal of chemical substances and mixtures that present unreasonable risk and/or injury to health or the environment. By virtue of this law, corresponding department orders are issued by the DENR, establishing monitoring mechanisms, regulations and prohibitions on chemicals, including ozone depleting substances (ODSs).

Sanctions against non-compliance to the R.A. 6969 and its subordinate legislation include fines and jail sentences.

5.1.2. Implementing Rules and Regulations of R.A. 6969 (DAO 92-29)

To implement the mandate of Republic Act No. 6969, DENR issued rules and regulations administrative order (DAO) 92-29. Under Section 19 of DAO 92-29, DENR shall issue a Priority Chemical List that will be regulated and/or controlled. DENR may from time to time amend this list to include additional chemicals in the coverage of the regulation and control.

Section 19 of DAO 92-29 gives DENR the mandate to regulate and/or control the usage, transport, process, manufacture, import or export of any new substances and priority chemicals that pose an unreasonable risk or hazard to public health or the environment through the passage of Chemical Control Orders. Such an order has been issued by the DENR, covering all ODSs (See 1.4.5).

5.1.3. Priority List of Chemicals (DAO 98-58)

Pursuant to the mandate of Republic Act No. 6969 and its implementing rules and regulations, DENR issued a Priority Chemical List in 1998, known as DAO 98-58. ODSs that were included in the Priority Chemical List are:

- Chlorofluorocarbons (CFCs);
- Halons
- 1,1,1,-Trichloroethane; and
- Carbon Tetrachloride.

Users, importers and manufacturers of these chemicals are required to register with, and report annually to DENR´s Environment Management Bureau (EMB).

5.1.4. DENR Notice to the Public 1998

The December 1998 "Notice to the Public," imposed a ban, starting January 1,1999, on import and consumption of CFCs and halon for the manufacturing of new equipment. (However, due to the downturn in the economy, this has not been fully implemented. Imports of CFC-11 and CFC-12 for service are allowed under the notice until 2010.)

5.1.5. Chemical Control Order (CCO) for ODS (DAO 2000-18)

The most important legal instrument for the phaseout of CFCs in the Philippines is the "Chemical Control Order (CCO) on Ozone Depleting Substances (ODS)", DAO No 2000-18. The CCO covers use, manufacture, import, export, transport, processing, storage, possession and sale of all ODS (as pure chemicals and in mixtures). The phaseout schedule in the CCO does not apply to HCFCs or methyl bromide since the Philippines' Government had not ratified the Copenhagen Amendment of the Montreal Protocol at the time of the adoption of the CCO but an import clearance is still required for the lawful importation of these substances under the CCO.

The February 2000 CCO confirmed previous bans on the import and use of CFC-11 and CFC-12 in new equipment and products from January 1, 1999 as stipulated in the Notice to the Public. The CCO also confirmed previous bans on the import of all the other CFCs, halons, 1,1,1-trichloroethane and carbon tetrachloride. Since January 1, 2000, the DENR-EMB may only allow for the import of controlled ODS for servicing of existing equipment/products or for essential uses. The CCO gives examples of essential uses as medical applications, such as for MDIs, laboratory and analytical uses and quarantine and pre-shipment applications. This ban has not been fully implemented due to a lack of capacity and resources at the responsible agencies and the economic situation of the country in recent years allowing for a grace period given by the Government.

With regard to the import of ODS products, the CCO prescribes that after appropriate studies, and in coordination with the Bureau of Customs, the Department of Trade and Industry and the

Central Bank, the DENR shall issue guidelines to realize target reductions in imports of second-hand ODS-using equipment/systems. It stipulates that they should, in any case, not be imported beyond December 31, 2010.

The CCO also establishes a system of accreditation applying to persons/companies servicing refrigeration or air-conditioning equipment. To receive a certificate of accreditation, a person must have the relevant knowledge of ODS and their role in the depletion of the ozone layer and *"capability to take effective measures, including the necessary equipment, technology, training and infrastructure for effectively handling these substances, minimizing their emissions, and ultimately phasing out their use by replacing them with substitutes/alternatives duly recognized by DENR/EMB."*

Distribution of controlled substances is to be limited to accredited companies/persons under the CCO. However, implementation of accreditation requirements is currently on hold and awaiting the implementation structure to be developed under this NCPP.

5.1.6. Tariff and Customs Code of the Philippines (P.D. No. 1464)

Under the Tariff and Customs Code of the Philippines (TCCP) as amended by P.D. 1464, the Bureau of Customs is mandated to assess and collect lawful revenues from imported articles and other fees, fines and charges, to prevent and suppress smuggling and other fraud and to enforce provisions of this code and associated regulations, but also other laws, rules and regulations implemented by EMB-DENR. However, improved coordination and cooperation must be established to ensure compliance as required and training be conducted to further enhance understanding.

5.1.7. Act to Authorize the Bureau of Product Standards (R.A. No. 4109)

The Republic Act No. 4109 authorizes the Bureau of Product Standards (BPS) to establish and adopt specific standards for goods and/or equipment that will be made available to the public. Importers are required to import only those goods and/or equipment that comply with standards set by the bureau, otherwise, they may not be allowed to offer them for sale or distribution in the country. Most types of ODS-using equipment are covered by specific product standards for safety and efficiency. These standards require that the name of the refrigerant chemical used and its volume or mass must be properly marked or labelled on the product or equipment. With these requirements, monitoring of the importation of ODS and equipment in which ODS are contained is possible although not carried out at present.

5.1.8. Clean Air Act of 1999 (R.A. No. 8749)

The Philippine Clean Air Act of 1999 is intended to formulate a holistic national program on air pollution. DENR is the lead agency but cooperates with other government agencies as well as with industry and related non-governmental organizations. The Clean Air Act's primary focus is on ambient air quality but it is applicable to all air pollutants including ODS (Sec. 5 and 30). So far, no controls on ODS have been issued under this act.

The existing systems for vehicle controls and registration set out in the act could play a role in CFC phaseout in the MAC sector in several respects. The Clean Air Act states, for instance, that the DENR shall, in collaboration with the Department of Transportation and Communications (DOTC), DTI and the Local Government Units (LGUs), develop an action plan for the control and management of air pollution from motor vehicles consistent with the Integrated Air Quality

Framework (Sec. 21 b). It also states that the DTI shall, together with the Department of Transportation and Communication (DOTC) and the DENR, formulate and implement a national motor vehicle inspection and maintenance program (sec. 21d). Motor vehicles are also controlled under the Land Transportation and Traffic Code of 1964 and various administrative orders, circulars and policy documents. These systems are managed by the Land Transportation Office (LTO) and specify inspection and registration requirements. The inspection procedures used by LTO could possibly be used to enforce a ban on installation of new MAC systems as well as prohibit backwards retrofits of HFC systems.

5.1.9. Presidential Decree 1572 and Ministry Order No. 32

The Presidential Decree 1572 and Ministry Order No. 32 empower the Secretary of Trade to regulate and control the operation of service and repair enterprises for motor vehicles, heavy equipment and engines and engineering works; electronics, air-conditioning and refrigeration equipment; office equipment; medical and dental equipment; and other consumer mechanical and industrial equipment, appliances or devices, including the technical person employed therein (P.D. 1572) and lay out rules and regulations on the accreditation of service and repair enterprises (Ministry Order No. 32).

Under this Presidential Decree and ministry order, all enterprises selling service or maintenance are required to obtain accreditation. This requirement has not been fully implemented in practice as focus has been on consumer protection under RA 7394 as described further below.

5.1.10. Consumer Protection Act (R.A. No. 7394)

The Department of Trade and Industry (DTI) is mandated under the Consumer Act of the Philippines (Republic Act No 7394, dated April 13 1992) to issue standards and regulations to protect the interests of the consumer, including protection against hazards to health and safety and deceptive, unfair and unconscionable sales acts and practices. This includes an accreditation scheme for repair and service firms and their technical personnel (Art. 125). Under this scheme no person shall operate a repair or service firm, or act as technical personnel without first being accredited by the DTI.

DTI has, based on this mandate, established procedures for accreditation of various categories of service and repair shops: motor vehicle, heavy equipment, engine and engineering works; (MVHEE); and, electronics, electrical, air-conditioning and refrigeration (EEAR). The system places requirements on training as well as tools and equipment. It also includes a system with additional “stars” that companies meeting higher standards can use in their marketing. DTI bases its training requirements on the certification schemes that are established by the Technical Education and Skills Development Authority (TESDA).

The DTI accreditation system for consumer protection will be evaluated and the structure used as far as it is judged suitable as a basis for developing the accreditation system outlined in Section 5 of the CCO.

TESDA has a well-developed structure for certification of skills at different levels as well as existing programs for shorter and longer courses in refrigeration and air-conditioning. Evaluation, and where necessary, adjustment or expansion of the existing curriculum to accommodate both short-term needs to educate the existing work force, as well as long-term requirements for new staff will be important during Phase II of this project. TESDA,

Commission on Higher Education (CHED), and DENR/POD together with trade representatives are expected to play an important role in the process of developing the certification structure.

5.1.11. Revised Guidelines for Registration and Classification of Contractors (Presidential Decree 1594)

Presidential Decree 1594 provides for guidelines for registration, classification, and procurement of contractors involved in government infrastructure projects. This law is supplemented by Republic Act 4566.

5.1.12. Contractor's License Law (R.A. 4566)

Republic Act 4566 or the "Contractor's License law" requires that all persons/entities engaged in the construction contracting business be licensed to do so. The rationale behind the mandatory licensing of contractors was based on the assumption that construction requires highly technical skills and considerable resources and ingenuity. Thus, a contractor does not merely sell his/her services, but sells his/her capability which is measured by financial and technical resources and a track record. A construction contractor's license can be obtained only from the Philippine Contractors Accreditation Board (PCAB) under the Department of Trade and Industry.

Considering that installation of chillers/air conditioners is part of a contractor's job, the POD works with PCAB for the inclusion of certified RAC technicians as integral qualification requirements for contractors in obtaining/renewing their licenses/accreditation.

5.1.13. Omnibus Investment Code (Executive Order 226)

This regulation and its 2000 Priority Investment Plan are utilized by the Government to encourage compliance with the Montreal Protocol and the Framework Convention on Climate Change by supporting the use of non-ODS equipment.

5.1.14. Local Business Permits

Through Republic Act 7160, vital services of the Government that were previously handled by national government agencies are slowly decentralised to the LGUs. LGUs have the authority to establish requirements to issue licenses and permits for service providers. The system of local business permits can be used to support the accreditation system and reduce the opportunities for non-accredited companies to work with CFC refrigerants.

5.1.15. Hazardous Waste Requirements

Hazardous waste is also controlled under the Republic Act 6969 ("Toxic Substances and Hazardous and Nuclear Wastes Control Act of 1990") and its Administrative Order (DAO) No. 29. "Hazardous substances" include substances that present either short-term acute hazards or long-term environmental hazards. Anyone who transports hazardous waste must have a permit from DENR. The waste generators shall bear the costs for proper storage, treatment and disposal of their hazardous waste. CFCs are normally classified as hazardous waste when they cannot be reused as refrigerants because they are mixed or because they are contaminated in other ways preventing them from being reclaimed.

5.2. Import Licensing System – Current Controls of ODS Supply

5.2.1. The Licensing System

Import permits by DENR for CFCs, halons, 1,1,1-trichloro-ethane and carbon tetrachloride have been required for many years pursuant to the Philippine Toxic Substance Act (Republic Act

6969). As noted in 5.1.5, the CCO was approved in February 2000. It adds Halon 2402 and Annex B Group I substances to the list of substances subject to the phaseout schedule. It further adds that import of any mixtures or blends containing any of the above substances is prohibited as of January 1, 2000 (CCO, Sec. 3.2.1.). This, in fact, implies that R-502 is now prohibited, which was not the intent of the Government since it is needed for servicing. This oversight will be addressed in the next CCO amendment.

Registration of importers of halon, CFCs, carbon tetrachloride or 1,1,1-trichloroethane was required by DAO 58. The CCO reiterates also this obligation, stating that importers who import any of the substances above must register with the DENR-EMB. A certificate of registration will be granted only to applicants who show proof of:

- An understanding and appreciation of the environmental effects of ODS and the effects of ozone depletion.
- Capability of taking effective measures including the necessary equipment and training for handling ODS.
- Not having violated R.A. 6969 and its implementing rules and regulations.

An application for registration must be made on the appropriate form and contain, inter alia, a copy of an "Environmental Compliance Certificate" issued by DENR and information on whether the applicant is an importer-distributor or an importer-end-user. Registrations must be renewed annually (CCO sect. 4.2 and 4.3).

Table 5-2. The CCO Quota System

Year	Maximum permits that can be issued as a percentage of base year (%)
1996	100 (Base Year)
1999	90
2000	80
2001	75
2002	70
2003	65
2004	60
2005	50
2006	45
2007	15
2008	10
2009	5
2010	5

After January 1, 2011, all import of the above substances will be prohibited (it may be noted that the last portion of CFCs that the CCO allows to be imported in 2010 assumes (incorrectly) the possibility of essential use exemptions under the Montreal Protocol, as the Protocol requires that all CFC consumption be eliminated by January 1, 2010 and with no essential use exemptions applying to Article 5 countries. The DENR-EMB maintains the right to speed up the phaseout if it is deemed necessary (CCO, Sec. 3.2.6). Violations of the CCO, DAOs or R.A. 6969 may result in the cancellation of the registration certificate (CCO Section 4.7) and also in fines and/or jail sentences under R.A. 6969.

Only registered importers may apply for clearances. The clearances are issued per shipment and applications must include information on the importer, substance and shipment and be accompanied by three separate forms. The Record of Actual Arrival of Shipment Form (Form B) states information on the latest import of the same chemical by the importer (i.e., quantities imported, date and port etc.). Form C, "Summary of Transactions Subject of Immediately Preceding Pre-Shipment Importation Clearance" gives an account of how that chemical was then distributed. Finally, the applicant must state how he/she intends to distribute the substance that is the subject of the current application on Form D. If everything is in order, the POD will issue a Pre-Shipment Importation Clearance, which is valid for a maximum of six months (CCO, Section 6.6).

EMB cooperates with banks, which issue Letters of Credit. The Central Bank Circular No. 1389 was issued in 1993 stating, among other things, that no letters of credit shall be issued for CFCs unless an import clearance has been issued by the EMB. Any importation without a clearance is considered an illegal import and should be confiscated and forfeited to the Government.

The main problem with the current licensing system is that, in practice, records of actual import have only been submitted by importers wanting to apply for subsequent clearances (in accordance with the Record of Actual Arrival of the Shipment - Form B), while those no longer importing have not shown their records to the DENR-EMB. There has not been any regular cooperation with customs to cross-check licensed imports with the actual imports registered by customs. BOC and POD are remedying this via a recently signed memorandum of understanding, which will clearly define their relative roles, tasks and responsibilities in the ODS phaseout.

5.2.2. The Customs Procedure

In general, imports are classified by BOC into the following groups:

- Prohibited importations
- Regulated importations
- Tax exempt and conditionally free importations
- Freely importable

BOC has three lanes where imported items are being processed for tariff and customs duties. They are the green lane, the yellow lane and the red lane or "selected channel." Low-risk cargo that does not require documentary examination and physical inspection is assigned to the green lane. Medium-risk cargo that requires a documentation check but no physical examination is assigned to the yellow lane. High-risk cargo that requires both documentary and physical examination is assigned to the red lane or the selected channel.

Under the present Automated Customs Operating System (Acos) with the Selectivity Mechanism, all imports are processed and allowed to pass through the mechanism which automatically selects or classifies imports into the various lanes. When a shipment of ODS arrives in the port, it is transferred to the dangerous cargo area by customs and the entry is filed with the Entry Encoding Centre. Customs codes have been customised for ODS, when imported as pure chemicals, under the 29.03 heading, up to a six digit specification. It is then transferred to a designated storage/holding area for all goods classified as dangerous cargo by a contractor under the supervision and control of PPA and BOC. Usually ODS shipments are selected to enter the

yellow or red lanes. The importers present the importer's copy of the POD import permit to the Customs Officer for examination who compares it with the Custom's copy forwarded by POD. The shipment is then re-channelled to the green lane and released to the importer.

There is a need for the review of the classification of ODS under its present tariff heading because some importation of ODS could be released without an import permit by misclassification of the tariff heading. In addition, the BOC is not equipped to identify or to test for the presence of ODS in the shipment. As noted earlier, a customs training project under UNEP's assistance has been approved for the Philippines and is scheduled to commence in the latter half of 2002.

CHAPTER 6

6. National CFC Phaseout Plan

The Philippines National CFC Phaseout Plan employs a phaseout strategy based on a combination of policy and regulatory interventions, and, investment and non-investment support activities including training, capacity building and public awareness. Various multi-stakeholder groups have provided input to this plan – either directly, during plant or site visits; at sub-sector meetings or through active participation at data review or other workshops.

This phaseout plan requires active engagement by various user communities. It also requires that enterprises be proactive and apply for funds based on rules and guidelines that their peer groups have helped establish and which are consistent with MLF funding principles.

This plan has, within its dimensions, both "carrots" and "sticks" – to encourage those who are willing and cooperative and to discourage those who might be otherwise inclined. Incentive structures will be designed with the aim of ensuring a permanent and sustainable CFC phaseout. In addition, public awareness activities, targeted training and critical area capacity-building remain key elements of a national CFC phaseout plan.

The NCPP covers a number of sectors and sub-sectors with different use profiles and potential for conversion over differing timeframes. Phaseout approaches are, therefore, out of necessity, sector, and in some instances, sub-sector specific. The national implementation modality for the different sectors and sub-sectors has been agreed by DENR and relevant industry sectors. The NCPP also sets specific performance targets (see Table 12-2) to be achieved before MLF funds are provided to the Philippines.

The study leading up to this proposal has demonstrated that without further action taken by the Government of the Philippines and without additional intervention from the Multilateral Fund, the Philippines will not meet its 50 percent reduction target for Annex A, Group I chemicals in 2005, its 85 percent reduction by 2007, and its complete phaseout by 2010.

6.1. Summary of Measures in the Manufacturing Sector

To contribute to the significant reduction of CFCs required for the 50 percent consumption reduction target in 2005, CFC consumption in the manufacturing sector must be eliminated. As pointed out earlier, the CFC phaseout achievement to date is attributed, at least in part, to the recent financial crisis, which resulted in a decreased demand for products containing or produced with CFCs. It is known that a significant part of the production capacity of the Philippine industry has been idle since the crisis. The fact that most residual CFC users are small- and medium-scale enterprises which have not received any support from the MLF and especially have difficulty in accessing required capital for conversion due to the financial crisis, enforcement of the ban on the use of CFCs in the manufacturing sector has not taken place. It is likely that the demand for CFCs could increase once the economy recovers. Not all CFC-consuming enterprises have received assistance from the MLF to convert their production facilities and there has been no legal enforcement to stop the use of CFCs by these enterprises. Consequently, this may create

an unintended and unfair advantage for companies still using ODS over those who have already converted to non-ODS technology.

In light of the above, the Government of the Philippines decided to assign a high priority to the complete phaseout of CFCs in the manufacturing sector by January 1, 2005. With the provision of MLF resources to the remaining CFC users in the manufacturing sector, the Government of the Philippines will enforce the ban on the use of CFCs in the manufacturing sector by January 1, 2005. This is critical to the success of sustainable phaseout of CFCs in the servicing sector.

Therefore, the Government of the Philippines proposes to undertake remediation and use curtailment activities in the aerosol and foam sector immediately after the approval of the NCPP. To ensure that conversion in these sectors is completed before 2005, funding to support these activities should be made available to the Philippines in 2002 and 2003. Complete conversion of the manufacturing sector will result in a permanent CFC phaseout of 518.21 ODP MT (476.87 ODP MT of CFC-11 + the 31.7 ODP MT from the ongoing project + 9.64 ODP MT of CFC-12) by 2005 onwards.

To meet the 50 percent reduction obligation of January 1, 2005 (reduction down to 1,509 ODP MT); the Government needs to reduce its 2001 consumption by 540.3 ODP MT. To achieve the 50 percent reduction, the Government will thus have to completely close down remaining production with CFCs in the country. It will do this by providing technical and financial assistance and invoking new policy where necessary and enforcing import controls on CFC-11. However, these actions will not be enough. The remaining reductions for the 2005 target of 22 ODP MT will need to come from the servicing sector. The import of CFC-11 will be totally banned (with a possible limited exception to cover minimum leakage for chillers). This will constitute a total or almost total prohibition on CFC-11 use. Additional reductions are expected to come from natural attrition and conversion to non-CFC equipment in the service sector. The enabling regulatory framework and supporting incentives and disincentives are described in Chapter 9. A detailed description of the manufacturing sector phaseout plan is set out in Chapter 7.

6.2. Summary of Measures in the Service Sector

To meet its 85 percent reduction obligations by January 1, 2007 (reduction down to 453 ODP MT) and the total elimination of CFC consumption by January 1, 2010 reductions of 1,056 ODP MT (2005-2007 reduction) first and subsequently 453 ODP MT must be achieved through the servicing sector. This will severely impact all sectors of society, especially the several thousand small service shops, and it will be necessary to begin immediately to create awareness, adjust attitudes and behaviour and alter the conditions in the marketplace in a gradual and orderly manner through both demand and supply-side management measures. The plan therefore includes program elements such as: targeted awareness raising, training and accreditation as fundamental compliance building blocks; controls on the supply chain; restrictions on who can import or purchase CFCs; legal pressure; and, incentives to end-users. A more detailed description of the servicing sector plan is set out in Chapter 8.

The refrigeration and air-conditioning service sector affects important functions in society and requires a different approach and timing than in the manufacturing sector. The phaseout of CFCs will thus require a change of practice among thousands of service enterprises, most of them small or medium-sized. CFC phaseout in the service sector will consist of a number of components:

- Phaseout due to old age of equipment – "natural phaseout;"
- Introduction of "Good Practice" in service and maintenance;
- Re-use of the existing stock of CFCs through recovery, recycling and reclamation; and,
- Early replacement and retrofit.

In order to be effective, these measures must be delivered in parallel and thus require concerted action. Natural phaseout through the retirement of equipment is based on the current average lifetime of the equipment as identified through statistics and information from trade representatives. It will be affected by the general economic situation in the country as well as the confidence of service enterprises and equipment owners in the viability of alternatives and understanding of the consequences of the phaseout. The phaseout in Table 6.1 is calculated by refrigerant and sub-sector.

The change of practice in the service sector is, in the following, defined as the introduction of "Good Practice." Achieving good practice will require a range of measures, such as capacity building in the vocational training sector, training of the existing work force, subsidies for proper service equipment, introduction of recovery and recycling as well as enforcement and awareness raising activities to encourage the service sector to offer an improved service and prepare equipment owners, who will make decisions on service measures, to demand service that improves systems reliability while decreasing adverse effects on the environment.

Good practice will include the use of proper leak detection methods and corrective measures before the recharge of systems, the use of recovery equipment instead of the release of refrigerant prior to repair and focus on preventive actions to extend the time between failures. Good practice also includes the use of alternative refrigerants in a correct manner. To establish and define what is considered as "good practice" in different sectors, it is important for trade groups, in cooperation with training institutes and environmental authorities, to establish a "Code of Good Practice" for the Philippines.

Re-use of the existing stock of CFCs is a key element in reducing demand and an important pre-requisite for the introduction of "Good Practice," where corrective measures must be carried out without release of the CFC charge. Unless the service enterprises have the "know how" and an infrastructure exists to re-use CFCs, repairs will be delayed and continuous re-charge will continue to be the standard procedure. Recovery and Recycling machines are part of the established procedure for larger MAC service shops on most markets but for smaller MAC shops and service enterprises in the stationary refrigeration and air-conditioning sector, the cost and/or weight of recovery and recycling equipment are prohibitive. These sectors rely on more lightweight and cheaper equipment that perform only recovery. This recovery equipment can be purchased at lower cost or assembled by the service technicians themselves but will require an infrastructure with reclamation capability before the refrigerant can be re-used in other installations. If refrigerant is moved between different stationary equipment without proper cleaning and control (reclamation), this will result in an increase in cross contamination between installations. Without a reclamation capability for the service sector, it is not possible to require service enterprises to recover refrigerant or ban intentional venting. Legal requirements and public awareness for service enterprises and equipment owners will be important since recovery of the refrigerant will impose additional short-term costs from the time it takes to recover, but

significant long-term savings as leaks are repaired when they are identified without the fear of losing a full CFC charge.

The measures for the service sector are closely intertwined and the success of the phaseout will come from the combined effect of these measures which is described in detail in Chapter 8. The target is to use a combination of legal requirements, capacity building, incentives to service enterprises to train and invest in equipment, incentives to initiate reclamation within the existing supply chain of refrigerants and enforcement to give methods reducing the demand for CFCs a market advantage. In addition, as reliability and energy efficiency is improved, long term cost-effectiveness is assured.

Measures in the service sector will take several years to implement before the effects are seen in the demand for CFCs. There are given sequences that cannot be bypassed. Train-the-trainers must come before training and certification of technicians, which in turn, must come before the accreditation system can be fully implemented. Reclamation capability must also be established before recovery and important components of "good practice" can be implemented. To achieve the results necessary to fulfil the Philippines commitments to the Montreal Protocol in 2007, it is essential that the sequences of measures are initiated without further delay and that supporting legislation and enforcement measures are put into place.

Table 6-1. CFC Phaseout from Ongoing and Newly Proposed Activities

	Current Demand	2003	2004	2005	2006	2007	2008	2009	2010
CFC-11 Demand 2001	668.6	668.6	668.6	668.6	668.6	668.6	668.6	668.6	668.6
Impact of On-going Projects (Foam)		31.7	31.7	31.7	31.7	31.7	31.7	31.7	31.7
Investment activities in foam sector		0.0	0.0	476.9	476.9	476.9	476.9	476.9	476.9
CFC-11 Chiller retirement (25 years)*		1.4	2.4	3.3	4.3	5.2	6.1	6.9	7.7
Introduction of "Good practice" in Chiller sector including stop to flushing/stockpiling 2005**		5.9	11.5	41.5	42.2	42.9	43.5	44.1	43.7
Stop to Flushing in Service sector (Ban)		0.0	10.0	100.0	100.0	100.0	100.0	100.0	100.0
Reclamation of CFC-11 from Chillers***		0.0	7.6	15.2	13.5	11.9	10.4	9.1	8.7
CFC-11 Reduction Schedule		39.0	63.2	668.6	668.6	668.6	668.6	668.6	668.6
Remaining CFC-11 to phase out		629.6	605.4	0.0	0.0	0.0	0.0	0.0	0.0

* Impact of CFC-11 Chiller retirement is based on the fact that Chillers will be de-commissioned when they reach 25 years of age. The reduction is based on the demand for leaks and regular service. The current high demand in this sector caused by extensive use for flushing and other poor practice is taken into account as reduction under introduction of good practice and the influence of the proposed ban on import of CFC-11.

** The current high demand in the chiller sector includes a significant amount of use for “poor practice” such as flushing and extensive recharging without repairs (partly explained by the low cost of CFC-11). The proposed ban of CFC-11 in combination with the training and accreditation is expected to change the behaviour rapidly when the ban is implemented in 2005 as this sector is well organised and the equipment owners normally depend heavily on equipment operating well.

*** The remaining demand after the introduction of the CFC-11 ban will have to come from reclamation of CFC-11, from decommissioned Chillers and the existing stock of used CFC-11 currently stored with the service providers in this sector. (For 2004 when the reclamation is being started 50 percent of the 2005 reclaim capacity is assumed).

CFC-12 Demand 2001	1378.3	1378.3	1378.3	1378.3	1378.3	1378.3	1378.3	1378.3	1378.3
Technical Assistance (Aerosol sector)		0.0	0.0	2.6	2.6	2.6	2.6	2.6	2.6
Investment Act. (Refrigeration Man.)		0.0	0.0	7.0	7.0	7.0	7.0	7.0	7.0
MAC equip. retirement (15 years) *		40.5	80.6	136.9	188.4	251.1	321.5	402.2	495.9
Stationary ref./AC equip. retirement (old age) *		52.4	78.6	104.7	130.9	157.1	183.3	209.5	235.7
Introduction of "Good practice", - MAC sector **		67.8	160.3	200.7	226.3	242.7	264.1	248.5	220.5
Introduction of "Good Practice", - Stationary Ref./AC **		0.0	35.7	49.6	60.9	69.6	75.7	79.2	100.1
Demand CFC - after good practice and phaseout of man. (ODP T)		1849.4	1630.3	878.2	762.9	648.7	524.4	429.6	316.5
Recovery and Recycling in MAC		0.0	28.8	57.6	86.4	115.2	115.2	115.2	115.2
Reclamation of CFC-12 (in MAC/Statio)		0.0	0.0	26.7	54.1	80.8	120.6	161.6	201.3
CFC-12 Reduction Schedule		160.6	383.9	585.8	756.7	926.2	1090.1	1225.8	1378.3
Remaining CFC-12 to phase out		1 217.6	994.3	792.5	621.5	452.1	288.2	152.5	0.0
CFC-115 (in R502) Demand 2001	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
Equipment retirement*		0.5	0.8	1.1	1.4	1.6	1.9	2.2	2.5
Introduction of "Good Practice"**		0.0	0.3	0.6	0.8	0.9	0.9	0.9	0.8
Reclamation of CFC-115 (in R502)		0.0	0.0	0.0	0.5	0.5	0.5	0.5	0.8
CFC-115 Reduction Schedule		0.5	1.1	1.7	2.7	3.0	3.3	3.6	4.1
Remaining CFC-115 to phase out		3.5	2.9	2.6	2.2	1.8	1.5	1.2	0.0
Total CFC Reduction (ODP MT)		**200**	**448**	**1255**	**1427**	**1597**	**1761**	**1896**	**2049**
Demand No intervention (ODP MT)	2 049	**1955**	**1887**	**1804**	**1725**	**1635**	**1537**	**1429**	**1309**
Demand CFC after NCPP (ODP MT)	2 049	**1849**	**1601**	**794**	**622**	**453**	**289**	**153**	**0**
Montreal Prot. commitment (ODP MT)	3 018	**3018**	**3018**	**1509**	**1509**	**453**	**453**	**453**	**0**

* Retirement of equipment is based on expected life time of the equipment as stated for different types of equipment under respective chapters. The demand is assumed to decrease proportionally to the number of equipment items de-commissioned due to age.

** A gradual impact of “good practice” from 2004 leading to a 50 percent reduction of demand for remaining equipment in 2010 is assumed.

*** Remaining demand above commitment in 2007 and 2010 is covered with Recovery & Recycling equipment and reclamation as detailed in 8.4.2 and 8.8

6.3. Call for Proposed Measures

As Chapter 1 describes, the progress made by the Philippines in ODS consumption phaseout to date can be easily erased if no further steps are taken in these critical years of the compliance period. With no further intervention from the MLF or from the Government, it is expected that the current consumption level of 2,051 MT a year (minus the 31.7 ODP MT currently being eliminated) will remain about the same. (The actual national CFC phaseout schedule for the Philippines is shown in Table 11-1.)

The two trends in consumption – persistent CFC consumption in manufacturing, especially in foams, and a significant consumption in the servicing sector – demonstrate the need to move quickly in parallel to remove all uses of CFCs in production and to tackle now the potential risk of non-compliance down the road due to CFC-12 consumption.

The Government of the Philippines is considering a number of incentives and disincentives as part of this NCPP, including for instance for the manufacturing sector, incentives that could be facilitated by the Board of Investment in conjunction with its new investment and modernization programs (special outreach and other incentives will need to be considered for SMEs); and, disincentives that could be developed and facilitated by the Bureau of Product Standards – namely, the strict and more comprehensive inspection of imported machinery; or a ban on imported second-hand ODS-using equipment. In conjunction with the conversion and training activities, suggested in this proposal, use and enforcement of possible incentives and disincentives will become more feasible.

As noted, there is one ongoing investment project and there are several non-investment projects that will also assist in creating the enabling conditions to facilitate CFC phaseout. The impact of the various investment, technical assistance programs and regulatory reform activities proposed under this NCPP will lead to a measured but sufficiently rapid phaseout of CFC consumption in the Philippines and pave the way for total cessation of its use.

CHAPTER 7

7. Action Plan for the Manufacturing Sector

7.1. Introduction

Based on the survey results, the total use of Annex A, Group I chemicals in enterprises in the manufacturing sector that are eligible but which have not received assistance from the MLF is about 417.51 ODP MT of CFC-11. The consumption figures set out in Chapter 3, with the exception of the ongoing UNDP project, are reproduced here as Table 7-1 for ease of reference.

Table 7-1. Summary of CFC Consumption Figures for the Manufacturing Sector

Category	Company	CFC-11 from all firms (ODP MT)	CFC 11 from eligible firms (ODP MT)	CFC-12 from all firms (ODP MT)	CFC-12 from eligible firms (ODP MT)
Aerosols		----	----	2.6	2.6
Foams -Foam mfg	See Table 3.3	300	280	---	--
Foams* -foam blowers (includes refrig. trucks entry below	See Table 3.4	167.77	118.77	---	---
Refrigerated Trucks - Foam Component included above	Orient Cold Storage	*(3.0)**	*(3.0)**		
Ind Equip Mfg	Low Temp	9.10	9.10	5.0	5.0
	Kooler Industries	-----	------	2.04	2.04
Total		**476.87**	**407.87**	**9.64**	**9.64**

*This figure (3.0) is included as a table entry; while this is hand-poured foam, there is a separate discussion of this subsector in the report.

The Government of the Philippines is seeking funding from the MLF to support conversion and/or technical assistance for these enterprises. The Government plans to achieve conversion of these enterprises before the end of 2004 and further restrict installations of equipment that can be used with CFCs (where practicable) before January 1, 2005. The only viable option for meeting the 2005 obligation that the Government of the Philippines deems achievable is to completely eliminate CFC-11 consumption (with the possible exception of chiller servicing) and to completely close down the CFC manufacturing sector. This will then eliminate 508.57 ODP MT from foam manufacture using CFC-11 (including two refrigeration enterprises which produce foam insulation and panelling and one ongoing UNDP project). Adding the elimination of CFC-11 used for flushing and that currently used by the chiller sector, brings the total to 668.6 ODP MT.

In addition, another 9.64 ODP MT of CFC-11 will be eliminated in the manufacturing sector for a running total of 678.24 ODP MT. This should enable the Philippines to meet the 1,509 ODP MT consumption obligation for January 1, 2005.

With the manufacturing sector becoming CFC-free, the amount of Annex A, Group I chemicals to be imported from 2005 onwards will be almost totally CFC-12 (there may still be a need for CFC-11 for chillers for meeting the demand in the servicing sector). As noted above, to meet the 85 percent reduction target by 2007, an additional CFC phaseout of about 1,056 ODP MT, in the service sector, must be accomplished within the next four years (from January 1, 2003 – December 31, 2006). Given the nature of the service sector and the geography of the Philippines, it is imperative that these terminal phaseout projects also be designed and initiated as soon as possible.

The Government of the Philippines is very concerned with the issue of equity and wishes to ensure in terms of financial support the small enterprises are treated on an equivalent basis to the larger enterprises already receiving MLF support. For this reason, the cost calculations have been made on the basis of historical cost-effectiveness values as opposed to a project-by-project basis.

7.2. The Aerosol Sector

7.2.1. The Aerosol Problem

The remaining use of CFCs in the aerosol sector in the Philippines is divided into two parts: continuing use of CFC-12 in aerosol products manufactured (SMEs); and, CFCs used in MDIs which is a common problem to many countries and which will be discussed in subsequent paragraphs.

The aerosol-producing SME group is very difficult to reach, let alone to make aware of environmental issues and the fact that the Government has in place a generic prohibition on the manufacture of products such as theirs. For the most part, these are very small subsistence-level, "mom and pop" type or "backyard" type operations.

Based on the information provided by the two major suppliers of aerosol cans in the Philippines, DENR was able to determine that there are nine confirmed manufacturers of CFC-based tear gas with a combined CFC-12 consumption estimated to be 2.6 MT. All nine of these were established before July 1995. Products produced by these enterprises are for the domestic market.

7.2.2. Solving the Aerosol Problem

Given the extremely small size of the remaining CFC-based aerosol sector – 2.6 MT for nine enterprises, MLF-assisted conversions are not feasible. CFC-12 is normally replaced with hydrocarbons as the propellant in aerosols but this may not be a technically or economically viable solution for many, if not most, of these remaining aerosol producers. Stringent safety requirements are needed for the usage of these flammable and explosive gases. The so-called "fire triangle" of oxygen; ignition source and fuel is well known. Since oxygen is always present in the air, safe filling of LPG always requires double safety controls – ventilation to avoid a dangerous concentration of LPG (the fuel), and a systematic control to avoid all sources of ignition. In a typical aerosol plant, all attempts are made to avoid the escape of LPG. Nonetheless, pipes and hoses will break, even if they are perfectly maintained; and there are always some "leakers," – cans that have defective valves or where the gassing adapter of the filling machine has damaged the valve. Also, the gassing operation, during which the propellant is injected into the can, always releases a small quantity of gas. Because of these factors, and since hydrocarbon *may be* present, it

is extremely important that no source of ignition exists during the time that it takes for the gas to dissipate. In many cases, it is also necessary to use artificial ventilation to assist in the dissipation of the propellant leaked, although in the case of smaller fillers, open air filling may permit the wind to take care of propellant dissipation. Thus the safety of the plant depends on completely avoiding flame or sparks on one hand, and at the same time under no conceivable circumstances allowing the concentration of hydrocarbon to approach its lower explosive limit (LEL).

Technical expertise will be needed to assist these nine small producers. It is therefore extremely important that the technical expert employed is capable of dealing with all matters relating to plant safety, and at the same time, capable of dealing with formulations and the various different alternate propellants.

It is likely the very small enterprises will be forced to have their products filled by other larger non-CFC contract fillers, however each circumstance might warrant different options and related safety issues with the use of alternative propellants such as: DME; HFC-152a, HFC-134a; CO_2, compressed air etc.

Although manufacturing has already been banned, specific announcements on the ban being applicable to the use of CFCs as a propellant in aerosol products in 2004 is being considered. Additional regulatory interventions under consideration to solve this problem include a reference to a prohibition on the use of CFCs in relation to aerosol products being attached to all import licenses (though this may have little impact as the importers are already aware of the need to phase out CFC-based aerosols). To pre-empt imports of CFC aerosol products, DENR is also considering to propose to the Bureau of Customs to include aerosol products containing CFCs in the list of restricted products whose imports require reviews and approvals from DENR. However, the review of all aerosol products and the bureaucracy and cost such a procedure entails, may not be justified for such a small remaining consumption. Also, import control of aerosols is not normally cost-effective since more than 99 percent of the aerosol trade (imports and exports) is now CFC-free.

7.2.3. The Aerosol Sector Implementation Modalities

To completely phase out the use of CFCs in this sector by the end of 2004, conversions or processing practices changes have to be carried out at the nine remaining small enterprises that are consuming, in total, 2.6 ODP MT of CFC-12. Of the nine, one enterprise, St. Pancratius Industries, accounts for about one half of this consumption (1.44 ODP MT). It is proposed that technical assistance (via a small contract to an aerosol expert) be given to assist this one larger enterprise on an individual basis and the remainder of the SMEs on a collective basis, to enable these companies to reformulate their products. As noted earlier, the major issue here will be the safety issues associated with the alternatives, many of which, are flammable and explosive. With new formulations, these SMEs can either set up their own filling plants or contract out filling to non-CFC using aerosol firms. With the possible exception of one firm, we believe that the rest should be encouraged to consider contract filling. However, costs of any conversions and/or any incremental costs related to the contracting out of the filling process to other fillers, is not included in this proposal. Given that there were no prior approved MLF projects for the Philippines (historical cost effectiveness data) in this sector and since this problem will be remedied through the application of technical assistance, it is proposed that the total funding for this sector be US$24,000 to provide the required technical assistance.

To monitor future use of CFCs in the aerosol industry, DENR is considering the possibility of setting up a periodic monitoring arrangement with DTI if these nine firms are, or can be registered with this agency. Consideration will also be given to ways of including the two aerosol can suppliers in the monitoring and control measures regime to be developed with DTI.

7.2.4. Metered Dose Inhalers

As noted earlier, the Philippines does not manufacture MDIs, however, there are, nonetheless, large quantities (1.2 million per year) imported from multi-national pharmaceutical companies as explained and the ingredients and circumstances described in Chapter 3.

It is proposed that an MDI phaseout strategy be developed as soon as possible. The Bureau of Food and Drug has expressed its willingness to develop a strategy to phase out CFC MDIs. The strategy will focus on how to reduce the growth of CFC MDIs dependence by early introduction of alternatives. The objective of the proposed strategy will be to promote the use of non-CFC alternatives and to formulate a proper transition plan taking into account the phaseout plan of major CFC MDI producers in both developed and developing countries.

It is very important that this activity be included in the NCPP. Such an undertaking designed to change mind-sets, behaviour and suspicion will take a long time. The proposed MDI strategy will include, inter alia, information dissemination programs targeting medical doctors and the management of public and private hospitals in order to raise their awareness pertaining to the need to phase out the use of CFC MDIs. The strategy will look into how to stop the growth of CFC MDI dependence and give momentum to the introduction into the market of the non-CFC-based MDIs. This work is considered to be crucial as the number of asthma patients in the Philippines is increasing rapidly due to deteriorating air quality.

To develop a plan for phasing out CFC MDIs, the Bureau of Food and Drug, in close consultation with DENR, will contract a consulting firm to undertake preparation of a strategy. The pharmaceutical industry, doctors, relevant government agencies, and relevant stakeholders, will be invited to participate in the strategy development process. The preparation process will include stakeholder consultation workshops, development of a transition plan including information dissemination strategies, and recommendations to promote the use of non-CFC alternative MDIs. The Bureau of Food and Drug has provided estimated budget elements for undertaking this activity. However, as noted by the OORG expert who reviewed the draft proposal, the funds indicated for this activity are probably too low. Thus, since no extra funding support will be requested at a future date for this activity, the additional counterpart contribution required will have to be determined at the detailed project design stage. It is proposed that baseline financial support of US$49,940 be provided by the MLF to support this activity.

Table 7-2. Technical Assistance Component for MDIs

Description	US$
Workshops	24,000
Consultant Fees	12,000
Information Dissemination Materials for Health Care Industry	9,400
Sub-total	45,400
Contingency 10%	4,540
Total	**49,940**

7.3. The Foam Sector

7.3.1. The Foam Sector Problem

As described in Chapter 3, there are six large foam enterprises, 20 foam blowers and likely some very small enterprises (unidentified) that are still using CFC-11 as a blowing agent albeit in small quantities. None of these enterprises have received assistance from the MLF. DENR is requesting funding from the MLF to phase out the use of CFC-11 in all clearly identifiable and eligible enterprises. All of these enterprises are 100 percent owned by Filipinos and their products are for the domestic market. Five of the six larger foam manufacturing firms were established before July 1995. However, to date, only 15 of the 20 foam blowers have been confirmed to have been established before July 25, 1995. The composition of these remaining 26 enterprises is as follows:

Table 7-3. CFC-11 Consumption in the Remaining Foam Enterprises

Sub-sector	All Foam Enterprises		Foam Enterprises Established after July 1995	
	No. of Enterprises	ODP MT	No. of Enterprises	ODP MT
Polystyrene/Polyethylene (PS/PE) Foams	None	None	None	None
Rigid Polyurethane Foam*	20	167.77	5	49
Flexible PU (Slabstock)	3	200	0	0
Integral Skin Foam and Flexible PU (Slabstock)	3	100	1	20
Total	26	467.77	6	69

*Includes 3 MT consumption of CFC-11 for a refrigerated truck company.

The list of eligible enterprises and their consumption is shown in Tables 3.3 and 3.4. Three of the six largest CFC foam manufacturers are producing flexible PU slabstock (one of whom is ineligible), and the other three are producing a 50:50 mix of flexible and integral skin foam. None of the five eligible firms have received any MLF support to date. These six firms are consuming 300 ODP MT of CFC-11 per year. However, the funding request will cover conversion of 280 ODP MT.

The smaller 20 CFC foam-blowing firms (including the refrigerated truck enterprise) are all making rigid polyurethane foam. These 20 firms are currently consuming 167.77 ODP MT of CFC-11 per annum. Five firms in this category were established after July 25, 2002 and their consumption as noted in the table above was 49 ODP MT. Thus, the eligible consumption from this sub-sector is 118.77 ODP MT.

7.3.2. Solving the Foam Sector Problem

The Philippines is proposing to curtail all foam manufacturing using CFCs before the end of 2004. (This will be the principal initiative to achieve compliance with the 2005

obligation.) If this is not accomplished, then the Philippines will not be able to achieve its 50 percent reduction obligation and will likely be in non-compliance.

In order to achieve compliance with the 2005 obligation, the Philippines intends to consider terminating all import of CFC-11. Additional regulatory interventions as well as soliciting the active input and engagement of the foam community is underway. This community includes the manufacturers, the importers, the polyol suppliers and other interested parties. DENR intends to restate the general prohibition on the use of CFCs and to make specific regulatory reference (perhaps via amendments to its Chemical Control Order) to a ban/prohibition with respect to CFC-11 use in foam production. This is expected to be achieved by the end of 2003. DENR also intends to enhance enforcement and imposition of severe penalties for any observed foam production contraventions as of late 2004. DENR is looking into the possibility of prohibiting the sale of CFC-11 for use as a blowing agent (this may be determined to be unnecessary repetition of the regulatory message). It is also investigating the feasibility of attaching a notification on import licenses stating that these new restrictions are now in place.

These efforts will deal with the "cease and desist" component but additional non-regulatory interventions and assistance will also be considered to resolve the problem in a sustainable manner. For the larger CFC-11 consumers (those with annual consumption of 10 ODP MT or greater),the Government will address conversion and the level of compensation for each of these enterprises individually. Each such project would have a distinct legal sub-agreement.

For the smaller CFC-11 foam blowers (1-10 ODP MT and 0-1 ODP MT), the nature of assistance and compensation will be determined by the Government based on input from this sector and a consultant or other independent entity will be hired to coordinate and administer umbrella project sub-grant agreements with LandBank of the Philippines for each of these two categories.

7.3.3. The Foam Sector Projects' Implementation Modalities

The calculated funding levels, for reasons noted in Section 7.1, are based on historical cost-effectiveness values. Reference to the terms "individual projects" or "umbrella projects" should not be misconstrued to imply that it is the intention of the Government of the Philippines to request funding on a project-by-project basis. When reference is made to either "individual projects" or "umbrella projects," we are referring to the methodology for administrative implementation.

All eligible foam enterprises that are still using CFCs in foam production will be invited by DENR, DTI and the polyol suppliers to submit proposals to request funding from DENR to convert to non-CFC alternatives. Funding will be given to enterprises established before July 25, 1995. All proposals must provide information pertaining to non-CFC alternatives, baseline equipment, and equipment disposal plans. All proposals must have conversion processes completed before the end of 2004.

DENR will provide assistance to help foam enterprises prepare their proposals. The assistance will be delivered through the HQ and regional staff of DENR, the DTI, the existing polyol suppliers and LandBank. If it is found that there are more foam enterprises that need to convert their production processes, costs of conversion at these additional

enterprises will be covered by the funds already approved for this NCPP or through their own funds.

7.4. The Solvent Sector

7.4.1. The Solvent Sector Problems Remaining

There has been no import of CFC-113 into the Philippines for almost the last four years (since 1998) and no 1,1,1 TCA imports in 2001. It was reported that 0.06 MT of CTC was consumed in 2001.

7.4.2. Solving the Solvent Sector Problems

An enhanced monitoring program will be introduced to ensure there is no regression in the Philippines in connection with the use of CFC-113 or 1,1,1 TCA. No assistance is being requested for this component.

Although as previously mentioned, CTC importation has technically been prohibited since 1998 there is still a small laboratory use of CTC. The Government is planning to create an enhanced awareness and education program and consequently follow up by re-affirming the prohibition and enforcement of the laws. Since only very small quantities of CTC are currently being consumed in the Philippines, no assistance is being requested from the MLF to complete the phaseout of this ODS.

7.4.3. Production of Industrial/Commercial Refrigeration Equipment

There are three enterprises in this sector still using CFCs in manufacturing. LowTemp Corporation established in 1993, is manufacturing small display cases and 4-door freezers and chillers using CFC-12. CFC-12 consumption in manufacturing is estimated at 5 ODP MT of CFC-12 and about 7 ODP MT of CFC-11. Another Filipino-owned firm in the sub-sector, Kooler Industries, established in 1972, manufactures water coolers and consumes 2.04 ODP MT of CFC-12 per annum. The third enterprise is involved in revamping/conversion to refrigerated trucks (by hand-pouring rigid foam) which consumes another 3 ODP MT per year of CFC-11. The consumption for this last firm was accounted for in the foam section of this chapter. The total consumption from these two firms is 16.14 ODP MT (both CFC-11 and CFC-12). Table 7-4 provides an overview of this sub-sector.

Table 7-4. Overview of Industrial/Commercial Refrigeration Equipment Subsector

Company	Product	Established	CFC-11 (ODP MT)	CFC-12 (ODP MT)
LowTemp Corp	Refrigerated counters	1973	9.1	5
Kooler Ind.	Water Coolers	1972	--	2.04
Totals			9.1	7.04

To solve this problem, the Government of the Philippines will seek assistance to convert these two firms and follow-up with negotiating compliance schedules with a view to curtailing CFC use as soon in advance of 2005 as is feasible.

Table 7-5. Reductions in the Manufacturing Sector Anticipated from the Application of Legal Measures, Improved or Altered Practice and Equipment

		2001	2005	2007	2010
Impact on CFC demand from technical assistance measures, investment projects, regulatory measures and monitoring and enforcement activities in the NCPP for the manufacturing sector (ODP MT)		0%	-100% reduction in mfg sector	0%	0%
CFC-12	Aerosols	2.60	0	0	0
	Commercial/Industrial equipment	7.04	0	0	0
CFC-11 Foams	6 Large Foam Mfgs	300.0	0	0	0
	20 Foam Blowers	167.77	0	0	0
CFC-11 Refrigerated truck enterprise (Rigid Foam) * (covered with foam blowers)		(3.0)*	0	0	0
CFC – 11 – industrial refrig. equip. mfg		9.10	0	0	0
Total remaining CFC demand from mfg sector		486.51	0	0	0
Montreal Protocol Phaseout Obligations		**3,018.0**	**1,509.0**	**452.7**	**0.0**
Remaining to be phased-out by the mfg sector		486.51	0	0	0

7.4.4. Summary of Manufacturing Sector Costs and Basis for the Calculations

The Government has decided that it is essential that the eligible remaining CFC-using industries be treated equitably. Because of this equity consideration, historical cost effectiveness figures have been used to calculate costs rather than on a project-by-project basis. What follows is a summary of the cost calculations for the entire manufacturing sector.

Table 7-6. Summary of Manufacturing Sector and Costs (using historical cost-effectiveness figures)

Subsector	Product	Cost-effect. US$/kg historical avgs.	No. of Firms	No. of eligible firms	Total ODP MT to be phased out	Eligible ODP MT	Calculation basis	Total Expected Costs US$	Costs to MLF US$
Aerosols (TA Project)	Tear gas	N/A	9	9	2.6 MT CFC-12	2.6 MT CFC-12	----------	24,000	24,000
Foam mfg*	3 slabstock 3 slab+ molded foam	9.34	3 3	3 2	300 CFC-11	280 CFC-11	300 at 9.34 & 280 at 9.34	2,802,000	2,615,200
Foam Blowers (Ref. Truck incl)	Rigid	7.83**	20	15	167.77 CFC-11	118.77 CFC-11	167.77 at US$7.83 118.77at US$7.83	1,313,639	929,969
LowTemp	Refrig Counters	15.21***	1	1	9.1 CFC-11 5 CFC-12	CFC-11-=9.1 CFC-12=5	14.1 at US$15.21	214,461	214,461
Kooler Ind.	Water coolers	15.21***	1	1	2.04 CFC-12	2.04 CFC-12	2.04 at US$15.21	31,028	31,028
Totals					**CFC-11= 476.87 CFC-12= 9.64**	**CFC-11= 409.87 CFC-12= 9.64**		**4,385,128**	**3,814,658**

* where the product mix is 50:50 flexible slabstock and molded foam, the average cost effectiveness of the two historical cost effectiveness figures was used 2.37 + 16.34/2 = US$9.34/kg ODP.

** The historical average is US$10.14/kg ODP. This value exceeds the cost-effectiveness threshold for this sector.
Therefore, the funding request is made on the basis of the cost-effectiveness threshold.

*** The historical average is US$28.64/kg ODP. This value exceeds the cost-effectiveness threshold for this sector. Therefore, the funding request is made on the basis of the cost-effectiveness threshold.

CHAPTER 8

8. Action Plan for the Air-Conditioning and Refrigeration Sector

8.1. General Considerations for the Service Sector

The refrigeration and air-conditioning service sector covers the biggest remaining CFC use in the Philippines. Within the service sector there are two major sub-sectors: the mobile air-conditioning sub-sector and the stationary refrigeration/air-conditioning sub-sector. These can then be further divided into sub-sectors such as car and bus air-conditioning; domestic, commercial and industrial refrigeration; and, CFC-11 chillers. There are also sub-sectors that are not clearly within any of the above, such as transport refrigeration. Many service enterprises are specialised but few are working strictly in one sub-sector since the basic technology is similar and the service equipment is often the same in the different applications. This integration forms a complex matrix for developing policy. The demand in this sector is established in Chapter 4.

The owners of equipment consuming CFCs are, for the most part, not well informed about their CFC system and frequently not aware of the type of work the service provider performs or if there are alternative ways that would improve the reliability of the system or reduce the adverse impact on the environment. The focus is frequently on the cost for the corrective measure, putting the service providers under pressure to do quick, short-term repairs.

To achieve the required reductions of CFC consumption in the service sector, it will be necessary to minimize intentional and unintentional emissions and sway the market to gradually switch to alternative refrigerants. This will require raising competency of the whole industry to enable them to improve service practices. Furthermore, it should be mandatory to detect and fix leaks before topping up refrigerant and to recover and recycle or reclaim refrigerant, (i.e., a venting ban should be introduced). The combined effect of the above can be defined as “good practice” and its successful introduction will depend on a combination of measures further discussed below.

The measures depicted in the following table will not, significantly reduce the consumption of CFCs in the Philippines independently from each other. Concerted action is required where the market is rapidly moving towards improved practice and deployment and full utilization of alternative (more environmentally appropriate) technologies. Stakeholders and authorities in the Philippines will have to continue close cooperation, building upon the already established workgroups for the successful design and implementation of these measures. Targeted awareness campaigns will also be undertaken to affect consumer preferences. The implementation of the measures is not only necessary to achieve the required reductions in the use of CFCs in the service sector, but will also result in improved practice and reduced, long-term costs for the servicing of refrigeration systems. The effects on leakage rates from a change of behaviour as displayed in Table 8-1 is based on international experience showing that a 50 percent reduction of the traditional leakage levels are realistic to achieve on old equipment.

Table 8-1. Reductions in the Service Sector Anticipated from Retirement of Equipment/Natural phaseout, Introduction of "Good Practice" (combined effect of training, Code of Practice, legal requirements and public awareness) and Recovery/Recycling/ Reclamation.

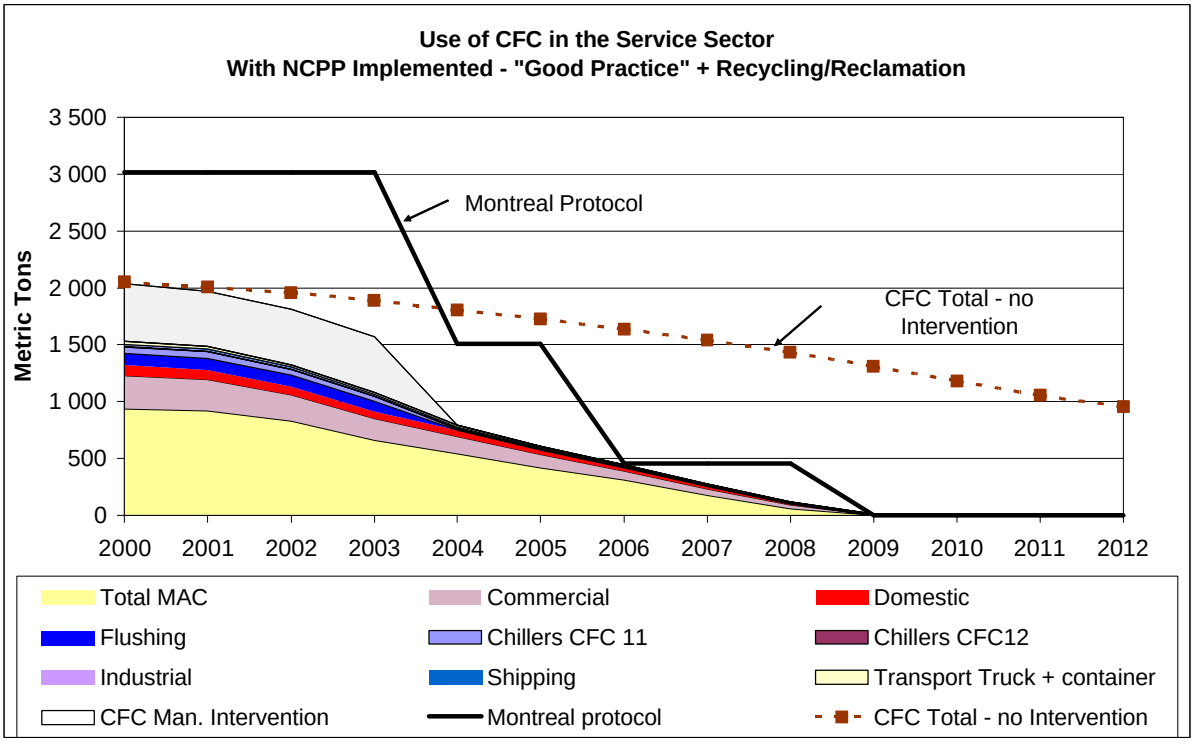
	Current Demand	2003	2004	2005	2006	2007	2008	2009	2010
CFC-11 demand 2001	160.0	160.0	160.0	160.0	160.0	160.0	160.0	160.0	160.0
CFC-11 chiller retirement (25 years)		1.4	2.4	3.3	4.3	5.2	6.1	6.9	7.7
Introduction of "good practise" in chiller sector including ban on import of CFC-11 2005		5.9	11.5	41.5	42.2	42.9	43.5	44.1	43.7
Stop to flushing in service sector (ban)		0.0	10.0	100.0	100.0	100.0	100.0	100.0	100.0
Reclamation of CFC-11 from chillers		0.0	7.6	15.2	13.5	11.9	10.4	9.1	8.7
Phaseout in service sector		7.3	31.5	160.0	160.0	160.0	160.0	160.0	160.0
CFC-12 demand 2001	1 368.6	1 368.6	1 368.6	1 368.6	1 368.6	1 368.6	1 368.6	1 368.6	1 368.6
MAC equip. retirement (15 years)		40.5	80.6	136.9	188.4	251.1	321.5	402.2	495.9
Stationary ref./AC equip. retirement (old age)		52.4	78.6	104.7	130.9	157.1	183.3	209.5	235.7
Introduction of "good practise" MAC sector		67.8	160.3	200.7	226.3	242.7	264.1	248.5	220.5
Introduction of "good practise," Stationary Ref./AC		0.0	35.7	49.6	60.9	69.6	75.7	79.2	100.1
Recovery and recycling in MAC		0.0	28.8	57.6	86.4	115.2	115.2	115.2	115.2
Reclamation of CFC-12 (in MAC/station)		0.0	0.0	26.7	54.1	80.8	120.6	161.6	201.3
Total reduction CFC-12 service sector		160.6	383.9	576.1	747.1	916.6	1 080.4	1 216.1	1 368.6
CFC-115 (in R502) demand 2001	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
Equipment retirement		0.5	0.8	1.1	1.4	1.6	1.9	2.2	2.5
Introduction of "good practise," recovery		0.0	0.3	0.6	0.8	0.9	0.9	0.9	0.8
Reclamation of CFC-115 (in R502)		0.0	0.0	0.0	0.5	0.5	0.5	0.5	0.8
CFC-115 reduction schedule		0.5	1.1	1.7	2.7	3.0	3.3	3.6	4.1
Total phaseout in service sector MT		168.4	416.6	737.8	909.8	1 079.6	1 243.8	1 379.7	1 532.7
Total phaseout in service sector in ODP MT		168.2	416.1	737.2	908.7	1 078.4	1 242.4	1 378.3	1 531.1

In Table 8-1, the reductions are based on a gradual impact of phaseout of old equipment and new service practices – "good practice," e.g., the change of service methods to focus on corrective measures rather than recharge and recovery of refrigerants before service is performed initiated by the combined impact of all training, awareness and enforcement measures (also the enforcement of the total ban for CFC-11 is taken into account). Even after the introduction of best practice service methods, the demand for CFCs in the service sector will surpass the limits set by the Montreal Protocol. The impact of "Good Practice"

will begin in 2004 and is expected to decrease the demand in the remaining equipment in 2010 with 50 percent. There is a clear indication that between 2007-2010 there will be a demand above the allowable imports under the Montreal Protocol. The Philippines will have to phase out an additional 170 ODP MT before 2007 and 318 ODP MT before 2010.

By encouraging the use of recovery and recycling machines in the MAC sector and by making sure there is an infrastructure to take care of recovered CFCs from the stationary sector and smaller MAC service shops (who can not afford the expensive Recovery and recycling equipment) that can facilitate the reuse of the existing stock of CFC-12 (e.g., the reclamation capability in the refrigeration supply chain), this remaining demand can be covered. The same infrastructure is also of key interest for an orderly phaseout of CFC-11 in the chiller sector, which, unless exempted, would be severely affected by the intended enforcement of the ban on import of CFC-11 from January 2005. It is thus assumed that 67 percent or 114 ODP MT of the additional reduction should come from the introduction of recovery and recycling machines in the MAC sector and 33 percent or 56.1 ODP MT from the reclamation of recovered CFC-12 from the stationary sector and smaller MAC shops. In addition, early decommissioning and retrofit of equipment will be encouraged. The measures are described later in this chapter. Graph 8-1 demonstrates the urgency in commencing implementation of the NCPP immediately as the impact of measures, especially in the service sector, will come about progressively.

Graph 8-1



Graph 8-1 displays phaseout through measures described below, including recycling and reclamation.

The phaseout plan for the service sector attempts to take an holistic approach with the intention to:

- Clarify legal requirements;
- Engage all relevant authorities and trade representatives in the phaseout process;
- Improve training capability in the existing vocational training system in the country;
- Train existing service technicians on proper methods and the use of alternatives;
- Strengthen the existing accreditation system;
- Support the introduction of adequate service equipment for proper service methods;
- Improve the control of the supply chain and prevent the sale of CFCs to non-qualified technicians;
- Support the responsible handling and re-use of the existing stocks of CFCs;
- Encourage the development of "Codes of Practices" within the trade;
- Create awareness among service providers on the potential advantages of the long-term service and energy costs of requiring state-of-the art service methods;
- Support the transition to new work methods by increasing the awareness among end-users of the long-term benefits of improved service practices as well as of the implications of the phaseout; and
- Place legal pressure on end-users through, for example, a ban on backwards retrofits and the denial of renewal of registration of vehicles that are backwards retrofitted.

The improvement and strengthening of the accreditation system will improve the trade structure and support the Government's strategy to focus on vocational training and a structured system to establish skilled labour competencies. The measures listed above and described more in detail below will reduce the demand in the service sector from 1,532 ODP MT in 2001 to 453 ODP MT in the most critical year, 2007, for a total phaseout of virgin CFC use in 2010. The phaseout of 1,079 ODP MT in the period of four years before 2007 will be the critical stage.

The requirement for accreditation in the current Chemical Control Order will be integrated with the existing accreditation system for service enterprises described in Chapter 9. This will prevent sales of CFCs to non-accredited enterprises giving a further incentive for enterprises to join the existing DTI accreditation. By integrating requirements for suitable competencies and equipment for responsible handling of CFCs in this accreditation scheme, there will be an increased pressure but also more benefits for the service enterprises to join the system.

In addition, only enterprises with accreditation can access subsidies for service equipment. With a public awareness effort, there will be further benefits and incentives for enterprises to join the system. Accredited service enterprises will raise awareness among their customers by marketing their accreditation. Promotional material should be made available through the supply chain of CFCs and their alternatives. Concurrently, a strengthening of the enforcement structures at both the local and national levels will further support enterprise "buy-in."

The measures can be divided into two segments, one that deals with improved practice resulting in reduced leaks and reduced emissions, including legal requirements, training, improved practice and public awareness measures, and the second that relates to the reuse of the existing stock through recycling and reclamation. The effect of natural phaseout and measures to introduce "best practice" are estimated to achieve a phaseout of a total of 871

ODP MT for 2007 in the service sectors. Measures to facilitate reuse of the existing stock of CFCs through recycling and reclamation will reduce the demand with an additional 208 ODP MT.

8.2. Mobile Air-conditioning Sector

It is estimated in Chapter 4 that without any reverse retrofit of HFC-134a MAC systems to CFC-12, the current consumption of CFC-12 in the MAC sector for servicing 1.4 million vehicles with CFC-12 MACs is 934 MT in 2001. However, if reverse retrofit of HFC-134a MAC systems become common practice among taxi companies and with private consumers, the consumption can increase. To ensure that the CFC demand in the MAC servicing sector continues to decrease over time as old vehicles are put out of service every year, and that no new demand of CFC-12 is being created by reverse retrofits, a strategy will be developed to target vehicle owners, service shops and suppliers of CFC-12.

A significant decline of CFC demand in the MAC sector will start to be realized from about 2005 onwards. By 2010, it is estimated there will still be about 600,000 vehicles in operation that were manufactured before 1998 and originally equipped with CFC-12 MACs. With other supporting activities, including legal pressure created by a MAC annual inspection, as discussed in the subsequent chapter, many owners of vehicles will replace their CFC-12 MACs with non-CFC systems when their original systems break down. Still, the actual impact of early retirement of CFC-12 MACs is expected to be much less than 600,000 units.

8.2.1. Flushing MAC Systems with CFC-11

CFC-11 is commonly being used in the Philippines by service companies for flushing in all service sectors, but also in the cleaning of HCFC-22 systems. Its use in the MAC sector can be replaced as there are alternative solvents and also alternative methods that do not require a solvent. These alternative methods are currently not well established in the Philippines but are used internationally and can be introduced through the training and public awareness measures included in this NCPP. The ban on CFC-11 and information would eliminate this non-critical use of CFC-11.

8.2.2. Legal Measures

Legal measures to create the incentives and disincentives necessary to change the way of doing business is detailed in the chapter on legal measures. These measures will include a ban on new installations to stop the backward retrofits and any increase in the future demand of CFCs. Additionally, there will include a venting ban and compulsory use of recovery equipment when a system is serviced or decommissioned, as well as requirements for training and the use of proper work methods in the servicing sector. These legal measures are important to send a clear message to the market of the Government's intention to carry out the phaseout but also to clarify the requirements and strengthen the pro-active service providers that are promoting state-of-the-art service methods, thereby creating a more level playing field.

8.3. The MAC Service Sector Activities – Technical Assistance

First, a condition will be imposed that vehicles manufactured from January 1, 1999 onwards will not be permitted to renew their registration if their MACs contain CFCs as a refrigerant beginning in 2004. This will discourage reverse retrofits of HFC-134a MACs and help prevent the demand of CFC-12 in this sector from increasing.

Second, a training program to be provided to service technicians is expected to help minimize the current practice of topping up refrigerants without fixing leaks. The use of proper service methods will also be supported by requirements in the legislation and in the accreditation system that service technicians should be trained and use proper service equipment and methods. Failure to live up to these requirements could result in penalties under the law and also in losing the accreditation, which also implies losing the right to conduct service and to buy refrigerant. In addition, public awareness measures will be designed to increase awareness and interest in the market for the improved service being offered by certified technicians. The combination of these measures and replacement of equipment that has served its natural life is expected to reduce emissions by 510 ODP MT before the most critical year, 2007, and by a total of 716 ODP MT before 2010.

A demonstration project in CFC-12 recovery and recycling was implemented by UNDP in Manila. The date of completion was September 2000 and the grant amount for this project was US$285,000. Thirty recovery and recycling units were distributed to service shops and the CFC consumption phased out as a result of this project was estimated in the project document to be 6-11 MT ODP. Lessons from this project will serve to improve this part of the NCPP.

8.3.1. Ban on Installation of CFCs in Non-CFC Systems and MAC Inspection

The Government of the Philippines is planning to ban the installation of CFC-12 in MAC systems designed for non-CFC refrigerants. All cars manufactured after 1998 are designed for use of non-ODS refrigerants. This can be based on the year the car was manufactured. The Land Transportation Office (LTO) is in the process of introducing a mandatory inspection on an annual basis to cover both commercial and private cars. Currently, there is no information in the registration nor renewal process covering the use of MACs or what refrigerant is used and physical inspections are only carried out in some commercial vehicles categories. It is proposed that the information on MAC systems and refrigerants be included in registration documents to increase vehicle owner-awareness. Furthermore, commencing on January 1, 2004, all vehicles manufactured after January 1, 1999 will not receive a registration renewal if their MACs contain CFC refrigerant. From 2016 on, no vehicles will be allowed to renew their registration if their MACs contain CFC refrigerant. (However, the import of CFC-12 will be prohibited from January 1, 2010.)

Under the Clean Air Act, a system for road-side inspections is in operation where cars are pulled over and their exhaust emissions checked. It is proposed that inspections of refrigerant content be carried out by these road-side inspection teams. Failing the inspection will result in the rejection of the vehicle registration renewal. Vehicle owners will be required to return to the MAC shop which provided the last service to their MAC systems in order to have their MACs filled with the proper refrigerant. If any service shops refuse to fix the problem, vehicle owners will be requested to report this to LTO/POD/DTI for follow-up action. Follow-up action could include revoking the accreditation of such service shops. The public will be informed of this policy by mid-2003.

To implement these proposed requirements essential to the success of the CFC phaseout program, the LTO inspection teams must have capacity to identify different types of refrigerants contained in MAC systems and to maintain the necessary records. It is proposed that all inspection teams as well as the LTO inspection centers currently used for inspection of commercial vehicles and training of staff be equipped with refrigerant

identifiers. There are currently 20 vehicle and 40 road side inspection teams across the 16 regions of the Philippines as well as inspection stations at headquarters and provincial offices of the LTO.

To increase the technical capacity of the existing vehicle inspection network, it is proposed that a manual describing procedures for determining the type of refrigerant in MAC systems be developed. All inspection teams working with the exhaust controls under the Clean Air Act should be trained. It is proposed that ten training sessions be organized: four in the Manila Metropolitan Area and another six in other regions of the country. At the conclusion of the training, each team will be given a refrigerant identifier which can identify CFC-12, HFC-134a and hydrocarbons. The LTO will monitor the frequency of inadequate practice and decide when and if extension of the inspections for all cars will be required.

It is expected that the cost of development and production of the manual for inspecting MAC systems will be US$10,000. An additional amount of US$35,000 is required for organizing ten training sessions for technicians of the vehicle inspection teams. For refrigerant identifiers, a budget of US$90,000 (approx. US$1,500 per unit) is required. The proposal is to equip the road-side inspection teams with 40 identifiers. Furthermore, 20 identifiers will be used in the Government-operated inspection centers. The proposal also calls for training of the new road-side inspections and on the use of identifiers for at least 120 inspectors.

The Government will also require that all vehicles have a sticker identifying the refrigerant type in the MAC unit and the name of the shop that last worked on the system. The sticker will also inform the owner that adding CFC-12 to an HFC-134a system is illegal and may harm the vehicle. Requiring all vehicles to include the information of the type of MAC system and the use of a sticker are effective methods of educating the public and technicians about the Government's regulations. Such stickers are common practice in many developed countries. They usually contain technical information such as type and amount of refrigerant and the date last serviced. This sticker can be visually inspected at annual inspections of cars.

Table 8-2. Description of the Philippines MAC Inspection Project Component

	US$
Development of a standard inspection manual	10,000
Development and printing of pamphlet explaining new laws on MAC systems	30,000
Development and printing of LTO-approved label for vehicles	30,000
Training of 120 Technicians from Inspection teams (10 sessions)	35,000
Refrigerant identifiers for stations	90,000
Sub-total	195,000
Contingency 10%	19,500
Total	**214,500**

Registration forms need to include a reference to the MAC system, information indicating that backwards retrofits are not legal, and some indication of the enhanced impact of the future phaseout. The inspections by the LTO teams will be conducted from 2004 onwards and will further increase awareness and discourage backward retrofits and encourage retrofits in connection with major repairs. The information given to car owners in connection with renewals of their registrations will include information on the importance

of proper maintenance for long-term reliability as well as the obligation of the service technicians to recover refrigerant and repair leaks before recharging refrigerants.

8.3.2. Certification and Accreditation of Service Technicians

According to the surveys performed in the preparation of this project, there are at least 2,800 MAC service shops throughout the country. Most of the car manufacturers have their own service network but there are many more independent workshops. In the DTI accreditation system there are already 1,171 service shops working in the automotive field. 66 percent of the currently accredited shops are located in the Manila Metropolitan Area. To reach out to this target group of more than 2,800 enterprises, the Technical Education and Skills Development Authority (TESDA), assisted by DTI and the Local Government, will conduct a public outreach program including distribution of information through the refrigerant supply chain and local governments, as well as articles in newsletters and trade magazines. The objectives of the public outreach program are as follows:

- To inform service shops of the need to phase out CFCs;
- To inform service shops of the implementation of the requirement in the CCO to limit sales of CFCs to accredited companies with staff certified in proper servicing techniques;
- To inform service shops of the proposed requirement from the LTO;
- To inform service shops of the future import quotas of CFC-12;
- To provide service shops with information pertaining to how and where to obtain the training; and,
- To inform service shops of assistance to provide basic equipment (i.e., vacuum pumps, pressure gauges, and leak detectors) that is required for proper maintenance of CFCs and HFC refrigeration systems.

Service shops will need to have certified staff in order to become accredited for working with MAC systems. To receive certification, a technician will need to pass an examination at an accredited training center. The objectives of the training program will be to educate service technicians on how to properly handle CFC-12 and how to properly repair non-ODS equipment. The training course should also provide service technicians with the knowledge to retrofit CFC systems to non-CFC alternatives. Service technicians will be trained not to top up refrigerants without detecting and fixing leaks and not to vent refrigerants during service. Technicians will also be trained on the need for proper labelling of all repaired units. They will also be informed of the potential commercial viability of the use of recovery and recycling machines. For smaller CFC users, information will be provided about the possibility to recover CFCs and return it free of charge to the supply chain for reclamation. The duration of training can, under the current Philippines' system for vocational training with certification of competencies, be adapted to the prior knowledge of the technician. The specified competencies will be verified through a test before the technicians receive their certificate. The competencies specified as a minimum level to get refrigeration service accreditation will also be integrated in the regular courses that are continuously operated.

In addition, it will be required of each accredited service shop to have access to certain specified equipment. Assistance in a form of a financial subsidy for the procurement of basic equipment will be given to the service shops where at least one of their technicians has already received training from one of the authorized training centers.

TESDA has a well-developed structure for certification of vocational training to different levels as well as existing programs for shorter and longer courses in refrigeration and air-conditioning. To evaluate and adjust or expand the existing curriculum to accommodate both short-term needs to educate the existing work force as well as long-term requirements for new staff, a working group consisting of TESDA, the Commission on Higher Education (CHED), DENR/POD, together with trade representatives were appointed during the preparation of the RMP component of this NCPP. Their work is now ongoing.

There are currently standards that are compulsory for many products but the specific legal requirement of labelling products with CFCs should be clarified and the requirement with specifics on the label should be included in the code of good practice clarifying that service shops should attach a label to each of the MAC systems they repair. The label should contain information pertaining to refrigerant type and names of service technicians and service shops.

It is proposed that the train-the-trainer program described below begin in mid-2003, and training for service technicians begin in early 2004. The cost for training 5,600 technicians is calculated to be at US$280,000 and will be covered by the Government of the Philippines. Service shops associated with major auto manufacturers will be urged by POD to have their technicians trained and to start employing the code of good practice in their service work by mid-2004.

The accredited service enterprises will raise public awareness through promotion of their accreditation. Along with public awareness, there will be further benefits and incentives for the enterprises to join the system. Thus, promotional material should be made available to them.

8.3.3. Train-the-Trainer Program

A train-the-trainer program for the MAC sector will be jointly developed by international and local trade experts and TESDA in close cooperation with the trade representatives appointed by the Resource Group. The existing training requirements and materials used for MAC training will be upgraded.

Once training regulations are available, TESDA will invite potential training centers and technical institutes, including the regional and provincial TESDA training centers, to apply for accreditation for the respective courses as is the established practice in the Philippines.

Proposals submitted by training centers will provide information related to their staff (those in charge of the training courses), descriptions of their existing facilities, and proposed duration for their service technician training courses. The intention is to have special training for skilled workers that only need specified new competencies. This could, with the existing system and with twelve technicians per session, require 2-5 days depending on the technicians' backgrounds. Based on this information, TESDA will accredit training centers across the country in this project component.

The local experts at TESDA will carry out five-day workshops to train trainers – a minimum of two trainers from each of the accredited training centers. Training will include hands-on sessions. At the end of training, participants will be required to take an examination. Those who pass the examination will receive certificates from TESDA.

Those who fail will be required to take make-up classes before certificates are given to them. The training centers will not receive basic equipment free of charge until all of their trainers have received certificates from TESDA.

After completion of each training course and exams, the accredited training centers will be obliged to provide a list of all technicians who have passed their exams along with names and addresses of service shops that they are working with to TESDA. A database containing names of certified technicians will be developed and maintained by TESDA.

It is proposed that two sets of basic equipment for training, such as pressure gauges, vacuum pumps, refrigerant charging cylinder, leak detectors, and recovery and recycling machines, be given to each of the participating training centers.

Table 8-3. Train-the-Trainer Program in the MAC Servicing Sector

Description	US$
Development and Production of Training Materials	15,000
Technical assistance to facilitate this process	2,000
Training of trainers by local experts (2 five-days courses, 15 persons for each course)	20,000
Basic Equipment for 60 Training Centers (2 sets each)*	540,000
Sub-total	562,000
Contingency 10%	56,200
Total	**618,200**

*Based on a standard cost of US$4,500.

The preparation of the training curriculum as well as the identification of the additional needs for training manuals are ongoing. Competencies that will be required for the certification are being established in the work group with participants from trade and the relevant authorities. The training capacities will be gradually increased during the first 6-12 months of the project depending on the current situation of each training center.

The funding is included in the total amount requested for the NCPP and will be addressed in the annual work plans.

8.4. The MAC Servicing Sector - Investment Component

8.4.1. Subsidy for Financing Procurement of Maintenance Tools

The use of appropriate equipment in the servicing sector will be essential to achieve the necessary reductions in CFC emissions. The size of the MAC sector makes this sector particularly important to reach compliance with phaseout target dates. With CFC consumption levels in the MAC servicing sector at approximately 934 ODP MT, the phaseout of CFC consumption in this sector will have a direct impact on the Philippines ability to meet its 50 percent and 85 percent reduction targets in 2005 and 2007 respectively.

Access to the necessary equipment will be a requirement incorporated in the DTI accreditation. It is important that financial assistance be provided to enable service shops to purchase the necessary equipment. The opportunity to get subsidies for the required service equipment will also be an important incentive to encourage the service sector to join the

training and accreditation scheme. Various financial assistance options, including full grants, partial grants, and concessional loans, have been considered.

While the concessional loan option was considered by the Government of the Philippines as the most cost-effective option, it was concluded that this option would not be practical with such a large number of small companies in the sector. Transaction costs would be very high due to the large number of transactions anticipated, along with the small size of each possible loan. It was thus determined that a partial grant approach would be the optimum way of proceeding.

In the case of small service shops, to reduce the demand of CFCs in the servicing sector, the Government plans to implement a voucher scheme similar to that being proposed for the Malaysian NCPP. Under the voucher scheme, the Government will select 4-5 qualified equipment suppliers. Service technicians who have undergone training and been certified by authorized centers or passed the appropriate exams as prescribed will be given a voucher to purchase service tools from a list of qualified suppliers. Based on the quotations provided by the qualified suppliers, the value of the voucher will be set. To ensure that financial assistance from the MLF will be allocated only to service technicians, and once service tools are acquired and are used, each service shop will be required to assume part of the cost of the equipment (tools covered in part by the voucher). Therefore, the value of the voucher will be less than the actual cost of the service tool-kits.

For determining the funding level to be requested from the MLF and the level of subsidy for the partial grant option, a comparison was made where a concessional loan option is used. In this comparison, to determine the funding level for this project component a grant funding of US$3.6 million is used as a starting point for establishing a revolving fund to finance CFC phaseout in the MAC servicing sector. This funding would be lent out to qualified equipment suppliers with no interest. The qualified equipment suppliers/borrowers would then provide credits to service shops to buy a basic set of tools that are necessary for properly repairing non-ODS MACs. To start the process, at the beginning of 2004 it is assumed that the total credit line of US$3.6 million will be distributed among all qualified suppliers based on their financial capacity and market shares. While the terms of credit to be given to service shops should be no longer than 24 months, suppliers would be required to settle their accounts in full by the end of 2005. During the loan settlement, suppliers could claim for a loan forgiveness rate of up to 40 percent (which is the average rate of non-performing loans in the Philippines). To reinvest the remaining funds, credit lines would be redistributed to suppliers. By the end of 2007, all suppliers would be required again to resettle their accounts. This procedure would be repeated for the period 2008-2009. According to this model, by the end of 2009 there would be approximately US$778,000 left and available in the revolving fund. These resources could then be returned to the MLF. The net present value of this amount, based on a 10 percent discount rate, is US$438,935. Therefore, the total grant fund to support this component of the plan is US$3,161,065. Based on the funding level determined by this approach, a level of subsidy based on a partial grant option will be determined. The level of subsidy for the partial grant option should ensure that the available funds will be sufficient to provide maintenance tools to service shops for the MAC servicing sector.

Table 8-4. Cash-flow for the Revolving Fund for Purchasing MAC Service Tool-Kits

Period	Begin Balance of the Revolving Fund	Ending Balance of the Revolving Fund US$	Number of Service Tool Kits Purchased*
2004 - 2005	3,600,000	2,160,000	1,440
2006 - 2007	2,160,000	1,296,000	864
2008 - 2009	1,296,000	777,600	518
Total			**2,822**

*Based on an estimate cost of US$2,500 per set.

Plan for a Partial Grant Program

It is, therefore, proposed that a funding request of US$3,161,065 be made to the MLF. The US$3,161,065 will then be given to 2,820 MAC service shops. Funding to be provided by the MLF will cover part of the cost of the equipment. It is also proposed that flexibility should be given to the country to work out in detail the actual subsidy scheme. The Philippines may consider to employ a sliding-scale on the level of subsidy. That is, to attract participation of service shops at the beginning of the program a higher level of subsidy can be offered to service shops. However, the level of subsidy will decrease for those shops that decide to join the program at a later date. The following is the financial plan to support this partial grant option.

To be qualified for a subsidy from this plan, service technicians must pass the examination as mentioned at an accredited training institute. Vouchers for purchasing service tools will be given to all certified service technicians. Values of the vouchers will be determined by DENR. Service technicians can use these vouchers to pay for part of the cost of the service tools at any qualified suppliers agreed by DENR The balance will have to be paid by the technicians own funds. After delivery of the service tools to the customer, qualified suppliers will submit vouchers to the financial intermediary to be appointed by DENR in order to get their reimbursement.

Table 8-5. Financial Plan for Purchasing MAC Service Tool-Kits

	2004	2005	2006	2007	Sub-total
Resource Allocation	1,106,373	948,320	790,266	316,107	3,161,065
Contingency (10%)	110,637	94,832	79,027	31,611	316,107
Total	1,217,010	1,043,151	869,293	347,717	3,477,172

8.4.2. Subsidy to Support Recovery and Recycling in the MAC Sector

In order for the Philippines to comply with the 2007 phaseout target, improving practice in the service of systems will not be enough. It will also be necessary to ensure that the existing stock of CFCs is reused. A legal requirement for mandatory recovery, training of service technicians in how to perform this operation and common access to reclamation facilities will help in this process. In addition, support will be given under the NCPP to encourage the use of recovery and recycling machines in the MAC sector.

A similar model as described in Section 8.4.1. will be used for determining the level of funding for this component. The calculations are based on the cost for procurement of 288 recovery and recycling machines for the removal of an additional 114 MT CFCs from the MAC sector.

To start the process, at the beginning of 2004, a total credit line of US$360,000 will be distributed among all qualified suppliers based on their financial capacity and market shares. The term of credit to be given to service shops should be no longer than 24 months. Suppliers are required to settle their account in full by the end of 2004. During the loan settlement, suppliers can claim for a loan forgiveness rate of up to 40 percent.

To reinvest the remaining funds, credit lines will be redistributed to suppliers. By the end of 2007, all suppliers are required to resettle their accounts and no reinvestment will be undertaken. According to this model, by the end of 2007 there will be approximately US$129,000 remaining and available in the revolving fund. These funds could then be returned to the MLF. The net present value of this amount, based on a 10 percent discount rate, is US$88,518. Therefore, the total grant fund to support this component of the plan is US$271,481.

Table 8-6. Financial Plan for Purchasing Approximately 288 MAC R&R Machines

Period	Begin Balance of the Revolving Fund	Ending Balance of the Revolving Fund	Number of R&R Machines Purchased
2004 – 2005	360,000	216,000	180
2006 – 2007	216,000	129,600	108
Total			**288**

The US$271,481 which is being requested from the MLF, will be used for supporting recovery and recycling of the existing stock of CFCs in the MAC sector on a partial grant basis. It is proposed that flexibility should be given to the country to work out in detail the actual subsidy scheme. The Government of the Philippines is studying the necessity of employing a sliding-scale on the level of subsidy. A higher level of subsidy will be needed at the beginning of the program to attract participation of service shops. The level of subsidy would decrease for those shops deciding to join the program at a later date.

Table 8-7. Financial Plan for Recovery and Recycling in the MAC Sector

	2003	2004	2005	2006	Subtotal
Resource Allocation	92,187	77,670	59,523	42,101	271,481
Contingency (10%)	9,219	7,767	5,952	4,210	27,148
Total	**101,406**	**85,437**	**65,475**	**46,311**	**298,629**

8.5. The Refrigeration and Stationary Air-Conditioning Sector

The total CFC consumption in the stationary refrigerator and air-conditioning servicing sectors is approximately 435 ODP MT as described in Chapter 4. Any significant, and early phaseout of this consumption will have a significant impact on the country's ability to meet its 50 percent and 85 percent reduction targets in 2005 and 2007. The total phaseout of this consumption is needed for the Philippines to meet its 100 percent phaseout by 2010 with the exemption of what can be serviced with reclaimed CFCs after that date.

Since there are no bans or disincentives to install CFCs in refrigeration systems, CFCs are used in the service sector both for repairs and also for new installations that are built on site. Due to the wide availability, easy access and low cost of CFCs, there are no incentives currently to improve service practice or recover refrigerants. The knowledge level of most customers of the technologies available is low and the expectations on life

expectancy and repair intervals are based on the long experience of "quick fix" practice. Furthermore, most service technicians receive on-the-job training and have a limited understanding of any methods that are not commonly used in their daily work and/or alternative methods that would improve the life expectancy and reduce energy consumption of refrigeration and air-conditioning systems.

A "Recovery/Recycling Scheme for the Philippines Technician Level Training Program" was recently carried out by UNIDO. This MLF project, funded at US$630,000 to phase out 60 ODP MT was finalised August 2000. The program focused on recovery and recycling including construction of low cost recovery machines. The program covered a one day session and included practical exercises on recovery and recycling. TESDA administered this program and there were 3,223 participants in attendance. The focus of this program is different from the training now suggested in this plan that focuses on leak prevention and other techniques to reduce emissions and refrigerant charge as well as supporting the shift to alternative refrigerants. UNIDO's program will be beneficial when an infrastructure for reclamation is established and recovered refrigerants can be reprocessed.

Many service shops in the Philippines repair both commercial refrigerators and domestic appliances or other refrigeration systems since technology and servicing procedures are quite similar. Therefore, it is proposed and has been decided that implementation of the CFC phaseout strategy in the commercial refrigeration sector will, in general, also cover the domestic refrigeration sector and the smaller more specialised sectors due to the frequent overlapping of target groups. As there is also a significant overlap with the MAC sector, the implementation will need to be coordinated. Due consideration will be taken in the implementation process of the need to tailor components of the plan to the different sectors such as domestic appliances, chillers, transport and industrial refrigeration. The sub-sectors and special concerns will be discussed subsequently.

8.5.1. Commercial Refrigeration

Based on the data described in Chapter 4, about 293 ODP MT of CFC-12 is being used for servicing CFC-12 commercial refrigerators. Since the Government of the Philippine has already banned the production of CFC commercial and domestic refrigerators, the demand for CFC-12 is already in decline.

Commercial refrigeration equipment is typically serviced for 10-20 years where the larger units, often with remote compressor units, have a longer life. Smaller units, however, have a shorter life expectancy. The compressor life expectancy varies between 2-10 years depending on the type of equipment. Phaseout of local production was completed in 1999. By 2010, the CFC demand for servicing commercial refrigerators is expected to decrease to 77 MT as a result of the retirement of old equipment. This scenario is again based on the assumption that there are no reverse retrofits of HFC commercial refrigerators to CFC-12. Without any measures to pre-empt reverse retrofits of HFC-134a in commercial refrigerators, the demand for CFC-12 will likely exceed 100 MT in 2010. While the analysis shows that there may still be a demand of 77 ODP MT of CFC-12 in 2010, this may be reduced if systems are retrofitted when service is needed rather than recharged with CFC-12, especially if CFCs are replaced in connection with major repairs the cost can be low and the impact significant. This can be promoted through public awareness including information that prices on CFCs can be expected to increase while the supply is decreasing. It is, therefore, concluded that no additional intervention, except training, certification and

accreditation covering the commercial refrigeration sector and access to reclamation for recovered refrigerants is required for this sector. No compensation for retrofit is requested under this plan.

8.5.2. Domestic Appliances – Household Refrigerators

Based on the data presented in Chapter 4, about 93 MT of CFC-12 was used for servicing CFC domestic refrigerators in 2001. With a life expectancy of 20 or more years for domestic refrigerators in the Philippines, it is expected that almost all CFC-12 domestic refrigerators will be retired by about 2016-2017. This means from 2010 onwards when the Philippines is no longer allowed to import any more CFCs, there will still be some CFC-12 domestic refrigerators requiring CFCs for servicing. It is estimated that in 2010 there may be over 4 million CFC-12 domestic refrigerators in service that will be phased out between 2010-2016. However, premature retirement of these units may be able to be avoided through refrigeration service technicians training programs. Therefore, while the analysis shows that there may still be a demand of 30-40 ODP MT of CFC-12 in 2010, this demand may be reduced if systems are retrofitted when service is needed rather than recharged with CFC-12. It is, therefore, concluded that no intervention except training, certification and accreditation covering the commercial refrigeration sector is required for this sector. No compensation for retrofit is requested under this plan.

8.5.3. Cold Storage and Large Centralized Refrigeration Systems

Based on the information presented in Chapter 4, the combined consumption of these CFC-12 and R-502 refrigeration systems in 2001 was determined to be 10 MT. During the last 10 years, discussion of the ozone issue and environmental awareness among many of these end-users has strengthened the focus on non-CFC technologies, and very few new CFC systems have been introduced. Since the life expectancy of these systems is about 20 years, by 2010 most of the CFCs cold storage and large refrigeration systems will be retired. With respect to systems remaining, they can be retrofitted to non-CFC technologies. If this is planned and implemented in conjunction with compressor changes or major repairs, the costs should not be prohibitive. It is, therefore, concluded that no additional intervention, except training, certification and accreditation and access to reclamation for recovered refrigerants is required for this sector. No compensation for retrofit is requested under this plan.

8.5.4. Refrigerated Transports – Ships, Trucks and Containers

The combined consumption of CFC-12 and R-502 in 2001 as described in Chapter 4 was less than 16 MT (14 MT of CFC-12 and 2 MT of R-502) in 2001. As all CFC-12 and R-502 refrigerated containers and trucks would be at least 10-15 years old, it is anticipated that by 2010 the demand for CFCs in this sector will disappear. It is reported that no reverse retrofit takes place in this sector and that most containers are owned by the multinational shipping industry moving out of CFCs. It is, therefore, concluded that no intervention except training, certification and accreditation and access to reclamation for recovered refrigerants will be required for this sector.

8.5.5. Chillers

At present, the chiller sector in the Philippines as described in Chapter 4 uses about 60 MT of CFC-11 including service and flushing and 5 MT of CFC-12 for servicing. The CFC-12 chillers are normally small size chillers with the same technology as most commercial refrigeration systems. The life time expectancy of these smaller chillers is less than 20 years and few of them have been installed after 1990 therefore the use of CFC-12 will be

mainly phased out before 2010. Retrofits are feasible if the compressor is changed or repaired.

A survey of chiller importers identified 193 large (300-1000 RT) centrifugal CFC-11 chillers that are all older than 10 years (most between 10 and 20 years old). Due to the large investment and the problematic economic conditions, the systems are being kept in operation beyond 2010. Some chillers are now more than 30 years old and are still in operation. The CFC-11 consumption in this sector is being used to replace refrigerants vented through an automatic purging device that removes non-condensable gases (air), and for leaks, service and flushing during service. The use of CFCs for flushing is planned to be banned. The CFC-11 demand to cover purging, leaks and unavoidable service, with service according to best practice should, for 193 chillers, be less than 15 ODP MT. By 2010, approximately 65 chillers will be more than 25 years old and may be retired.

Various options to eliminate the use of CFCs in this sector have been thoroughly discussed with the multi-stakeholder group. It was agreed that retrofit was not a suitable option as it normally results in lower cooling capacity and is less efficient. Moreover, the cost of retrofit could be as high as 50-70 percent of the cost of new chillers. Purge recovery systems are not well known and not currently being installed. It was agreed that purge recovery systems could be considered as an option only if there was a legal requirement preventing intentional venting of CFC refrigerant.

Chiller replacement was considered by the multi-stakeholder group to be the more technically viable option. However, this option, which probably presents a reasonable rate-of-return-on-investment, (especially from an energy savings perspective) does not engender enthusiasm or even attract the attention of chiller owners. Lack of interest is expected to be at least in part due to their lack of collateral for loans and that the return provided by this option is less attractive than investment they might require in other areas. The Government is now planning further meetings with chiller owners, chiller suppliers, POD, and the LandBank, with a view to identifying possible incentives that could be used to support the chiller replacement option.

In regards to the current proposal, the emphasis will be on reclamation of CFCs. To ensure that suppliers and contractors take proper measures to recover and reclaim CFCs when they replace old CFC chillers with new non-CFC units, the Government has to ensure that the proper legislative support is in place and that the chiller industry establishes a code of good practice whereby recovery and reclamation of CFC refrigerants is mandatory. A strategy for creation of a reclamation structure suitable to handle inter alia this sector is discussed in Section 8.8.

8.5.6. Flushing Refrigeration and Air-conditioning Systems With CFC-11

CFC-11 is being used in the Philippines by many, but not all, service companies for flushing. There are alternative solvents to CFC-11 but also alternative methods. It is estimated that about 100 ODP MT of CFC-11 per year is used for flushing in the MAC and stationary service sector. There are alternative methods but there is no ban on flushing and CFC-11 is cheaper than the alternatives. The suggested ban on CFC-11 and information would eliminate this non-critical use of CFC-11.

8.6. The Refrigeration and Stationary Refrigeration Sector – Technical Assistance

8.6.1. Legal Measures

Legal measures to create the incentives and disincentives necessary to change the way of doing business are detailed in Chapter 9. The legal measures will include a ban on new installations with CFCs and the introduction of a venting ban and compulsory use of recovery equipment when a system is serviced or decommissioned as well as requirements for training and the use of proper work methods in the servicing sector. These legal measures are important to send a clear message to the market of the Government's intention to carry out the phaseout, but also to clarify the requirements as well as strengthen the pro-active service providers that are promoting state-of-the-art service methods and create a level playing field for them. Enforcement of a ban on importation of CFC-11 is necessary to fulfil the 2005 and 2007 phaseout commitments. It will have implications on two areas in the service sector: flushing and the chiller sector. The ban on using CFC-11 as a flushing agent should not pose a major concern as alternative methods are available whereas the impact on the CFC-11 chiller sub-sector will require significant efforts by the trade and end-users discussed in Section 8.8.

8.6.2. Certification and Accreditation of Service Technicians

The measures for the stationary sector should be similar to the MAC sector due to similar problems and some companies are active in both sectors. A major difference between the sectors is that recovery and recycling is usually not suitable for the commercial sector where hermetic compressors can make the CFCs unusable unless it is cleaned through a more advanced process (reclaimed). Also the use of many different refrigerants and heavy recycling units make "recovery only" more practical in stationary refrigeration. Recovery can be done with simple units that can be assembled locally or by the service technicians themselves. There are about 2,200 enterprises providing services for domestic and commercial refrigerators. In addition, there are in-house servicing teams who work, within or on, a number of larger hotels, industries, malls and larger supermarkets.

The structure of the certification and accreditation strategy will be the same as described in Section 8.3.2. However, it should be noted that the content of the training programs as well as the necessary equipment is different compared to that in the MAC sector which will be reflected in the requirements relevant to the certification and accreditation for this sector.

8.6.3. Train-the-Trainer Program

A train the trainers program will be developed with a similar outline as that described for the MAC sector in Section 8.3.3. However, the education in stationary refrigeration and air-conditioning service rests with a different unit of TESDA. The content of courses and necessary material, including equipment will also need to be tailored specifically to meet the needs of this sub-sector.

Table 8-8. Train-the-Trainer Program in the Refrigeration Servicing Sector

Description	US$
Development and Production of Training Materials	15,000
Technical assistance to facilitate this process	2,000
Training of trainers by local experts (4 five-days courses, 15 persons for each course)	10,000
Basic Equipment for 30 Training Centers (2 sets each) adjusted for 22 sets of equipment delivered in UNIDO project*	478,400
Sub-total	505,400
Contingency 10%	50,540
Total	**555,940**

*Based on a standard cost of US$4,500 as specified in Annex VI. Basic equipment to be supplied to training centers is reduced in view of the equipment supplied by the UNIDO project (22 sets with recovery and recycling machines, leak detector and pressure gauges).

The preparation of training requirements and training manuals are ongoing and competencies that will be required for the certification are being established in the work group with participants from trade and the Government. Training capabilities will be gradually increased after 6 to12 months from project start-up depending on the current situation of each training center. It is thus proposed that the train-the-trainer program start in mid-2003, and training for service technicians begin in 2004. The cost for training 4,400 technicians is calculated to be US$220,000 and will be covered by the Government of the Philippines.

The support funding is included in the total amount requested for the NCPP and will be addressed in the annual work plans.

8.6.4. Code of Practice

It will be an important step in the phaseout program for the Philippines to establish codes of practice within the trade to ensure an improved standard of services in the sector. A code of practice should be linked to the legislation and provide further details of the general legal requirements with respect to design and procedures for maintenance. Examples of areas which may be better regulated by a code of practice than by legislation include:

- Design criteria;
- Requirements for safety equipment installation techniques;
- Leak detection requirements and procedures; and
- Requirements for how service, inspection, recovery, reclamation and retrofitting should be performed.

The development of the code will need to be a joint effort between all the industries involved, working in close cooperation with Government authorities, to ensure consistency with legal requirements and accepted practices. To establish a process to develop an agreed code of practice in a trade dominated by SMEs will require the formation of a cooperative trade structure to deal with the issue. It will be important to involve the existing trade organisations that represent the different sectors. The Government will have to participate in the process of developing the code of practice to ensure that it is an unbiased document and that it also meets objectives in the areas of environmental protection, customer protection and health and safety aspects. Once a code is completed in the Philippines, following the “code of practice” should be a condition for companies to obtain and retain accreditation and/or business permits.

During the preparation of the strategy for the service sector presented in this NCPP, discussions began between the Government and industry on how to develop a code of practice. It has been agreed that the various trade organisations currently in existence in the Philippines will take on this task in cooperation with DENR and TESDA. For the process of developing a code of practice, representatives from the trade will have to devote some of their time to work on the code, but in addition, it will be necessary to create a secretariat to coordinate the input from the trade to the development process and to be the official channel through which the trade can communicate with the Government. This component will be covered by counterpart funding and no request is made to the Fund for this component.

Table 8-9. Development of a Code of Practice and trade cooperation structure

	US$
Secretariat with part time local staff and printing.	19,000

8.7. The Refrigeration and Stationary Air-conditioning Servicing Sector-Investment Components

8.7.1. Subsidy for Financing Procurement of Maintenance Tools

A voucher system identical to that proposed in the MAC sector in Section 8.4.1 will be used to provide equipment to certified refrigeration technicians in this sector. The types of tools needed to perform service according to good practice in this sector are different than in the MAC sector. This will be reflected in the requirements for accreditation in this sector.

To determine the funding level for this project component, a comparison was made with a grant funding level of US$2.835 million to be used for establishing a revolving fund to finance CFC phaseout in the stationary refrigeration servicing sector. These funds would be lent out to qualified equipment suppliers with no interest. The qualified equipment suppliers/borrowers will then provide credits to service shops to buy a basic set of tools that are necessary to properly repair non-ODS systems.

To start the process, at the beginning of 2004, the total credit line of US$2.835 million will be distributed among all qualified suppliers based on their financial capacity and market shares. While the terms of credit to be given to service shops should be no longer than 24 months, suppliers will be required to settle their accounts in full by the end of 2005. During the loan settlement, suppliers can claim for a loan forgiveness rate of up to 40 percent (which is the average rate of non-performing loans in the Philippines). To reinvest the remaining funds, credit lines will be redistributed to suppliers. The level of the credit lines will depend on suppliers past performance. Priority will be given to suppliers that sell more equipment to service shops in the previous round and to those requesting a lower loan forgiveness rate. By the end of 2007, all suppliers are required again to resettle their accounts. This procedure will be repeated for the period 2008-2009. According to this model, by the end of 2009 there will be approximately US$612,360 million left and available in the revolving fund. These resources can then be returned to the MLF. The net present value of this amount, based on a 10 percent discount rate, is US$345,661. Therefore, the total grant fund to support this component of the plan is US$2,489,339.

Table 8-10. Cash-flow for the Revolving Fund for Purchasing Refrigeration Service Tool-Kits

Period	Begin Balance of the Revolving Fund	Ending Balance of the Revolving Fund	Number of Service Tool Kits Purchased*
2004 - 2005	2,835,000	1,701,000	1,134
2006 - 2007	1,701,000	1,020,600	680
2008 - 2009	1,020,600	612,360	408
Total			**2,223**

In addition to the high transaction costs, another constraint in this model is timing for delivering these service tool-kits to all service shops. To ensure that expected repayments are collected at certain dates, it is important that the purchase of service tool-kits be done in one batch at the beginning of each lending cycle. For example, with the lending term of 24 months, all 1,134 refrigeration service tool-kits must be purchased at the beginning of 2004, 680 units in the beginning of 2006 and 408 units in the beginning of 2008 in order to have the ending balance of the revolving fund equal to US$612,360 million at the end of 2009. The most practical solution is to opt for a partial grant funding approach. However, to maintain the same level of liability to the MLF, the remaining funds in 2009, as projected by this financial model, would be returned to the fund. In 2009, the net present value of the US$612,360 is about US$345,661. This amount is deducted up front from the beginning balance. Therefore, the total grant fund to support this component of the plan is US$2,489,339.

Plan for a Partial Grant Program

A funding request of US$2,489,339 is therefore being made to the MLF. The US$2,489,339 will then be channeled to the 2,200 refrigeration service shops. Funding to be provided by the MLF will cover part of the cost of the equipment. It is also proposed that flexibility be given to the country to work out in detail the actual subsidy scheme. The Philippines may consider employing a sliding-scale on the level of subsidy. That is, to attract participation of service shops at the beginning of the program, a higher level of subsidy could be offered. The level of subsidy would decrease for those shops deciding to join the program at a later date (an incentive to participate early). Table 8.11 depicts the financial plan to support this partial grant option.

Through multi-stakeholder consultations, it was determined that such a scheme was workable and would be attractive to small service shops providing the level of counterpart funding to be furnished by the service shops did not exceed US$200.

To be qualified for a subsidy from this plan, service technicians must pass the examination as mentioned in Chapter 4. Vouchers for purchasing service tools will be given to all certified service technicians. The value of the vouchers will be determined by DENR. Service technicians can use these vouchers to pay for part of the cost of the service tools at any qualified supplier agreed by DENR. The balance will have to be paid by the technicians own funds. After delivery of the service tools to the customer, qualified suppliers will submit vouchers to the financial intermediary to be appointed by DENR in order to be reimbursed.

Table 8-11. Financial Plan for Purchasing Refrigeration Service Tools

	2004	2005	2006	2007	Sub-total
Resource Allocation	871,269	746,802	622,335	248,934	2,489,339
Contingency (10%)	87,127	74,680	62,233	24,893	248,934
Total	**958,396**	**821,482**	**684,568**	**273,827**	**2,738,273**

8.8. Reuse of Existing Stock of CFC-Recovery and Reclamation Scheme

In the international automotive sector (where there is no electrical motor in the system), recovery and recycling in the workshop has become the prevailing practice for medium size and larger service shops. For smaller MAC service shops recovery only can be a more cost effective solution as the equipment is cheap and the quantities they could recover is limited. However, in the stationary refrigeration sector the risk of the formation of by-products as well as the risk of mixing different refrigerants recovery for reclamation normally takes place at central reclamation facilities. This has been the internationally dominating practice unless the CFCs are returned to the same equipment after a repair (and then only when the CFCs are trusted to be in good condition). To move refrigerant between different plants without reclamation in a more sophisticated process is not generally accepted practice due to the liability concerns and the high resulting cost if contaminants cause failure in the plants receiving a poor quality refrigerant.

To make the ban of CFC-11 possible without severe adverse effects on the chiller sector, the capability for reuse of the existing stock of CFC-11 is essential.

The use of CFCs will also be important for all other sectors in order to avoid the economic loss of premature scrapping of existing equipment. The import of virgin CFCs will sharply decrease and from 2010 onwards reclaimed refrigerants will be the only source to keep existing equipment in the stationary refrigeration sector in operation. The introduction of new practices in the service sector to reduce the emissions of CFCs in connection with service and decommissioning includes the use of leak detection equipment and legal requirements to recover refrigerant instead of releasing it when a system has to be emptied for service. The recovered refrigerant is an asset not used by the service shops due to the lack of a functioning collection and reclamation scheme. As long as the supply of CFCs is above the demand, it is common to release the CFCs recovered during service. Currently, there is no regulation to discourage this and no infrastructure to deal with used refrigerants.

The reuse of the existing CFC stock will play an important role in the phaseout of CFCs in the Philippines. The Government plans to impose a venting ban in the revised version of the CCO. In order to create credibility of a ban on venting and compulsory recovery, there is a need for an infrastructure to deal with the recovered refrigerant. Currently, there is no such capacity in the Philippines. The CFC importers organisation, PARII, has in several discussions during the preparation of the RMP, reiterated its commitment to work in a responsible way with CFCs and its interest in offering its customers the service to reclaim CFCs. PARII sees the long-term need and future profitability as CFCs become scarce and more costly HFC alternatives and HCFC-22 reclamation becomes possible. However, as long as there are no legal requirements and recovery equipment is not regularly used, there is no possibility for it to justify the investment. In addition PARII has expressed a concern that it lacks knowledge of reclamation techniques. There will be a crucial phase-in period when reclamation of CFCs has to be the common practice in order to make the system profitable. PARII now faces the problem that as long as there is no reclamation facility no

one will recover CFCs and if there is no recovered material, there is no profitability in reclamation capability.

In order to tackle the servicing sector and to enable the Philippines to meet the Montreal Protocol requirements, it is important to establish reclamation capability early on, both to solve the issue of the CFC-11 chillers and to give credibility to the requirements associated with improved service practices, such as a venting ban. The existing refrigerant distributors, the natural operators of such equipment, already have part of the infrastructure needed for handling the recovered CFCs and have declared their interest.. For this technical assistance, suitable equipment is needed. To solve the deadlock described above and bridge the period until the supply of recovered CFCs increases as practice is improved, some initial funding to start the reclamation process will be needed.

Table 8-12. Technical Assistance to Initiate Infrastructure to Reclaim CFCs

Description	**US$**
Technical assistance to analyze need	10,000
Training of operators	10,000
Sub-total	20,000
Contingency 10%	2,000
Total	**22,000**

Besides a reclamation unit, analyzing equipment is required to establish a reclamation facility for verification that the refrigerant quality is acceptable after reclamation. The equipment normally used for this is a gas chromatographer. There is also an additional need for reusable cylinders that do not exist in a sufficient number in the Philippines today.

Suitable reclamation units with a capacity of 50 kg/hours and with the capability of being switched between different refrigerants are available. To achieve the necessary capacity to reclaim CFC-11 for the chiller sector and CFC-12 for the stationary refrigeration sector, it is estimated that approximately ten facilities are needed in the Philippines based on the number of active importers.

After information has been provided via the technical assistance component, all refrigerant suppliers/distributors will be invited by DENR to submit proposals to request funding from DENR to establish reclamation capability for CFC-11 and CFC-12. All proposals must provide information pertaining to equipment plans along with a description of the facility and timetable for establishment. DENR will provide technical assistance to help enterprises prepare their proposals. Priority will be given to those companies that will establish their capability early in the process.

DENR will also consider making it a legal requirement for suppliers eligible to receive CFC import clearances to take back recovered CFCs from their customers. This would eliminate any unfair competitive disadvantage to a supplier who would have planned to establish the infrastructure and shoulder initial costs with no guarantee that it would be used.

Table 8-13. Financial Plan for the Purchase of Equipment for Infrastructure to Reclaim CFCs

Description	US$
Estimated demand 10 GCs at a cost of US$14,000	140,000
Estimated demand 10 Reclamation units at a cost of US$30,000	300,000
Reusable cylinder for recovered CFCs (800 pcs at US$100)	20,000
Sub-total	**440,000**

To determine the funding level for these investment components, it is assumed that a grant funding of US$280,000 is needed for establishing a revolving fund to finance reclamation equipment primarily for the stationary refrigeration servicing sector. This funding would be lent out to enterprises that have supplied the most attractive offer to DENR.

To start the process, at the beginning of 2004, the total credit line of US$280,000 will be distributed among the selected enterprises. The terms of credit to be given should be no longer than 24 months. Refrigerant suppliers and distributors will be required to settle their accounts in full by the end of 2005. To reinvest the remaining funds, a second round will be offered to the enterprises. By the end of 2007, all accounts should again be resettled. These resources of US$100,800 could then be returned to the MLF. Based on a 10 percent discount rate, the net present value of this amount is US$68,848. Therefore, the total grant fund to establish reclamation capability is US$211,152.

Table 8-14. Cash-flow for the Revolving Fund for Purchasing Reclamation Equipment

Period	Beginning Balance of the Revolving Fund	Ending Balance of the Revolving Fund	Number of Reclamation Facilities Initiated
2004 - 2005	280 000	168 000	6
2006 - 2007	168 000	100 800	4
Total			**10**

US$211,152 would be given to ten suppliers/distributors of refrigerants. MLF funding would only cover part of the costs of the equipment. In average, the level of subsidy will be approximately 48 percent of the equipment cost. It is also proposed that flexibility should be given to the country to work out in details the actual subsidy scheme. The following is the financial plan to support this partial grant option.

Table 8-15. Financial Plan for Reclamation Equipment

	2004	2005	Sub-total
Resource Allocation	147,806	63,346	211,152
Contingency (10%)	14,781	6,335	21,115
Total	**162,587**	**69,680**	**232,267**

CHAPTER 9

9. Enhancing the Enabling Infrastructure

9.1. Possible Amendments and Supplements to DAO 2000-18, DENR Chemical Control Order (CCO) for Ozone Depleting Substances

The Government of the Philippines recognizes that the achievement of sustainable phaseout of CFCs will require adjustments to the current legal framework. In fact, the Government is currently moving forward in close cooperation with the World Bank with amendments that will remove some anomalies in the current version of the CCO. This will avoid confusion surrounding the issuance of import licenses. The current CCO wording, if left unchanged, would make it difficult for the country to meet, and/or verify that it has met, its Protocol obligations. The Government realizes that the preparation and analyses processes that have given rise to this NCPP have also identified additional adjustments to the framework that need to be considered in order to achieve the phaseout in a timely manner and is prepared to proceed, with further amendments to the CCO in late 2003 or 2004, if warranted.

The Government of the Philippines is at risk of non-compliance with the January 1, 2005 obligations and each obligation thereafter. It has already undertaken policy and legal reviews but now needs the benefit of the experience and expertise of international and national legal consultants to ensure that everything that needs to and can be put in place is known and that the legal precedence and mechanisms are well understood. This NCPP therefore contains an outline of the resources needed to conduct a comprehensive legal review of the authorizing legislation of each of the engaged and responsible ministries, departments and agencies with a view to enabling all possible and practical control measures to facilitate the phaseout and yield appropriate data and reporting.

DENR is now studying the feasibility of a number of legal interventions that could further assist in meeting the obligations of the Montreal Protocol. The summary of possible legal measures below contains suggestions from various interest groups, which will be assessed by the DENR for possible use in combination with each other or alone. The summary also includes some measures that are already in the CCO, but not yet fully implemented. This is an "indicative list" to give a sense of the scope of the legal assessment to be undertaken. Some of the items listed will likely be determined to be impractical. No attempt has been made at this stage to prioritize the items on this list or in any other way, pre-judge the outcome of the comprehensive study.

Possible Legal Measures

Cross-sectoral

- prohibit back conversion of existing equipment;
- ban all new installations of CFC-using systems (including MACs); and
- prohibit the sale and use of small disposable containers ("mini cans" <1 kg) with CFCs.

Importation

- impose a total ban on the import of CFC-11 by 2005 (with a possible exemption for a small use of CFC-11 for servicing Chillers);
- prohibit the offering for sale of products containing CFCs (the exception, for the time being, is MDIs);
- ban the importation of CFCs containing equipment and attach a reference to a prohibition of CFCs in products, including pre-mixed polyol and aerosols, to all import licenses while noting penalties for contraventions (fines and imprisonment); reaffirm the prohibition on the import, offering for sale and use of ODS solvents (1,1,1 TCA, CFC-113) (to safeguard against any resumption of use);
- prohibit the filling or refilling of CFCs into imported equipment;
- specify requirements for registration of importers (Section 4 of the CCO);
- require that import clearances be used before the end of the calendar year; and
- instate procedures relating to seizure of shipments, disposition of seized goods and associated penalty provisions.

Manufacturing

- enhance enforcement and adjust the law to provide for the imposition of severe penalties for any observed manufacturing contraventions (use of CFCs);
- prohibit the sale of CFC-11 for use as a blowing agent; and
- reaffirm the ban on any remaining allowable uses of CFCs in the manufacturing sector and add a statement to the CCO allowing a temporary exemption (until 2005) for companies that have come forward and signed an agreement to cooperate with the DENR to gradually phase out their CFC use.

Servicing

- prohibit venting of CFCs from servicing equipment, or refrigerants in general (mandatory recapture);
- prohibit flushing with CFCs and CTC (and possibly all ODS);
- require that only accredited enterprises/persons service and decommission refrigeration and air-conditioning equipment designed for CFC refrigerants and require that CFCs only be sold to accredited enterprises/persons utilizing these substances for allowable uses;
- specify and differentiate requirements for accreditation of dealers, retailers and service providers for training, equipment, etc., as stated in Section 5 of the CCO, including the procedures and pre-conditions to acquire accreditation and conditions that are to be attached to those with approved accreditation (such as not being able to work on certain types of equipment) and specifying procedures for certification of individuals to the required competency;
- provide DTI through DENR-EMB, the power/authority to withdraw accreditation if the company or person no longer fulfils stated conditions;
- require mandatory leak detection and application of corrective measures before recharging refrigeration and air-conditioning systems; and
- instate general requirements aimed at minimizing emissions (e.g., requirements for regular leak detection and maintenance, avoiding flare connections, proper methods to handle the new refrigerants, etc.).

MACs

- prohibit use of CFCs in MACs in vehicles manufactured after 1998 and completely ban the uses of CFCs in MACs after *(2016)*; and
- require replacement of CFC MACs with non-CFC types if major repairs are required after a specified date.

Monitoring and Reporting

- require mandatory record keeping and annual reporting of CFC sales, use and any other prohibited or restricted ODS substances; and
- require BOC to report annually to POD on actual imported quantities registered in customs.

9.2. Building the Necessary Capacity for Sustainable Results

These proposed policy and regulatory interventions, for the most part, appear to be within the mandate of, and consistent with, the policy objectives of Republic Act No. 6969, which states, inter alia, under item b) "monitor and regulate the importation, manufacture, processing, handling, storage, transportation, sale, distribution, use and disposal of chemical substances and mixtures that present unreasonable risk or injury to health or to the environment in accordance with national policies and international commitments." However, a comprehensive review of the possible legislative amendments that might be needed to ensure that the CFC phaseout is sustainable is still needed, along with a determination of various agency purviews over these measures and an analysis to examine their potential roles and responsibilities – in light of developed country experience and in the context of securing a sustainable phaseout.

This work will build upon the ongoing regulatory framework enhancement work-program of various working groups established already during and before the preparatory phase of this NCPP (see Annex III). Their continued work on the identified issues is deemed necessary to achieve sustainable outcomes and will require continued support under the leadership of POD/DENR.

Enforcement, as noted earlier, is weak due to lack of both capacity and resources. The DENR is willing to redirect resources for enforcement of the phaseout but will need assistance in enhancing existing capacity. As noted earlier, this plan will affect not only the work of DENR, but also the work of various government agencies at both the national and regional levels. For example, regional staff of DENR will have to assume a large part of the responsibility for monitoring and enforcement and become involved in the program in its capacity as issuer of business permits, and possibly, for other monitoring activities. LTO will need to take the lead, in cooperation with the DENR, on the inspections of MAC systems. DTI will be responsible for the accreditation of service shops. BOC will be responsible for enforcing import quotas at the border. The refrigerant suppliers (or trade organizations) will assume responsibility for the reclamation of used refrigerants. The DENR/POD will have the main responsibility for the strategy, and will need to have oversight of all activities to ensure that they are progressing smoothly and that the desired results are achieved within the agreed timeframes. It is essential that DENR/POD be given support as proposed in Section 9.3 to ensure that this key role in the NCPP implementation is carried out, and that it, in turn, can support similar processes with other concerned agencies and entities.

9.3. Implementation and Monitoring

9.3.1. Project Implementation and Monitoring Activity

Because the NCPP entails a comprehensive review of the legal and policy framework to strengthen and develop; enhancement of the enforcement and compliance monitoring capacity; CFC phaseout activities in the manufacturing sector and in more than 5,000 servicing enterprises; and training of a large number of small and medium-scale service

shops; it initially requires a project management unit (PMU) with full-time staff which will work closely with DENR/POD.

Implementation of this proposed plan will involve a very large amount of administrative work to facilitate the development of the policy and regulatory framework, a database of CFC users and public awareness activities, overseeing project development, selection and hiring of consultants, providing assistance to the BOC and a myriad of other activities. The PMU will include, but need not be limited to representation of organizations and agencies with responsibilities and/or competencies related to the implementation needs of the NCPP. The resources of the PMU will provide funding in support of activities undertaken on behalf of the various agencies under the PMU and in support of the CFC phaseout program developed or sanctioned by the PMU.

9.3.2. Regulations

The PMU will assist, inter alia, in the following regulatory activities under supervision of the DENR/POD: preparation of departmental orders banning/restricting the use of CFCs in the manufacturing sector; conveyance of further investigative and implementation work needed with respect to the service sector; preparation and drafting of legal requirements for importers to clearly identify their ODS clients and end-users; preparation of any agreed amendments to the CCO; development of lists of prohibited products with DTI and/or the Bureau of Customs to; integration with DTI of the accreditation system of DTI and DENR; cooperation with LTO to enforce CFC elimination through vehicle inspections and registration renewals; and, revision of the import quota to make consistent with the goals and objectives outlined in this plan.

9.3.3. Project Implementation

The PMU will undertake the following implementation activities under the supervision of the DENR/POD:

- prepare standard implementation procedures for eligible enterprises that would like to seek project funding from MLF resources;
- assist eligible CFC consuming enterprises prepare proposals to obtain MLF financial support for converting operations;
- arrange technical support, on an as-needed basis, to assist enterprises to identify appropriate non-CFC alternative technology;
- review and approve proposals submitted by eligible enterprises;
- coordinate the establishment of the networks of authorized training centers for the refrigeration and MAC servicing sectors;
- facilitate the selection of qualified suppliers to supply tools and equipment for MAC and refrigeration servicing sectors to service shops;
- provide DENR with recommendations on the level of subsidy for MAC and refrigeration servicing tools and R&R machines;
- develop and maintain, in cooperation with TESDA, a database of refrigeration and MAC certified technicians including names and addresses of service shops that already have their technicians trained;
- assist TESDA, where/if required, to train vehicle inspection stations to identify various refrigerant types in the MAC systems;
- provide advice and recommendations on the allocation of annual import quotas of all Annex A, Group I, chemicals to DENR; and,

- prepare an annual progress report of overall implementation of the NCPP in accordance with ExCom procedures and requirements pertaining to this task.

9.3.4. Public Awareness

The PMU will undertake the following tasks under the supervision of the DENR/POD:

- disseminate information related to the Government's policy to completely phase out CFCs in the manufacturing sector by the end of 2004;
- inform the industry of the availability of funds provided by the MLF;
- raise general public awareness of the environmental and economic impact of ozone layer depletion via newsletters, news articles, seminars, radio spots, etc.;
- organize a promotional program to encourage the public to have its refrigeration and MAC systems repaired by certified technicians; and,
- undertake public outreach programs for the refrigeration and MAC servicing sectors as described in the previous sections.

9.3.5. Monitoring

The PMU will assist DENR/POD to carry out the following tasks:

- manage/direct the foam sector task group to monitor consumption, use and distribution of CFCs and HCFC-141b in the foam sector;
- set up a website with a list of importers, their annual quotas, and the actual amount already imported within the current calendar year;
- update the information on the actual amount of imported CFCs with the BOC on a quarterly basis and discuss/clarify all observed CFC-related anomalies;
- monitor import of HFC-134a, HCFC-22, and HCFC-141b;
- inspect where possible, the warehouses of CFC, HCFC and HFC-134a importers and determine inventory stocks and common practices;
- report any incidents of illegal import of CFCs and facilitate the initiation of compliance actions;
- carry out safety and technical audits of all projects undertaken under this plan.

Table 9-1. Project Management (Implementation and Monitoring) Unit (2003-2007)*

Description	**US$**
Regulatory and policy support	150,000
Project implementation and management (including expert's fees)	400,000
Public awareness	450,000
Monitoring activities	250,000
Sub-total	1,250,000
Contingency 10%	125,000
Total	**1,375,000****

*After 2007, remaining tasks will be carried out solely by the Philippines Ozone Desk (POD).
**Please refer to Table 10-1 for full PMU costs.

CHAPTER 10

10. Costs of National CFC Phaseout Plan

The following tables summarize the anticipated costs of the National CFC Phaseout Plan. Costs that will not be reimbursed by the MLF are also delineated in the tables.

Table 10-1. Cost for Investment and Non-investment Components of the NCPP in the Manufacturing Sector

Activity Description	No. of firms	ODP MT to be Phased out	Time Frame	Total Expected Costs US$	Costs to MLF US$
Aerosol Subsector	**9**	**CFC-12 2.6**		**24,000**	**24,000**
- Selection/hiring of local technical expert to advise St. Pancratius Industries and 8 or more CFC-using SMEs on options - Consultations with enterprises			Jan 03 Feb-Mar 03		
MDI Phaseout -- Technical Assistance				**49,940**	**49,940**
♦ Selection of consultant ♦ Strategy developed – (Consultant Fees) ♦ Consultations (Workshops (16 regions)			Jan 03 Feb-Mar 03 Jul-Aug 03	 12,000 24,000	 12,000 24,000
Info materials for health-care industry			May-Jun 03	9,400	9,400
Sub-total				45,400	45,400
Contingency @ 10%				4,540	4,540
Foam Sector*	**26**	**CFC-11 467.77**		**4,115,639**	**3,545,169**
- Large manufacturers ***Investment projects*** - contracts signed - equipment delivered - test & trials - activity completed	6	300	 Jun-Sep 03 Jul-Dec 03 Aug 03–Feb 04	2,802,000	2,615,200
- Foam blowers ***Umbrella Investment Project (incl. Ref. Truck)*** - contracts signed - equipment delivered - test & trials - activity completed	20	167.77	 Oct 03–Jan 04 Nov 03–Mar 04	1,313,639	929,969
Industrial refrigeration equipment mfg (foam and refrigeration)	**2**	**CFC-11 9.1 CFC-12 7.04**		**245,489**	**245,489**
Investment Projects - contracts signed - equipment delivered - test & trials - activity completed			 May-Jun 03 Jun-Sep 03 Jul-Nov 03		

Project Management Unit - Regulatory and policy support - Project implementation and management - Public awareness - Monitoring activities - Legal framework review and overhaul - Enforcement training in 16 regions				**1,540,000**	**1,375,000**
Totals	**37**	**CFC-11 476.87 CFC-12 9.64**		**5,975,068**	**5,239,598**

*Excludes 31.7 MT consumption in 2001 for the UNDP foam project.

Table 10-2. Cost for Investment and Non-investment Components of the NCPP in the Service Sector

Activity Description	No. of Firms	ODP MT to be Phased Out	Time Frame	Total Expected Costs (US$)	Costs to MLF (US$)
MAC Service sector					
Philippine road side inspection of MACs			Jan 04 -	214,500	214,500
Train-the-Trainer Program in the MAC Servicing Sector (2 persons each from 60 centers)	60 Training centers		Jan 03 -	618,200	618,200
Certification of MAC Service Technicians (2,800 shops * 2 technicians/shop * US$50 per person)	2800		Jul 03 -	280,000	-
Financial subsidy for purchasing MAC servicing equipment	2800	830.4 R-12	Jan 04 -	7,000,000	3,477,172
Financial subsidy for purchasing MAC R&R machines	280	113,7 R-12	Jan 04 -	576,000	298,629
Phaseout of CFC-11 flushing		40.0 R-11			
Sub total for the MAC sector	**2800**	**984.0**	**4.41**	**8,688,700**	**4,608,501**
Stationary ref and air-conditioning sector					
Train-the-trainer program in the refrigeration servicing sector (2 persons each from 60 centers)	60 Training centers		Jan 03 -	555,940	555,940
Costs to establish a "code of practice"	5000		Jan 04 -	19,000	-
Certification of refrigeration service technicians (2,200 shops * 2 technicians/shop * US$50 per person)	2200		Jun 03 -	220,000	-
Financial subsidy for purchasing refrigeration servicing equipment	2200	379.0 R-12	Jan 04 -	5,500,000	2,738,273
Technical assistance to initiate infrastructure to reclaim CFC	10		Jan 03 -	22,000	22,000
Financial plan for reclamation equipment	10	15.0 MT R-11 200 MT R-12	Jun 04 -	462,000	232,267
Phaseout of CFC-11 for chillers & flushing		105 MT R-11	Jan 05		-
Sub-total for the stationary ref and air conditioning sector	**2210**	**555.0**	**5.98 C.E.**	**6,778,940**	**3,548,480**
Total service sector	**5000**	**1,539.0**	**4.97 C.E.**	**15,467,640**	**8,156,981**

CHAPTER 11

11. National CFC Phaseout Schedule

As a result of the initiation of the legal review by the Philippines as mentioned in Chapter 9, the Government will likely announce preliminary, amendments to its current Chemical Control Order in early 2003, which will serve notice to the ODS-consuming community in the Philippines of its schedule for the total phaseout of Annex A, Group I and Annex B, Group III chemicals. The announcement will make clear the continuous tightening of the import schedule (an annual reduction or termination of allowable import quotas). The schedule, based on a revised quota system, is shown in Table 11.1. The annual quota will be distributed amongst importers that are authorized to import CFCs to the Philippines. The list of importers is set out in Annex IV.

Table 11-1. Import Quota for Annex A Group I Chemicals: The Phaseout Plan

Year	Annex A, Group I (ODP MT)
2003	1960
2004	1810
2005	1509
2006	1360
2007	453
2008	400
2009	300
2010	0
2011	0

The Government will make it clear that CFC-11 use in the manufacturing sector will be curtailed shortly (after temporary exemptions are lifted by 2005) and that, in addition, CFC-12 supplies to the servicing sector will be restricted with more severe restrictions to come shortly. The Government announcement will highlight the impact these restrictions will have on the MAC, chillers, and refrigeration sub-sectors and the actions that the Government will take to minimize the negative impacts associated with the transition, including the availability of training, assistance to repair shops and recovery and recycling schemes.

For those who believe that there is always an alternative route, the Government will also warn of enhanced penalty provisions; the reduction in global supplies of these chemicals anticipated within just a few years; the need to convert or terminate ODS use as soon as possible; and, its intent to take active enforcement actions against those who may choose to ignore the law. The Government will also announce that no import licenses will be granted to new importers for the importation of CFCs. The diminishing annual quotas will be distributed among existing importers. The actual phaseout and implementation schedules follow in Table 11.2

Table 11-2

Task	2003				2004				2005				2006				2007				2008				2009				2010			
Manufacturing Sector	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Technical Assistance Projects in the Aerosol Sector																																
(i) Expert/ advisor contracted																																
(ii) Activity completed																																
Technical Assistance for MDI Sector																																
(i) Selection of consultant																																
(ii) Development of MDI strategy																																
Investment Project Refrigeration Equipment Manufacturers																																
(i) Contract signed																																
(ii) Equipment delivered																																
(iii) Test and trials																																
(iv) Assistance program for small users established/ implemented																																
(v) Activity completed																																

Investment Projects in the Foam Sector
(i) Contract signed
(ii) Equipment delivered
(iii) Test and trials
(iv) Assistance program for small users established/ implemented
(v) Activity completed

Service Sector	**2003**				**2004**				**2005**				**2006**				**2007**				**2008**				**2009**				**2010**			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Mobile Air-Conditioning Servicing Sector																																
(i) Development of Inspection Manual																																
(ii) Training for Vehicle Inspection Technicians																																
(iii) Procurement of Equipment																																
(iv) Equipment Delivered																																
(v) Road-side Inspection																																
(vi) Code of Practice																																
(vii) Train-the-Trainer Program																																

(viii) Certification of Existing Service Technicians Workforce (intro. phase)																														
(ix) Ongoing and New Service Technicians Training																														
(x) Subsidy System for MAC Service Tools																														
(xi) Subsidy System for MAC R&R Machines																														

Task	2003				2004				2005				2006				2007				2008				2009				2010			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Refrigeration Servicing Sector																																
(i) Code of Practice																																
(ii) Train-the-Trainer Program																																
(iii) Certification of Existing Service Technicians Workforce (intro. phase)																																
(iv) Ongoing and New Service Technicians Training																																
(v) Subsidy System for Refrigeration Service Tools																																
(vi) Reclaim Facility Technical Assistance																																
(vii) Subsidy System for Reclaim and Analyzing Equipment																																
Code of Practice																																
(i) Code of Practice																																

Reclamation Facility																															
(i) Reclaim Facility Technical Assistance																															
(ii) Subsidy System for Reclaim and Analyzing equipment																															
(iii) Collection Scheme/banking of CFC-11 from Decommissioning																															
Project Management Unit																															
(i) Implementation Assistance																															
(ii) Public Awareness Activities																															
(iii) Regulatory Support																															
(iv) Monitoring																															

CHAPTER 12

12. Financing Modalities and Cash Flow

The agreed implementation modalities for various sectors and sub-sectors are as follows.

12.1. Full Grant Funding – Investment Projects

The following implementation and financing modalities will be applied to investment projects in the aerosol, industrial and commercial refrigeration equipment manufacturing, and foam sectors.

Advertising and promotion of the MLF funding and CFC phaseout program will be undertaken through workshops, national newspapers and trade magazines. All enterprises in these sectors will be invited to attend project preparation workshops. At these workshops, the PMU will provide training to enterprises on how to prepare project proposals. For enterprises that require technical assistance to identify suitable non-ODS alternatives, they will be requested to submit their requests to DENR/POD. Sector experts will be contracted by DENR/POD through the PMU. Sector experts will assist these enterprises to select appropriate non-ODS alternatives.

All enterprises will be invited to submit requests for funding based on existing MLF guidelines. Priority will be given to the most cost-effective proposals. In the event that phaseout costs requested by enterprises exceed the funding approved by the MLF, funding will be capped at the average cost-effectiveness of previously MLF-approved projects in respective sectors or sub-sectors.

Enterprises will be required to submit their proposals before April 1, 2003. After the deadline for submission of proposals, if the total funding request for all eligible projects is less than the amount approved, savings can be used for assisting any late identified enterprises or for other phaseout activities covered by the NCPP. Each enterprise will be required to provide detailed information regarding its baseline situation, CFC consumption and planned phaseout schedule. Before signing contracts, information provided by enterprises will be verified by the project management team.

12.2. Partial Grant Financing – Servicing Tools and MAC R&R Machines

The financing modality for this plan will be applied to all refrigeration and MAC service shops. A partial grant funding approach will be employed. Possibly, a sliding scale of the level of subsidy will be used. For those who participate early, a higher subsidy level might be provided to assist them in purchasing service tools for proper maintenance of CFC-12, non-CFC refrigerators and MACs, and MAC recovery and recycling machines.

The PMU will undertake a selection process to identify qualified suppliers for providing service tools and MAC recovery and recycling machines. A public outreach program, including information through the refrigerant supply chain, component suppliers, DTI, local government as well as articles in newsletters, newspapers, trade magazines, radios, and workshops will be carried out by the PMU. This program will inform service shops

of the need to phase out CFCs, the intention of DENR/POD to implement the restriction of CFC sales to only those who have been trained on proper handling of CFCs, and provide information about the authorized training centers and the availability of financial assistance to support the procurement of basic tools for proper maintenance of non-CFC and CFC-12 refrigeration and MAC systems.

To be qualified for financial assistance, service shops must have at least one of their technicians trained and certified at one of the training centers authorized by TESDA. Training centers will provide a list of certified technicians to DTI. DTI will include names of certified technicians and service shops into its database. Financial assistance should only be given to certified technicians and accredited enterprises.

12.3. Full Grant Financing for Technical Assistance and Capacity Building Components

This financing modality will be applied to technical assistance and capacity building components, such as any train-the-trainer programs, technical capacity building for vehicle inspection stations and other activities.

12.4. Cash flow for the National CFC Phaseout

Table 12-1

Description	Total Request (US$)	2002*	2003	2004	2005	2006	2007	2008	2009
Technical assistance Projects – aerosols – MDIs	 24,000 49,940	 12,000 24,970	 12,000 24,970						
Investment and technical assistance projects – foam	3,545,169	1,772,585	1,772,584						
Refrigeration commercial manufacturing	245,489	122,744	122,745						
Sub-total Manufacturing	**3,864,598**	**1,932,299**	**1,932,299**	**0**	**0**	**0**	**0**	**0**	**0**

*Denotes the year funding is received.

Description Service Sector + PMU	Total Request (US$)	2002*	2003	2004	2005	2006	2007	2008	2009
Train-the-trainer – ref.	555,940	277,970	277,970						
Financial subsidy for purchasing refrigeration servicing equipment	2,738,273	547,655	1,095,309	821,482	273,827				
MAC inspection requirement	214,500		214,500						
Train-the-trainer – MAC	618,200	309,100	309,100						
Financial subsidy for purchasing MAC servicing equipment	3,477,172	695,434	1,390,869	1,043,152	347,717				
Financial subsidy for purchasing MAC R&R machines	298,629		101,406	85,437	65,475	46,311			
Technical assistance to initiate infrastructure to reclaim CFCs	22,000	22,000							
Costs to initiate infrastructure to reclaim CFCs	232,267		232,267						
Subtotal Service Sector	**8,156,981**	**1,852,159**	**3,621,421**	**1,950,071**	**687,019**	**46,311**	**0**	**0**	**0**
PMU									
Project Implementation and Monitoring Unit	1,375,000	275,000	240,000	220,000	220,000	220,000	100,000	100,000	
Totals	**13,396,579**	**4,059,458**	**5,793,720**	**2,170,071**	**907,019**	**266,311**	**100,000**	**100,000**	**0**

*Denotes the year funding is received.

12.5. Financial Plan -- Key Project Implementation Milestones

Table 12-2. Key Project Implementation Milestones

Milestone	Imports (ODP MT)	Performance Target	Amount (US$)
1st Tranche (Nov. 2002)	2,049	National CFC Phaseout Plan approved by ExCom	4,059,458
2nd Tranche (2003)	1,960	PMU established, import control training; Local aerosol expert has been contracted and technical assistance project to aerosol firms is underway; Development of the MDI phaseout strategy has commenced and all key agencies are engaged; Announcement of the NCPP and phaseout schedule/import quota for CFCs from 2003 – 2010; Criteria and procedures for seeking financial support for investment projects completed; Investment project funds are distributed to eligible enterprises; Train the trainers finalized; Criteria for subsidies to the service sector established and announced; and Entering into force of accreditation 1/2005 announced.	5,793,720
3rd Tranche (2004)	1,810	Equipment testing and trials are underway; All conversions set out in compliance schedules and scheduled for completion 2004; Technical assistance has been provided to all identified CFC-based aerosol manufacturers and remediation/conversion plans are being implemented; Announcement of the Land Transportation Department of its MAC inspection requirement; and MDI strategy and workshops have been implemented.	2,170,071
4th Tranche (2005)	1,509	All manufacturing sector uses (aerosol and foams) of Annex 1 Group I chemicals has been terminated; Government has reassessed availability of alternatives with a view to banning CFC-based MDIs; Accreditation system enters into force. Prohibited to sell refrigerants to non-accredited entities as of 1 Jan 2005; System for reclamation of used refrigerants is in operation; and All CFC phaseout activities in manufacturing sectors completed.	907,019
5th Tranche (2006)	1,360	Annual MAC inspection requirement is operationalized; nad Annual consumption does not exceed the amounts set out for this year in the phaseout plan (Table 11-1).	266,311
6th Tranche (2007)	453	Database of trained technicians in the MAC sector is functional; and Annual consumption does not exceed the amounts set out for this year in the phaseout plan (Table 11-1).	100,000
7th Tranche (2008)	400	CFC import in the previous year is consistent with the import quota set out in Table 11-1.	100,000
8th Tranche (2009)	300	CFC import in the previous year is consistent with the import quota.	Zero
9th Tranche (2010)	0	CFC import in the previous year is consistent with the import quota.	Zero

CHAPTER 13

13. Rationale for the Selection of Alternative Technology

13.1. The Aerosol Sector

The remaining CFC-based aerosol consumption in the Philippines is about 2.6 MT of CFC-12 annually via a potentially large number of small enterprises that manufacture a variety of custom-made products, the largest being nine enterprises that produce tear gas canisters. Since these producers are mostly 1-2 person SMEs and are operating largely in the "informal sector," efforts will be made to encourage them to have their products filled by one of the larger producers that have already converted.

The following alternatives (with the supporting rationale) will be considered under this plan for those small enterprises wishing to continue the filling operation themselves:

Hydrocarbon aerosol propellants have been the principal alternatives to CFC-12 and CFC-11/12 blends employed worldwide. However, they are not without their dangers and require special equipment and precaution. They were accepted by the 2001 UNEP Technical Options Report titled "Aerosols Sterilants and Miscellaneous Uses and Carbon Tetrachloride." Currently, they are the acceptable alternatives for substituting CFCs as aerosol propellants. Aerosol grade hydrocarbons, and LPG that can be cleaned with molecular sieves for use with most products, both appear to be available in the Philippines.

Di-methyl ether (DME) is also a liquefied gas propellant. The advantages of DME include high solvency and ease of reformulation to water-based products. Environmental, health, and safety disadvantages include its flammability, which requires the retrofit or redesign of filling lines and storage facilities and the fact that it is a volatile organic compound (VOC) as are hydrocarbons. DME corrodes tinplate and aluminum cans if water is also present and therefore requires the addition of special corrosion inhibitors. In addition, DME may dissolve can linings. The use of DME as a propellant requires the use of butyl rubber or neoprene valve gaskets.

While DME propellant formulations may present a lower potential for fire hazards to workers and fire fighters than hydrocarbon formulations, the flammability of the total aerosol product must be considered. Therefore, the same fire safety and explosion prevention precautions should be taken in DME filling and storing operations as with hydrocarbon aerosol propellants. In addition, anyone choosing this option will require retrofitting or redesign of filling lines and storage facilities.

In conclusion, DME is a more expensive option than hydrocarbons and should only be employed where special conditions warrant its use. Conversion to hydrocarbons from CFC-12 may produce incremental operating savings. DME is more expensive with less incremental operating savings.

13.2. The Foam Sector

13.2.1. Selecting Alternative Chemicals and Technologies

The selection of alternative technologies must take into consideration the following points or respond to the following questions in a positive manner:

- Is it a proven and reasonably mature technology?
- Can there be a cost-effective conversion?
- Local availability of substitute, at acceptable pricing?
- Support from the local systems suppliers?
- Impact on critical properties to be maintained in the end product; and,
- Meeting established standards on environment and safety.

What follows is a discussion of the various chemicals in the context of the above considerations.

HCFC-141b has an ODP of 0.11. Its application is proven, mature, and relatively cost-effective and systems that fit the enterprises applications are locally available. HCFC-141b can, however, be destabilizing in higher concentrations, being a strong solvent, which would lead to the need to increase the foam density. Being an interim option, its application would only be recommended if permanent options do not provide acceptable solutions.

HCFC-22 has an ODP of 0.05 and is a gas under ambient conditions. It is not offered in the Philippines as a pre-mixed system and will require an on-site pre-mixer. It is not suitable for spray foam/slabstock applications. Its insulation value is somewhat less than that of HCFC-141b.

HCFC-141b/HCFC-22 blends can reduce the solvent effect of HCFC-141b alone and therefore allow lower densities while maintaining acceptable insulation values. The blends are, however, not available in the Philippines or neighboring countries. On-site blending would significantly increase the one-time project costs. In addition, the technology is not proven for spray foam applications. Being an interim option, the same restrictions as for HCFC-141b would apply.

Cyclopentane meets all selection criteria, except that of local availability. The use of hydrocarbons is a preferred solution when feasible from a safety and cost effectiveness standpoint. The relatively high investments for safety costs tend to limit pentane use to relatively large CFC users. In addition, the use of pentane is limited to those enterprises whose facilities can be adapted to meet safety requirements and can be relied on to maintain safe operations. While it may be applicable for slabstock operations, albeit connected with high investments and density limitations, it cannot be used for (on-site) spray foam applications, where ever-changing ambient conditions preclude conditions necessary for achieving the required safety measures.

Water-based systems are an alternative in cases where pentane is not feasible due to safety concerns, cost efficiency or availability. Water-based systems are, however, more expensive (up to 50 percent) than other CFC-free technologies due to reductions in insulation value (requiring more thickness) and lower cell stability (requiring higher densities). They are also currently not available in the country. Water-based formulations tend to be most applicable in relatively less critical applications, such as in-situ foams and thermoware. In spray foam applications, while in principle feasible, it is reported that the current technology does not allow for overhead spraying and is therefore limited. For box foam, the technology is not applicable as it would lead to an unacceptably high increase in the reaction temperature, leading to severe scorching and even spontaneous combustion.

Liquid HFCs do not meet the requirements on maturity and availability. However, trials in other countries show that systems based on these permanent options would be feasible in spray foam as well as slabstock applications.

HFC-134a is a gas under ambient conditions. It is not available in the Philippines as a pre-mixed system and would therefore require an on-site pre-mixer. It is not suitable for spray foam applications. It is also less energy efficient, and expensive compared to most other technologies.

13.2.2. Rigid PU Foam

The presently available ODS phaseout technologies for rigid polyurethane insulating foams are set out in Table 13-1.

Table 13-1. Alternative Technologies for the Manufacture of Rigid PU Foam

Classification	Liquid Technology	Gas Technology
Low OPD technologies (interim solution)	HCFC-141b, HCFC-141b/22	HCFC-22, HCFC-142b HCFC-22/142b
Non-ODS technologies (permanent solutions)	Cyclopentane, water, HFC-365, HFC-245fa	HFC-134a

The advantages and disadvantages were fully discussed under paragraph 7.2.1 above.

13.2.3. Flexible PU Foam (Slabstock)

The following technologies have been considered for the flexible polyurethane foam conversion:

The use of methylene chloride (MeCl) has been the standard replacement technology for the use of CFCs in flexible PU slabstock and box foam for a long time. Its use has been limited only by regulatory restrictions based on toxicity considerations and processing problems when used in large amounts.

Recently, more regulatory restrictions have emerged on the emissions of MeCl as well as on allowable workplace concentrations, leading to active searches for replacements. In slabstock, the emergence of liquid carbon dioxide (LCD) is quickly replacing any residual CFC use as well as MC in many developing countries. This technology does not

yet apply to box foam, where the recent introduction of low index/additive (LIA) technology shows some promise for, at least a partial, replacement of CFCs/MC.

Enterprises will be informed by the sector expert of any other available technical options. If MC is selected as an alternative technology, enterprises will be required to implement the necessary safety measures to ensure occupational health safety of workers.

13.2.4. Integral Skin Foams

The following technologies have been considered for integral skin foam conversion:

Table 13-2. Integral Skin Foam Technologies

Classification	Technology
Low ODP technologies (interim solutions)	HCFC-141b, HCFC-22
ODS-free technologies (permanent solutions)	Pentane, all water blown, HFC-134a, HFC-245fa

The selection of the alternative technology would be governed by the same considerations as outlined in paragraph 7.2.1.

HCFC-22 and HCFC-141b are interim solutions, and as such are regarded as intermediate steps to a final solution. Where necessary, companies may use HCFC-141b as an interim since it is commercially available and reasonably priced.

In the permanent solutions category, pentane is a technologically feasible alternative, but would require extensive and costly safety modifications to implement. The use of pentane, in this case, would be prohibitive from a safety cost standpoint. Gaseous HFCs are used in the United States extensively for shoe soles and steering wheels. Water-blown foams are a more attractive option than systems employing either HCFCs or HFCs, even though water-blown is more costly than CFC-11 blown foams. In addition, carbon dioxide, the resulting blowing agent from water-blown technology, has no ODP, making water-blown the most favorable final solution.

It should be noted that in some individual cases, MC has been utilized as an effective solution, but due to processing concerns, it cannot be seen as an overall permanent solution.

13.3. The Refrigeration and Air-Conditioning Service Sector

New equipment in these sectors has, since 1995 to 1998, been supplied with alternative refrigerants such as HCFC, HFC, ammonia or hydrocarbons. The preferred strategy is to first reduce the emissions from the existing CFC equipment and then to reuse the inventories or stocks of CFCs which become available when equipment is de-commissioned. Replacement or retrofit is primarily recommended in connection with major repairs. In these situations, it is often possible to change to non-ODS refrigerants at a limited cost. HCFC refrigerants can be an option to reduce the impact from existing equipment that cannot be changed to non-ODS in a cost-effective manner. In low cost equipment like domestic appliances HCFC alternatives can often be the only economical option as there are technical issues with replacement with HFC and Hydrocarbons often

pose an unacceptable hazard in old systems not designed with consideration for use with a flammable refrigerant. For larger systems the options become more equipment dependent as compressor types as well as system design will affect the suitability for the alternative refrigerants. HCFC alternatives are frequently the solutions that require least changes to the system as HFC in general requires a replacement of basically all oil in the system and hydrocarbons are suitable as refrigerants only when proper measures can be taken to assure that their flammability will not pose an unacceptable hazard to users or service staff.

13.4. Government's Statement on the use of HCFCs and HFC as an Interim Solution

The Government of the Philippines is fully aware of the ExCom requirements pertaining to the use of HCFC. The Philippines Ozone desk (POD) will review, and monitor closely, the use of HCFC during the implementation of this National CFC Phaseout Plan. The Philippines has a preference for non-ODS substances and will enforce the general policy when and wherever possible.

The Government of the Philippines is well aware of the environmental concerns associated with the use of HFC as reflected in the Kyoto Protocol. However, after due consideration of the technical and economical viability of alternatives, HFC offers the most practical alternatives in applications previously noted. The Government of the Philippines will continue to take into account the global warming impact and all environmental, health and other potential hazards of available alternatives.

Annex I. List of Acronyms

AHAM	Association of Home Appliances Manufacturers
AUV	Asian Utility Vehicles
BIS	Bureau of Import Services
BOC	Bureau of Customs
BOI	Bureau of Investments
BPS	Bureau of Product Standards
CAMPI	Car Manufacturers Association of the Philippines
CCO	Chemical Control Order
CHED	Commission on Higher Education
DAC	Disposable cylinders
DENR	Department of Environment and Natural Resources
DME	Dimethyl ether
DOF	Department of Finance
DOST	Department of Science and Technology
DOTC	Department of Transportation and Communication
DTI	Department of Trade and Industry
IEIRD	Import entry and internal revenue declaration
LCV	Light Commercial Vehicles
LGU	Local Government Units
LTO	Land Transport Office
MACs	Mobile Air Conditioners
MAPHIL	Maintenance Association of the Philippines
MeCl	Methylene Chloride
MLF	Multilateral Fund (Montreal Protocol)
MOA	Memorandum of Agreement
MOU	National Ozone Units
MT	Metric Tons
NEDA	National Economic Development Authority
ODS	Ozone Depleting Substances
ODP	Ozone Depleting Potential
PACC	Philippine Aerosol Container Corporation
PARII	Philippine Association of Refrigerant Importers, Inc**.**
PCL	Priority Chemicals List
PMU	Program Management Unit
POD	Philippines Ozone desk (DENR)
PPA	Philippine Ports Authority
PSVARE	Philippine Society of Ventilating, Air Conditioning and Refrigeration Engineers
RG	Resource Group (with trade representatives)
RMP	Refrigeration Management Plan
RT	Refrigeration Tonnes
SAE	Society of Automotive Engineers.
SEI	Stockholm Environment Institute
SEIFI	Electronic Industry Technical Association

SME	Small and Medium sized Enterprises
SUV	Sport Utility Vehicles
TESDA	Technical Education and Skill Development Authority
TWG	Technical Working Group (with representatives for relevant authorities)
UPCP	Updated Philippine Country Program

Annex II. Revised and Current Line and Staff Composition of POD

Current Philippines ODS Program Institutional Set-up
Undersecretary (USEC) for Environment and Natural Resources Operations (POD Coordinator)
Undersecretary (USEC) for Planning and Policy (POD Co-Coordinator)
EMB Director
Project Manager, POD
Project Evaluation and Monitoring Officer (2)
Information Officer
Administrative Officer
Finance Officer
Project Accountant
Administrative assistants (2) and driver

The Project Manager and subordinate staff (administrative and technical support staff) work on ODS matters on a full-time basis.

Annex III. Philippines Montreal Protocol Technical Working and Resource Groups

Montreal Protocol Inter-Agency Technical Working Group

Department of Environment and Natural Resources (DENR) - Foreign Assisted and Special Program Office (FASPO)
Environment Management Bureau (EMB)
Philippine Ozone Desk (POD)
Bureau of Customs (BOC)
Technical Education and Skills Development Authority (TESDA)
Skills Standards Certification Office (SSCO)
National Institute for Technical Vocational Education and Training
Department of Trade and Industry (DTI)
- Bureau of Trade Regulation and Consumer Protection (BTRCP)
- Bureau of Product Standard (BPS)
- Bureau of Import Services (BIS)
- Board of Investment (BOI)

Department of Interior and Local Government – Local Government Units (LGU)
Land Transportation Office (LTO)
Land Bank of the Philippines
Department of Health – Bureau of Food and Drug
National Economic and Development Authority (NEDA)
- Committee of Trade and Related Matters

Department of Finance
Central Bank of the Philippines
Tariff Commission
Department of Science and Technology – PAGASA
Philippine Ports Authority
Philippine Coast Guard
Department of Foreign Affairs
Commission on Higher Education

The Resources Group

Philippine Association of Refrigerant Importers (PARII)
Other Refrigerant Importers (e.g. DuPont, CIGI, SIG, BOC, etc.)
Philippine Chamber of Commerce and Industry
Philippine Society of Ventilation, Air-conditioning and Refrigeration Engineers (PSVARE)
Maintenance Association of the Philippines (MAPHIL)
Chamber of Cosmetics Industries of the Phils. (CCIP)
Association of Home Appliance Manufacturers (AHAM)
Blenders Association of the Philippines
Hotel Engineers Association of the Philippines
Philippine Association of Supermarket, Inc.
Philippine Hospital Association
Chamber of Automotive Manufacturers of the Phils. Inc. (CAMPI)
AESSEP-Semiconductors Electronics Industry Foundation, Inc. (SEIFI)
Polyol Suppliers
Aerosol can manufacturers (e.g. Aeropack & Phil. Aerosol Container Corporation (PACC))
Foam Manufacturers (i.e. MBA Urethane)
Chiller Manufacturers/Suppliers (Trane & York)
Teargas Manufacturers
MDI Suppliers
Compressor Suppliers

Resource Sub-Group for RMP Accreditation

DENR-EMB-POD
Department of Trade and Industry (DTI)-Bureau of Trade Regulation and Consumer protection (BTRCP)
Department of Trade and Industry (DTI)- Philippine Contractors Accreditation Board (PCAB)
Technical Education and Skill Development Authority (TESDA)
Department of the Interior and Local Government (DILG) - Local Government Units (LGUs)

Resource Sub-Group for RMP Certification

DENR-EMB-POD
Technical Education and Skill Development Authority (TESDA)
Philippines Society of Ventilating, Air-conditioning and refrigeration Engineers (PSVARE)
Department of Trade and Industry (DTI)-Bureau of Trade Regulation and Consumer protection (BTRCP)
Department of Trade and Industry (DTI)- Philippine Contractors Accreditation Board (PCAB)

Department of the Interior and Local Government (DILG) - Local Government Units (LGUs)
Service Shops Organization

Resource Sub-Group for RMP MAC Control

DENR-EMB-POD
Land Transport Office (LTO)
Department of Transport and Communications (DOTC)
National Economic Development Authority (NEDA)

Annex IV. CFC Importers

Company Name
Abomar
Arrow*
Canadian*
DELSA
Elite*
Fedayeen*
Imperial*
Manhattan/Noah/Westchem
Maris*
Mark Davies/Genetron
MIPCO
Shezura*
Thermo
Vines Realty*
Wise

*** No Import Clearances after year 2000**

Annex V. Definitions and Abbreviations from the RMP

Substance Definitions

The substances listed below are often presented with an R before the number instead of the CFC/HCFC/HFC used in this report. This "R" comes from the word Refrigerant and is the standard designation established in the USA and in many countries. Refrigerants are sold under many trade names such as Freon 12 and Genetron 12. The number in a trade name is often, but not always, referring to the refrigerant numbers in the above mentioned standard.

Ozone Depleting Substances (ODS)

CFC	***ChloroFluoro Carbons – commonly used fully halogenated CFCs include:***
CFC-11	Trichlorofluoromethane
CFC-12	Dichlorodifluoromethane
CFC-113	Trichlorotrifluoromethane
CFC-115	Chloropentafluoroethane (This is not used as a pure substance but as 51.2 percent of the mixture known as R-502)
R-502	Mixture of CFC-115/HCFC-22

There are a number of refrigerants used in low volumes for special applications in the refrigeration industry. These are often CFCs or mixtures with CFCs such as:

CFC-114	Dichlorotetrafluoroethane
CFC-500	mixture of CFC-12/HFC-152a (73.8/26.2)
CFC-13	Chlorotrifluoromethane
CFC-13B1	Bromotrifluoromethane
CFC-503	mixture of HFC-23/CFC-13 (40.1/59.9)

HCFC	***HydroChloroFluoro Carbons, the most common being:***
HCFC-22	Chlorodifluoromethane

Non-ODS

HFC	Hydrofluorocarbons
HC	Hydrocarbons
NH_3	Ammonia

Since CFC phaseout in Art. 2 countries, many new mixtures have been developed to replace CFCs in existing applications (e.g., service blends) and in new applications. These mixtures will become more common in new equipment in the Philippines in the next few years. Some of these contain HCFCs and will be phased out. Many are mixtures of HFCs and are likely to be the long-term replacements for CFCs and HCFCs. Of these mixtures, some of the most common are:

HCFC Blends

R-401A and B	Replaces R-12 mixture of R-22/R-152a/R-124
R-402A and B	Replaces R-502 mixture of R-125/R-290/R-22

HFC-134a/R-134a	Replaces R-12
HFC-404A/R-404A	Replaces R-502
HFC-407C/R-407C	Replaces HCFC-22
HFC-507/R-507	Replaces R-502 (very similar to HFC404A)
HFC-410A/R-410A	Replaces HCFC-22 in new equipment

Annex VI. Standard Costs

The following standard costs are applied to the National CFC Phaseout Plan:

Recovery and Recycling Equipment:

• Recovery and recycling machine	US$2,000

MAC and Refrigeration Servicing Equipment for Training Centers:

• Vacuum pump	US$ 800
• Manifold and gauges	US$ 300
• Hoses	US$ 100
• Portable leak detector	US$ 500
• Refrigerant charging cylinder	US$ 800
• Recovery and recycling machine	US$2,000
Total	**US$4,500**

MAC and Refrigeration Servicing Equipment for Servicing Shops:

• Vacuum pump	US$ 800
• Manifold and gauges	US$ 300
• Hoses	US$ 100
• Portable leak detector	US$ 500
• Refrigerant charging cylinder	US$ 800
Total	**US$2,500**

Equipment for Vehicle Inspection Stations and Customs Department

• Refrigerant Identifier	US$1,500

Annex VII. Cash Flow for the National CFC Phaseout Plan - Philippines

Description Manufacturing sector	**Total Request (US$)**	**2002**		**2003**		**2004**		**2005**		**2006**		**2007**		**2008**		**2009**		**2010**	
		WB*	**SWE****	**WB**	**SWE**	**WB**	**SWE**	**WB**	**SWE**	**WB**	**SWE**	**WB**	**SWE**	**WB**	**SWE**	**WB**	**SWE**	**WB**	**SWE**
Investment Projects – Aerosols	24,000	12,000		12,000															
TA for MDIs	49,940	24,970		24,970															
Investment Projects – Foam	3,545,169	1,772,585	0	1,772,584															
Refrigeration Commercial Manufacturing	245,489	122,744		122,745															
Sub total manufacturing	**3,864,598**	**1,932,299**	**0**	**1,932,299**		**0**		**0**		**0**		**0**		**0**		**0**			**0**
Description Service sector + PMU	**Total Request (US$)**	**2002**		**2003**		**2004**		**2005**		**2006**		**2007**		**2008**		**2009**		**2010**	
Train-the-Trainer – Refrig.	555,940		277,970	0	277,970														
Financial Subsidy for Purchasing Refrigeration Servicing Equipment	2,738,273	547,655		1,095,309		821,482		273,827											
LTO MAC Inspection Requirement	214,500			214,500															
Train-the-Trainer – MAC	618,200		309,100		309,100														
Financial Subsidy for Purchasing MAC Servicing Equipment	3,477,172	695,434		1,390,869		1,043,152		347,717											
Financial Subsidy for Purchasing	298,629			101,406		85,437		65,475		46,311									

MAC R&R Machines																			
Technical asssistance to initiate infrastructure to reclaim CFCs	22,000		22,000																
Costs to initiate infrastructure to reclaim CFCs	232,267				232,267														
Subtotal service sector	**8,156,981**	**1,243,089**	**609,070**	**2,802,084**	**819,337**	**1,950,071**	**0**	**687,019**	**0**	**46,311**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
PMU																			
Project Implementation and Monitoring Unit	1,375,000	215,000	60,000	190,000	50,000	180,000	40,000	220,000		220,000		100,000		100,000					
Sub-Total	**13,396,579**	**3,390,388**	**669,070**	**4,924,383**	**869,337**	**2,130,071**	**40,000**	**907,019**	**0**	**266,311**	**0**	**100,000**	**0**	**100,000**	**0**	**0**	**0**	**0**	**0**
Support Cost	**1,150,692**	**296,535**	**57,816**	**435,594**	**76,240**	**184,506**	**2,000**	**72,832**	**0**	**15,168**	**0**	**5,000**	**0**	**5,000**	**0**	**0**	**0**	**0**	**0**
Total	**14,547,271**	**4,413,809**		**6,305,555**		**2,356,577**		**979,851**		**281,479**		**105,000**		**105,000**		**0**		**0**	

*Funding under this category of “WB” is Component I of the Agreement and is the funding which will be channeled from the Fund by the World Bank to the country.
**Funding under this category of “SWE” is bilateral funding from the Government of Sweden and is referred to Component II in the Agreement.

Annex VIII. Government Letter of Endorsement

Republic of the Philippines
Department of Environment and Natural Resources
Visayas Avenue, Diliman, Quezon City
Tel. Nos. (632) 920-4301 * (632) 929-6691 to 93
924-2540 * 928-5582
929-6626 loc. 2012 • 2014

Mr. Steve Gorman
Chief, Montreal Protocol/POPs Unit
Environment Department, The World Bank
1818 H. St. NW, Washington DC 20433
USA

Dear Mr. Gorman:

Subject: ***National CFC Phase Out Project of the Government of the Philippines***

The Government of the Philippines through the Philippine Ozone Desk (POD) of the Environmental Management Bureau - Department of Environment and Natural Resources (EMB-DENR) requests the World Bank to submit the Philippine National CFC Phase Out Plan to the Executive Committee of the Multilateral Fund for the implementation of the Montreal Protocol for consideration at its 38th Meeting.

A. ODS Consumption Data

1. The CY 2001 ODS consumption figure of the project reported in the NCPP has been validated by the Philippine Ozone Desk (POD), as follows.

	CFC-12	CFC-11	R-502	TOTAL
Weight in MT	1,375.3	668.6	4.1	2,051.0
Ozone Depleting Potential (ODP)	1.0	1.0	0.6	
Weight in ODP MT	1,378.9	668.6	2.46	2,049 3

2. The consumption data have been retained in the records of the NOU-POD for reference and/or future verification.

3. The Government has been advised by the POD that the agreement to the project indicates a commitment to ensure that the validated phase-out figures were realized over a period of eight years and yielded a sustained reduction from the current 2001 sector consumption of 2,049.3 ODP tonnes.

B. EMB-DENR's Position

1 The Plan is needed to ensure the Philippines' compliance to the Montreal Protocol. Based on current consumption trends, the country will need to reduce its consumption of 2,049.3 ODP tonnes by at least 537.3 ODP MT during the period 2001 to 2005 to meet the 50% reduction requirement

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equivalent to 1,509 ODP MT. Another 1,056.3 ODP MT between 2005 and the end of 2006 are needed to be phased out to ensure our compliance with 85% reduction target of only 452.7 ODP MT of CFC consumption by 2007. With no additional intervention from the government, the Philippines will not meet the 50% reduction requirement by 2005 much more the subsequent interim phase-out targets by 2007 and 2010. But since our country has not fully recovered from the effect of the Asian financial crisis, financial assistance from the Multilateral Fund (MLF) is very much needed.

2. The EMB-DENR is fully aware of the MLF requirements pertaining to the use of HCFC. The Philippine Ozone Desk (POD) will review, and monitor closely, the use of HCFC during the implementation of this National CFC Phase-out Plan. The Philippines has a preference for non-ODS substances and will enforce the general policy when and wherever possible.

3. Also, the EMB-DENR is well aware of the environmental concerns associated with the use of HFC as reflected in the Kyoto Protocol. However, after due consideration of the technical and economic viability of alternatives, HFC offers the most practical alternatives in applications previously studied. Rest assured that the EMB-DENR will continue to take into account the global warming impact and all environmental, health and other potential hazards of available alternatives like HFC.

4. Finally, the EMB-DENR accedes to commit the Government of the Philippines to religiously follow this plan to completely phase out CFC consumption in the country by year 2010. Consequently, any additional resources needed to phase out CFC consumption, beyond MLF funds, will be provided by the government in partnership with various enterprises using CFC.

May I express our sincerest thanks for the bank's assistance in preparing the Philippine National CFC Phase Out Plan.

Warm regards

Very truly yours,

RAMON J.P. PAJE
Undersecretary for ENR Operations and
Philippine Ozone Desk Coordinator
Telephone: (632) 926-4806
Fax: (632) 926-4706
E-mail: [illegible]@denr.gov.ph
[illegible]

Date: August 15, 2002

Annex IX. OORG Technical Reviews

Refrigeration Sector — OORG Reviewer: Lambert J. Kuijpers

Scope
The plan under review describes the consumption data and the measures to come to a national phase-out of CFCs in Philippines. Only the specific parts related to refrigeration have been analysed. The different parts reviewed are described below in the sequence they are described in the NPP.

The overall impression of the National CFC Phase-out Plan (NCPP) for the Philippines is that it is an adequate description of the CFC consumption in the different sectors, of the measures to reduce consumption, of the replacement strategies and of the major institutional framework behind the measures to be taken.

1. Scope, Objective and Background
No comments regarding these parts.

2. Consumption Data
The figures presented do not raise comments (see Table 2-1), the consumption is described in an adequate manner, and the demand for CFCs in the different sectors seems to be in order. One can calculate the consumption of CFCs not for servicing, and can derive a figure of about 24%, which seems reasonable in comparison to other, similar type, countries (it is a figure, which is higher than expected, nevertheless). Figure 2-1 gives a good overview of the CFC consumption in the different subsectors. Considerations given in section 2.4 do not ask for further comments.

3. Baseline Consumption in Manufacturing and in the Servicing Sector
No comments to the descriptions in 3.2.1, 3.2.2, 3.2.3, 3.3.1 (table 3-8) for manufacturing.

The "Overview" description of the servicing sector is in order. It is clear that the CFC servicing needs are largest in the MAC sector, somewhat lower than 50% of the total consumption (this percentage is even lower than in other similar type countries). The issue of reverse retrofit to CFC-12 is well known and can only be influenced by the price level of CFC-12 versus the alternatives.

In section 4.4.1, the CFC use for servicing in the refrigeration subsectors is given. The amounts derived for servicing in commercial (293 ODP t), domestic (93 ODP t), industrial (10 ODP t), transport refrigeration (10 ODP t), for ships (10 ODP t) and chillers (50-60 ODP t CFC11, 5 ODP t CFC-12) may sometimes be inaccurate but these are the best values possible. The use in industrial, transport and ships may be larger than estimated, especially for ships.

The flushing consumption may be rightly estimated at 100 ODP t per year. Also here it is regulations and training, but particularly the cost price that will influence consumption.

4. National CFC Phase-out Plan
The summaries of measures in the manufacturing and the servicing sector are consistent with the earlier chapters. Tables 6-1 and 6-2 give an overview of savings for CFC-11 and CFC-12.

It is recommended to expand on the calculation method where it concerns (1) the amounts saved per year from CFC-11 chiller retirement (2) the amounts of CFC-11 reclaimed from chillers (because the connection to the current 50-60 ODP t used for servicing per year is not clear), as well as on (3) the CFC-12 amount determination from MAC and stationary equipment retirement, as well as the impact of good practice. Some of the amounts must have been fitted to each other to reach the total of 2049 ODP t in the year 2010.

5. Action Plan Manufacturing Sector

Phase-out in the commercial refrigeration sector is calculated on the basis of the threshold value. The argument is that the historic value has been larger and that therefore the threshold is applied. It is difficult to judge whether this argument is a valid one. But there is no more information available.

6. Action Plan Service Sector
The same comments apply to Table 8-1 as mentioned under (4). Graph 1 gives a good impression of the effect of the phase-out in the different sub-sectors. The following applies to stationary refrigeration:
8.5.1 Commercial Refrigeration: retrofitting is mentioned as the solution for phase-out. It will require that CFCs are not available or very expensive.
8.5.2 Domestic Refrigeration: retrofitting is mentioned as the solution. It would imply retrofitting to probably HCFC-based blends (only to hydrocarbons if safety standards can be kept which is unlikely for old appliances), not to HFCs (replace "commercial" in this paragraph).
8.5.3 Cold Storage: retrofitting is the solution here. This is a solution that is common (replace "commercial" in this paragraph).
8.5.4 Transport: No comments.
8.5.5 Chillers: Replacement is indeed the only option, but this seems not acceptable at this stage. It will, however, have an impact on the CFC demand in the phase-out process.

7. Technical Assistance
No comments to the contents. The costs for the train the trainer program seem acceptable. Whether the Code of Practice should be different than others and needs US$19,000 is arbitrary. The partial grant plan (revolving fund) for the service toolkits is acceptable. The costs for the reclaim infrastructure are acceptable. The investments here are considered acceptable too (via the revolving fund). It should be emphasised that this assumes no large investments in recovery units. A clear explanation in the project proposal (although it is mentioned under 8.8, page 64) would be desirable.

8. Infrastructure
In 9.1 possible legal measures are given. However, which measures and regulations will be implemented is not always clear (as mentioned in the proposal). There will be a number of bans and there will be import quota (see also graph 11-1). However, can this ensure that availability really decreases sufficiently and that there will be consequences for the cost price of CFCs? As far as can be taken from chapter 11, announcements to be made by the Government should cause awareness of the availability problem.

The issues "capacity" and "monitoring" will not be commented to here.

9. Miscellaneous
No comments to the timetables and the key project implementation milestones given.

No comments to the cash flow scheme given.

No comments to Annex VI and Annex VII. No comments where it concerns the statements on alternative technology, although this could have been more elaborate, e.g. which alternatives to use in which types of retrofits.

10. Conclusion
The NCPP for the Philippines **is supported** where it concerns the strategies, and the technical approaches **in the refrigeration sector only, provided**
- the figures on the reduction of refrigerant use over time in chillers as well as in stationary equipment are elaborated upon (tables 6-1, 6-2) etc.;
- the text in 8.5 is checked where it concerns the retrofits (and the definition "commercial" refrigeration);
- the issue of not applying recovery machines (except maybe some operations on-site) is expanded;
- the text in 13.3 and 13.4 is expanded where it concerns the use of non-CFC refrigerants (which types, which procedures) in retrofits.

Eindhoven, 02 08 13
Kuijpers, LJM

Foam Sector OORG Reviewer: Mike Jeffs

GENERAL

The plan covers the phase-out of a total of 2017.6 ODP tons in the Philippines. Of this there was, in 2001, 668.6 tons of CFC 11 in the manufacturing sector with 467.77 tons in direct "foam" manufacture supplemented by 9.1 tonnes in foam in the refrigeration sector and 3.0 tons in the refrigerated truck sector. The amount eligible for supporting under the MLF is less than this because some enterprises started operations after the cut-off date of June 1995.

The elimination of the use of CFCs in the manufacturing sector and, in particular, in the foam sector is critically important in achieving the reduction of 50% as required by the Montreal Protocol. The elimination of the use of ODS in the servicing sector will take longer than in the manufacturing sector.

The enterprises using CFC 11 to manufacture foam are divided into medium and small enterprises which have been identified (Tables 3-3 and 3-4) and very small manufacturers who have not been individually identified. The enterprises in the refrigeration and truck sector have been identified. The enterprises using over 10 tons of CFC 11 will be covered by individual projects (Section 7.3.2). Those in the 1 to 10 ton consumption range will be covered by an Umbrella project. There is no apparent plan, except reference to the phase-out plan (section 3.1.3) to deal with the several enterprises who each consume less than I ton each. Several of these have been identified in Table 3-4.

It is noted that all manufacturers of domestic refrigerators and freezers in the Philippines have already eliminated CFCs from the production of insulating foams in projects funded by the MLF.

The foam sub-sectors are:

Flexible slabstock – six medium-sized enterprises make flexible slabstock foams. It is not indicated whether this is continuously produced or box foam. This should be clearly identified as this affects the choice of replacement technology. In section 13.2.3 there is reference to both slabstock and to box foams.

Flexible moulded/integral skin foams – three of the above enterprises also make "moulded foam" Table 3-3. In Table 7.3 these are indicated to be making "integral skin" foams. There are other references to integral skin foams and this should be clarified. The application of the integral skin foam should also be determined, whether furniture or automotive applications, since this can affect the choice of replacement technology.

Rigid foams – several enterprises are listed but there is no indication of the types of foams which they manufacture. These may well affect the choice of replacement technology. Presumably this aspect will be addressed in the individual phase-out projects or in the umbrella projects for those consuming less than 10 tons of CFC 11.

"Refrigerated counter tops" and four door freezers – made by LowTemp Corporation – this is commercial refrigeration equipment. Are the former items commercial display refrigerators used in stores? The "counter top" description is strange and unknown to the reviewer.

Refrigerated truck – renovation of foam for truck refurbishment. There should be clarification of the type of technology used. This could be by a spray foam technique or by injection to make panels.

In section 3.1.3 it is stated that CFCs are used in the Philippines for polystyrene/polyethylene foams in addition to the foam types mentioned above. Yet there is no further reference to polystyrene/polyethylene foams. These foams are not normal made by very small enterprises such as those small manufacturers which have not yet been identified. This item should be clarified – are they from enterprises whose conversion to non-ODS technology has already been made? In addition, the first paragraph of this section refers to the two predominant types of foams which have been "highlighted" – this has not been done.

Table 2-2 and Figure 2-1 do not agree on amounts in foam manufacture – 467.77 and 496.47 respectively. Further, the analysis in section 3.1.3 gives another total of 476.87 tons.

TECHNOLOGY

The technology selection criteria in section 13.2.1 are fully supported.

Addressing each sector in turn:

Flexible slabstock foam – on the basis that this is continuously produced foam the basic choices are between methylene chloride and LCD technologies as indicated in Section 13.2.3. The size of the enterprise will have a strong bearing on which technology is cost effective. Table 3-3 indicated that LCD technology may be cost effective for both Style Foam and for United Foam. LCD technology should be applied wherever possible, in preference to methylene chloride, for health and safety reasons. LCD technology is now well proven. This is not suitable for box foams and the clarification of the production technique, referred to above, is important.

Integral skin foam – if the application is furniture mouldings then the preferred replacement technology is water-based. This technology is well proven. For this application the use of an ODS technology is not supported. Neither is the use of HCFCs needed for automotive mouldings. The enterprises are too small to consider pentane technology.

Rigid foams – it is presumed that all the foams are for insulating applications. The type of production method is not specified, as mentioned above. However, given the sizes of the enterprises (Table 3-4) it is likely that HCFC 141b technology would be a first choice since it is cost effective for small enterprises and requires only minor modifications (depending on the baseline equipment). HCFC 141b technology is very well proven and widely used. It gives insulation levels only marginally worse that obtained with CFC 11. Once used, it is likely that conversion to HFC technology at a later date can be effected with no capital requirements. The enterprises Dongshin, Michigan Enterprise and Chong Hwa Ind. May be suitable for conversion to pentane depending on the type of products produced. This replacement would be feasible, for example, for panel production but is not suitable for spray foams. For most applications, except for domestic refrigerators and freezers, n-pentane is preferred to cyclopentane.

Commercial refrigeration equipment – given the ODS consumption of the enterprise it is recommended that the preferred alternative technology is HCFC 141b

Refrigerated trucks – the most cost effective choice for this application at the levels of CFC 11 used. It is well proven in the rigid foam sector (see above). Section 3.3.1 refers to the hand pouring of foam for this application. This can be used for CFC 11 but is not supported for HCFC 141b. Consideration must be given to the replacement of the hand technology by a machine mixing technique with appropriate financial input by the enterprise. Another point to is that the CFC 11 consumption is very high for the refurbishment of only six trucks per year. At normal use in the formulation and normal foam densities there is enough CFC11 for the manufacture of 150 m^3 for each truck. This is equivalent to about 2,000 m^2 of foam panels per truck. One explanation is that there could be very high losses of CFC 11 to the atmosphere during the preparation of the foam because of the hand-mixing method used.

SAFETY AND ENVIRONMENTAL ISSUES

In section 13.4 the Philippine Government policy on the use of HCFCs and HFCs is clearly stated. The transitional status of HCFC will require its phase-out by 2040.

The use of pentane is preferred to an ODS replacement but it is not suitable for spray applications and its use requires stringent safety measures. If this technology is applied then appropriate equipment, safety audits and training are required. There could be concern that the small enterprises under consideration would not have sufficient in-house management resource for operating with pentane. Some “institutional strengthening” would be necessary.
The safe working with methylene chloride is also a concern and, if it is applied, there has to be provision for adequate ventilation and thorough training.

PROJECT COSTS

At this stage there can be little detailed comments on projects costs as they refer to the foam manufacturing enterprises. There is a need to establish detailed baseline equipment information in each case. Data from previous projects has been used to estimate foam costs but these may not be representative of the costs required for the small enterprises involved in the Country Programme. Excom Decisions, including 31/44 foam densities, should be applied in the individual and umbrella projects.

IMPLEMENTATION TIMEFRAME

This is indicated in Chapter 11. Table 11-2 gives the schedule for foams and requires completion in Q3 2004. This is challenging and the individual and umbrella projects must be developed without delay.

RECOMMENDATION

The plan is supported. Guidance is given on the detailed information required for the individual and umbrella projects.

M Jeffs

11/08/2002

MAC Sector OORG Reviewer: James Baker

General comments

The tools proposed (R&R, service equipment, training) are all consistent with established means of reducing CFC-12 emissions in the MAC sector.

The unit costs of the tools proposed are reasonable and similar to other RMP's

The financial subsidy for R&R equipment appears grossly insufficient to equip a significant portion of service shops to have a meaningful effect on eliminating the venting of refrigerant during service. The financial subsidy for service equipment appears to be designed to cover most service shops (2822 kits for 2931 shops), but R&R coverage is only about 10% (288 units for 2931 shops). 90% of the service shops would face the need to transport the vehicle to a facility with R&R capability prior to working on the system - with no incentive to do so except, perhaps, for a regulation that is likely not to be well enforced. Often, the system must be discharged, then charged with the correct amount to diagnose the problem and then discharged again to repair the problem before recharging the final time. Such would involve multiple movements of the vehicle to and from an R&R facility to ultimately provide completed repair. Most shops would still likely either service by 'gas and go' or pretend that the vehicle came in empty of charge and then vent the refrigerant prior to attempting to repair the system. Without the ability to recover refrigerant on site, the cost of full service could be prohibitively high.

A basic premise of this effort is to change established behavior via new enablers. The predominant causes of emissions are leaky systems and venting at service. Without an enforced requirement that eliminates the simple, low cost, gas and go service where refrigerant is simply added to a leaky system, likely no service shop will be any more able to compete after the program is implemented than is the case today. Without means of prohibiting (or at least minimizing) recharge without repair, the preferred service scenario referenced on page 26, paragraphs 2 and 3 will likely continue to legally prevail and the new equipment will not be sufficiently utilized to realize the goals of the RMP.

Given the current and historical absence of actual repairs being made during service, one wonders if an appropriate service parts infrastructure exists to support fixing leaks, should that become a widespread practice?

Relative to Table 4-1, it appears that table is provided to rationalize the consumption of CFC-12 and the vehicles using it, which is OK. But, the column titled 'average leak/year' could be problematic. On the surface it implies that all emissions are from direct leakage from the vehicle itself and no emissions result from venting at service or scrap. Perhaps a better title might be something like 'average emissions/year', which would represent the average annual refrigerant supply needed to service the average vehicle.

Relative to Page 65, paragraph 3, line 2, "reduce charges in existing equipment" - it would be possible to do this in 'new' equipment, but existing equipment requires a specific refrigerant charge to function properly. Thus, it is not advisable to reduce the charge below the manufacturer's recommendation.

Recommendations

The ability to recover and recycle refrigerant effectively is at least as important to emissions reduction as the ability to effectively repair leaky systems. Given this, my immediate recommendations are to address wider coverage of R&R equipment and find means (regulatory or persuasive) to induce customers to seek service at shops that will repair their systems via environmentally friendly service methods.

Given that MACS CFC-12 emissions represent 46.4% of total ODP emissions but only 34% of targeted funding, perhaps more money could be allocated to R&R equipment.

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Comments

7.2.2 "Solving the Aerosol Problem:" This section appears to be the crux of all commentaries on the aerosol section and it has very little real substance. The first sentence states "CFC-12 use in aerosols can be replaced with hydrocarbon as a propellant but this may not be a technically or economically viable solution for many, if not most, of the aerosol producers in the "micro" industrial sector." That is fine. But some reference to the extremely small size of remaining aerosol producers could proceed it, and some commentary on "solutions" could follow it. Some suggested text might be:

"Given the extremely small size of the remaining aerosol producers – 2.6 mt. for nine enterprises – it is not possible to postulate a solution using MLF funding. CFC-12 is normally replaced with hydrocarbons as a propellant in aerosols, but this may not be a technically or economically viable solution for many, if not most, of the aerosol producers in the "micro" industrial sector. Severe safety requirements exist for the usage of these flammable and explosive gases. An experienced international consultant will be employed to counsel these nine companies. The first recommendation will undoubtedly be to have there products filled by other larger contract fillers, but the expert will also be prepared – in case the enterprise does not accept this - to discuss safety matters and the use of alternate propellants, DME, HFC 152a, HFC 134a, CO_2, compressed air, etc.

The remaining commentaries in the submitted text, which deal with regulatory matters, could then continue this section.

7.2.2 The final part of this section refers to import control, not normally cost effective in aerosols. 99+% of all aerosols imported and exported worldwide today are non-ODS propelled, so one must control and register an enormous number of products and may never encounter one that uses ODS.

7.2.3 This section seems to presume that the conversion difficulties in aerosols are due to the formulations changes. This sometimes occurs, but the majority of the problems encountered have been those of manufacturing aerosols *safely* using flammable propellants.

Both DME and the hydrocarbons are flammable at low concentrations. They are odorless in vapor phase when mixed with air. They are heavier than air and thus settle into low places. Almost any spark or flames will ignite them. In an open area, this produces a damaging fireball, in an enclosed area this converts into an explosion.

The so called "fire triangle" is well known:

Oxygen

Fuel **Ignition Source**

Since oxygen is always present in the air, we can do nothing about this. Safe filling of LPG always requires double safety controls - ventilation to avoid a dangerous concentration of LPG (the fuel), and a systematic control to avoid all sources of ignition.

In a typical aerosol plant, all attempts are made to avoid the escape of LPG. Nonetheless, pipes and hoses will break, even if they are perfectly maintained; and there are always some "leakers," cans that have defective valves or where the gassing adapter of the filling machine has damaged the valve.

Also, the gassing operation, during which the propellant is injected into the can, always releases a small quantity of gas. Because of these factors, since hydrocarbon *may be* present, it is extremely important that no source of ignition exists during the time that it takes for the gas to dissipate. In many cases, it is also necessary to use artificial ventilation to assist in the dissipation of the propellant leaked, although in the case of smaller fillers, open air filling may permit the wind to take care of propellant dissipation.

Thus the safety of the plant depends on completely avoiding flame or sparks on one hand, and at the same time under no conceivable circumstances allowing the concentration of hydrocarbon to approach its lower explosive limit (LEL).

Thus it is extremely important that the technical expert employed is capable of dealing with all matters relating to plant safety, and at the same time, capable of dealing with formulations and the various different alternate propellants.

7.2.4 New formulation MDIs – without CFCs - normally are based on HFC 134a, and require a complete equipment change to be filled. That is unimportant here as the Philippines imports all of their MDIs.

What isn't mentioned is that there are alternate dispensing devices for depositing these medications in the lungs, the principal being DPIs or "dry powdered inhalers."

Further, in all cases of substitution, *patient tolerance* of the substitutes is extremely important. Any phaseout strategy that ignores this factor is doomed to failure. The primary responsibility concerning this lies with the doctor – patient relationship, as supported by the pharmaceutical companies that are actively importing MDIs in the Philippines.

Asthma is a serious illness, and in extreme cases, is life threatening. Patient tolerance of the substitutes is absolutely critical. Any strategy that tries to *limit imports* or *regulate phaseout* without considering patient tolerance will not work and could be very dangerous. This factor is not directly mentioned in the NCPP.

While the amount budgeted for technical assistance in the MDI sub-sector may be adequate, considering the problems involved with patient tolerance of the substitutes, the total amount may be insufficient. If possible, an increase in local expenses would be beneficial. If this is not possible, MDI and other dosis means suppliers will of necessity have to play an even more important role here.

Comments on Philippines [CISA2C6]:

12.1 page # 86: The comment "savings can be used for assisting any late identified enterprises that may have been established after July 1995" seems to break the rules, has
The Philippines obtained authorization to fund projects – or to use MLF money - for companies established after July 1995? In other areas of the NCPP there is a clear differentiation between *eligible* and *non-eligible* enterprises. Thus this reference may be a typo, and if that is so, this phrase should be eliminated.

13.1 page #91:

[a] You might want to site a more recent copy of the TOC report "Aerosols Sterilants and Miscellaneous Uses and Carbon Tetrachloride." The same indication that hydrocarbons are the principal replacement appears in the 2001 version of the UNEP Technical Options Report titled "Aerosols Sterilants and Miscellaneous Uses and Carbon Tetrachloride."

[b] Since It is mentioned that DME is a VOC, it should probably also be mentioned that hydrocarbons are also VOCs.

[c] DME is a more expensive option than hydrocarbons that should only be employed where special circumstances require it. Conversion to hydrocarbons from CFC 12 may produce incremental operating savings ("IOS"). DME is much more costly, and therefore there are less IOSs, and grants become larger - often for no reason.

The National CFC Phaseout Proposal (NCPP):

Most commentaries that pertain have already been made. Please consider the recommendation for increased funding for local expenses for MDI conversion – elucidated in the commentaries on section 7.2.4 above. Referring specifically to aerosol sector participation, this appears to be the only budgetary problem.

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