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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：伊朗

本文件载有基金秘书处关于下列项目提案的评论和建议：

制冷

• 在 Ali Felez Co.的商用制冷设备生产中用 HCFC-141b 技术淘汰 CFC-11，用 HFC-134a 技术淘汰 CFC-12	开发计划署
• 在 Nik Boroudati & Hararati Co.的商用和工业制冷设备生产中用 HCFC-141b 技术淘汰 CFC-11，用 HFC-134a 技术淘汰 CFC-12	开发计划署
• 在 Nik Sard Co.的商用制冷设备生产中用 HCFC-141b 技术淘汰 CFC-11，用 HFC-134a 技术淘汰 CFC-12	开发计划署
• 在 Ouj Bouran Co.的商用制冷设备和硬质泡沫塑料生产中用 HCFC-141b 技术淘汰 CFC-11，用 HFC-134a 技术淘汰 CFC-12	开发计划署
• 在两家企业(Sanaye Boroudati Pajang and Yakhchalsazi Azizian)的商用制冷设备生产中用 HCFC-141b 技术淘汰 CFC-11，用 HFC-134a 技术淘汰 CFC-12	开发计划署
• 在第一个伊朗商用制冷设备制造厂家中等规模总体项目分组的商用制冷设备生产中用 HCFC-141b 技术淘汰 CFC-11，用 HFC-134a 技术淘汰 CFC-12	工发组织

• 在 Niksun Sanaat Co.的家用冰箱生产中用 HCFC-141b 技术淘汰 CFC-11，用 HFC-134a 技术淘汰 CFC-12	开发计划署
• 在第一个伊朗家用制冷设备制造厂家中等规模总体项目分组的家用制冷设备生产中用 HCFC-141b 技术淘汰 CFC-11，用 HFC-134a 技术淘汰 CFC-12	工发组织
• 在第二个伊朗家用和商用制冷设备制造厂家中等规模总体项目分组的家用和商用制冷设备生产中用 HCFC-141b 技术淘汰 CFC-11，用 HFC-134a 技术淘汰 CFC-12	工发组织
• 制冷设备(生产)行业 淘汰 CFC 计划	开发计划署
• 制冷维修行业淘汰 ODS 的制冷剂管理计划(包括：进行制冷剂良好管理办法的训练，训练海关官员，回收和再生方案) 第一期	工发组织

项目评价表
伊朗

部门： 制冷 本行业的 ODS 消费量（2001 年）： 2,681.1 ODP 吨
次级行业成本效益阈值： 商用 15.21 美元/公斤

项目名称:

(a) 在 Ali Felez Co.的商用制冷设备生产中用 HCFC-141b 技术淘汰 CFC-11，用 HFC-134a 技术淘汰 CFC-12
(b) 在 Nik Boroudati & Hararati Co.的商用和工业制冷设备生产中用 HCFC-141b 技术淘汰 CFC-11，用 HFC-134a 技术淘汰 CFC-12
(c) 在 Nik Sard Co.的商用制冷设备生产中用 HCFC-141b 技术淘汰 CFC-11，用 HFC-134a 技术淘汰 CFC-12
(d) 在 Ouj Bouran Co.的商用制冷设备和硬质泡沫塑料生产中用 HCFC-141b 技术淘汰 CFC-11，用 HFC-134a 技术淘汰 CFC-12
(e) 在两家企业(Sanaye Boroudati Pajang and Yakhchalsazi Azizian) 的商用制冷设备生产中用 HCFC-141b 技术淘汰 CFC-11，用 HFC-134a 技术淘汰 CFC-12
(f) 在第一个伊朗商用制冷设备制造厂家中等规模总体项目分组的商用制冷设备生产中用 HCFC-141b 技术淘汰 CFC-11，用 HFC-134a 技术淘汰 CFC-12

项目数据	**商用**					
	Ali Felez	**Nik Bouroudati**	**Nik Sard**	**Ouj Bouran**	两家企业	第一个中等规模分组
企业消费量（ODP 吨）	8.62	26.75	15.06	12.79	9.78	53.85
项目影响（ODP 吨）	8.14	25.12	14.35	12.00	9.27	51.60
提议的项目期限（月）	30	30	30	30	30	24
原申请经费数额（美元）	97,726	268,158	186,687	111,747	136,026	741,925
最后项目经费（美元）：						
增支资本费用(a)	109,500	202,000	118,000	115,000	223,000	586,000
酌处资金(b)	10,950	20,200	11,800	11,500	22,300	40,100
增支经营费用(c)	36,499	91,622	67,263	27,375	53,541	115,825
项目费用总额（a＋b＋c）	156,949	313,822	197,063	153,875	298,841	741,925
地方所有权（％）	100%	100%	100%	100%	100%	100%
出口比重（％）	0%	0%	0%	0%	0%	0%
申请经费数额（美元）	97,726	268,158	186,687	111,747	136,026	741,925
成本效益值（美元/公斤）	12.01	10.68	13.01	9.31	14.67	14.38
对应出资是否已经确认？		是	是	是	是	是
国家协调机构	环境局					
执行机构	开发计划署	开发计划署	开发计划署	开发计划署	开发计划署	工发组织
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）						

项目评价表
伊朗

部门： 制冷	本行业的 ODS 消费量（2001 年）：	2,681.1 ODP 吨
次级行业成本效益阈值：	商用	15.21 美元/公斤
	家用	13.76 美元/公斤

项目名称:

(g) 在 Niksun Sanaat Co.的家用冰箱生产中用 HCFC-141b 技术淘汰 CFC-11，用 HFC-134a 技术淘汰 CFC-12
(h) 在第一个伊朗家用制冷设备制造厂家中等规模总体项目分组的家用制冷设备生产中用 HCFC-141b 技术淘汰 CFC-11，用 HFC-134a 技术淘汰 CFC-12
(i) 在第二个伊朗家用和商用制冷设备制造厂家中等规模总体项目分组的家用和商用制冷设备生产中用 HCFC-141b 技术淘汰 CFC-11，用 HFC-134a 技术淘汰 CFC-12
(j) 制冷设备(生产)行业 淘汰计 CFC 计划

项目数据	家用		家用/商用	多种次级行业
	Niksun Sanaat Co.	第一个中等规模分组	第二个中等规模分组	行业淘汰计划
企业消费量（ODP 吨）	16.19	48.95	50.96	389
项目影响（ODP 吨）	15.21	47.05	48.87	372
提议的项目期限（月）	30	24	24	48
原申请经费数额（美元）	161,517	541,745	604,493	2,500,000
最后项目经费（美元）：				
增支资本费用(a)	118,000	419,000	480,000	4,227,000
酌处资金(b)	11,800	30,600	30,700	384,200
增支经营费用(c)	31,717	92,145	93,793	350,236
项目费用总额（a＋b＋c）	161,517	541,745	604,493	4,961,436
地方所有权（%）	100%	100%	100%	100%
出口比重（%）	0%	0%	0%	0%
申请经费数额（美元）	161,517	541,745	604,493	2,500,000
成本效益值（美元/公斤）	10.62	11.51	12.55	13.35
对应出资是否已经确认？	是	是	是	是
国家协调机构	环境局			
执行机构	开发计划署	工发组织	工发组织	开发计划署
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）				

项目评价表
伊朗

部门： 制冷维修（不包括汽车空调机） 本行业的 ODS 消费量（2001 年）： 4750DP 吨

次级行业成本效益阈值： 不适用

项目名称:

(k) 制冷维修行业淘汰 ODS 的制冷剂管理计划(包括：进行制冷剂良好管理办法的训练，训练海关官员，回收和再生方案) 第一期

项目数据	制冷剂管理计划
	制冷剂管理计划
企业消费量（ODP 吨）	475.00
项目影响（ODP 吨）	403.70
提议的项目期限（月）	48
原申请经费数额（美元）	250,000
最后项目经费（美元）：	
增支资本费用(a)	5,729,098
酌处资金(b)	
增支经营费用(c)	
项目费用总额（a＋b＋c）	5,729,098
地方所有权（％）	100%
出口比重（％）	0%
申请经费数额（美元）	250,000
成本效益值（美元/公斤）	14.14
对应出资是否已经确认？	
国家协调机构	环境局
执行机构	工发组织

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

行业背景

CFC (附件 A 一类) 消费和淘汰概况

伊朗根据第 35/57 号选择采用备选办法 1 作为起点，其数量是：	2,511.5 ODP 吨
- 截至第三十八次会议符合资助条件的剩余 CFC 消费量（根据第 35/57 号决定，条件 B）	1,708.1 ODP 吨
- 向第三十八次会议提交经费申请的所有 CFC 项目产生的影响	1,106.9 ODP 吨
- 在核准提交第三十八次会议的项目后符合资助条件的剩余 CFC 消费量上限	601.2 ODP 吨

制冷行业概况

- 上报的 2001 年制冷行业 CFC 消费量*	2,681.1 ODP 吨
- 执行中的制冷项目应该淘汰的 CFC 数量	977.5 ODP 吨
- 向第三十八次会议提交经费申请的制冷项目对剩余的 CFC 消费量产生的影响	1,106.9 ODP 吨

* 以向基金秘书处报告的数据为依据

1. 执行委员会核准了淘汰生产家用冰箱和商用制冷机所使用 2,720.4 ODP 吨 CFC 的 86 个投资项目。已经为执行这些项目拨款约 3,100 万美元。国家方案进度报告中提供的 2001 年 ODS 消费数据为 2,681.08 ODP 吨。已经核准但尚未执行的项目将淘汰的 ODS 数量为 977.5 ODP 吨，因此，该行业的剩余消费量为 1703.6 ODP 吨。

2. 伊朗政府报告 1996 年以来其制冷行业 CFC 的消费量为如下：

年份	1996	1997	1998	1999	2000	2001
ODP 吨	1,070	3,045	2695	1,945	2,632	2,590

3. 开发计划署和工发组织提交了伊朗家用冰箱和商用制冷机行业淘汰 CFC 的 5 个个别项目和 4 个总体项目。此外，开发计划署提交了一个制冷设备(生产)行业淘汰 CFC 的计划，以便涵盖该行业所有剩余的企业。申请资助的总额为 5,350,024 美元，这些项目的总影响是 603.61 ODP 吨。

4. 这些企业在发泡工序中使用低压和高压注入机。它们使用基线真空泵、填料机和泄漏探测器执行与制冷剂有关的工序。

5. 用 HCFC-141b 淘汰 CFC-11 技术作为泡沫塑料发泡剂，用 HFC-134a 淘汰 CFC-12 作为制冷剂，将实现淘汰 CFC-11 和 CFC-12。现有的发泡机将视基线予以更换或改造。所有其余都需要更换或改造工业级别或便携式填料机、真空泵和泄漏探测器，以便可使用 HFC-134a。其他费用包括重新设计、测试、试验和训练等费用。这些企业申请获得增支费用，因为化学品和部件费用较高。

使用 HCFC-141b 的理由

6. 项目文件根据对各企业工序的技术和经济分析，说明了使用 HCFC-141b 的理由。开发计划署和工发组织指出，与这些企业讨论了现有的代用技术以及执行委员会关于使用 HCFC-141b 作为临时代用泡沫塑料发泡剂的有关决定之后，它们选择用 HCFC-141b 作为过渡性技术。

7. 依照执行委员会关于使用 HCFC 的有关决定，已经提交了伊朗政府赞同使用 HCFC-141b 的一份送文函，现随文附上该送文函。

制冷维修行业淘汰 ODS 的制冷剂管理计划(包括：进行制冷剂良好管理办法的训练，训练海关官员，回收和再生方案) 第一期

制冷设备维修行业

8. 2000 年，伊朗维修制冷设备所用的 CFC 总量为 475 吨，其中不包括汽车空调机。制冷剂管理计划指出，由于维修工艺不良，缺乏维修工具，大约 85％的 CFC 消费量逸入大气层。伊朗每年维修的 CFC 制冷设备包括：

(a) 160 万台家用冰箱(占总数 8％)，消费总量为 400 吨(平均每次维修消费 0.25 公斤 CFC);

(b) 80,000 台商用制冷机(占总数 20％);

(c) 1,500 个工业冷库和大型冷库(为该国所有此类冷库)每年重新注入制冷剂两次，估计消费量为 300 吨；据估计，每次维修约有 30％的制冷剂逸出；

(d) 400 辆冷藏卡车每年维修两次， CFC-12 消费总量为 4 吨。

9. 伊朗约有 8,000 个注册的制冷设备维修厂和 2,000 个未正式注册的维修厂。这 10,000 名维修厂雇佣大约 25,000 名熟练技师和非熟练技师。此外，还有 2,000 个汽车空调机维修厂，雇佣 4,000 名技师。

10. 在这些雇员中，估计 5,000 人曾经受过制冷和空调方面的基本训练。其余技师是通过在职训练或职业训练中心提供的短训班掌握技术的。大多数维修厂规模很小，雇佣二至四人。大约 90％的维修厂没有真空泵或泄漏探测器。

11. 目前制冷设备的保养水平普遍很糟糕。维修设备时，实际使用制冷剂的数量是注入设备数量的二至三倍；使用制冷剂进行清洗和冲洗制冷系统的现象屡见不鲜。全国各地修建的冷藏厂状况不良，工业和商业制冷次级行业中尤为如此。保养水平普遍很低，制冷剂泄漏现象很常见。

12. 臭氧机构将制定和执行下列管制措施：

(a) 如果不实现计划的(降低)消费数字，则提高 ODS 的进口关税和税收；

(b) 支持生产和维修企业获得淘汰 ODS 活动所需的许可证；

(c) 对制冷和空调维修厂采用许可证制度，以便加强良好的工作程序；

(d) 利用大众媒体，支持训练和宣传运动，并鼓励不同的公共行政部门就淘汰 ODS 计划开展合作；

(e) 鼓励志愿组织和公民团体参与，支持训练方案。

13. 制冷剂管理计划项目包括下列组成部分：

(a) 制冷行业良好做法训练方案，费用总额为 1,138,608 美元；

(b) 海关官员控制 ODS 和使用 ODS 的设备进口训练方案，费用为 229,200 美元；

(c) 回收和再生方案(包括汽车空调机次级行业)，费用为 4,361.290 美元。

14. 执行制冷剂管理计划将导致淘汰 405 ODS 吨 CFC；通过执行管制措施以及废除使用 CFC 的旧设备，到 2010 年底将淘汰剩余的消费量(75 吨)。制冷剂管理计划项目的成本效益为 14.14 美元/公斤。

15. 制冷剂管理计划项目是通过伊朗臭氧干事签署的正式信件提交的。伊朗承诺在不为制冷剂管理计划申请其他资助的情况下，到 2005 年实现维修次级行业消费量(475 吨)减少至少 50％，到 2007 年减少至少 85％。

秘书处的评论和建议

评论

数据出入

16. 开发计划署和工发组织的提案(不包括制冷剂管理计划)已提交执行委员会第三十七次会议审议。秘书处发现了制冷行业 ODS 消费数据有出入的问题。因此，撤销了所有提案。自此以来，秘书处与开发计划署、工发组织和伊朗伊斯兰共和国政府进行了广泛的讨论，试图解决这个问题。令人遗憾的是，这个问题迄今没有得到解决。这些提案再次提交给第三十八次会议。此外，工发组织提交了伊朗制冷剂管理计划。

17. 关于伊朗伊斯兰共和国制冷行业 CFC 消费数据的讨论始于 2000 年 12 月。曾有十四个家用和商用制冷项目提交给执行委员会第三十二次会议审议。对于伊朗剩余制冷企业的清单、制冷行业 ODS 消费数据的可靠性以及需要有淘汰 ODS 的明确决心的实证，曾经提出若干问题。这些项目推迟到执行委员会第三十四次会议审议(第 32/65 号决定)。

18. 依照第 32/65 号决定，秘书处向执行委员会第三十四次会议报告指出，经过与伊朗政府、开发计划署和工发组织进行广泛协商之后，确定了伊朗制冷行业 ODS 消费的可靠数字。计算 2000 年可资助的剩余消费量时以 1999 年该行业、包括生产和维修的 CFC 消费量(1,920 ODP 吨)为依据，确定其为 1,252 ODP 吨，其中包括生产所用的 805.11 ODP 吨以及维修和中小型企业所用的 446.89 ODP 吨。伊朗政府提供了剩余企业的最新清单，并向秘书处说明了这些企业的生产量和 ODS 消费量。伊朗政府还申明承诺遵守淘汰 ODP 的计划以及《蒙特利尔议定书》的规定，并提供了政府为支持这些承诺将采取的具体行动的清单。秘书处存有 2001 年 5 月 19 日伊朗政府就此发送的来信。

19. 根据第 32/65 号决定，向执行委员会第三十四次会议提供了这一资料。执行委员会核准了第三十二次会议所推迟的 14 个项目以及开发计划署和工发组织提交的制冷行业 14 个新的项目，淘汰总额为 476.6 ODP 吨。符合资助资格的剩余消费量为生产用的 328.4 ODP 吨以及维修和中小型企业用的 446.89 ODP 吨。

20. 秘书处收到确定剩余消费量的 2001 年 5 月 19 日来信之后，又立即收到伊朗国家臭氧机构关于伊朗国家方案执行情况的报告，其中列有 2000 年的 ODS 消费数据。据报告，CFC 消费总量为 4,164.53 ODP 吨。制冷行业的 CFC 消费量为 2,634.53 ODP 吨，比上述来信提供的消费数量多 714 ODP 吨。秘书处提请国家臭氧机构注意这一出入，并要求对这个问题作出澄清。秘书处当时没有收到国家臭氧机构的答复。后来查明，国家臭氧机构向臭氧秘书处报告的订正 CFC 消费数据与此相同。

21. 开发计划署和工发组织向执行委员会第三十五次会议提交了淘汰 273 ODP 吨的 22 个项目。秘书处在评价文件中通知执行委员会，基于 2001 年 5 月 19 日来信所确认的剩余消费量，核准提交的提案可以使伊朗制冷行业的剩余消费余额降低到 503 ODP 吨，其中生产行业为 56 ODP 吨，维修和中小型企业约为 447 ODP 吨。

22. 开发计划署和工发组织向第三十八次会议提交的项目提案将淘汰 1,078.61 ODP 吨。此外，如 2001 年国家方案进度报告所述，将提交给今后会议的汽车空调机维修次级行业项目将淘汰 CFC-12 消费量 350 ODP 吨。这是伊朗首次报告汽车空调机行业的消费量。

23. 秘书处要求开发计划署、工发组织和伊朗政府对 CFC 消费数据的出入作出澄清。伊朗国家臭氧机构向秘书处指出，新的调查提供了比较准确的 CFC 消费数据，并附上了制冷行业剩余生产企业的订正清单。它还答复指出，“虽然伊朗政府和多边基金秘书处商定了 1999 年制冷行业的消费数量(1,920 公吨)(以 2001 年 5 月 19 日来信第 6 段规定为准)，但是，伊朗臭氧办公室所报告 2002 年和 2001 年的数据是该行业的实际消费情况。伊朗根据执行委员会第 35/37 号决定，选择采用备选办法 2 作为起点，执行其国家消费总量以及各行业的剩余消费量，并向制冷行业(不包括汽车空调机)分配了 1,075 公吨。因此，要求多边基金秘书处着手审查开发计划署和工发组织向执行委员会第三十八次会议提交的个别项目和总体项目。提交的这些项目提案都与分配给制冷行业的 1,075 公吨相关。”

24. 谨建议执行委员会考虑，鉴于伊朗于 2001 年 5 月 19 日作出的承诺，开发计划署和工发组织为伊朗制冷行业提出的提案是否符合资助条件。谨建议执行委员会在审议该问题时，注意到第 35/57 号决定的条件 B，即“还进一步指出，由此得出的数字是基金将出资减少的剩余 ODS 上限，应全面遵守基金关于项目接受资助的资格的现行准则”。

制冷行业剩余企业订正清单

25. 秘书处审查了新的企业清单，发现清单中所列企业总数有出入。此外，订正清单表明，确定 1995 年 7 月 25 日之后建立的仅有 21 家企业。但是，1999 年 3 月工发组织给秘书处的函文中指出，1995 年 7 月 25 日之后建立的企业数量更多(87 家)。

增支资本费用和经营费用

26. 秘书处审查了这些提案，发现申请的设备费用存在若干问题。该行业淘汰计划为制冷(生产)行业淘汰 CFC 申请的增支经营费用为 350,236 美元。该行业计划所包括的许多企业 CFC 消费量很低。行业计划没有提供生产数据。对于小企业数目很多而且没有获得关于制冷行业结构的详细资料的现象，执行委员会在第 25/50 号决定中作出了规定。鉴于缺乏关于这些企业生产情况和产品分配情况以及所用预混合多元醇成分的详细资料，已适用第 25/50 号决定，特别是(d)部分((i)至(v)项目)。

27. 此外，通过生产和消费记录，无法确定企业三年期间的消费情况。要确定今后几年可能生产的数量(以及消费数量)也许是不现实的，因为这些企业是逐个组装制冷设备，并没有安装生产线。根据第 31/45 号决定核准的准则，清单所列的许多企业似乎都属于制冷设备组装、安装和注入制冷剂的次级行业。鉴于上述情况，秘书处通知开发计划署，伊朗该行业计划的增支经营费用不符合资助条件。

28. 秘书处仍在与开发计划署和工发组织讨论与增支资本费用和经营费用有关的问题。将通知项目审查小组委员会这一情况。

制冷维修行业淘汰 ODS 的制冷剂管理计划(包括：进行制冷剂良好管理办法的训练，训练海关官员，回收和再生方案) 第一期

29. 秘书处审查了制冷剂管理计划项目提案，并考虑到多边基金援助项目未涉及的伊朗制冷行业 CFC 消费总数，其中生产次级行业为 55.5 吨，维修次级行业为 446.9 吨。2001 年 5 月 14 日，人类环境事务局副局长在一份公函中向基金秘书处报告了这些数量。根据伊朗政府提交的数据，执行委员会在第三十四次和第三十五次会议上核准为伊朗泡沫塑料行业和制冷行业 55 个投资项目提供 1,282 万美元(包括机构支助费用)。

30. 秘书处通知工发组织，审查制冷剂管理计划的唯一前提是制冷维修行业符合资助条件的剩余消费总量为 446.9 ODP 吨。

31. 提交的制冷剂管理计划到 2007 年底将在伊朗制冷维修行业淘汰消费总量的 85%，其中不包括汽车空调机次级行业。在这方面，秘书处指出，执行委员会在第三十七次会议上决定，对于非低消费量国家的制冷剂管理计划，执行协定中不应该采用过渡性步骤，除非已经全部淘汰生产中使用的 CFC；而且协定应该作为淘汰 CFC 的国家计划或行业计划的组成部分，导致彻底淘汰(第 37/19 号决定)。因此，应该修订制冷剂管理计划项目提案，以便处理维修行业所消费的全部 CFC，包括维修汽车空调机所用的 CFC-12。

32. 秘书处要求工发组织对估计伊朗维修行业 CFC 用量(575 吨)的依据作出澄清。就此，工发组织指出，为编制制冷剂管理计划项目所进行的调查表明，维修行业目前 CFC 的消费量为 750 吨；但是，上文所提到的伊朗政府的信件指出，维修行业的剩余 CFC 消费量为 450 吨。

33. 秘书处指出，1997 年 1 月，伊朗开始生产不使用 CFC 的制冷设备。1999 年，非 CFC 家用冰箱的产量约为 140 万台。自那时以来，伊朗非 CFC 制冷设备产量不断增加，同时，使用 CFC 的设备数量不断减少。按照这种设备平均寿命为 10 至 15 年计算，制冷机每年将减少 7%至 10%，因此，2002 年维修行业的消费量将比所上报 2000 年的消费量低 15%至 20%。今后几年中这一趋势将持续存在，导致剩余需维修的 CFC 设备数量不断减少。工发组织同意秘书处的看法，即“……损耗，但是，由于伊朗制冷机的平均寿命约为 25 至 30 年，报告所述制冷机每年减少的数量依然是可靠的”。

34. 依照制冷剂管理计划提案，估计伊朗制冷维修行业约有 10,000 个维修厂和 25,000 名技师。秘书处指出，根据项目提案中报告的数据，按设备类别划分，这些维修厂和技师每年维修的设备数量很少，详情见下表。

	每年维修制冷设备数量		
次级行业	维修总数	每个维修厂	每个技师
家用冰箱	1,600,000	160.0	6.4
商用制冷机	80,000	8.0	0.3
工业/大型冷库	3,000	0.3	0.0

35. 工发组织指出，每个维修厂修理和维修的制冷设备平均数量依维修厂的规模及其地点而不同。维修厂为家用冰箱、商用制冷机和工业/大型冷库提供维修服务。对于工业和大型冷库，部分设备由技术人员就地进行维修，有时候将设备维修分包给合格的工程师；虽然维修总数正确，但是，维修的冷库平均数不正确(因为数目因维修厂的规模和地点而有不同)。

36. 秘书处指出，与最近为下列国家所核准项目维修行业部分的成本效益相比，该项目的成本效益(14.14 美元/公斤)很低：阿尔及利亚(5.8 美元/公斤，加上政府将在基金不提供进一步援助的情况下淘汰另外 315 吨)，巴西(3.70 美元/公斤)，马来西亚(5.00 美元/公斤)，泰国(4.40 美元/公斤)和也门(2.72 美元/公斤)。

37. 秘书处和工发组织正在就该项目各构成部分、包括第 37/19 号决定的执行情况作最后讨论。讨论结果将通知项目审查小组委员会。

建议

38. 所有上述项目均待定。

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

PROJECT COVER SHEET

COUNTRY	IRAN		**IMPLEMENTING AGENCY**	UNDP
PROJECT TITLE	Sector Phase-out Plan for CFCs in the Refrigeration (Manufacturing) Sector in Iran			
PROJECT IN CURRENT BUSINESS PLAN			Yes	
SECTOR			Refrigeration (Manufacturing)	
SUB-SECTOR			All	
ODS USE IN SECTOR	Baseline (Average of 1995-97)		2,400	MT ODP (Mfg + Servicing)
	Current (2001)		2,268	MT ODP (Mfg + Servicing)
	Current (2001)		475	MT ODP (Servicing)
	Current (2001)		1,793	MT ODP (Mfg)
	From approved ongoing projects		1,175	MT ODP
	From other proposals under consideration		229	MT ODP
	From remaining non-eligible enterprises		31	MT ODP
	From remaining eligible enterprises		358	MT ODP
	Net in this Plan		389	MT ODP
PROJECT IMPACT			**372**	**MT ODP**
PROJECT DURATION			4 years	
PROJECT COSTS	Incremental Capital Costs	US$	4,227,000	
	Contingencies	US$	384,200	
	Incremental Operating Costs	US$	350,236	
	Total Project Costs	US$	4,961,436	
LOCAL OWNERSHIP			100%	
EXPORT COMPONENT			0%	
REQUESTED GRANT		US$	**4,961,436**	
COST EFFECTIVENESS		US$/kg/y	13.35	
IMPLEMENTING AGENCY SUPPORT COSTS		US$	555,758	
TOTAL COST OF PROJECT TO MULTILATERAL FUND		US$	5,517,794	
STATUS OF COUNTERPART FUNDING			N/A	
PROJECT MONITORING MILESTONES			Included	
NATIONAL COORDINATING BODY			Ozone Layer Protection Center, Department of Environment	

PROJECT SUMMARY

This project will phase out all the remaining CFC consumption in the Refrigeration (Manufacturing) Sector in Iran upon completion. The Sector Phase-out Plan will be implemented through four annual implementation programmes and together with the implementation of the approved ongoing projects and other individual/group projects submitted to the 38th EC Meeting, would result in the complete phase-out of CFCs in the Refrigeration (Manufacturing) Sector in Iran in four years. The Sector Phase-out Plan will cover the technology conversions in the 85 remaining eligible enterprises in the Refrigeration (Manufacturing) Sector and ensure timely, sustainable and cost-effective phase-out through a combination of investment, technical support and policy/management support components. The Refrigeration (Servicing) Sector is being addressed through a separate proposal being simultaneously submitted for consideration at the 38th EC Meeting. The total eligible incremental costs and the requested grant for the Refrigeration (Manufacturing) Sector Phase-out Plan are US$ 4,961,436.

IMPACT OF THE PROJECT ON THE COUNTRY'S MONTREAL PROTOCOL OBLIGATIONS

The approval of this project will assist Iran in meeting its Montreal Protocol obligations, such as the phased reductions in ODS consumption as per the agreed schedules.

PREPARED BY	UNDP in consultation with NOU Iran	**DATE**	September 2002
REVIEWED BY	Dr. Hubert Creyf (Foams), Dr. Lambert Kuijpers (Refrigeration)	**DATE**	September 2002

PROJECT OF THE GOVERNMENT OF IRAN
Sector Phase-out Plan for CFCs in the Refrigeration (Manufacturing) Sector in Iran

1. PROJECT OBJECTIVES

The objectives of this project are:

a) To ensure timely, sustainable and cost-effective CFC phase-out in the Refrigeration (Manufacturing) Sector, through development and implementation of a combination of investment, technical support and policy/management support components.
b) To enable Iran to meet its obligations of phased ODS reductions in accordance with the control schedule of the Montreal Protocol.
c) To achieve complete phase-out of CFCs in the Refrigeration (Manufacturing) Sector in Iran within four years.

2. INSTITUTIONAL FRAMEWORK

Iran ratified the Vienna Convention and the Montreal Protocol in October 1990. The preparation of the Country Programme incorporating the national strategy and action plan to phase out ODS in line with the Montreal Protocol control schedule, began in 1992. The Country Programme was approved in 1993. The Country Programme proposed measures and actions by the government and industry, such as institutional and regulatory measures, awareness and information dissemination, technical assistance, training and investments for technology conversions, for facilitating the phase-out of ODS in the various ODS consuming industry sectors and to assist them for complying with the country's commitments and priorities.

Considering the needs of the industry, continued economic availability of CFCs and the overall economy in Iran, and against the background of the new strategic planning frameworks and adjusted funding policies adopted by the Multilateral Fund, complete CFC phase-out is now targeted beginning 2007.

The activities related to ozone layer protection and implementation of the Montreal Protocol, are managed and coordinated through the Ozone Layer Protection Center, within the Department of Environment.

To provide regulatory and policy support for enabling the industry to eliminate ODS, the Government of Iran has taken the following initiatives and actions:

a) Partial establishing a licensing system for import of ODS from 2002.

b) Ban on imports of certain types of ODS-based refrigeration compressors from 2002.

c) Active participation in the preparation, implementation and monitoring for projects funded by MLF

d) Formulating guidelines and regulations as necessary for policy implementation

e) Supporting public awareness initiatives for promoting ozone layer protection at the consumer level for encouraging public involvement.

f) Regular interaction with other ministries and departments, industry representatives and implementing agencies for information dissemination related to impact of policy measures

g) Promoting information dissemination on the application and use of ozone-friendly technologies.

3. SECTOR BACKGROUND

3.1 Background of the Refrigeration Sector

The range of products manufactured in the sector includes, household refrigerating appliances such as domestic refrigerators and freezers, commercial refrigeration equipment such as display cabinets, bottle coolers, chest freezers, hot and cold water dispensers, visi-coolers, reach-in refrigerators, supermarket equipment, walk-in coolers and freezers and industrial refrigeration equipment such as cold storage and transport refrigeration systems and process chilling and freezing systems. The Refrigeration Sector in Iran has experienced significant growth in the past decade due to the consistent growth in the per capita incomes, the predominance of the service industry and the relatively low market penetration of refrigeration appliances and equipment in the past. CFCs are consumed as blowing agents (CFC-11) and refrigerants (CFC-12, R-502, R-22, etc) in the manufacture of refrigeration and air-conditioning products.

The ODS phase-out activities in this sector in Iran began in 1993. Since then, several investment projects in the domestic and commercial refrigeration sub-sectors have been approved, several completed and many under implementation.

3.2. Structure of the Refrigeration Sector

3.2.1 Supply Industry

There are two indigenous manufacturers of hermetic refrigeration compressors in Iran, which produce compressors suitable for domestic refrigeration appliances using CFC-12 technology and are presently undergoing conversion process. Their combined production is estimated to be about one million units annually, which meets only a part of the domestic demand, the balance being imported. The hermetic and semi-hermetic compressors required by the commercial refrigeration sub-sector are predominantly imported.

Refrigerants and the blowing agents are also not manufactured in Iran and the domestic requirements are met through imports from producers in India, China, Europe, etc. The chemicals required for producing the polyurethane foam insulation are also imported from developed countries and supplied through distributors, indenting agents and systems houses.

The other refrigeration system components are partly produced indigenously and partly imported. Considering the geography and size of the country, the availability of upstream supplies in general is satisfactory, however the quality and level of customer service and technical support is quite limited, mainly due to inadequate infrastructure and due to insufficient availability of trained and qualified staff.

3.2.2 User Industry

In the domestic refrigeration sub-sector, there are several manufacturers of household refrigerators and freezers. The large manufacturers and some medium-sized manufacturers have already converted or are in the process of converting to CFC-free technology with the assistance of MLF. There are a few medium-sized manufacturers, who are yet unaddressed.

In the commercial refrigeration sub-sector, there are several medium-sized manufacturers, who have converted to or are in the process of converting to CFC-free technology with MLF assistance. This sub-sector comprises of a large number of predominantly small and medium-sized enterprises, which are geographically scattered and with relatively little access to sophisticated technology and practices. Low levels of investments in plant and machinery and resulting labor-intensive operation characterize these enterprises.

Although general awareness about quality assurance, training, environment and safety-related issues exists, it does not receive much emphasis in practice, due to low levels of operating capital, because of the low scale of operation and the pressures on profitability exerted by the very competitive domestic market as well as cheap imports. In general, the knowledge of the latest chemicals and technologies is limited in the enterprises. The industrial and transport refrigeration sub-sectors are relatively small, and also comprise of similar small and medium-sized enterprises as described earlier, however most of these enterprises also manufacture commercial refrigeration equipment.

There is a relatively large and fast growing servicing sector comprising of a significant number of large and small servicing establishments, with predominantly labor-intensive operations.

3.3 History of ODS phase-out

The overall CFC consumption for all sectors in Iran, as reported by the Government of Iran for the various CFC consuming sectors, is as tabulated below:

Table-1
Iran: CFC Consumption Data for CY 2000

Sector	Baseline Consumption (1995-97 Avg.) (ODP MT)	Consumption covered by approved projects (ODP MT)	Consumption from approved unimplemented projects (ODP MT)	Consumption for CY 2000 (ODP MT)
Aerosols	**0**	0	0	**0**
Foams	**2,133**	1,520	728	**792**
Refrigeration	**2,071**	2,289*	356*	**1933***
MAC	**357**	0	0	**350**
Solvents	**11**	10	0	**10**
TOTAL	**4,572**	**4,169**	**1,084**	**3,085**

* Excludes consumption from canceled project IRA/REF/31/INV/070 – Bahranfarr.

The Refrigeration Sector in Iran accounts for about 45% of Iran's baseline CFC consumption. Since 1993, until December 2001, a total of 83* investment projects in the Refrigeration (Manufacturing) Sector have been funded under the Montreal Protocol mechanism, implemented by UNDP or UNIDO. The detailed list of investment projects approved in this sector till end-2001 is attached in Annex-1. The summary of approved investment projects is as below:

Table-2
Iran Refrigeration Sector - Historical investment project approvals as of December 2001

Sub-Sector(s)	Number of approved Projects	CFC Phase-out Target (ODP MT)	Approved Funding (US$)	Overall CE (US$/kg)
Domestic and commercial refrigeration	83*	2,704*	29,652,308*	10.97

* Excludes consumption and funding from canceled project IRA/REF/31/INV/070 – Bahranfarr.

The Montreal Protocol programme in Iran has addressed predominantly the domestic and commercial refrigeration sub-sectors, considering the significant contribution of the sector to the overall CFC consumption in Iran as well as considering the significant socio-economic impact of the sector due its capacity to generate employment and incomes.

In addition to achieving the ODS phase-out targets, it has created a degree of awareness among the industry, of the need for incorporating environmental objectives in their investment and operational decisions. The technical assistance and training inputs received through the projects have also enhanced to some extent, the capacity at the enterprise level to address technical and environmental issues. However, the source of the remaining consumption in the Refrigeration (Manufacturing) sub-sector is by small and medium-sized enterprises characterized as described in the user industry structure (section 3.2.2) by modest levels of investments, training, technical knowledge base and awareness available to these enterprises. Moreover, the enterprises are scattered and difficult to access.

3.3.1 Historical Phase-out Approach

All the projects approved in this sector so far (with the exception of three projects) are individual projects. From experience in other similar developing countries, the group approach has been proven to be effective in terms of coverage, cost-effectiveness and CFC phase-out, though it has not necessarily been fully effective in mitigating the infrastructural barriers, such as technology awareness, technical assistance, training, etc. due to the relatively limited amounts of resources approved for these activities, which are considered to be crucial in sustaining the viability of the enterprises and the CFC phase-out. However, a sector-wide phase-out approach needs to be selected to address the remaining CFC consumption in this sector, addressing these concerns and considering that:

- Requirement of cost-effective and sustainable phase-out, while addressing the potential socio-economic impacts thereof.
- A time bound action plan is needed to ensure compliance in line with the Montreal Protocol control schedules and in line with the requirement of attaining sustainable, aggregate and permanent reductions in consumption
- Only the phase-out of CFCs in new products in all remaining enterprises in this sector will primarily limit CFC use in this sector on a sustainable basis and provide the Government with the control and confidence needed to assure Iran's compliance with the Montreal Protocol control milestones

3.3.2 Historical Technology Choices

The large enterprises in the domestic refrigeration sub-sector selected cyclo-pentane technology for conversion of their foam operations. Most medium and small-sized enterprises selected HCFC-141b based systems. The choices have been guided primarily by the scale of operations and costs. For the refrigerant operations, enterprises of all approved projects in the sector have chosen HFC-based technology, being the only cost-effective and viable technology available.

3.3.3 Current Status

The breakdown of CFC consumption in the Refrigeration Sector in Iran for CY 2001 is as below:

Table-3
Breakdown of the CFC consumption in the Refrigeration Sector for CY 2001

Substance	Refrigeration Manufacturing (ODP MT)	Refrigeration Servicing (ODP MT)	TOTAL (ODP MT)
Annex-A, Group-I (CFCs)	1,793	475	2,268

The Refrigeration (Manufacturing) Sector has a net unaddressed residual CFC consumption of 389 MT (excluding projects submitted to the 37th EC Meeting amounting to 229 MT) and the Refrigeration (Servicing) Sector has a net unaddressed residual CFC consumption of 475 MT, not including the CFC use in MAC servicing. The following is the current CFC phase-out status in the Refrigeration Sector:

Sector	Sub-sector	Status
Manufacturing	Domestic refrigeration	Most of the existing large manufacturers of domestic refrigerators have completed CFC phase-out with assistance from the Multilateral Fund. The few remaining medium-sized manufacturers will complete their CFC phase-out through ongoing projects and through the Sector Phase-out Plan
	Commercial, industrial and transport Refrigeration	The enterprises in this sub-sector are predominantly small and medium-sized and scattered throughout the country. So far several enterprises have been covered under the Montreal Protocol programme. Many enterprises in this sub-sector remain to be addressed for CFC phase-out.
	Residential and commercial air conditioning	This sub-sector does not consume CFCs, but predominantly uses HCFCs and HCFC blends, mainly HCFC-22.
	MAC	There is no indigenous manufacturing activity of MAC equipment and therefore no CFC consumption in this sub-sector
	Chillers	There is no indigenous manufacturing capacity for central air conditioning centrifugal chillers in Iran.
Servicing	Domestic & commercial refrigeration	Comprises of service establishments serving the existing population of domestic and commercial refrigeration appliances and equipment. The estimated number of such establishments is about 10,000. A phase-out plan for the servicing sector is presently under submission.
	Residential and commercial air conditioning	As noted above, this sub-sector does not have CFC consumption.
	MAC	A pilot/demonstration programme is under implementation in cooperation with France. About 326 MT still needs to be addressed as of 2001.
	Chillers	This being addressed through the servicing sector phase-out plan currently under submission.

3.3.4 Future CFC phase-out Action Plan

The Government of Iran plans to address the remaining CFC consumption in the Refrigeration Sector as below:

- Individual/group projects submitted to the 37th EC meeting in July through UNDP and UNIDO are proposed for consideration at the 38th EC meeting: 229 MT
- Sector Phase-out Plan for the Refrigeration (Manufacturing) Sector to be submitted for MLF approval in the 38th EC Meeting in November 2002: 389 MT
- Sector Phase-out Plan for the Refrigeration (Servicing) Sector is being submitted for MLF approval in the 38th EC Meeting in November 2002: 475 MT

3.4 Survey of the Refrigeration Sector

With a view to reliably establish the CFC consumption in the Refrigeration (Manufacturing) Sector to facilitate addressing the CFC phase-out in the Refrigeration Sector through a sector-wide approach, the Government of Iran, through the Ozone Layer Protection Center, requested UNDP to assist them in conducting surveys of the Refrigeration (Manufacturing) Sector. With the agreement of the Government, a local refrigeration consultancy firm was identified and retained. The firm and the Ozone Layer Protection Center conducted the survey during May to September 2002. The survey and identification work covering enterprises in the Refrigeration (Manufacturing) sector was completed in Early September 2002 and the remaining CFC consuming enterprises in the Refrigeration (Manufacturing) Sector are now identified and their verified baseline information obtained.

3.4.1 Survey Methodology

The survey methodology for the refrigeration (manufacturing) sector comprised of the following steps:

- Obtaining the lists of enterprises from the Ministry of Industries and Mines and the small industries guild.
- Physical visits and verification of baseline information at the enterprise level.

Based on the records of registration of the enterprises with the Ministry of Industries and the small industries guild, lists of enterprises were prepared. As per the local regulations, the enterprises are registered under the names of their promoters/owners, therefore special emphasis was laid on correlating the names of the enterprises appearing in previously prepared lists and those previously surveyed.

Most of the enterprises surveyed were physically visited through field trips and plant visits carried out by the consultancy firm and by representatives from the Ozone Layer Protection Center. For the purpose of obtaining baseline information on the enterprises, a questionnaire developed by UNDP and the Ozone Layer Protection Center was used. The CFC consumption figures obtained through the survey were verified at the enterprise levels through procurement records and with records available with the relevant government departments through the Ozone Layer Protection Center, to the extent available.

3.4.2 Survey Results

A total of 106 enterprises engaged in manufacturing refrigeration equipment were identified. Most of these enterprises were located in and around major industrial and commercial centers, such as Tehran, Esfahan, Hamedan, etc., however they are widely distributed in the provinces. The total CFC consumption in the 106 identified enterprises for CY 2001, is estimated at 389 MT.

3.4.3 Eligibility and Classification

The eligibility of the surveyed enterprises was determined in accordance with the relevant Executive Committee decisions. Of the total 106 enterprises, the CFC-based production capacity in 85 enterprises was established before July 25, 1995. The capacity at the remaining 21 enterprises was established after July 25, 1995, and these enterprises would therefore not be eligible for funding by MLF.

Out of the 85 enterprises, 60 fall into the category of small-sized enterprises, with a CFC consumption of less than 5 MT/y. The remaining 25 are considered medium-sized with a CFC consumption of over 5 MT/y. All enterprises are 100% indigenously owned and reported that they were financially viable and had no exports to non-Article-5 countries. Table-4 below provides a summary of the overall residual CFC consumption in the Refrigeration (Manufacturing) Sector in Iran:

Table-4
Iran - Residual CFC Consumption in Refrigeration (Manufacturing) Sector

Sub-Sector	Total number of enterprises identified	Number of eligible enterprises	ODS (MT)	Number of non-eligible enterprises	ODS (MT)
Domestic Refrigeration	13	13	153	0	0
Commercial/Industrial Refrigeration	93	72	205	21	31
Total	**106**	**85**	**358**	**21**	**31**

Table-5 below provides a summary of the classification of the eligible enterprises identified, based on their size (small enterprises with a CFC consumption less than 5 MT and medium-sized enterprises with a CFC consumption of more than 5 MT):

Table-5
Iran - Classification of remaining eligible enterprises in the Refrigeration (Manufacturing) Sector

Sub-Sector	Number of eligible enterprises	Number of small-sized enterprises	ODS (MT)	Number of medium-sized enterprises	ODS (MT)
Domestic Refrigeration	13	0	0	13	153
Commercial/Industrial Refrigeration	72	60	114	12	91
Total	**85**	**60**	**114**	**25**	**244**

3.4.4 Products manufactured

The surveyed enterprises in the domestic refrigeration sub-sector manufacture household refrigerators and freezers and are generally better organized.

The enterprises in the commercial and industrial refrigeration sub-sectors typically manufacture equipment such as chest freezers, display cabinets, bottle coolers, visi-coolers, reach-in refrigerators, hot/cold water dispensers, etc, serving the users in the hospitality and food service industry. The enterprises also manufacture process refrigeration systems, supermarket refrigeration systems and equipment, walk-in coolers/freezers, cold rooms, etc

Out of the 85 eligible enterprises, 55 enterprises consume CFC-11 used as blowing agent for the rigid foam insulation. The remaining 30 enterprises have negligible or no foaming operations in the baseline.

3.4.5 Baseline Equipment

Based on the responses to the questionnaires, as well as the inputs received from plant visits, the baseline equipment for the foam and refrigeration operations in the enterprises can be summarized as below:

Foaming: All 55 enterprises engaged in foaming, use locally made foam dispensers.

Refrigeration: Medium-sized enterprises typically have semi-automatic charging units, vacuum pumps and leak detectors suited for CFC-12. Small-sized enterprises mostly have assorted charging kits and vacuum pumps, suited for CFC-12.

3.4.6 Baseline Resources

While the owners/management of the enterprises surveyed, are more or less conversant with the need to eliminate CFCs under the Montreal Protocol, most enterprises do not have the financial or technical resources to undertake conversions at their own cost. Most of the small-sized enterprises have less than 10 employees. The medium-sized enterprises employ more than 10 persons. While the technicians have basic skills in refrigeration charging and evacuation, there is a lack of good housekeeping and related practices and lack of adequate knowledge or training on CFC-free technologies or applications. Most of the small-sized enterprises do not have well-equipped factories or workshops and lack adequate organizational and infrastructural facilities.

3.4.7 Summary

The following table summarizes the breakdown of the remaining CFC consumption in the Refrigeration (Manufacturing) Sector:

Table-6

Iran Refrigeration (Manufacturing) Sector – Summary of remaining unfunded CFC users/consumption

Sub-sector/Category	Number of Enterprises	CFC Consumption (MT)
Eligible enterprises		
Medium-sized enterprises (CFCs ≥ 5 MT/y)	25	243.89
Small-sized enterprises (CFCs < 5 MT/y)	30	77.51
Small-sized enterprises (CFCs < 5 MT/y without foaming baseline)	30	36.96
TOTAL	**85**	**358.36**
Ineligible enterprises	21	31.21
GRAND TOTAL	**106**	**388.57**

A list of all the remaining enterprises in the Refrigeration (Manufacturing) Sector, with their brief baseline information is presented in Annex-2.

4. PROJECT DESCRIPTION

The Sector Phase-out Plan for elimination of CFCs in the Refrigeration (Manufacturing) sector in Iran will be implemented through a combination of Investment, Technical Support and Policy & Management Support components.

4.1 Investment Component

The investment component of the plan will focus on enabling the participant enterprises to physically eliminate CFCs from their production activities and would comprise of the following elements:

- Assessment of the technical requirements of conversion
- Determining the scope of international and local procurement
- Development of technical specifications and terms of reference for procurement
- Prequalification and short-listing of vendors
- International/local competitive bidding
- Techno-commercial evaluation of bids and vendor selection
- Procurement contracts
- Site preparation
- Customs clearance and delivery
- Installation and start-up
- Product and process trials
- Operator training
- Commissioning and phase-in of CFC-free production
- Destruction of baseline equipment

The approach for implementing the investment component in the remaining eligible and unfunded enterprises in the sector is proposed to be through a combination of individual and group sub-projects as below:

For medium-sized enterprises (CFC consumption more than 5 MT/y)

- Individual sub-projects covering 25 enterprises

For small-sized enterprises (CFC consumption less than 5 MT/y)

- Four group sub-projects covering 60 enterprises

This approach draws on previous implementation experience and has been designed based on the size, level of organization, location and customer base of enterprises concerned and also based on ease and convenience for execution and management. Given the generally small size of the remaining enterprises in the sector, with inadequate in-house technical capabilities, the need for adequate investments for plant and process changes, supported by investments on adequate technical assistance, trials and training, is critical and will involve proportionately larger inputs. It is foreseen that the durations for the sub-projects would be set in such a way as to ensure that the verifiable annual performance targets as may be required for the Sector Phase-out Plan, would be more conveniently quantifiable and achievable.

CFC phase-out in ineligible enterprises will not be funded under the sector phase-out plan and is expected to take place through the control, which the Government will have through policy and regulatory actions. Any unaccounted or unidentified eligible enterprises will be identified and accommodated within the resources approved for this sector phase-out plan.

4.1.1 Plant and process investments

Foam Operations

a) New chemicals suitable for the selected alternative technology will be required. These will be available from existing chemical suppliers. No specific investments are foreseen for handling of raw chemicals. However, activities under 4.1.2 will assist enterprises for safe handling of the chemicals.

b) The use of new formulations will lead to a marginal change in mixing ratios and increased viscosity leading to reduced flowability of the chemical mixture. In case of rigid foam conversions, the HCFC-141b based foam will have an increased thermal conductivity in relation to that produced with CFC-11, which is being replaced. The existing manual mixing process or low-pressure foam dispensers will not be able to handle the new formulations without adversely affecting the cell structure and thereby the thermal conductivity of the foam. Hand mixing is also not recommended from occupational health and safety standpoints. Therefore new high or medium-pressure foam dispensers as applicable, of equivalent effective capacity, which will provide a finer cell structure and help minimize the deterioration of thermal conductivity of the foam, and also minimize the occupational health and safety risks, will be needed to replace the existing dispensers/hand-mixing process.

c) The HCFC-141b based foam will have an increased molded density with respect to the CFC-11 based foam, resulting in increased requirement of chemicals. This increase will be partially offset by the savings resulting from more efficient handling of chemicals due to the new foam dispensers.

Refrigerant Operation

a) Compressors suitable and optimized for HFC-134a/R-404a will be required. These will be available from existing suppliers.

b) The chemical stability of HFC-134a/R-404a and of the synthetic lubricants compatible with HFC-134a/R-404a is highly sensitive to moisture and impurities in the system, as compared to that with CFC-12. The evacuation/charging process for HFC-134a/R-404a and polyolester lubricant will need to ensure the required level of cleanliness and dryness in the system. To ensure this the following is proposed:

- The vacuum pumps will need to be suitable for use with HFC134a/R-404a. Retrofitting of vacuum pumps has not proven feasible or cost-effective in the past due to several factors (unsatisfactory condition, inaccessible suppliers, unavailability of parts, production downtime, etc) therefore appropriate quantities of new vacuum pumps suitable for the conversion, consistent with the baseline capacities, will need to be provided.

- The existing refrigerant charging units/kits are not suitable for use with HFC-134a/R-404a and cannot be retrofitted, and will therefore be replaced with automatic charging units or portable semi-automatic charging units suitable for HFC-134a/R-404a duty.

c) The design/sizing of the refrigeration system will need to be suitably changed, to ensure the viability of the process and to maintain the product standards for performance and reliability, such as:

- Reengineering evaporators and condensers, so as to ensure the levels of cleanliness and contamination that can be tolerated with HFC-134a/R-404a (< 5 ppm)
- Lengthening of the capillaries or changing the thermostatic expansion valve models.
- Use of filter-dryers with finer pores, suitable for use with HFC-134a/R-404a.

d) The existing leak detection is unsuitable for detecting HFC-134a/R-404a leakages; therefore suitable hand-held leak detectors will need to be provided.

4.1.2 Technical assistance

Technical assistance will be required to be provided through international experts and, when available, national experts to ensure a smooth transition to the new replacement technology. The experts would need to be process specialists and their functions will include overall technical supervision of conversion projects and technical coordination between equipment/chemical suppliers, recipient enterprises and the implementing and/or executing agency. Their specific responsibilities include:

a) Technical assistance for preparing specifications of equipment to be procured in the sub-project
b) Technical equipment bid evaluation from suppliers during the competitive bidding process
c) Technical guidance to the recipient enterprise during start-up with the new equipment and process
d) Resolving technical issues with the phase-in of the new equipment and processes
e) Technical evaluation of the results of production and product quality trials jointly with the recipient enterprise
f) Technical project commissioning including final technical inspection of equipment and process for establishing completion and compliance with project objectives such as the destruction of the baseline CFC-based equipment where applicable, verification of depletion of CFC stocks, and verifying that the non-CFC production process is in operation
g) Technical evaluation of enterprise reimbursement claims on equipment, raw materials, local works and other items and certification of the same
h) Technical clearance of project completion, so that the project assets can be handed over and the project closed.
i) Technical assistance for completion and other reporting requirements.

4.1.3 Product and Process Trials

Trials will be required to validate the new/retrofitted equipment as well as the production process using the new technology, specifically to establish their performance and suitability for the conversion in accordance with specifications and project objectives. Trials will also be needed to evaluate and establish satisfactory end product properties. Trial costs will cover the cost of chemicals, raw materials, components, consumables and utilities required during site preparation and commissioning.

4.1.4 Application and Process Training

Training will be needed to acquaint the production personnel in the enterprise with the new equipment and processes. Training will also be required to address safety and industrial hygiene issues, such as flammability, ventilation, and health hazards and to institute the required industrial practices as applicable to the replacement technology.

4.2 Technical Support Component

Since the Sector Phase-out Plan will address the entire Refrigeration (Manufacturing) Sector, the industry as a whole will need to be supported through provision of a technical support component for ensuring that phase-out actions and initiatives are not only technically sound but also sustainable, and consistent with the important priorities of the Government, which are to prevent industrial dislocation and obsolescence. The Technical Support component will assist the Refrigeration (Manufacturing) Sector as a whole, for the following:

a) Establishment quality and performance standards for the CFC-free products and applications within the sector.
b) Interaction with the user industry for providing technology assistance for sustainability of CFC-free refrigeration applications, through technical workshops and meetings
c) Establishment of a training, certification and licensing program for refrigeration system production equipment operators and technicians, for sustaining the CFC-free technologies.

4.3 Policy & Management Support Component

The implementation of the Sector Phase-out Plan will need to be closely aligned and coordinated with the various policy, regulatory, fiscal, awareness and capacity-building actions the Government of Iran is taking and will need to take in future, in order to ensure that the implementation of the Sector Phase-out Plan is consistent with the Government priorities, such as promotion of indigenization and decentralized management. Further, in view of the annual performance-based targets needed to be achieved under the terms of the Sector Phase-out Plan, the implementation of the Plan would need to be closely and efficiently managed and will introduce additional coordinating, reporting and monitoring activities.

The Refrigeration (Manufacturing) Sector Phase-out Plan will be managed by a dedicated management unit, comprising of a coordinator to be designated by the Government and supported by representatives and experts from the implementing/executing agencies and the necessary support infrastructure. The Policy & Management Support component of the Sector Phase-out Plan will include the following activities, for the duration of the Plan:

a) Management and coordination of the Plan implementation with the various Government policy actions pertaining to the Refrigeration Sector
b) Establishment of a policy development and enforcement program, covering various legislative, regulatory, incentive, disincentive and punitive actions to enable the Government to acquire and exercise the required mandates in order to ensure compliance by the industry with the phase-out obligations.
c) Development and implementation of training, awareness and capacity-building activities for key government departments, legislators, decision-makers and other institutional stakeholders, to ensure a high-level commitment to the Plan objectives and obligations.
d) Awareness creation of the Phase-out Plan and the Government initiatives in the Sector among consumers and public, through workshops, media publicity and other information dissemination measures.
e) Preparation of annual implementation plans including determining the sequence of enterprise participation in the planned sub-projects.
f) Verification and certification of CFC phase-out in completed sub-projects within the Plan through plant visits and performance auditing.
g) Establishment and operation of a reporting system of usage of CFCs/substitutes by users
h) Reporting of implementation progress of the Plan for the annual performance-based disbursement.
i) Establishment and operation of a decentralized mechanism for monitoring and evaluation of Plan outputs, in association with provincial regulatory environmental bodies for ensuring sustainability.

5. TECHNOLOGY

The selection of the alternative technology for conversion would be governed by the following:

a) Proven and reasonably mature technology
b) Cost-effective conversion.
c) Availability of the systems at favorable pricing.
d) Critical properties that have to obtained in the end product
e) Compliance with established (local and international) standards on safety and environment.

The technology selected would also need to be easily adaptable at the (generally small-sized) recipient enterprises, which predominantly would be participating in this project. The selection of the technology would also need to be consistent with the priorities of the Government and industry and to ensure sustainability of the technology in the long-term.

5.1 Foam Operation

The presently available/emerging CFC-phase-out technologies, for rigid polyurethane insulating foams are:

CLASSIFICATION	LIQUID TECHNOLOGY	GASEOUS TECHNOLOGY
Low ODP technologies (Interim)	HCFC-141b, HCFC-141b + water	HCFCs (22, 142b, 22 + 142b/141b
Zero ODP technologies (Permanent)	Water, Pentanes (n, iso, cyclo) HFC-245fa, HFC-365mfc, HFC-365/227	HFCs (134a, 152a)

Interim Technologies

HCFC-22 (independently or in combination with HCFC-142b and more recently with HCFC-141b) based systems, due to the low boiling point of HCFC-22, cannot be supplied pre-blended and will require investments in full-fledged in-house blending facilities. HCFC-22 also has residual ODP.

HCFC-141b has a boiling point near ambient temperatures. HCFC-141b based systems are technically mature and commercially available. They also provide relatively the most acceptable insulation value and energy efficiency, and the lowest investment and operating costs vis-à-vis other options. No major changes in the auxiliary equipment/tooling in the production program, such as jig/mold redesign, are needed. However, HCFC-141b has residual ODP and is also an aggressive solvent.

Permanent Technologies

Pentane based (n-, iso-, cyclo) systems require extensive safety related provisions/investments due to their flammability. Due to safety considerations, the use of pre-blended systems is not viable and additional investments for in-house pre-mixing are required. Cyclopentane has miscibility limitations with polyols. The molded densities and insulation values are still inferior to those obtained with HCFC-141b. The advantages are their relatively lower operating costs; they are environmentally relatively safe (no ODP/GWP or health hazards) and constitute a permanent technology. Hydrocarbons are thus, the preferred conversion technology for large and organized users, where safety requirements can be complied with and investments can be economically justified. In the present scenario, since most of the enterprises are small or medium-sized, application of hydrocarbon-based systems is not considered feasible.

Gaseous HFCs have been used successfully but cannot been applied widely at the present time, due to cost and availability factors.

For water-based systems, the insulation values, density and commercial availability are unsatisfactory at present. However, these systems have acceptable processing characteristics and are expected to be mature and commercially viable in the near future, especially for applications where insulation values are not very critical. In addition, they are environmentally safe (zero ODP/GWP, no health or safety hazards) and constitute a permanent technology. Since in the current situation the rigid foam is for insulation applications, applying water-based technology is not considered feasible.

Chemical and systems suppliers and the appliance industry have extensively evaluated liquid HFC-based systems. Preliminary trials with non-optimized formulations indicate lower molded foam densities, insulation values comparable to HCFC-141b and no solvent action. On the whole, liquid HFCs are considered to be the only potential zero-ODP alternatives to hydrocarbons. HFC-245fa is expected to be commercially produced beginning the mid-2002. Another candidate, a non-flammable blend of HFC-365mfc and HFC-227, is also planned for commercial production in the second half of 2002. Provided that the commercial and availability considerations are addressed, these substances can be considered to be viable long-term substitutes.

Based on the above considerations, the enterprise will convert to CFC-free systems for their rigid polyurethane foam operations. Until the commercial introduction of mature CFC-free systems, HCFC-141b based systems will need to be used as an interim technology, to maintain product standards and acceptability.

5.2 Refrigerant Operation

The alternative technologies for replacement of CFC-12 in small capacity hermetic/semi-hermetic refrigeration systems are as below:

HCFCs: HCFC-22, Blends
HFCs: HFC-134a, HFC-152a
Hydrocarbons: HC-290 (Propane), HC-600a (Isobutane), and HC290/600a (1:1mixture of both)

HCFCs are not preferred long-term substitutes, due to their residual ODP.

Hydrocarbon technologies though environmentally safe (no ODP/GWP or health hazards) and technically acceptable, require elaborate safety/monitoring provisions and investments due to their flammability and will not be suitable for cost-effective and financially sustainable transfer to small and medium-sized enterprises.

HFC-152a has higher discharge temperatures/pressures, is flammable and less stable at high temperatures and the technology for the same is not widely available.

HFC-134a technology as a replacement for CFC-12 based refrigeration systems, is universally accepted, especially in small hermetic/semi-hermetic systems. HFC-134a is a zero ODP option. The technology is commercially available. Hermetic compressors optimized for HFC-134a are commercially available. This technology is therefore the preferred conversion technology in this project. For low-temperature applications using R-502, based on similar lines as above, R-404a will be the selected replacement technology.

5.3 Technology Selection

Based on the selection parameters for the technologies for foam and refrigerant operations described earlier, the selection of the CFC replacement technologies in the remaining enterprises can be summarized as below:

Sub-sector	CFC Consumption (MT)	Technology Selected
Foam operation	230.22	HCFC-141b + partial water-based systems
Refrigerant operation	158.35	HFC-134a/R-404a

5.4 Additional Justification for HCFC technology

The Ozone Layer Protection Center assisted by the implementing agency experts, prior to the preparation of this proposal, provided detailed briefings to the technical and managerial personnel of the enterprises, regarding the choice of technology for replacing the existing CFC-based technology, under the project as below:

1. An overview of the available interim (low ODP) and permanent (zero ODP) replacement technologies.
2. The techno-economic impact of each technology on the products manufactured, and the processes and practices employed by them.
3. The possible implication of each technology, in terms of its known impact on environment, health and safety, such as ozone depleting potential, global warming potential, occupational health, fire and explosion hazards.
4. It was emphasized to them that HCFC technologies are interim in nature due to their residual ODP and therefore may continue to adversely affect the environment, though at a lower scale than CFCs.
5. It was further explained that HCFCs use may become restricted under present or future international conventions and may also need to be phased out at a future date, and any investments required for their phase-out and for conversion to safer technologies, may have to be borne by them.

The enterprises indicated their preference for selection of HCFC-141b based technology, in their rigid foam operation. The specific justifications offered by them are: Water-based systems were considered, but are unsuitable due to the unsatisfactory insulation values, density and other end-product properties, which will affect their competitiveness. They considered hydrocarbon-based systems unsuitable due to the following:

a) The fire, explosion and security hazard and compliance with local safety regulations involved in the storage and handling of hydrocarbons, in view of their flammability. In the present premises of these enterprises such compliance is not possible. At the present time, it would not be cost-effective or viable for them to relocate their manufacturing facilities to ensure such compliance.
b) Since hydrocarbons cannot be pre-mixed in polyols due to the safety hazard they present in transportation, additional investments on in-house premixing equipment will be required. Considering their low volume of production, such investments are not economically viable.
c) In view of safety considerations, additional and continuous monitoring of plant operations by statutory authorities will be needed. The plant operators will need additional retraining for safety practices. The insurance premiums will increase. This will add to the burden of recurring costs.

In view of the above, the enterprises selected HCFC-141b (+ partial water) based systems for their rigid foam operations as the conversion technology, which will ensure quick phase-out of most of the ODP, while maintaining products competitive and the properties at acceptable levels.

6. INCREMENTAL COSTS

6.1 Summary of incremental costs

The incremental capital and operating costs for the Phase-out Plan are calculated based on the guidance provided by the various Executive Committee Decisions and precedents and agreements reached with MLF during recently approved similar projects in this Sector. The basis and detailed calculations for the various cost elements are presented in Annex-3. The total costs worked out are as below:

Incremental Capital Costs:	US$ 4,227,000
Contingencies:	US$ 384,200
Incremental Operating Costs:	US$ 350,236
Total:	**US$ 4,961,436**

6.2 Economies

The incremental costs of the Plan are budgeted on the basis that the sector-wide phase-out approach will result in economies through adoption of cost-effective execution strategies and also through dynamics of the market forces, while providing the Government with the flexibility and the resources to align its policy and regulatory actions with the technical actions, for ensuring a timely, systematic and sustainable phase-out. Some of the salient provisions of the economies considered for calculating the incremental costs of the sector-wide approach as compared to the individual project-to-project approach are as below:

a) In the investment component, budgets for technical assistance, trials and training are reduced to reflect the savings in the group/sector-wide approach, consistent with prior agreements for similar projects.

b) Only those enterprises with significant or meaningful foaming baselines have been considered for supporting the foaming operations.

c) The proposals for replacing the baseline CFC-based equipment have been based on functionality rather than eligibility alone, resulting in savings in the overall costs of the replacement equipment, in accordance with prior agreements with MLF on similar projects.

d) To account for the impact of market forces in shaping the incremental operating costs, projected price differentials are considered only for foam chemicals and refrigerants (and not for other components).

7. COST EFFECTIVENESS

The Cost Effectiveness (ratio of the total incremental costs to the net ODP phased out per year post-project) of this project works out to US$ 13.35/kg/y. This has been calculated from the net incremental project costs of US$ 4,961,436 and the total CFCs (reflecting the net ODP value after deducting the residual ODS of HCFC-141b) amounting to 372 MT, to be phased out upon completion. Details are provided in Annex-4.

8. FINANCING

The total requested grant funding is **US$ 4,961,436.**

9. IMPLEMENTATION

9.1 Management

The overall management of the Plan will be carried out as described in Section 4.3, by Government of Iran, with the assistance of UNDP as the implementing agency and UNOPS as the executing agency.

The Ozone Layer Protection Center within the purview of the Department of Environment will be responsible for monitoring of the implementation of the Sector Phase-out Plan. The Ozone Layer Protection Center will be responsible for tracking the promulgation and enforcement of policy/legislations and preparation of annual implementation plans and progress reports to the Executive Committee of MLF, with the assistance of UNDP. The Ozone Layer Protection Center with the assistance of UNDP would conduct an annual independent audit for verifying CFC consumption levels including spot checks and random visits and supervise implementation activities.

9.2 Performance and Disbursement Schedule

Year	ODS phase-out target (MT)			Remaining Sector ODS Consumption (MT)	Disbursement (US$)
	From approved ongoing projects	From Sector Phase-out Plan	Total		
2002	0	0	0	1,793	2,500,000
2003	300	0	300	1,493	1,250,000
2004	400	100	500	993	750,000
2005	500	200	700	293	250,000
2006	204	89	293	0	211,436
2007	0	0	0	0	0
TOTAL	**1,404 ***	**389**	**1,793**	**0**	**4,961,436**

* Including 229 MT for individual/group projects submitted to the 37th EC meeting in July 2002 through UNDP and UNIDO, for consideration and approval at the 38th EC meeting.

9.3 Funding Arrangements

Upon approval by MLF of the Phase-out Plan, the Government of Iran, through UNDP, requests the Executive Committee to authorize disbursement of the 2002 funding, the implementation plan for which, is as below:

a) Establishment of operational mechanism for management and monitoring of the Phase-out Plan.
b) Formulation of detailed terms of reference and work plans for various activities under the Technical Support and Policy & Management Support components
c) Establishment of an operational mechanism for participation in the Phase-out Plan and for obtaining phase-out commitments from enterprises.
d) Initiating CFC phase-out activities for the 25 medium-sized enterprises through individual sub-projects.
e) Selection of the small-sized enterprises for group projects
f) One workshop under the Technical Support Component for technology assistance to prospective participant enterprises in the sector.
g) One workshop for public awareness and information dissemination under the Policy and Management Support component.

Since the average duration for completion of a sub-project is expected to be about 18 months, the phase-out activities initiated in 2003 will not produce results until mid or end-2004, contributing to the reduction of consumption starting 2005. Since complete phase-out under this Sector Phase-out Plan is to be achieved in a short four-year period, the Government of Iran, through UNDP, will request the disbursement of the 2003 funding at the second Executive Committee Meeting of 2003, against satisfactory reporting of activities carried out in 2003. The funds for 2004, 2005 and 2006 will be transferred to UNDP at the first meeting of the Executive Committee in these years, for the amounts listed in the table above, upon approval of the annual implementation plan and upon confirmation by Government and UNDP that the agreed reduction targets and relevant performance milestones of the respective preceding years have been achieved.

10. RESULTS

This project will eliminate the use of CFCs in the Refrigeration (manufacturing) Sector in Iran

ANNEXES

Annex-1: List of Approved Investment Projects in the Refrigeration Sector in Iran
Annex-2: List of Remaining Enterprises in the Refrigeration (Manufacturing) Sector in Iran
Annex-3: Incremental Costs
Annex-4: Cost-effectiveness Calculations
Annex-5: Environmental Assessment
Annex-6: Draft Agreement
Annex-7: Technical Reviews

ANNEX-1

Iran - Approved Investment Projects in the Refrigeration (Manufacturing) Sector

(As of December 2001)

No	Agency	Title	ODS	ODP Phased Out	Grant (US$)	C. E. (US$/kg)	Approval Date	Status
1	UNIDO	Arj, Azmayesh, Bahman, Iran Poya and Pars Appl.	757.0	757.0	8,906,390	11.77	Nov-1993	Completed
2	UNIDO	Movalled Home Appliance Co.	70.0	70.0	607,732	8.68	Nov-1997	Completed
3	UNIDO	Pars Machine Manufacturing Co.	62.0	62.0	608,605	9.82	Nov-1997	Completed
4	UNIDO	Lorestan Refrigerator Mfg Industries	94.0	94.0	615,018	6.54	Nov-1997	Completed
5	UNIDO	Gadook Industries Co.	18.5	18.5	373,838	20.21	Nov-1997	Completed
6	UNIDO	Fariz Iran	109.0	109.0	612,504	5.62	Nov-1997	Completed
7	UNIDO	Pars Monark Co.	18.5	18.5	369,939	20.00	Nov-1997	Completed
8	UNIDO	Electro Steel Co.	120.0	120.0	898,159	7.48	Dec-1999	Completed
9	UNIDO	Yakh Chavan Mfg. Co.	41.8	41.8	527,802	12.63	Dec-1999	Completed
10	UNIDO	Yakh Saran Co.	34.0	34.0	458,663	13.49	Dec-1999	Completed
11	UNIDO	Zagross II Co.	34.0	34.0	444,858	13.08	Dec-1999	Completed
12	UNIDO	Sobouhi Refrigeration	30.4	30.4	237,847	7.82	Nov-1998	Completed
13	UNIDO	Yazd Arg, Yazd Sardin & Shervin	62.2	62.2	743,990	11.96	Nov-1998	Completed
14	UNIDO	Sherkate Sanayee Emerson	45.8	45.8	343,873	7.51	Jul-1999	Completed
15	UNDP	Foroughmanesh Co.	35.8	35.8	399,803	11.17	Jul-1999	Completed
16	UNDP	Tahvich Garm va Sard Co.	20.5	20.5	278,659	13.59	Jul-1999	Completed
17	UNIDO	Alisard,Pardis,Mohebi,Jalalzadeh,Meibod,Tagarg,Shahab	42.5	42.5	309,966	7.29	Jul-1999	Completed
18	UNDP	Movaledsarma Co.	77.6	77.6	816,698	10.52	Jul-1999	Completed
19	UNIDO	Sherkate Broudati Ghandil Iran	27.5	27.5	335,423	12.20	Jul-1999	Completed
20	UNDP	Electro Shargh Mazandaran Co.	28.2	0.0	301,715	10.70	Nov-1999	
21	UNDP	Sardkaran Industrial Mfg Co.	25.3	0.0	155,405	6.14	Nov-1999	
22	UNDP	Khozestan Technique Co.	9.6	0.0	132,041	13.75	Nov-1999	
23	UNDP	Electro Sard Azna Co.	18.7	0.0	191,061	10.22	Nov-1999	
24	UNDP	Behsarma Co.	34.5	34.5	455,593	13.21	Jul-1999	Completed
25	UNIDO	Saiwan Sannat Co.	14.9	0.0	200,709	13.47	Nov-1999	
26	UNIDO	Sherkate Sanaayee Toulidy Bard Co.	16.4	0.0	205,529	12.53	Nov-1999	
27	UNIDO	Minavand Refrigeration Company	13.4	0.0	176,777	13.19	Nov-1999	
28	UNIDO	Forouzan Yakhchal Company	16.7	0.0	192,704	11.54	Nov-1999	
29	UNDP	Fadak Refrigeration Industries	17.3	0.0	258,937	14.97	Jul-2000	
30	UNDP	Jaleh & Negin Co.	23.6	0.0	322,309	13.66	Jul-2000	
31	UNDP	MH Seyed Salaki Co.	9.8	0.0	141,590	14.45	Jul-2000	
32	UNIDO	Partou Sard Tawan and Himalia	36.1	0.0	377,544	10.46	Jul-2000	
33	UNDP	Baharanfarr Co.	0.0	0.0	0	N/A	Jul-2000	Canceled
34	UNDP	Fereidooni Refrigerant Industries	10.4	0.0	157,454	15.14	Jul-2000	
35	UNDP	Sanaye Part	8.2	0.0	114,770	14.00	Jul-2001	
36	UNIDO	Takran Mobbarad Co.	9.6	0.0	119,864	12.49	Jul-2001	
37	UNDP	Ojan Cooling Industries	7.5	0.0	110,863	14.78	Jul-2001	
38	UNIDO	Tehran Shirak Co.	20.5	0.0	202,836	9.89	Jul-2001	
39	UNIDO	Donyaye Mojdeh Co.	15.4	0.0	191,020	12.40	Jul-2001	
40	UNIDO	Zarifan Mashad Co.	22.0	0.0	200,550	9.12	Jul-2001	
41	UNIDO	Novin Enjemad Co.	10.1	0.0	138,702	13.73	Jul-2001	
42	UNIDO	Roshan Industrial Group	18.6	0.0	203,960	10.97	Jul-2001	

Annex-1
Iran - Approved Investment Projects in the Refrigeration (Manufacturing) Sector (Cont'd)

No	Agency	Title	ODS	ODP Phased Out	Grant (US$)	C. E. (US$/kg)	Approval Date	Status
43	UNIDO	Avaj Sarma Co.	15.2	0.0	176,477	11.61	Jul-2001	
44	UNIDO	Arjah Boroudat Co.	27.4	0.0	209,425	7.64	Jul-2001	
45	UNIDO	Gasso Co.	11.7	0.0	158,232	13.52	Jul-2001	
46	UNDP	Yakhchaisazi Yazd Co.	30.0	0.0	248,646	8.29	Jul-2001	
47	UNDP	Rezvan Co.	13.2	0.0	182,182	13.80	Jul-2001	
48	UNDP	Electro Ara Co.	13.0	0.0	178,784	13.75	Jul-2001	
49	UNDP	Boloorin Yazd Refrigerator Co.	20.5	0.0	212,320	10.36	Jul-2001	
50	UNDP	Sarmaye Sepahan Co.I	10.8	0.0	148,525	13.75	Jul-2001	
51	UNDP	Mersun Co.	11.8	0.0	162,891	13.80	Jul-2001	
52	UNDP	Ideal Sardsir Co.	16.2	0.0	187,907	11.60	Jul-2001	
53	UNDP	Parsa Sazan Co.	20.0	0.0	212,845	10.64	Jul-2001	
54	UNDP	Zenoz Sanaat Co.	10.2	0.0	140,036	13.73	Jul-2001	
55	UNDP	Sepand Afroz Co.	12.6	0.0	172,881	13.72	Jul-2001	
56	UNDP	Yakhchalsazi Anzabi Co.	10.1	0.0	138,935	13.76	Jul-2001	
57	UNDP	General Industries	31.1	0.0	428,197	13.77	Jul-2001	
58	UNDP	Ghaynar Khazar Co.	16.8	0.0	191,092	11.37	Jul-2001	
59	UNDP	Hanzad Co.	19.8	0.0	199,627	10.08	Jul-2001	
60	UNDP	Sana Commercial Co.	11.4	0.0	156,286	13.71	Jul-2001	
61	UNDP	Golsarma Co.	28.3	0.0	230,066	8.13	Jul-2001	
62	UNDP	Shagayegh Boroudat Co.	10.0	0.0	137,985	13.80	Jul-2001	
63	UNIDO	Ariz Pouyayeh Sanaat	7.6	0.0	86,365	11.36	Dec-2001	
64	UNIDO	Yaghouabli Bazdid Vahdat (Isun)	10.5	0.0	131,605	12.53	Dec-2001	
65	UNIDO	Borna Sanat Arak	8.0	0.0	108,238	13.53	Dec-2001	
66	UNIDO	Sarma Gostar Co.	9.3	0.0	100,384	10.79	Dec-2001	
67	UNIDO	Sardintous Co.	10.3	0.0	145,879	14.16	Dec-2001	
68	UNIDO	Abbaspour Co.	9.7	0.0	144,206	14.87	Dec-2001	
69	UNIDO	Sard va Garam Iran	8.4	0.0	125,350	14.92	Dec-2001	
70	UNIDO	Darvesh Mohamed Nazari (Jahan Nama)	9.3	0.0	139,970	15.05	Dec-2001	
71	UNIDO	Sherkate Taavoni (Khorsandi)	5.4	0.0	82,107	15.21	Dec-2001	
72	UNIDO	Alborz Nishabour Co.	16.0	0.0	189,669	11.85	Dec-2001	
73	UNIDO	Bouran Saaz Karaj Co. (Kohsar)	9.6	0.0	120,526	12.55	Dec-2001	
74	UNIDO	Moradi Co.	6.4	0.0	82,400	12.88	Dec-2001	
75	UNDP	Alireza Abdulrezazadeh Co.	7.7	0.0	116,646	15.15	Dec-2001	
76	UNDP	Havasaz Mfg. And Industrial Co.	24.5	0.0	252,294	10.30	Dec-2001	
77	UNDP	Sarma Fan	20.8	0.0	267,075	12.84	Dec-2001	
78	UNDP	Sanaye Broudati Maleki	17.9	0.0	215,052	12.01	Dec-2001	
79	UNDP	Sain Electric Co.	11.2	0.0	152,024	13.57	Dec-2001	
80	UNDP	Mehran Sard Co.	17.7	0.0	144,715	8.18	Dec-2001	
81	UNDP	Tehran Sardsazi Industrial Co.	15.5	0.0	125,244	8.08	Dec-2001	
82	UNDP	Garm Iran Co.	11.8	0.0	153,447	13.00	Dec-2001	
83	UNDP	Parto Shiva Sanaat	23.9	0.0	283,948	11.88	Dec-2001	
84	UNDP	Ghotb Jonoub Industrial Group	14.6	0.0	170,125	11.65	Dec-2001	
TOTAL			**2,704**	**1,736**	**29,652,308**	**10.97**		

ANNEX-2
Iran - Indicative List of Remaining Enterprises in the Refrigeration (Mfg) Sector

Group I: Enterprises with CFC consumption > 5 MT/y

Domestic Refrigeration Sub-sector

No	Name	Location	Sub-sector	CFC Consumption (MT/y)			Baseline Equipment	
				CFC-11	CFC-12	Total	Foam	Refrigeration
1	Arak Taqsooz	Arak	DR	14.00	3.14	17.14	LPD	1 SACU, 2 VP, 1 LD
2	Barin-e-Fars	Shiraz	DR	15.00	5.00	20.00	2 LPD	1 SACU, 6 VP, 1 LD
3	Bayatak	Ahwaz	DR	12.00	4.00	16.00	2 LPD	1 SACU, 6 VP, 1 LD
4	Boroudati Garam	Shiraz	DR	7.00	2.00	9.00	LPD	1 SACU, 2 VP, 1 LD
5	Jamali	Tehran	DR	4.95	0.95	5.90	LPD	3 MCK, 3 VP, 1 LD
6	Majlesi (Majic Cool)	Tehran	DR	5.08	1.33	6.41	LPD	4 MCK, 2 VP, 1 LD
7	Sahar-e-Bakhtar	Urumich	DR	11.50	3.00	14.50	LPD	1 SACU, 4 VP, 1 LD
8	Sanaat-e-Sard	Tehran	DR	10.27	3.71	13.98	LPD	1 SACU, 5 VP, 2 LD
9	Sanaye Boroudati Vahid	Tehran	DR	9.00	3.00	12.00	2 LPD	1 SACU, 2 VP, 1 LD
10	Sardsir	Tehran	DR	4.42	1.20	5.62	LPD	3 MCK, 2 VP, 2 LD
11	Sorena	Tehran	DR	8.00	2.50	10.50	LPD	1 SACU, 4 VP, 1 LD
12	Tajhizat Ashfazkhaneh	Tehran	DR	7.04	1.84	8.88	LPD	1 SACU, 3 VP, 1 LD
13	Zafar Boroudat	Garmshahr	DR	10.00	3.00	13.00	LPD	1 SACU, 4 VP, 1 LD
Total (13 enterprises)				**118.26**	**34.67**	**152.93**		

Commercial Refrigeration Sub-sector

No	Name	Location	Sub-sector	CFC Consumption (MT/y)			Baseline Equipment	
				CFC-11	CFC-12	Total	Foam	Refrigeration
1	Adis Technique	Tehran	CR	4.20	2.10	6.30	LPD	3 MCK, 2 VP, 1 LD
2	Baradaran Jamali	Golpaygan	CR	2.94	2.78	5.72	LPD	3 MCK, 2 VP, 1 LD
3	Charmahali (Arvin)	Hamedan	CR	5.62	6.85	12.47	LPD	4 MCK, 2 VP, 1 LD
4	Esfahan Yakhchal	Esfahan	CR	7.66	3.27	10.93	LPD	5 MCK, 2 VP, 1 LD
5	Momtaz	Tehran	CR	3.81	1.37	5.18	LPD	3 MCK, 3 VP, 2 LD
6	Rad Sarma	Tehran	CR	3.92	1.18	5.10	LPD	3 MCK, 2 VP, 1 LD
7	Sarmasazi Alborz	Abadan	CR	6.59	2.29	8.88	LPD	4 MCK, 2 VP, 1 LD
8	Steel Behnaam	Tehran	CR	7.80	3.37	11.17	LPD	4 MCK, 3 VP, 2 LD
9	Super Technique	Tehran	CR	4.92	1.09	6.01	LPD	3 MCK, 2 VP, 1 LD
10	Taavoni Pars Shova	Hamedan	CR	3.50	2.50	6.00	LPD	3 MCK, 2 VP, 2 LD
11	Tolidi Sanati Amin	Esfahan	CR	5.70	1.60	7.30	LPD	4 MCK, 3 VP, 2 LD
12	Tolidi Sanati Ehsan	Esfahan	CR	4.30	1.60	5.90	LPD	4 MCK, 2 VP, 1 LD
Total (12 enterprises)				**60.96**	**30.00**	**90.96**		

Group II: Enterprises with CFC consumption < 5 MT/y (with foaming baseline)

No	Name	Location	Sub-sector	CFC Consumption (MT/y)			Baseline Equipment	
				CFC-11	CFC-12	Total	Foam	Refrigeration
1	Bahsard	Tehran	CR	2.00	0.96	2.96	LPD	Assorted MCK, VP, LD
2	Barfak	Tehran	CR	1.15	0.50	1.65	LPD	
3	Bell	Tehran	CR/IR	0.23	1.17	1.40	LPD	
4	Chekad Lorestan	Khorramabad	CR/IR	0.17	0.34	0.51	LPD	
5	Daryush Hoshangi	Esfahan	CR	2.00	1.68	3.68	LPD	
6	Eftekhari	Tehran	CR	2.55	1.25	3.80	LPD	
7	Electro Alvand	Tehran	CR/IR	0.19	0.17	0.36	LPD	
8	Electro Bahar	Tehran	CR	0.36	0.22	0.58	LPD	

Annex-2: Indicative List of Remaining Enterprises in the Refrigeration Sector (Cont'd)

Group II: Enterprises with CFC consumption < 5 MT/y (with foaming baseline) – Cont'd

No	Name	Location	Sub-sector	CFC Consumption (MT/y)			Baseline Equipment	
				CFC-11	CFC-12	Total	Foam	Refrigeration
9	Electro Marjan	Tehran	CR	1.16	0.16	1.32	LPD	Assorted MCK, VP, LD
10	Electro Pars	Tehran	CR/IR	0.85	2.05	2.90	LPD	
11	Electro Saied	Shabestar	CR/IR	1.80	2.50	4.30	LPD	
12	Electro Shahab	Tehran	CR/IR	1.44	1.32	2.76	LPD	
13	Kolon Nik (Nikpeiman)	Mashhad	CR/IR	1.50	1.20	2.70	LPD	
14	Iran Goudarz	Tehran	CR	1.09	0.98	2.07	LPD	
15	Keyvan	Sanandaj	CR/IR	1.10	1.50	2.60	LPD	
16	Kian Sanaat	Khomeinisha	CR	3.65	0.86	4.51	LPD	
17	Kohrang	Esfahan	CR/IR	2.30	2.20	4.50	LPD	
18	Mehdi Souri	Tehran	CR/IR	0.32	1.18	1.50	LPD	
19	Mehr	Esfahan	CR/IR	1.13	1.75	2.88	LPD	
20	Milad Sarma	Tehran	CR	1.90	0.96	2.86	LPD	
21	Mir Ahsani	Tehran	CR	0.47	0.23	0.70	LPD	
22	Nobakht	Tehran	CR	1.02	0.56	1.58	LPD	
23	Pars Noo	Tehran	CR	1.56	0.41	1.97	LPD	
24	Saeigheh	Lorestan	CR	0.33	0.15	0.48	LPD	
25	Sana-e-sard Naeem	Tehran	CR/IR	1.69	2.00	4.69	LPD	
26	Sarmasazi Jonoub	Abadan	CR	3.18	0.94	4.12	LPD	
27	Shaheen	Tehran	CR	2.42	1.44	3.86	LPD	
28	Super Automatic	Arak	CR	2.00	1.00	3.00	LPD	
29	Tagarg Sanaat	Esfahan	CR	3.10	1.55	4.65	LPD	
30	Yehganeh	Tehran	CR	1.43	1.19	2.62	LPD	
Total (30 enterprises)				**44.09**	**32.42**	**77.51**		

Group III: Enterprises with CFC consumption < 5 MT/y (without foaming baseline)

No	Name	Location	Sub-sector	CFC Consumption (MT/y)			Baseline Equipment	
				CFC-11	CFC-12	Total	Foam	Refrigeration
1	Adel Mirzanejad	Ardebil	CR/IR	0.00	2.10	2.10	N/A	Assorted MCK, VP, LD
2	Atlas	Mashhad	CR/IR	0.00	3.00	3.00	N/A	
3	Ebtekar	Tehran	CR/IR	0.00	0.31	0.31	N/A	
4	Electronique	Tehran	CR/IR	0.00	0.48	0.48	N/A	
5	Goudarzi	Tehran	CR/IR	0.00	0.87	0.87	N/A	
6	Iran Freezer	Tehran	CR/IR	0.00	1.12	1.12	N/A	
7	Iran Sanaat	Tehran	CR/IR	0.00	0.92	0.92	N/A	
8	Jahan Sarma	Tehran	CR/IR	0.00	1.50	1.50	N/A	
9	Jam	Tehran	CR/IR	0.00	2.02	2.02	N/A	
10	Khavaran	Tehran	CR/IR	0.00	2.19	2.19	N/A	
11	Kiaei	Tehran	CR/IR	0.00	1.50	1.50	N/A	
12	Mehdi Vafaye	Esfahan	CR/IR	0.00	2.17	2.17	N/A	
13	Mostafa Daghigh	Babol	CR/IR	0.00	0.27	0.27	N/A	
14	Negin	Tehran	CR/IR	0.00	1.70	1.70	N/A	
15	Nemmoneh	Tehran	CR/IR	0.00	0.48	0.48	N/A	
16	Nesar	Tehran	CR/IR	0.00	2.00	2.00	N/A	
17	Safari	Tehran	CR/IR	0.00	0.70	0.70	N/A	
18	Sahand	Tehran	CR/IR	0.00	2.11	2.11	N/A	
19	Sanaye Sardogarm Iran	Hamedan	CR/IR	0.00	0.90	0.90	N/A	
20	Sard Mezan	Tehran	CR/IR	0.00	1.38	1.38	N/A	

Annex-2: Indicative List of Remaining Enterprises in the Refrigeration Sector (Cont'd)

Group III: Enterprises with CFC consumption < 5 MT/y (without foaming baseline) – Cont'd

No	Name	Location	Sub-sector	CFC Consumption (MT/y)			Baseline Equipment	
				CFC-11	CFC-12	Total	Foam	Refrigeration
21	Tehran Sard	Tehran	CR/IR	0.00	0.57	0.57	N/A	Assorted MCK, VP, LD
22	Toloo	Tehran	CR/IR	0.00	0.49	0.49	N/A	
23	Yakhrizzangharb	Hamedan	CR/IR	0.00	1.84	1.84	N/A	
24	Zarin	Ardebil	CR/IR	0.00	1.18	1.18	N/A	
25	Zarin Noo	Ardebil	CR/IR	0.00	1.16	1.16	N/A	
26	Yakhchalsazi Tavana (Electro Toos)	Mashhad	CR/IR	0.00	0.42	0.42		
27	Farmad Sarma	Tehran	CR/IR	0.00	0.80	0.80		
28	Alvand	Sabzevar	CR/IR	0.00	0.30	0.30		
29	Hadi Tamadon Nejad	Jajroud	CR/IR	0.00	1.50	1.50		
30	Taavoni Tolidat Sanati Sepahan	Esfahan	CR/IR	0.00	1.00	1.00		
Total (30 enterprises)				**0.00**	**36.96**	**36.96**		

Group IV: Ineligible Enterprises

No	Name	Location	Sub-sector	CFC Consumption (MT/y)			Baseline Equipment	
				CFC-11	CFC-12	Total	Foam	Refrigeration
1	Arman	Tehran	CR	2.19	0.73	2.92	LPD	Assorted MCK, VP, LD
2	Arshak Gharapetian	Tehran	CR/IR	0.00	0.66	0.66	N/A	
3	Azar Sard	Tehran	CR	1.53	0.48	2.01	LPD	
4	Baharan	Tehran	CR/IR	0.00	0.13	0.13	N/A	
5	Baradaran-e-Khalifi	Tehran	CR/IR	0.00	2.11	2.11	N/A	
6	Binalod Shargh	Mashhad	CR/IR	0.00	2.00	2.00	N/A	
7	Electro Omega	Tehran	CR/IR	0.00	0.38	0.38	N/A	
8	Esfandani	Tehran	CR/IR	0.00	0.80	0.80	N/A	
9	Ettehad	Tehran	CR/IR	0.00	0.71	0.71	N/A	
10	Iran Tekno	Qom	CR/IR	0.00	2.05	2.05	N/A	
11	Jahan Boroudat	Tehran	CR/IR	0.00	0.50	0.50	N/A	
12	Kaktoos	Tehran	CR/IR	0.00	1.37	1.37	N/A	
13	Novin	Tehran	CR/IR	0.00	0.49	0.49	N/A	
14	Sanaye Boroudati Amir	Tehran	CR/IR	0.00	2.50	2.50	N/A	
15	Sepahan Takee	Esfahan	CR	1.31	1.17	2.48	LPD	
16	Shayan	Tehran	CR/IR	0.00	2.71	2.71	LPD	
17	Shazaidi Refrigeration	Esfahan	CR	1.88	1.15	3.03	LPD	
18	Tak	Tehran	CR/IR	0.00	0.60	0.60	HM	
19	Toochal	Tehran	CR/IR	0.00	0.80	0.80	HM	
20	Top	Tehran	CR/IR	0.00	0.80	0.80	HM	
21	Zarren Sarma	Ardebil	CR/IR	0.00	2.16	2.16	HM	
Total (9 enterprises)				**6.91**	**24.30**	**31.21**		

Annex-2: Indicative List of Remaining Enterprises in the Refrigeration Sector (Cont'd)

Summary

Enterprise Size/Category	Indicative Number of Enterprises	CFC Consumption (MT/y)		
		CFC-11	CFC-12	Total
Medium-sized (CFCs ≥ 5 MT/y)	25	179.22	64.67	243.89
Small-sized (CFCs < 5 MT/y) with foaming	30	44.09	32.42	76.51
Small-sized (CFCs < 5 MT/y) without foaming	30	0.00	36.96	36.96
Ineligible enterprises	21	6.91	24.30	31.21
GRAND TOTAL	**106**	**230.22**	**158.35**	**388.57**

KEYS FOR TABLES:

DR: Domestic Refrigeration
CR: Commercial Refrigeration
IR: Industrial Refrigeration

HM: Hand-mixing
LPD: Low-pressure foam dispenser
HPD: High-pressure foam dispenser

MCK: Manual charging kits
SACU: Semi-automatic charging units
ACU: Automatic charging units
VP: Vacuum pumps
LD: Leak detectors

ANNEX-3
Incremental Costs

A. Incremental Capital Costs

Investment Component

Domestic Refrigeration

Cost Head	Cost (US$)
Foam Operation	
Foam Dispenser	60,000
Trials	2,000
Technical Assistance	2,000
Training	1,000
Sub-total (Foam)	**65,000**
Refrigerant Operation	
Automatic charging stations	15,000
Vacuum pumps	5,000
Leak detectors	2,000
Trials	2,000
Technical Assistance	2,000
Training	1,000
Sub-total (Refrigeration)	**27,000**
Number of enterprises	13
Total (13 enterprises)	**1,196,000**
Additional cost for 3 foam dispensers and trials at US$ 62,000/foam dispenser	**186,000**
Total (Domestic Ref) - A	**1,382,000**

Commercial Refrigeration

Cost Head and Enterprise Type	Medium-sized enterprises (≥ 5 MT CFCs)			Small-sized enterprises (< 5 MT CFCs)		
	No foaming baseline	Hand-mixing baseline	Dispenser baseline	No foaming baseline	Hand-mixing baseline	Dispenser baseline
Foam Operation						
Foam dispenser	N/A	N/A	60,000	0	N/A	30,000
Trials	N/A	N/A	2,000	0	N/A	2,000
Technical assistance	N/A	N/A	2,000	0	N/A	2,000
Training	N/A	N/A	1,000	0	N/A	1,000
Sub-total (Foam)	N/A	N/A	**65,000**	**0**	N/A	**35,000**
Refrigerant Operation						
Charging units	N/A	N/A	4,000	2,000	N/A	2,000
Vacuum pumps	N/A	N/A	5,000	2,500	N/A	2,500
Leak detectors	N/A	N/A	2,000	1,000	N/A	1,000
Trials	N/A	N/A	1,000	1,000	N/A	1,000
Technical assistance	N/A	N/A	1,000	1,000	N/A	1,000
Training	N/A	N/A	500	500	N/A	500
Sub-total (Refrigeration)	N/A	N/A	**13,500**	**8,000**	N/A	**8,000**
Total (per enterprise)	**N/A**	**N/A**	**77,500**	**8,000**	**N/A**	**43,000**
Number of enterprises	N/A	N/A	**12**	**30**	N/A	**30**
Total (all enterprises)	N/A	N/A	**930,000**	**240,000**	N/A	**1,290,000**
Total (Commercial) – B						**2,460,000**

Annex-3: Incremental Costs (Cont'd)

A. Incremental Capital Costs (Cont'd)

Investment Component (Cont'd)

Domestic Refrigeration (A)	1,382,000
Commercial Refrigeration (B)	2,460,000
Sub-total	3,842,000
Contingencies (10%)	384,200
TOTAL (US$)	**4,226,200**

Non-investment Component

See notes	385,000
TOTAL (US$)	**385,000**

Summary

Investment Component	4,226,200
Non-investment Component	385,000
TOTAL INCREMENTAL CAPITAL COSTS (US$)	**4,611,200**

B. Incremental Operating Costs

Incremental Operating Costs (see notes)	350,236
TOTAL INCREMENTAL OPERATING COSTS (US$)	**350,236**

C. TOTAL COSTS

Incremental Capital Costs including Contingencies	4,611,200
Incremental Operating Costs	350,236
GRAND TOTAL INCREMENTAL COSTS (US$)	**4,961,436**

NOTES & CLARIFICATIONS

Incremental Capital Costs

Foam Operation

1. The following considerations are involved in calculating the budgets for foaming equipment.

Enterprise type	Baseline	Replacement	Cost (US$)	Funding (US$)	Remarks
Small-sized	No foaming	None	0	0	
	LPD	Medium-pressure dispenser	30,000	30,000	0% contribution
Medium-sized	LPD	High-pressure 60 lit/min	60,000	60,000	0% contribution

2. The budgets for trials, training and technical assistance (total TTT) for the foam operation are based on US$ 5,000 per enterprise with a foaming baseline.

Refrigerant operation

3. Regardless of the baseline, trolley-mounted semi-automatic portable charging units are proposed for all enterprises in the commercial refrigeration sub-sector. One such charging unit is proposed for each small-sized enterprise and two units for each medium-sized enterprise. For the domestic refrigeration sub-sector, one automatic charging unit is proposed for each enterprise.

3. Two vacuum pumps and two hand-held leak detectors are proposed for each medium-sized enterprise. One vacuum pump and one hand-held leak detector is proposed for each small-sized enterprise.

4. The budgets for trials, technical assistance and training for the refrigerant operation (total TTT) are based on US$ 2,500/enterprise.

Incremental Operating Costs

Foam Operation

Domestic Refrigeration

Item	Unit	Before Conversion (US$)			After Conversion (US$)			Net Incremental Cost (US$/yr)
		Qty	Rate	Amount	Qty	Rate	Amount	
Foam Chemicals	Kg	788,400	2.50	1,971,000	827,820	2.67	2,210,279	239,279
Subtotal				1,971,000			2,210,279	239,279
Less savings due to more efficient processing of chemicals (5%)								(110,514)
Incremental operating costs/year for foam operation								**128,765**
Incremental operating costs for foam operation (6 months)								**64,383**

Commercial Refrigeration

Item	Unit	Before Conversion (US$)			After Conversion (US$)			Net Incremental Cost (US$/yr)
		Qty	Rate	Amount	Qty	Rate	Amount	
Foam Chemicals	Kg	406,400	2.50	1,016,000	426,720	2.67	1,139,342	123,342
Subtotal				1,016,000			1,139,342	123,342
Less savings due to more efficient processing of chemicals (5%)								(56,967)
Incremental operating costs/year for foam operation								**66,375**
Incremental operating costs for foam operation (NPV for 2 years @10% annual discounting)								**115,493**

Refrigerant Operation

Domestic Refrigeration

Item	Unit	Qty.	Price Differential between pre- and post conversion (US$/unit)	Modifying Factor (if applicable)	Net Incremental Cost (US$/yr)
Refrigerant	Kg	34,670	3.00	0.90	84,942
Incremental operating costs/year for refrigeration operation					**84,942**
Incremental operating costs for refrigeration operation (6 months)					**42,471**

Commercial Refrigeration

Item	Unit	Qty.	Price Differential between pre- and post conversion (US$/unit)	Modifying Factor (if applicable)	Net Incremental Cost (US$/yr)
Refrigerant	Kg	30,000	3.00	0.90	73,500
Incremental operating costs/year for refrigeration operation					**73,500**
Incremental operating costs for refrigeration operation (NPV for 2 years @10% annual discounting)					**127,890**

Summary of Incremental Operating Costs

Sub-sectors	DR	CR	Total
Foam	64,383	115,493	179,876
Refrigeration	42,471	127,890	170,361
Total	**106,853**	**243,383**	**350,236**

Basis and Considerations

1. **Incremental operating costs claimed pertain only to the cost differentials between foam chemicals and refrigerants, as it is foreseen that these differentials would exist throughout the duration of the project due to continued economic availability.**
2. **Incremental operating costs are not claimed on account of cost differentials for other components, such as compressors, condensers, evaporators, capillaries or expansion devices, etc., as it is foreseen that these cost differentials may not apply throughout the duration of the project.**
3. The increased costs on account of molded foam density increases in rigid foam with HCFC-141b based systems with respect to CFC-11 based systems as calculated as recommended by OORG and adopted by Executive Committee Decision 31/35. For commercial refrigeration sub-sector, in order to apply the density increases, the distribution of products manufactured by relative CFC consumption, is assumed to be equal among the five product classifications, namely, display cabinets, chest freezers, visi-coolers, vending machines and walk-in-coolers.
4. The net savings on account of more efficient handling of chemicals due to the introduction of a new high-pressure or medium-pressure foam dispensers are calculated at 5%.
5. The calculation of incremental operating costs is based on the following assumptions and chemical costs:

   Rigid foam
   - Cost of baseline CFC-based chemical system: US$ 2.50/kg (Baseline ratio - 100:43:143)
   - Cost of HCFC-141b based chemical system: US$ 2.67/kg (New ratio - 100:26:145)

   Refrigeration
   - Cost differential for refrigerant: US$ 3.00/kg

6. All amounts rounded off to the nearest US$ 1.00
7. The calculations exclude all taxes/duties and growth.

Non-investment activities

The breakdown of the budgets for the non-investment activities (over a 4-year period) is as below:

Component	Activity	Basis	Budget (US$)
Sector Technical Support	Quality and product standards	Technical consulting @ 60 man days	45,000
	Technology workshops	4 workshops	40,000
	Licensing/certification program	Legal/technical consulting @ 50 man days	25,000
Policy and Management Support	Management and monitoring	100 days/year for 4 years (400 man days)	40,000
	Policy development & enforcement	100 days/year for 4 years (400 man days)	40,000
	Training and capacity-building	10 workshops (US$ 7,500/workshop)	75,000
	Awareness programmes	8 workshops and information dissemination	80,000
	Verification and certification	100 days/year for 4 years (400 man days)	40,000
Total			**385,000**

ANNEX-4
Cost-Effectiveness

A. ODP Impact of the Project

SUBSTANCE	ODP	CONSUMPTION (KG)	NET ODP (KG)
CFC-11	1.00	230,220	230,220
Substitute: HCFC-141b	0.11	153,481	(16,883)
CFC-12	1.00	158,350	158,350
Substitute: HFC-134a	0.00	142,515	0
Net ODS Phase-out			**371,687**
Remaining ODP Consumption in the sector			**16,883**

B. Cost-effectiveness Calculation

PARAMETER/COST HEAD	UNIT	TOTAL
Total Project Costs		
A. Incremental Capital Costs	US$	4,227,000
B. Contingencies (10% of A)	US$	384,200
C. Incremental Operating Costs	US$	350,236
D. Total Project Costs (A + B + C)	US$	4,961,436
Adjustments to Project Costs		
E. Adjustment for non-Article-5 ownership	US$	0
F. Adjustment for export to non-Article-5	US$	0
G. Adjustment for technological upgrade	US$	0
Net Project Costs		
H. Net Project costs (D – [E + F + G])	US$	4,961,436
ODS Phase-out		
I. Total ODS phase-out	Kg	388,570
J. Net ODP phase-out	ODP Kg	371,687
Cost-effectiveness		
K. Cost-effectiveness (H/J)	US$/kg/y	13.35
Eligible MLF Funding	**US$**	**4,961,436**

ANNEX-5
Environmental Assessment

HCFC-141b has an ODP of 0.11 and GWP of 630, which are considered acceptable for rigid polyurethane foam application. HCFC-141b is considered non-flammable as a liquid and moderately flammable as a gas (7.6% to 17.7% in air by volume), and is considered safe in applications where the exposure level is less than 500 ppm on a 8-hour time weighted average basis, which is marginally lower than the existing technology. The smog potential of HCFC-141b is about ten times that of CFC-11, although with an emission rate of only about 3% during production, this is not an issue. No changes in the current occupational safety practices are envisaged.

HFC-134a has zero ODP and GWP of 1,300. For this application, this is considered acceptable. HFC-134a is non-flammable, and has been extensively tested for toxicity, and is considered safe in applications where the exposure level is less than 1000 ppm on a 8-hour time weighted average basis, which is the same as that for CFC-12, the existing technology. Therefore no changes in the current occupational safety practices are envisaged in this project.

This project thus uses environmentally safe and acceptable technology

The enterprises participating in this project have obtained the necessary statutory environmental clearances for their present operations. Additional clearances if any, for implementing this project, will be obtained as and when required from the relevant competent authorities.

ANNEX-6
Draft Agreement

1. The Executive Committee approves in principle a total of US$ 4,961,436 in funding for the phased reduction and complete phase-out of CFCs used in the Refrigeration (Manufacturing) Sector in Iran. This is the total funding that would be available to Iran from the Multilateral Fund for the complete elimination of CFC use in the Refrigeration (Manufacturing) Sector in Iran, by 31 December 2006. The agreed level of funding would be disbursed in installments as indicated in Table-1 and on the basis of the understanding set out in this agreement. By this agreement, Iran commits that it will eliminate its total CFC consumption in the Refrigeration (Manufacturing) Sector in accordance with the phase-out target and CFC consumption limits as indicated in Table-1 below:

Table-1
Disbursement Schedule and Control Targets for CFC Consumption
and Phase-out in the Refrigeration (Manufacturing) Sector in Iran

Parameter	2002	2003	2004	2005	2006	2007	Total
Annual CFC Consumption limit in the Refrigeration (Mfg) Sector (ODP MT)	1,793	1,793	1,493	993	293	0	N/A
Annual CFC phase-out target from on-going projects (ODP MT)	0	300	400	500	204	0	1,404
Annual CFC phase-out target in the Refrigeration (Mfg) Sector Phase-out Plan(ODP MT)	0	0	100	200	89	0	389
Annual Funding Disbursement Tranche (US$)	**2,500,000**	**1,250,000**	**750,000**	**250,000**	**211,436**	**0**	**4,961,436**
Agency Support Costs (US$)	280,039	140,019	84,011	28,004	23,685	0	555,758
Total cost to Multilateral Fund (US$)	**2,780,039**	**1,390,019**	**834,011**	**278,004**	**235,121**	**0**	**5,517,794**

2. The phase-out of CFCs achieved in the Refrigeration (Manufacturing) Sector in excess of the specified target for a given year will contribute to achievement of the phase-out targets in subsequent years.

3. The Executive Committee also agrees in principle that the funds for the implementation of the annual programme for any given year will be provided in accordance with the disbursement schedule in Table-1 for the exact amount listed for that year and on the basis of the implementation programme for the year, subject to the performance requirements contained in this agreement. The Executive Committee will strive to ensure that funds are provided at its second meeting in the preceding year. The funding installments for 2004, 2005 and 2006 will be released subject to:

a) The confirmation that all agreed phase-out targets and consumption limits for the previous year have been achieved;

b) The verification that the activities planned for the previous year, were undertaken in accordance with the annual implementation programme.

4. The Government of Iran agrees to ensure accurate monitoring of the phase-out. The Government of Iran will provide regular reports, as required by its obligations under the Montreal Protocol and this Agreement. The consumption figures provided under this agreement will be consistent with Iran's reports to the Ozone Secretariat under Article 7 of the Montreal Protocol.

The Government of Iran also agrees to allow independent verification audits as provided for in this agreement, and in addition, external evaluation as may be directed by the Executive Committee, to verify that annual CFC consumption levels correspond to those agreed and that the implementation of the Refrigeration (Manufacturing) Sector Phase-out Plan proceeds as scheduled and agreed in annual implementation programmes.

5. The Executive Committee agrees to provide Iran with flexibility in using the agreed funds to meet the consumption limits indicated in Table-1. The Executive Committee has the understanding that during implementation, as long as it is consistent with this Agreement, the funds provided to Iran pursuant to this Agreement may be used in the manner that Iran considers will achieve the smoothest possible CFC phase-out, consistent with operational procedures as agreed between Iran and UNDP in the Refrigeration (Manufacturing) Sector Phase-out Plan as revised and as indicated in the annual implementation programmes. In the Executive Committee's acknowledgement of the flexibility available to Iran in achieving a complete CFC phase-out in the Refrigeration (Manufacturing) Sector, it is understood that Iran is committing to provide the necessary level of resources as may be required for the implementation of the plan and for achieving the consumption limits indicated in Table-1 above.

6. The Government of Iran agrees that the funds being agreed in principle by the Executive Committee at its 38th Meeting for the complete phase-out of CFCs in the Refrigeration (Manufacturing) Sector are the total funding that will be available to Iran to enable its full compliance with the reduction and phase-out as agreed with the Executive Committee, and that no additional Multilateral Fund resources will be forthcoming for any related activities in the Refrigeration (Manufacturing) Sector. It is also understood that aside from the agency fees referred to in paragraph 8 below, the Government of Iran, the Multilateral Fund, and its Implementing Agencies, and bilateral donors will neither request nor provide further Multilateral Fund related funding for the accomplishment of the total phase-out of CFCs in the Refrigeration (Manufacturing) Sector in Iran.

7. The Government of Iran agrees that if the Executive Committee meets its obligations under this Agreement, but Iran does not meet the reduction requirements outlined in Table-1 and other requirements outlined in this Agreement, the Implementing Agency and the Multilateral Fund will withhold subsequent tranches of funding outlined in Table-1, until such time as the required reduction has been met. It is clearly understood that the fulfillment of this Agreement depends on the satisfactory performance by both the Government of Iran and the Executive Committee of their obligations. In addition, Iran understands that with respect to all calendar year targets beginning with 2004, the Multilateral Fund will reduce the subsequent tranches and therefore the total funding for Annex-A Group-I substances in the amount of US$ 11,200 per ODP MT of reductions in consumption not achieved in any year, unless the Executive Committee decides otherwise.

8. UNDP is the Implementing Agency for the implementation of this Phase-out Plan, which will be completed by the end of 2006. A fee of 13% (for the first US$ 0.5 million) and 11% (for the amount in excess of US$ 0.5 million) been agreed in accordance the relevant Executive Committee Decisions as indicated in Table-1. As the main implementing agency, UNDP would be responsible for the following:

a) Ensuring performance and financial verification in accordance with specific UNDP procedures and requirements as specified in the Refrigeration (Manufacturing) Sector Phase-out Plan;

b) Reporting on the implementation of the annual implementation programmes to be included as part of each annual programme starting with the submission for the 2004 annual implementation programme prepared in 2003;

c) Providing verification to the Executive Committee that the control targets listed Table-1 and the associated activities have been met;

d) Ensuring that technical reviews undertaken by UNDP are undertaken by appropriate independent technical experts;

e) Assisting Iran in preparation of annual implementation programmes, which will incorporate achievements in previous annual programmes;

f) Carrying out required supervision missions;

g) Ensuring the presence of an operating mechanism to enable effective, transparent implementation of the programme, and accurate data reporting;

h) Verifying to the Executive Committee that CFC consumption phase-out in the Refrigeration (Manufacturing) Sector has been completed based on the schedules listed in Table-1;

i) Ensuring that disbursements are made to Iran based on agreed performance targets in the project and provisions in this Agreement;

j) Providing assistance for policy, management and technical support for implementation of the Sector Phase-out Plan, as and when required.

9. The Government of Iran also commits through this Agreement, to permanently sustain the reductions indicated in Table-1.

TECHNICAL REVIEW

1.Country:

Iran.

2.Project Title:

Sector phaseout plan for CFCs in the refrigeration (manufacturing) sector in Iran.

3.(Sub)Sector:

Refrigeration. Rigid foam.

This review only covers the foam part.

4.CP-Relationship:

Iran ratified the Vienna Convention and the Montreal protocol in 1990. The CP was prepared in 1993 with the aim to eliminate OSD, whereby priority was given to the foam and refrigeration sectors.

The Ozone Layer Protection Center supervises and coordinates phaseout efforts through the adoption of the strategy formulated by the National Ozone Committee, in cooperation with the consuming and supplying industries, and helped by the implementing agencies.

Complete phaseout is now foreseen early 2007.

5.Technology:

In order to eliminate the remaining ODS in the refrigeration manufacturing sector, this project foresees a combination of investment, technical support and policy, and managing components.

Under the first heading, and for the mediumsized enterprises, individual subprojects covering 25 companies are foreseen, which can be split up into domestic (13 units) and commercial refrigeration (12 units).

The small enterprises count 2 group subprojects, respectively with 30 and 25 companies, the latter group having no foaming baseline.

In all projects, CFC 11 will be substituted with HCFC 141b. The justification is acceptable (as mentioned in 5.4), if it is considered as an interim step to a zero ODS solution.

The technical changes, as explained under 4.1.1, as well as the technical assistance (as clarified under 4.1.2, 4.1.3 and 4.1.4) are correct.

The policy and management support component should foresee further information to the eligible companies as to inform them when a technically and economically zero ODS technology is available in Iran.

6.Environmental Impact:

HCFC 141b has an ODP and a GWP of 0.1 (vs 1.0 for CFC 11). The smog potential is about ten times the one of CFC 11. The emission legislation of Iran must be consulted, and the workplace concentration must be monitored and kept below the legal value.

7.Project Costs:

Both ICC and IOC can be accepted as presented.

8.Implementation:

Can be accepted as presented, but ten quarters seem rather long.

9.Recommendation:

It is recommended to accept the project.

Prepared by Dr. Hubert Creyf, UNDP Foam Sector Reviewer.

Date:092502.

UNDP - Project Proposal Review

Country: **IRAN**
Firm: **Various**
Type: **Refrigeration (Manufacturing) Sector Phase-out Plan**
Date: **September 2002**

RTU-UN/Pav-LK-20338-dl

Scope
The plan under review covers the conversion in Iran of the remaining CFC consumption in the manufacturing of all domestic and commercial refrigeration units (it excludes the servicing sector). Only the refrigeration part has been reviewed.

1. Project Objectives and Institutional Framework
No comments regarding this description. The (existing) legislation is adequately described.

2. Description of the Refrigeration Sector
The description of the background and the structure of the refrigeration sector are clear. 3.2.1 "Supply industry" and 3.2.2 "User industry" give a good overview. In fact, the domestic manufacturing sector to date only deals with a few medium sized manufacturers, the commercial sector deals with a large number of small and medium sized manufacturers. The ODP tonnes (and CE values) given in the tables 1-2/3 are clear. It is useful information to learn that the net refrigeration consumption for 2001 is 1933 ODP tonnes (excluding servicing); a large amount of CFCs has already been addressed in approved projects (about 75%). The conclusion is correct (from the figures given from the survey that are confirming) that a "net" consumption of 389 ODP tonnes (of the consumption in refrigeration in 2001) still needs to be addressed via projects (or a sectoral plan for manufacturing), where a small portion is ineligible. Table 2 gives an adequate description of the historic project information, where the domestic and commercial sectors had a funding level of US$10.97/ODP kg.

The description of the historical approach (and technology choices) in phasing out as given in sections 3.3.1 and 3.3.2 does not raise questions. The current status as presented in section 3.3.3, particularly regarding the CFC phase-out is adequate. It is useful information to learn that only 20% of the total consumption are for servicing. Chapter 3.4, sections 3.4.1, survey methodology, and 3.4.2, survey results, do not raise comments. Looking at non-eligibility and eligibility is correctly interpreted. Tables 4 and 5 give brief descriptions of the companies concerned (small-sized and medium sized companies), which is supported by sections on "products manufactured", "baseline equipment", baseline resources" etc. Annex 2, which presents a list of the companies to be addressed, including with baseline information, is in order.

3. Project Description
The plant and process investments material given here is identical to the material given in separate projects before. A brief explanation is given why vacuum pumps cannot be retrofitted (although the list does not really explain issues), which is acceptable. It can be assumed (although there may be exceptions) that the existing refrigerant charging kits are not suitable for HFCs. Under "refrigerant operation" part c it is mentioned "upsizing the condensers and reengineering evaporators and condensers, so as to ensure the levels of cleanliness....". The first is engineering for product performance, the second has to do with the manufacturing process. This needs to be corrected (as far as experience from comparable projects is concerned, this can easily be reworded or changed).

The technical assistance is the important issue. One can assist companies via national consultants and experts, but it should be emphasised that one needs to make provisions that the companies do not stick to the use of CFCs (if they are cheap and available); in fact the small companies are comparable to small servicing companies where the same issue plays an important role. This implies destruction of old equipment, national monitoring, and some kind of certification of the manufacturing people and the products.

This is explicitly mentioned under "technical support component" point c "...sustaining the CFC free technologies". The important issue is the question "how can training and certification guarantee that the non-CFC operations become "sustainable". This is pertinent and is -as mentioned- addressed in section 4.2.

No comments to the management component description. This management could indeed be part of the system that guarantees that operations are CFC free, and one should attribute to this management component a clear reporting requirement on all kind of phenomena (verification of CFC phase-out, reporting system of CFCs and substitutes etc.).

4. Technology

The summary of the selection of the alternative technology for conversion is brief and adequate. The proposal gives a short overview of the refrigerant candidates for domestic/commercial refrigerators, i.e. HCF-134a, HFC-152a, propane and isobutane and their mixture (1:1). In fact, only, HFC-134a (R-404A) and isobutane are globally valid options for new equipment; it is acceptable that the proposal mentions that flammables are not suited for the SME operations considered here. The choice for HFC-134a (R-404A) is acceptable.

5. Environmental impact

The refrigerant HFC-134a (R-404A) proposed has no ODP and acceptable other environmental characteristics.

6. Project costs

The following to the project costs:
Incremental capital and operating costs and contingencies etc. amount to US$4.832 million, with a CE of 13.00/kg ODP. If this is compared to the cost effectiveness of historical approvals for medium or small commercial and domestic firms, being about US$10.97 (see Annex 1in the proposal), one can observe that the CE value in this proposal is about 16% higher, which is rather difficult to explain in general terms (mainly due to costs for foaming equipment).

No comments to Annex 1 and Annex 2. The values mentioned in the Summary of Annex 2 are consistent.

Costs given per company for domestic refrigeration manufacturers (US$27,000 per company, Annex 3) and for small and medium sized enterprises in the commercial sub-sector (US$8,000 and 13,500 per commercial refrigeration company for the refrigerant operation presented in Annex 3) are acceptable. The calculation of operational costs on the basis of the chemical only is acceptable (Annex 3). No comments to the cost effectiveness calculation.

Costs for quality and product standards consultancy are acceptable (it cannot be judged whether it should it be more than US$500 per day); the same applies to the policy component (it cannot be judged whether it should be US$100 per day).

7. Implementation time frame (disbursement schedule)

No comments. The draft agreement cannot be commented to.

8. Recommendation

The conversion project **is supported** where it concerns the entire project concept (for the refrigeration components) and the various elements, both investment and non-investment activities.

Eindhoven, 02 09 25
Kuijpers, LJM

C/text-general/project/wundp753

Ref:.....

Date:.....

Islamic Republic of Iran
Department of Environment

In the name of God

Montreal Protocol Unit
United Nations Development Programme
304 East 45th Street
New York, NY 10017

Subject : Submission of ODS phase-out projects for the 37th Meeting of the Executive Committee of the Multilateral Fund

Dear Sirs,

The Government of the Islamic Republic of Iran hereby requests UNDP to submit projects listed below to the 37th Meeting of the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol.

Name of Project	Type of ODS	ODS Consumption (ODP-MT)	ODS Phase-out (ODP-MT)	Implementing Agency
Group (Pajang, Azizian)	CFC-11, CFC-12	9.79	9.28	UNDP
Ali Felez	CFC-11, CFC-12	8.62	8.14	UNDP
Nik Boroudati & Hararati	CFC-11, CFC-12	26.75	25.12	UNDP
Nik Sard	CFC-11, CFC-12	15.06	14.35	UNDP
Niksun Sanaat	CFC-11, CFC-12	16.19	15.21	UNDP
Oul Bouran	CFC-11, CFC-12	12.79	12.00	UNDP

ODS Consumption Data

1. The ODS consumption figures of the projects have been validated by the Ozone Layer Protection Unit of Iran, our national ozone unit.

2. The ODS consumption data have been retained in the records of the Ozone Layer Protection Unit for reference and/or future verification.

3. The Government has been advised by Ozone Layer Protection Unit that the agreement to the projects indicates a commitment to ensure that the validated ODS phase-out figures will realize a sustained reduction from

Other Actions

4. It is understood that in accordance with the relevant guidelines, the funding received for a project, would be partially or fully returned to the Multilateral Fund, in cases

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Date:.....

Islamic Republic of Iran
Department of Environment

In the name of God

where technology will be changed during implementation without informing the Multilateral Fund Secretariat and/or without approval from the Executive Committee.

5. Ozone Layer Protection Unit undertakes to monitor closely, in cooperation with the customs authorities and the environmental protection authorities, the imports of CFCs and to combine this monitoring with periodic plant visits, for checking unauthorized use of CFCs.

6. Wherever applicable, Ozone Layer Protection Unit will cooperate with UNDP to conduct safety inspections and keep records of fires arising from conversion projects.

HCFC Justification

7. In line with Decision 27/13 of the Executive Committee and in recognition of Article 2F of the Montreal Protocol, the Government of Iran:

i) Has reviewed the specific situations involved with the projects mentioned above as well as its HCFC commitments under Article 2F.

ii) Has nonetheless determined that at the present time, the projects need to use HCFCs for an interim period with the understanding that no funding would be available for future conversion from HCFCs, for the enterprises involved.

Yours Sincerely
Dr. Yousef Hojjat

National Project Director and
Deputy Head of Department of Environment

May 22, 2002

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Date: 6 may 2002

Islamic Republic of Iran
Department of Environment
Human Environment Affair

In the name of God

Government Note of transmittal of investment projects to the executive committee of the multilateral fund for the implementation of the montreal protocol

The Government of the Islamic Republic of Iran requests UNIDO to submit the project(s) listed in Table 1 below to the Executive Committee of the Multilateral Fund for the implementation of the Montreal Protocol for consideration at its 37th Meeting.

Section I: ODS Consumption Data

The ODS consumption figures of the projects has/have been validated by the National Ozone Unit (NOU).

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

The Government has been advised by the NOU that the agreement to the projects indicates a commitment to ensure that the validated phase out figures were realized and yielded a sustained reduction from the 2001 consumption of 53.85 ODP tonnes for the refrigeration sector.

Table 1: Projects Submitted to the 37th Meeting of the Executive Committee by UNIDO

Project Title/Sector	Type of ODS	Consumption (ODP Tonnes), (2001)	Amount to be Phased Out (ODP Tonnes), *(2004)*
Refrigeration Sector			
Phasing out CFC-11 by conversion to HCFC-141b and CFC-12 to HFC-134a technology in the manufacture of commercial refrigeration equipment at the first medium size umbrella group of Iranian Commercial Refrigeration Manufacturers (Steel Work Co., Abbas Ali Nazari & Share Holders "Yakhnoosh Co.", Sard va Garm Sazi Pars Sasan Co., Momtaz Gharb Co. and Sard Sazan Kavir Kerman)	CFC-11 & CFC-12	53.85	51.60
Total		**53.85**	**51.60**

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In the name of God

Section II: Other Relevant Actions Arising from Decision 33/2

It is understood that, in accordance with the relevant guidelines, the funding received for a project would be partly or fully returned to the Multilateral Fund in cases where technology was changed during implementation of the project without informing the Fund Secretariat and without approval by the Executive Committee;

The National Ozone Unit undertakes to monitor closely, in cooperation with customs authorities and the environmental protection authorities, the importation and use of CFCs and to combine this monitoring with occasional unscheduled visits to importers and recipient manufacturing companies to check invoices and storage areas for unauthorized use of CFCs.

The National Ozone Unit will cooperate with the relevant implementing agencies to conduct safety inspections where applicable and keep reports on incidences of fires resulting from conversion projects.

Section III: Projects Requiring the Use of HCFCs for Conversion

In line with Decision 27/13 of the Executive Committee and in recognition of Article 2F of the Montreal Protocol, the Government

has reviewed the specific situations involved with the projects; *Steel Work Co., Yakhnoosh Co., Sard va Garm Sazi Pars Sasan Co., Momtaz Gharb Co. and Sard Sazan Kavir Kerman Co.* as well as its HCFC commitments under Article 2F; and

has nonetheless determined that, at the present time, the projects needed to use HCFCs for an interim period with the understanding that no funding would be available for the future conversion from HCFCs for the companies involved.

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Islamic Republic of Iran
Department of Environment
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In the name of God

Name and signature of responsible Officer:

Date: 4 May 2002

Designation:

Deputy Head of The Department for Human Environment Affair and The Ozone National Project Director

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Islamic Republic of Iran
Department of Environment
Human Environment Affair

In the name of God

Government Note of transmittal of investment projects to the executive committee of the multilateral fund for the implementation of the montreal protocol

The Government of the Islamic Republic of Iran requests UNIDO to submit the project(s) listed in Table 1 below to the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol for consideration at its 37th Meeting.

Section I: ODS Consumption Data

1. The ODS consumption figures of the projects has/have been validated by the National Ozone Unit (NOU).
2. The consumption data have been retained in the records of the NOU for reference and/or future verification.
3. The Government has been advised by the NOU that the agreement to the projects indicates a commitment to ensure that the validated phase out figures were realized and yielded a sustained reduction from the 2001 consumption of 48.952 ODP tonnes for the refrigeration sector.

Table 1: Projects Submitted to the 37th Meeting of the Executive Committee by UNIDO

Project Title/Sector	Type of ODS	Consumption (ODP Tonnes), (2001)	Amount to be Phased Out (ODP Tonnes), (2004)
Refrigeration Sector			
Phasing out CFC-11 by Conversion to HCFC-141b and CFC-12 to HFC-134a Technology in the Manufacture of Domestic Refrigeration Equipment in the First Medium Size Umbrella Group of Iranian Domestic Refrigeration Manufacturers (Mohammad Zadeh Industrial Group, Kavir Yazd Surma Co., Sarshar Broudat Co. "Sonya") / Dom. Ref	CFC-11 & CFC-12	48.952	47.049
Total		48.952	47.049

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Date: 4th May 2002

Islamic Republic of Iran
Department of Environment
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In the name of God

Section II: Other Relevant Actions Arising from Decision 33/2

4. It is understood that, in accordance with the relevant guidelines, the funding received for a project would be partly or fully returned to the Multilateral Fund in cases where technology was changed *during implementation of the project without* informing the Fund Secretariat and without approval by the Executive Committee;

5. The National Ozone Unit undertakes to monitor closely, in cooperation with customs authorities and the environmental protection authorities, the importation and use of CFCs and to combine this monitoring with occasional unscheduled visits to importers and recipient manufacturing companies to check invoices and storage areas for unauthorized use of CFCs.

6. The National Ozone Unit will cooperate with the relevant implementing agencies to conduct safety inspections where applicable and keep reports on incidences of fires resulting from conversion projects.

Section III: Projects Requiring the Use of HCFCs for Conversion

7. In line with Decision 27/13 of the Executive Committee and in recognition of Article 2F of the Montreal Protocol, the Government

(i) has reviewed the specific situations involved with the projects; Mohammad Zadeh Industrial Group., *Kavir Yazd Sarma Co.* , *Sarshar Broudat Co. "Sonya"* as well as its HCFC commitments under Article 2F; and

(ii) has nonetheless determined that, at the present time, the projects needed to use HCFCs for an interim period with the understanding that no funding would be available for the future conversion from HCFCs for the companies involved.

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Date: 7 May 2002

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Department of Environment
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In the name of God

Name and signature of responsible Officer:

Yhaggat

Designation:

Date: 4 May 2002

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Date: 18 Sept. 2002

Islamic Republic of Iran
Department of Environment
Ozone Layer Protection Unit

In the name of God

38th Meeting of the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol

GOVERNMENT NOTE OF TRANSMITTAL OF INVESTMENT PROJECTS TO THE EXECUTIVE COMMITTEE OF THE MULTILATERAL FUND FOR THE IMPLEMENTATION OF THE MONTREAL PROTOCOL
PROJECT(S) OF THE GOVERNMENT OF THE ISLAMIC REPUBLIC OF IRAN

The Government of Islamic Republic of Iran requests UNIDO to submit the projects listed in Table 1 below to the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol for consideration at its 38th Meeting.

Section I: ODS Consumption Data

1. The ODS consumption figure of the projects have been validated by the National Ozone Unit (NOU).

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

3. The Government has been advised by the NOU that the agreement to the project indicates a commitment to ensure that the validated phase-out figure was realized and yielded a sustained reduction from the 2001 consumption of ODP tonnes for the refrigeration sector

Table 1: Projects to be Submitted to the 38th Meeting of the Executive Committee by UNIDO

Project Title/Sector	Type of ODS	Consumption (ODP Tonnes). (2001)	Amount to be Phased Out (ODP Tonnes). (2004)
Refrigeration Sector			
Phasing out CFC _ 11 by convertion to HCFC_141b And CFC _12 TO HFC-134a technology in the manufacture of domestic refrigeration equipment at the first medium sized umbrella Group of Iranian Domestic Refrigeration Manufacturers Fanavar Novin Persia Co., Milad Khorram Co., Babak Ind. Co., Arminco Co.	CFC-11, CFC-12	50.96	48.87
Total			

Section II: Other Relevant Actions Arising from Decision 33/2

4. It is understood that, in accordance with the relevant guidelines, the funding received for a project would be partly or fully returned to the Multilateral Fund in cases where technology was changed during implementation of the project without informing the Fund Secretariat and without approval by the Executive Committee;

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Department of Environment
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In the name of God

5. The National Ozone Unit undertakes to monitor closely, in cooperation with customs authorities and the environmental protection authorities, the importation and use of CFCs and to combine this monitoring with occasional unscheduled visits to importers and recipient manufacturing companies to check invoices and storage areas for unauthorized use of CFCs.

6. The National Ozone Unit will cooperate with the relevant implementing agencies to conduct safety inspections where applicable and keep reports on incidences of fires resulting from conversion projects.

Section III: Projects Requiring the Use of HFCs for Conversion

7. In line with Decision 27/13 of the Ex Com and in recognition of Article 2F of the Montreal Protocol, the Government

(a) has reviewed the specific situation involved with the projects: Fanavar Novin Persia Co., Milad Khorram Co., Babak Ind. Co., Arminco Co. as well as their HCFC commitments under Article 2F; and

(b) has nontheless determined that, at the present time, the projects needed to use HCFCs for an interim period with the understanding that no funding would be available for the future conversion from HCFCs for the companies involved.

Name and signature of responsible Officer :

Fereidoun Rostami F. Rostami

Designation: Ozone Office Manager
Date: 18 September 2002
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38th Meeting of the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol

GOVERNMENT NOTE OF TRANSMITTAL OF INVESTMENT PROJECTS TO THE EXECUTIVE COMMITTEE OF THE MULTILATERAL FUND FOR THE IMPLEMENTATION OF THE MONTREAL PROTOCOL

PROJECT OF THE GOVERNMENT OF THE ISLAMIC REPUBLIC OF IRAN

The Government of Iran requests UNDP to submit the project(s) listed in Table 1 below, to the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol for consideration at its 38th Meeting.

Section I: ODS Consumption Data

1. The ODS consumption figure of the project has been validated by the Ozone Layer Protection Center.

2. The consumption data have been retained in the records of the Ozone Layer Protection Center for reference and/or future verification.

3. The Government has been advised by the Ozone Layer Protection Center that the agreement to the project indicates a commitment to ensure that the validated phase-out figure would be realized and would yield a sustained reduction from the CY 2001 consumption of 2,268 ODP MT for the Refrigeration Sector.

Table 1: Project Submitted to the 38th Meeting of the Executive Committee

Project Title	Sector/Sub-Sector	ODS Phase-out (ODP MT)	Implementing Agency
Sector Phase-out Plan for CFCs in the Refrigeration (Manufacturing) Sector in Iran	Refrigeration Sector (excluding Servicing)	372	UNDP

Section II: Other Relevant Actions Arising from Decision 33/2

4. It is understood that, in accordance with the relevant guidelines, the funding received for a project would be partly or fully returned to the Multilateral Fund in cases where technology is changed during implementation of the project without informing the Fund Secretariat and without approval by the Executive Committee;

5. The Ozone Layer Protection Center undertakes to monitor closely, in cooperation with customs authorities and the environmental protection authorities, the importation and use of CFCs and to combine this monitoring with occasional unscheduled visits to importers and recipient manufacturing companies to check invoices and storage areas for unauthorized use of CFCs.

6. The National Ozone Unit will cooperate with the relevant implementing agencies to conduct safety inspections where applicable and keep reports on incidences of fires resulting from conversion projects.

Section III: Projects Requiring the Use of HCFCs for Conversion

7. In line with Decision 27/13 of the Executive Committee and in recognition of Article 2F of the Montreal Protocol, the Government

(i) has reviewed the specific situations involved with the recipients/participants in this project, as well as its HCFC commitments under Article 2F; and

(ii) has nonetheless determined that, at the present time, the project needs to use HCFCs for an interim period with the understanding that no funding would be available for the future conversion from HCFCs for the recipients/participants involved.

Signature: Yhojjat
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