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执行蒙特利尔议定书
多边基金执行委员会
第六十七次会议
2012 年 7 月 16 日至 20 日，曼谷

项目提案：中国

本文件载有基金秘书处有关以下项目提案的评论和建议：

销毁

- 关于消耗臭氧层物质废物管理和处置的试点示范项目 工发组织/日本

甲基溴

- 国家淘汰甲基溴（第二阶段，第七次付款） 工发组织/意大利

淘汰

- 氟氯烃淘汰管理计划（第一阶段）（订正协定） 开发计划署

项目评价表－多年期项目

中国

项目名称	执行机构
•关于消耗臭氧层物质废物管理和处置的试点示范项目	工发组织（牵头） 日本

国家协调机构：中华人民共和国环境保护部对外经济合作中心

最新报告的项目所涉消耗臭氧层物质消费数据

A：**第 7 条数据**（ODP 吨，2010 年）

附件一，氟氯化碳	968.6		

B：**国家方案行业数据**（ODP 吨，2010 年）

ODS 名称	次级行业/数量	次级行业/数量	共计
氟氯化碳			968.59

本年业务计划：供资总额：876,377 美元　淘汰总量：91.8 ODP 吨

项目名称

企业的消耗臭氧层物质用量		暂缺
将淘汰的消耗臭氧层物质		暂缺
将使用的消耗臭氧层物质		暂缺
本年业务计划中的项目		是
行业		消耗臭氧层物质销毁
次级行业		制冷和空调次级行业
项目影响		192 吨
项目期限		30 个月
地方所有权		100%
出口部分		%
申请的多边基金赠款	美元	2,197,885
执行机构支助费用	美元	206,341
多边基金的项目总成本	美元	2,404,226
成本效益	美元/公斤	11.45 ODS（公制）
项目监测进度标志		包括

秘书处的建议：	供单独审议

项目说明

导言

1. 工发组织作为牵头执行机构代表中国政府向第六十七次会议提交了一份关于消耗臭氧层物质废物管理和处置的试点示范项目的项目提案，最初提交时项目的费用总额为2,197,885美元。此项目是按照第58/19号决定提交的，将涉及在中国销毁192公吨消耗臭氧层物质废物。此项目将同作为双边机构的日本政府共同执行。

2. 第五十七次会议做出了一项决定，研究将遵照第二十次缔约方会议第XX/7号决定提出的关于消耗臭氧层物质处置的试点项目，规定此类试点项目可能涉及消耗臭氧层物质的收集、运输、储存和销毁，重点放在全球升温潜能值高的已集中的库存上，并对具有区域差异的第5条国家进行有代表性的抽样。成员们还强调关于消耗臭氧层物质处置的示范项目应当是可行的，且应当包括共同资金的引资方法。执行委员会第五十八次会议讨论了消耗臭氧层物质处置项目的选择标准和准则，并且最终通过了第58/19号决定。此项决定为关于消耗臭氧层物质的处置示范项目的审批奠定了基础。

背景

3. 在第五十九次会议上，执行委员会为工发组织提供了资金，以为中国的消耗臭氧层物质试点示范项目做准备。秘书处根据通过第58/19号决定确定的原则对这一提案进行了审查。秘书处还适用了此项决定第（a）（ii）分段，即具体规定不会为此试点项目的消耗臭氧层物质废物收集工作提供资金。消耗臭氧层物质收集的定义列入第五十八次会议报告的附件中，名为“列入消耗臭氧层物质处置示范项目供资暂行准则中的活动定义”。

4. 中国的试点项目将涉及已经收集的消耗臭氧层物质废物以及在项目期内由于参与省份正在进行的收集活动每年将获得的额外数量的氟氯化碳。此项活动通过执行三个组成部分，试图通过提供与消耗臭氧层物质销毁的各个方面（技术、财务、管制和业务）相关的重要信息和吸取的相关教训，为中国的消耗臭氧层物质销毁建立并展示一个可持续模式。此项目将与中国根据2008年核准的国家立法（废旧家电贸易政策执行措施）的规定针对家用电器正在开展的消耗臭氧层物质废物收集活动同时执行。此项法律提供了一项制度，规定凡购买新家电的消费者如果将更换的废旧电器送到指定的回收企业进行拆解将享受补贴。这还与2011年1月生效的废旧电气和电子设备回收和处置方案进一步挂钩，以促进中国综合利用资源和发展循环经济。在省一级，立法和其他相关规定由相应的环境保护局（环保局）来执行。详细的项目提案作为附件一附在本文件之后。

项目说明

5. 此试点项目首先将应对供销毁的192公吨消耗臭氧层物质的处置问题。此项目将在中国的三省一市（广东、江苏、天津和山东）执行，在设计时围绕着下文简述的三项战略内容进行：

(a) 第1部分：将侧重于销毁从拆解家用电冰箱过程中收集的CFC-12制冷剂并将其储存在罐中。设想这将在使用两种不同的技术——等离子体和回转窑——的两个地方销毁设施中进行。这一部分将在这两个设施所在地广东和天津进行示范。

(b) 第2部分：将侧重于按照两种不同的泡沫塑料管理战略销毁从拆解家用电冰

箱中获得的泡沫塑料中用作发泡剂的 CFC-11。第一种办法将研究销毁从使用中国已经供应的提取设施从泡沫塑料中提取的 CFC-11。第二种办法将使用两种不同的设施——地方市政废物处理设施和地方有害废物处理设施（都使用回转窑）——示范如何销毁含 CFC-11 的固体泡沫塑料。第 2 部分将在江苏省、山东省和天津市实施。每个省将管理在其本省再循环和回收中心储存的泡沫塑料中所含的 CFC-11，销毁工作将在设在各个省的销毁设施中进行。

(c) 第 3 部分：将侧重于销毁消耗臭氧层物质与销毁持久性有机污染物之间的增效作用，并审查在一家设施销毁这些物质的技术障碍。这一部分将示范 CFC-12 和含 CFC-1 的泡沫塑料在正在开展持久性有机污染物销毁活动的设施中是如何处理/销毁的。第 3 部分的实施工作将在天津市现有的一家此类设施中进行。

6. 在中国销毁消耗臭氧层物质所采用的总体办法将是通过销毁家电来进行，利用中国现有的国家有害废物和工业废物管理能力。因此，此试点项目的目的是，示范一个有害的消耗臭氧层物质可能产生巨大的废物流的发展中大国，是如何制定一项以无害环境方式管理消耗臭氧层物质废物的战略办法，以便在中国的不同省份进行更广泛推广的。还将出台各种措施，通过考虑到将通过全国庞大的技师和私营部门再循环公司网络收集的现有消耗臭氧层物质废物以及全国各地现有焚化设施中的此类废物，支持此项目的可持续性。这将得到中国现行立法框架的支持，其中包括涉及《蒙特利尔议定书》下消耗臭氧层物质管理的管理条例中的消耗臭氧层物质废物再循环和销毁规定。

7. 中国现在进行的最相关的消耗臭氧层物质废物收集活动是针对家电开展的活动。如上文第 4 段所述，《废旧家电贸易政策执行措施》允许各省市针对废旧家用电器建立收集、运输和拆解系统，包括家用电冰箱和空调设备。除了家用电器行业外，中国制冷维修行业的氟氯化碳淘汰计划也启动了汽车、工业和商用制冷及拆船次级行业的制冷剂再循环和再生活动。

8. 挑选这三省一市参加这一试点示范项目，是因为它们的经济发展水平高，电冰箱市场大和电冰箱更替率高；各省都针对显示出再循环率高的家电建立了收集系统；这些省份在当地还可提供销毁设施。依据在这些地区运行的现行收集系统，考虑到已经收集的数量和在执行项目期间将收集的数量，将有 27.8 吨 CFC-12 和 848.4 吨 CFC-11 可供销毁。试点项目将涉及上文所述总量中的 192 吨。

9. 表 1 提供了此试点项目三个项目组成部分的总体概述：

表 1：项目组成部分概述

	第 1 部分	第 2 部分	第 3 部分
名称	销毁 CFC-12 制冷剂	销毁泡沫塑料中所含的 CFC-11	同销毁持久性有机污染物的增效作用
说明	销毁从拆解家用电冰箱中获得的和罐中储存的 CFC-12 制冷剂	销毁通过两项不同的战略从拆解的家用电冰箱中获得的泡沫塑料中用作发泡剂的 CFC-11： • 战略 1：用现有设备提取 CFC-11，并将罐中储存的 CFC-11 运输到有回转窑的当地危险废物处理设施 • 战略 2：在两类销毁设施中直接销毁含 CFC-11 的泡沫塑料	在持续开展持久性有机污染物销毁活动的设施中销毁 CFC-12 制冷剂和含 CFC-11 的泡沫塑料
将要销毁的消耗臭氧层物质 - 数量 - 类型	8.37 吨 CFC-12	183.67 吨 CFC-11	• 27.05 吨（第 1 部分和第 2 部分下已经考虑） • CFC-12（1.35 吨）和 CFC-11（25.7 吨）
省/直辖市	广东和天津	山东、江苏和天津	天津
销毁设施	• 有等离子体设施的危险废物处理站（广东深圳危险废物处理站） • 天津：有回转窑的危险废物销毁设施（天津市天津合佳威立雅环境服务有限公司）	• 有回转窑的危险废物处理站（山东青岛新天地） • 有回转窑的市政固体废物销毁设施（江苏） • 有回转窑的危险废物销毁设施（天津市天津合佳威立雅环境服务有限公司）	• 有回转窑的危险废物销毁设施（天津市天津合佳威立雅环境服务有限公司）
示范价值	• 对于每项技术： a） 拟订销毁试验议定书 b） 解决设施内运营条件的技术问题 c） 监测要求（持续的最终排放监测、过程操作监测） • 根据后勤方面和成本效益考虑因素对两种受测试技术进行比较	• 就关于销毁泡沫塑料中所含的 CFC-11 的两项战略的成本效益问题得出结论（界定“距离阈值”指标） • 就提取的 CFC-11 处置工作的实际执行的各个方面得出相关结论 a） 拟订销毁试验议定书 b） 解决技术问题 c） 监测要求（持续的最终排放监测、过程操作监测） • 制订采样和实验室试验议定书，将此作为核查手段，以确保可获得销毁的 CFC-11 数量的精确估计数	• 落实销毁持久性有机污染物与销毁消耗臭氧层物质的后勤方面（运输、就地储存等）的成本最优化相关的增效作用 • 在界定搬运储存的消耗臭氧层物质废物、贴标签等程序时同继续进行的持久性有机污染物销毁项目协作 • 在界定以无害环境方式处置消耗臭氧层物质废物的整套标准时同继续进行的持久性有机污染物销毁项目协作 • 界定与开展持久性有机污染物和消耗臭氧层物质销毁活动的设施的技术鉴定相关的共同方面

10. 此试点项目还确定需要开展将提供体制支持的活动，旨在便利将这一试点示范项目纳入一项总体战略中，以确保在中国开展的消耗臭氧层物质销毁工作具有长期可持续性。这些支助性活动将涉及制定一个适当的政策框架，以支持以无害环境方式管理消耗臭氧层物质废物、培训活动和监督、核查以及管理信息系统的开发。

11. 设想消耗臭氧层物质销毁示范项目将在两年半的时间里执行。

将要处置的消耗臭氧层物质估计数

12. 如上所述，此试点项目将要处理的消耗臭氧层物质数量为 192 吨，其中有 78.7 吨已经收集并储存在 CFC-12 罐中和已收集的含 CFC-11 的袋装泡沫塑料中。这么多的消耗臭氧层物质随时可以销毁。如下文表 2 所列示，项目期限内估计的消耗臭氧层物质废物数量将来自在上述收集计划下开展的家用电器的处置活动，而某些数量的消耗臭氧层物质来自报废车辆和船只以及制冷维修：

表2：此项目中将收集和使用的消耗臭氧层物质废物估计数量

物质	已收集的数量（公吨）	执行项目期间将收集的消耗臭氧层物质废物（公吨）			项目执行期间将销毁的总量
		2012 年（下半年）	2013 年	2014 年（上半年）	
CFC-12	7.28	5.14	10.28	5.14	8.37
CFC-11	71.42	194.25	388.50	194.25	183.63
此试点项目将要销毁的数量	78.70	37.76	37.76	37.76	192.00

项目的财务管理

13. 设想多边基金提供的资金将承担在选定设施销毁上文确定数量的消耗臭氧层物质废物费用以及维护此试点项目的可持续性所需的支助性活动的费用。收集活动完全由地方环保局和再循环设施供资。将来运营这些焚化设施和其他基于本试点结果可能改型以便利消耗臭氧层物质销毁的潜在焚化设施，将通过中国国家指定的回收和再循环设施来供资。基于估算预测和进行中的现行收集工作，在此试点项目结束后 30 个省可能报废的终端电冰箱数量将达到 1 亿多台，保守地估计，预计将产生 100 万吨左右的消耗臭氧层物质废物。

挑选销毁技术/办法

14. 工发组织和中国考虑了在中国销毁消耗臭氧层物质废物的各种选择。技术选择的最重要考虑因素是，找到一种将有助于比较各种不同的销毁方法并且鉴定这些销毁方法的技术、经济和环境效益的选项。此项目没有考虑国家新设施的发展，也没有考虑供销毁的消耗臭氧层物质废物的出口，因为中国已经有了一些设施而且产生的废物可在当地销毁。至关重要的是要鉴定这些设施，并从体制上将其同目前已经投入使用的收集系统建立起联系。因此，提交的提案是围绕这一选项设计的。

对销毁进行监测和核查

15. 为了确保所有消耗臭氧层物质废物都得到适当说明，销毁过程将得到密切监测，将

通过为此目的建立的系统来记录数据。该系统将与一家已投入运行的信息中心链接，以确保在中国被拆解的家用电器可以追踪。由各省决定，该信息系统由地方政府商务部门或当地环保局管监测和管理。要求销售部门、收集企业和拆解站提交详细数据，以确保提供一个适当的监管链，以便从收集企业到拆解站收集的电器数量和类型可以追踪。鉴于该系统要求提供信息，确定对消耗臭氧层物质废物追踪，可以采用为保证在拆解方案期间回收终端消耗臭氧层物质而密切监测家电的相同方式，因为这是在源头产生的。现行的信息系统已经在使用，以收集参加项目执行的每个回收和再循环中心的现有氟氯化碳库存信息。这一详细程度和地方环保局在实地开展的相应核查活动阻止将纯净消耗臭氧层物质作为废旧消耗臭氧层物质列入，因为原来就有一项要求，再循环和回收中心提供关于已收集消耗臭氧层物质的由始至终的信息。

项目成本

16. 如下表所示，估计项目总成本为 2,399,295 美元，向多边基金申请的金额为 2,197,885 美元。201,410 美元将由其他供资来源承担，并将承担泡沫塑料运输费用、等离子体销毁设施技术鉴定费用以及项目的某些应急费用。

表 3：项目的拟议成本

类型	项目	单位成本（美元）	台数	金额（美元）
主要项目活动	回转窑和等离子体销毁 CFC-12	11.02	1,352.57	14,902
	等离子体销毁 CFC-12	14.70	7,016.57	103,144
	纯净的 CFC -11	9.27	59,862.20	554,923
	泡沫塑料中所含的 CFC-11	9.25	123,774.68	1,144,916
	技术鉴定	50,000	2	100,000
	小计			1,917,885
支助性项目活动	政策研究	20,000	1	20,000
	培训材料	10,000	1	10,000
	培训	150	100	15,000
	信息系统	10,000	1	10,000
	咨询费	10,000	5	50,000
	技术文献	25,000	1	25,000
	执行和管理	150,000	1	150,000
	小计			280,000
共计（美元）				2,197,885
成本效益（美元/公斤）				11.45

秘书处的评论和建议

评论

17. 秘书处根据遵照第 58/19 号决定阐述的标准进行的审查向工发组织发送了若干评论和意见。特别是，它注意到，试点示范项目将涉及三省一市，而核准的最初项目编制设想此项目仅在一个省的一家具体设施中执行。工发组织解释说，在项目编制过程中发现，在中国，在立法、再循环和处置能力和其他考虑因素方面，各省相差甚远。因此，工发组织和中国讨论并认为，对涉及具体设施和焚化方法的省份进行有代表性的抽样，将有助于得出一套适用于许多具有不同背景的省份的结论。仅在一个省是不可能的。它们还认为，仅在一个省执行项目对于中国这种大国来说不可能产生意义重大的示范价值。工发组织又指出，选定的省份已经拥有既定的收集、运输和拆解废旧家用电气系统以及焚化设施，因为完全能够参加这一试点项目。

18. 秘书处还对作为处置项目一部分提出的三个组成部分中所用的办法提出意见和疑问。它注意到，在第 1 部分中，似乎需要某种资本投资以购买等离子体设备并要求对此做出澄清，特别是鉴于这些关切与使用等离子体技术及其运行成本高相关。有关第 2 部分，秘书处提请工发组织注意将包括从泡沫塑料中提取 CFC-11 的拟议战略。之前的消耗臭氧层物质处置项目中就考虑过提取，但随后放弃了，因为发现这个过程极其昂贵且并不容易。关于第 3 部分，秘书处要求进一步详细介绍所采用的办法，包括考虑已经用于持久性有机污染物销毁的设施在使用方面的技术障碍，这可能导致逆排放加剧（即氟和氯），考虑如何解决这些问题。针对总体项目还就将采用的鉴定标准和如何衡量排放量提出疑问。

19. 工发组织澄清，关于第 1 部分，将在危险废物处理站安装的等离子体销毁设施与消耗臭氧层物质销毁项目毫不相干，多边基金不会提供资金。等离子体设备将在项目在广东开始执行时提供使用。关于第 2 部分，工发组织解释说，此项目可以测试从泡沫塑料中提取的 CFC-11 的销毁情况，提取业务将在山东的设施通过现有的和已投入运行的适当提取设备来完成。因此，使用这种设备不会给项目带来额外费用，因为其运行是目前在山东已到位的现行收集计划的一部分。它还澄清，此项目将研究提取成本、长期实施是否可行以及将其同与销毁含 CFC-11 的固体泡沫塑料相关的技术和成本进行比较，以弄清哪个对于中国最适合。

20. 针对秘书处对第 3 部分（显示出销毁持久性有机污染物与销毁消耗臭氧层物质的增效作用）提出的关切，工发组织在答复时说，将分析以下各项内容：

(a) 落实销毁持久性有机污染物与销毁消耗臭氧层物质的后勤方面（运输、就地储存等）的成本最优化的相关增效作用；

(b) 在界定搬运储存的消耗臭氧层物质废物、贴标签等程序时同继续进行的持久性有机污染物销毁项目协作；

(c) 在界定以无害环境方式处置消耗臭氧层物质废物的整套标准时同继续进行的持久性有机污染物销毁项目协作；以及

(d) 界定与开展持久性有机污染物和消耗臭氧层物质销毁活动的设施的技术鉴定相关的共同方面。

21. 关于排放监测，选定的销毁设施拥有一个在线系统，以监测在废气烟道中大多数污染物的浓度。该系统产生的信息将提供给当地环保局，各环保局将监测实地情况且可能适用纠正措施。工发组织还指出，在中国运行的用于销毁化学品的所有设施都必须达到国家排放标准并得到密切监测。工发组织又解释说，通过制订和执行试验性销毁议定书进行技术鉴定，将确保此项目所涉及的每个销毁设施达到技术和经济评估小组接受的 99.99%的销毁去除率，以及达到中国国家和地方政策及标准所规定的环境保护要求。试验性销毁议定书将包括，如果对于主要运行指标以及导致的排放的定性实行严格监测的话，处理参与此项目执行的每个设施收到的 5 吨以下的消耗臭氧层物质废物的数量。销毁设施应要求由一个经认可的独立审计员对这些标准进行核查，提供视察、核查、测试和认证服务。

22. 在同工发组织进一步讨论时，秘书处还建议，此项目的一个重要示范成果将是，编制一份技术报告/手册，将记录每个组成部分采取的步骤和取得的结果、开展技术鉴定的方式、设施升级的方式以及所涉费用。它建议，本报告随后可以在中国使用，并将为更广泛地通过销毁战略提供一种办法，这种办法是专门为拥有类似设施和特点的每个省份特制的。预计这将成为示范项目的一项重要成果，随后将纳入到收集系统中，将来也能够自我维持。工发组织将此考虑在内，并指出这将成为在此项目中确定的支助性活动下的技术文献的一项产出。

23. 工发组织还提供了秘书处要求提供的其他信息，以确保该提案完全符合第 58/19 号决定中的准则要求。项目的最终费用商定为最初提交时的金额，即 2,197,885 美元外加以 11.45/公斤美元计算的支助费用，这低于上文第 17 段下表 3 所述的第 58/19 号决定中规定的阈值（13.2 美元/公斤）。在这些资金中， 1,297,885 美元给工发组织， 900,000 美元给日本政府，作为其双边捐款的一部分。

建议

24. 谨提议执行委员会考虑：

(a) 赞赏地注意到中国政府提交的关于消耗臭氧层物质废物管理和处置的试点项目，销毁总共 192 公吨消耗臭氧层物质废物；以及

(b) 核准在中国执行关于消耗臭氧层物质废物管理和销毁的试点项目，总额为 2,404,226 美元，包括给工发组织 1,297,885 美元外加 97,341 美元的机构支助费用；以及给日本政府 900,000 美元外加 109,000 美元的机构支助费用，但条件是将来不再为任何消耗臭氧层物质处置项目向中国提供其他资金。

PROJECT EVALUATION SHEET – MULTI-YEAR PROJECTS

China

(I) PROJECT TITLE	AGENCY
Methyl bromide	Italy, UNIDO

(II) LATEST ARTICLE 7 DATA (ODP Tonnes)			Year: 2010	
CFC: 968.6	CTC: 282.6	Halons: 0.0	MB: 201.7	TCA: 0.0

(III) LATEST COUNTRY PROGRAMME SECTORAL DATA (ODP Tonnes)						Year: 2010							
Substances	Aerosol	Foam	Halon	Refrigeration		Solvent	Process Agent	MDI	Lab Use	Methyl Bromide		Tobacco fluffing	Total Sector Consumption
				Manufacturing	Servicing					QPS	Non QPS		
CFC								968.6					968.6
CTC							179.3		256.9				436.2
Halons													0
Methyl Bromide										1,206.9	336.2		1,543.1
Others													0
TCA													0

(IV) PROJECT DATA			2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
Montreal Protocol Consumption Limits		MB	1,102.1	1,102.1	1,102.1	881.7	881.7	881.7	881.7	881.7	881.7	881.7	881.7	881.7	881.7	0.	
Maximum Allowable Consumption (ODP Tonnes)		MB	1,087.8	1,087.8	1,087.8	880.	723.8	570.6	390.	250.	209.	176.	150.	100.	50.	0.	
Project Costs (US$)	UNIDO	Project Costs		4,086,600.				1,200,000.	1,800,000.	1,300,000.	600,000.	500,000.	500,000.	500,000.	302,742.		10,789,342.
		Support Costs		306,495.				90,000.	135,000.	97,500.	45,000.	37,500.	37,500.	37,500.	22,706.		809,201.
	Italy	Project Costs				4,000,000.											4,000,000.
		Support Costs				470,000.											470,000.
Total Funds Approved in Principle (US$)		Project Costs		4,086,600.		4,000,000.		1,200,000.	1,800,000.	1,300,000.	600,000.	500,000.	500,000.	500,000.	302,742.		14,789,342.
		Support Costs		306,495.		470,000.		90,000.	135,000.	97,500.	45,000.	37,500.	37,500.	37,500.	22,706.		1,279,201.
Total Funds Released by the ExCom (US$)		Project Costs		4,086,600.		4,000,000.		1,200,000.	1,800,000.	1,300,000.	600,000.	500,000.	0.	0.	0.		13,486,600.
		Support Costs		306,495.		470,000.		90,000.	135,000.	97,500.	45,000.	37,500.	0.	0.	0.		1,181,495.
Total Funds Requested for Current Year (US$)		Project Costs											500,000.				
		Support Costs											37,500.				

(V) SECRETARIAT'S RECOMMENDATION:	Blanket Approval

项目说明

25. 工发组织作为牵头执行机构，代表中国政府向执行委员会第六十七次会议提交了为执行国家甲基溴淘汰计划第二阶段第七次付款（2012 年工作方案）供资的申请，总费用为 500,000 美元，外加给工发组织 37,500 美元的机构支助费用。所提文件还包括关于 2011 年甲基溴淘汰计划执行情况的进度报告和 2012 年执行方案。该项目目前正由意大利政府协助执行。

背景

26. 在其第四十四次会议上，执行委员会原则上核准了中国消费行业的国家甲基溴淘汰计划的第二阶段，供资总额为 14,789,342 美元（包括之前第四十一次会议为工发组织核准的淘汰 389 ODP 吨甲基溴的金额）。执行委员会还核准了中国政府与执行委员会之间的《协定》（第 44/30 号决定）。自那时以来，执行委员会核准了项目的头六次付款，总额为 9,400,000 美元，外加 875,000 美元的机构支助费用（470,000 美元批给意大利政府，405,000 美元批给工发组织）。

进度报告

27. 2007 年起甲基溴未被用作商品熏蒸用途。2006 年开始的技术援助方案已经完成，并为中国所有粮储设施提供了培训。国家粮食局以本国资金提供了培训和监测，并更新了储存设施。2008 年以来甲基溴不再被用于烟草育苗熏蒸。环境保护部环境保护对外合作中心和国家烟草专卖局提供了技术援助活动，包括实行了烟草苗圃的综合害虫管理，以确保持久的甲基溴淘汰，并提供了定期监测与核查以确保替代技术的长期可持续性。

28. 农业行业的甲基溴淘汰采取的办法是通过引进替代化学品以及黄瓜和番茄的嫁接以及对姜类作物使用替代化学品实现的。散发了培训材料、替代化学品和农业材料；2011 年对 1436 名农民进行了培训。

29. 进出口许可证制度自 2004 年 1 月 1 日起生效。中国政府自 2008 年起实施了制订的甲基溴生产的监测和管理制度。甲基溴消费与生产方案之间的协调机制已经制订。甲基溴受控用途的出口配额 2008 年定为 57 ODP 吨；2009 年定为 30 ODP 吨；2010 和 2011 年为零。未来几年的配额将根据甲基溴受控用途的年度削减目标有所削减。此外中国政府相关当局还于 2011 年 6 月撤销了对草莓和黄瓜行业使用的甲基溴的登记；因为甲基溴只能用于生姜行业。

30. 截至 2012 年 3 月，已为头六次付款核准 9,400,000 美元，并已发放 8,689,971 美元。710,029 美元的余额将于 2012－2013 年期间用于采购农业材料、额外培训和改进嫁接技术。

2012 年工作方案

31. 将有超过 107.5 公顷的土地采用生姜生产替代技术，在 16 个示范农场淘汰 43.0 ODP 吨甲基溴。工作方案还涉及：进一步改进和巩固黄瓜、烟草、茄子和西瓜作物的嫁接技术；制作适用替代化学品的机器原型；完成对中国农业行业淘汰甲基溴的评估，特别是在生姜行业。对 45 名项目管理者、80 名技术员、30 名监测工作人员和 900 名农民的培训方案将继续落实，同时还将举办提高认识活动。将举办关于嫁接寄主、生姜的综合害虫管理和评估淘汰方案成果的 4 次国际会议。

秘书处的评论和建议

评论

32. 中国政府根据《蒙特利尔议定书》第 7 条报告的 2010 年的 201.7 ODP 吨的甲基溴消费量，已较《议定书》所允许的 881.7 ODP 吨低 680.0 ODP 吨，较该国政府与执行委员会《协定》所允许的 209.0 ODP 吨低 7.3 ODP 吨。2011 年的甲基溴消费量估计为 176.0 ODP 吨，与《协定》所允许消费量相仿。如下表 1 所示，自从淘汰计划获得核准后，在意大利政府和工发组织的援助下，中国政府实现的甲基溴消费量的削减大于《协定》中所规定的消费量：

表 1. 中国甲基溴消费量

行业/年份	甲基溴消费量（ODP 吨）							
	2004	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011***
《协定》允许的消费量								
商品	126.0	46.0	25.2	-	-			
烟草	427.8	300.0	164.6	124.6	-			
农业	534.0	534.0	534.0	446.0	390.0	250.0	209.0	176.0
共计	1,087.8	880.0	723.8	570.6	390.0	250.0	209.0	176.0
实际消费量								
商品	52.2	32.1	7.0	-	-	-		
烟草	227.8	54.0	21.0	32.4	-	-		
农业	534.0	534.0	282.1	351.7	371.3	241.9	201.7	176.0
共计	814.0	620.1	310.1	384.1	371.3	241.9	201.7	176.0

(*) 估计。

33. 秘书处提出了几个技术和与费用相关的问题，并得到了工发组织的满意答复。关于土壤虫害控制所用氯化苦的长期可持续性的问题，工发组织解释说，由于熏蒸公司所使用的技术、专长和专门设备会降低熏蒸剂的剂量比率，抵消了同规定持有许可证熏蒸人员必须使用熏蒸剂相连的较高经营成本。

34. 关于中国的 1,3-二氯丙烯的登记，工发组织解释说，尽管该进程于两年前开始，但鉴于欧洲几个国家取消熏蒸剂的注册，这一进程尚未结束。虽然熏蒸剂被证明对生姜作物有效，但却是很持久性的化学品，造成地下水的污染。目前正在发展作物管理规约和综合害虫管理。

35. 在解释同培训方案相关的活动时，工发组织指出，地方政府机构工作人员将负责向农民提供技术援助，监测并评估执行项目外的甲基溴替代品。培训方案还将与学术界的项目（由于河北农业大学负责监测和评价整个项目）和科学界（由于中国农业科学院负责执行技术援助方案）相连。对熏蒸公司工作人员的“训练培训员”将确保替代技术的广泛传播。

36. 如下文表 2 所示，正如工发组织报告的，自执行甲基溴淘汰计划第一次付款以来，培训了超过 23,400 名培训员和农民。

表 2. 中国培训的培训员和农民人数

作物	2008	2009	2010	2011	共计
培训员					
草莓	233	185	60	-	478
黄瓜/番茄	57	678	-	-	735
生姜	27	475	-	-	502
茄子	-	-	-	-	0
共计	317	1,338	60	0	1,715
农民					
草莓	10,851	6,902	500	172	18,425
黄瓜/番茄	120			200	320
生姜	50	1,554	308	879	2,791
茄子				185	185
共计	11,021	8,456	808	1,436	21,721
总计	11,338	9,794	868	1,436	23,436

建议

37. 谨建议执行委员会考虑：

(a) 注意到关于中国国家甲基溴淘汰第二阶段的第六次付款执行情况的进度报告；以及

(b) 核准同第七次付款相关的 2012 年度执行方案。

38. 秘书处还建议按下表所示金额一揽子核准同国家甲基溴淘汰第二阶段 2012 年度执行方案相关的第七次付款。

	项目名称	项目资金（美元）	支助费用（美元）	执行机构
(a)	国家甲基溴淘汰计划（第二阶段，第七次付款）	500,000	37,500	工发组织

中国：氟氯烃淘汰管理计划（第一阶段）（经订正的协定）开发计划署

39. 在执行委员会第六十四次会议上，第 64/49 号决定核准了中国氟氯烃淘汰管理计划以及“中国政府与多边基金执行委员会关于削减氟氯烃消费量的协定”。在随后的一次会议上，对该协定作了修订，对溶剂行业的行业计划作出了规定，新的文本获得核准。在第六十六次会议上，执行委员会核准了附录 5-A，内载以往所确定的监测作用和机构。

40. 在编制本文件时，仍需作三项修正：

(a) 在第六十六次会议上，德国政府通知，德国政府试图削减其在挤塑聚苯乙烯泡沫塑料行业的执行工作中的双边机构的角色。德国政府提交了相应减少其对挤塑聚苯乙烯泡沫塑料行业执行工作的捐助，并相应增加对工发组织所提

供资金的申请。德国政府还提议，经工发组织和中国政府同意后，将挤塑聚苯乙烯泡沫塑料行业的行业牵头机构的角色由德国政府移交给工发组织；

(b) 中国政府向臭氧秘书处提交了 2010 年的第 7 条数据，除其他外，导致确定了中国的氟氯烃消费量基准。根据第 64/49 (f) 和第 65/36 (d) 号决定，秘书处被授权对协定作相应的增订。开发计划署代表中国政府提出了相关的草案；

(c) 对所有参与执行中国氟氯烃淘汰管理计划的机构而言，除了第一次付款的机构费用外，没有确定过机构费用，因为目前尚未商定本三年期的行政费用机制。第二次付款的供资申请计划向第六十八次会议提出，如果未就中国氟氯烃淘汰管理计划的行政费用机制和支助费用达成协议，该申请要获得核准就需要具体的安排。

秘书处的评论和建议

评论

41. 秘书处审查了德国政府就其角色和捐款所提议的改变。秘书处起草了德国政府所要求改变之外的若干改变，以便在与这两个执行机构的角色相关的《协定》附录 6-C 和 6-E 的新版本中反映改变后的角色和责任。通过作为牵头机构的开发计划署，这确保了中国政府同意所提议的德国政府和工发组织角色的改变，并同意将这一点反映在文件附件一附录 6 第 9 段所载《协定》中。

42. 中国政府提供了与有关其现在所确定基准以及其在《协定》中的表述的信息。这包括与《协定》反映在《协定》附录 2-A 第 1.1 行“目标和供资”中与第 7 条相符的基准数据，以及同意附录第 1.2 行所示修订后的根据本协定的氟氯烃最高允许消费量，以及附录 1-A“物质”所示所有氟氯烃的起点的相应数字。附录 1-A 中的数字以及附录 2-A 第 1.2 行的最高允许消费量的数字，反映了多边基金中国消费量淘汰协定中的现时作法，即：核实海关记录和中国政府的许可证数据，以确定消耗臭氧层物质的进出口，以及核实业界相同的消耗臭氧层物质的生产情况，并将这些数据结合在一起，得出与第 5 (a) (i) 第 2 段所界定的与遵守《协定》相关的 数字。在基准修订后，附录 2-A 第 1.3 行“目标与供资）中的数字也作了更新。

43. 在第六十六次会议上，中国政府向秘书处和执行委员会的几位成员提出了与计算《协定》下的全部淘汰相关的问题；会议期间未能满意地回答解决这些问题。秘书处重新审视了秘书处的记录，并重新计算了数字。因此，秘书处认为，现有《协定》准确反映了第六十四和第六十五次会议的讨论情况和决定的用意。经与开发计划署和中国政府协商后，双方均确认了秘书处的意见。意识到《协定》的以往版本在使用小数点后一位和两位数方面有不一致的时候，继收到臭氧秘书处关于今后 ODP 吨的消费量数字使用小数点后两位数的信函后，并理解中国的基准数字的计算和今后的继续提供都采取小数点后一位数，秘书处相应地以小数点后一位数的形式提供了《协定》中基准信息的数字，以小数点后两位数的形式提供了与剩余符合条件的消费量相关的所有信息的数字。拟议的相关改变已通知给牵头机构，以便与中国政府进行讨论，中国则政府通过开发计划署确认，秘书处的这一建议已被接受。

修订氟氯烃淘汰管理计划的协定

44. 由于中国氟氯烃淘汰管理计划的核准是在氟氯烃履约基准确定之前，执行委员会在核准氟氯烃淘汰管理计划之前，请秘书处相应对《协定》加以更新（第 64/49 号决定）。《协定》内增加了新的一段，以指出，增订的《协定》取代第六十五次会议上达成的协定。本文件附件一提供了供执行委员会审议的新《协定》草案。

建议

45. 谨建议执行委员会：

(a) 注意到关于中国政府将氟氯烃氟氯烃消费量的持续总体削减的起点由 19,408.8 ODP 吨修正为 18,865.44 ODP 吨；

(b) 参照上文提供的评论，审议开发计划署代表中国政府提交的中国政府与执行委员会关于削减氟氯烃消费量的经订正的拟议《协定》草案；以及

(c) 注意到基金秘书处更新了中国政府与执行委员会的协定的第 1、6 和 9 段以及附录 1-A、2-A 和 6，以反映新确定的氟氯烃履约基准，以及，增加了新的第 15 段，以指出经增订的《协定》取代本文件附件一所载第六十五次会议上达成的《协定》（第六十六次会议核准了该协定的修正）。

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附件一

中国政府与多边基金执行委员会关于减少氯氟烃消费量的协定

1. 本协定是中国（“国家”）政府和执行委员会关于按照《蒙特利尔议定书》时间表在 2015 年 1 月 1 日之前将附录 1-A 所列消耗臭氧层物质（“物质”）的控制使用减少到 16,978.9 ODP 吨的持续数量的协定。

2. 国家同意执行本协定附录 2-A（“目标和供资”）第 1.2 行（附件 C 第一类物质的最高允许消费总量）以及附录 1-A 规定的《蒙特利尔议定书》中所有物质削减时间表所列各种物质的年度消费量限额。国家接受，在接受本协定以及执行委员会履行第 3 款所述供资义务的情况下，如果物质的任何消费量超过附录 2-A 第 1.2 行规定的数量，这是本协定针对附录 1-A 规定的所有物质的最后削减步骤，或者任何一种物质的消费量超过第 4.1.3、4.2.3、4.3.3、4.4.3、4.5.3 和 4.6.3 行规定的数量（剩余符合资助条件的消费量），该国将没有资格就这些物质申请或接受多边基金的进一步供资。

3. 以国家遵守本协定所规定义务为条件，执行委员会原则上同意向国家提供附录 2-A（“目标和供资”）第 3.1 行规定的资金。执行委员会原则上将在附录 3-A（“资金核准时间表”）所指明的执行委员会会议上提供此笔资金。

4. 国家同意根据所提交氟氯烃淘汰行业计划以及附录 8-A 所述承诺执行本协定。根据本协定第 5(a)(二)和第 5(b)(一)款，国家应接受对制造能力改造情况的完成情况以及附录 2-A 第 1.2 行所规定各种物质的年度消费限额的成果进行的独立核查。。

5. 国家如果至少在资金核准时间表所指明相应执行委员会会议之前 8 周[1]未能满足下列条件，执行委员会将不按照资金核准时间表提供资金：

(a) 为了任一次付款的发放：

(一) 国家已达到附录 2-A 第 1.2 行规定的所有相应年份的目标。相应年份指的是本协定核准之年以来的所有年份。在向执行委员会会议提交供资申请之日无义务报告国家方案数据的年份除外；

(二) 已对这些目标的实现情况进行了独立核查，除非执行委员会决定不需要进行此类核查；以及

(三) 对于自第六十八次会议起的所有呈件而言，收到政府确认已制订可付诸实施的国家氟氯烃进口（以及适当情况下生产和出口的）许可证和配额制度，且该制度能够确保国家在本协定期间遵守《蒙特利尔议定书》的氟氯烃淘汰时间表；

(b) 作为发放行业计划付款的前提条件需予以满足的条件：

(一) 对含有制造能力转产活动的行业计划而言，国家提交了关于将要核查的年份中改造业已完成的至少 5%的生产线的随意抽样的核查报告，

[1] 根据第 20/7 号决定，金额超过 500 万美元的付款申请应在所适用执行委员会会议之前满 12 周之前提交。

但有一项谅解，即：生产线随意抽样的氟氯烃总体消费总量至少占该年所淘汰行业消费量的 10%；

(二) 国家已按照附录 4-A 规定的形式提交了涵盖上一个日历年的年度执行情况报告（“年度执行情况报告和计划格式”）；该国完成了之前已核准付款中规定的大部分执行行动；且之前已核准付款可提供的资金发放率超过 20%；以及

(三) 国家按照附录 4-A 规定的形式提交了涵盖各自行业的每个日历年的年度执行计划（“年度执行报告和计划格式”），其中包括供资日程表预计在完成所有预期活动之前提交下一次付款或者最后一次付款的年份。

6. 国家应确保对本协定所规定活动进行准确的监测，并将建立和维持监测不同行业消费量的制度，以确保遵守附录 2-A 第 1.3.1、1.3.2、1.3.3、1.3.4 和 1.3.5 行规定的行业消费限量。附录 5-A（“监测机构和作用”）所述机构应按照附录 5-A 规定的作用和职责，对上一个年度的执行计划的活动的执行情况进行监测，并作出报告。这种监测也应接受上文第 4 款所述的独立核查。

7. 执行委员会同意，国家可在为每一行业预想的资金范围内，根据实现最平稳减少附录 1-A 所述物质的消费量和淘汰这些物质的发展情况，灵活重新分配已核准资金或部分资金：

(a) 在执行本协定期间，如果国家决定实行替代技术而不是所提交行业计划中建议的技术，或以不同于各项行业计划所建议的方式予以执行，则所作改变需要作为年度执行计划的一部分获得批准。还可作为现有年度执行计划的一部分提供文件，但应于任何一次执行委员会会议之前 8 周提交。这一要求应包括为落实新替代技术所开展活动的变化所作说明、对相关增支费用的计算以及对气候的影响。国家同意，与技术改变相关的增支费用的可能的节余将相应地减少本协定规定的总体供资数额；

(b) 对资金分配有重大改变的，应按上文第 5(b)(三)款之规定事先记入下一年度执行计划，并征得执行委员会的同意。还可作为现有年度执行计划的一部分提供文件，但应于任何一次执行委员会会议之前 8 周提交。重大改变所涉及的是：

(一) 有可能涉及影响多边基金规则和政策的问题；

(二) 对本协定任何条款的修改；

(三) 已分配给单独的双边或执行机构的行业一级的不同付款的资金年度数额的变化；

(四) 为未列入现核准年度执行计划的方案或活动提供的资金，其费用超过上一次核准付款总费用的 20%；或 250 万美元，以数额较低者为准；以及

(五) 自年度执行计划中删除费用超过上一次核准付款总费用的 20%的活动或 250 万美元，以数额较低者为准；

(c) 不被视为有重大改变的重新分配，可纳入正在执行的已核准年度执行计划，并在随后的年度执行情况报告中向执行委员会做出报告；以及

(d) 任何剩余资金均应在《协定》的上一次付款完成之时退还多边基金。

8. 国家已同意全面负责管理和执行本协定以及为履行本协定的义务由国家或以国家名义开展的所有活动。对于本协定所规定的国家活动，开发计划署已同意担任牵头执行机构（“牵头执行机构”），德国政府、日本政府、工发组织、环境规划署和世界银行同意担任合作机构（“合作执行机构”）。国家同意接受各种评价，评价将在多边基金监测和评价工作方案下或参与协定的任何执行机构的评价方案下进行。

9. 牵头执行机构将负责确保协调根据本协定在所有相关行业开展的所有活动的规划、执行和报告工作，包括但不限于：根据第 5(b)(一)款规定的独立核查，以及执行同附录 6-A 所述作为牵头执行机构的作用相关的活动和附录 6-B 所述作为行业牵头执行机构的活动。工发组织和环境规划署将负责分别开展附录 6-C 和 6-F 所述各自行业计划中的活动，以及嗣后根据第 5(b)(三)款和第 7 款所作修订。世界银行将负责根据第 5(a)(二)款进行的独立核查，并执行附录 6-E 所述其作为行业牵头执行机构作用的额外活动。作为“合作执行机构”的德国和日本政府将负责开展附录 6-D 和 6-G 所述各项活动。执行委员会原则上同意向牵头执行机构及合作执行机构提供附录 2-A 第 2.1.2、2.2.2、2.2.4、2.3.2、2.4.2、2.5.2、2.5.4、2.6.2 和 2.7.2 行所列经费。

10. 如果国家由于任何原因没有达到附录 2-A 第 1.2 行规定的消除这些物质的目标，或没有遵守本协定，则国家同意该国将无权按照资金核准时间表得到资金。执行委员会将酌情处理，在国家证明已履行接受资金核准时间表所列下一期资金之前应当履行的所有义务之后，将按照执行委员会确定的订正资金核准时间表恢复供资。国家承认，执行委员会可按照当年未能削减的消费量的每一 ODP 公斤计算，减少附录 7-A 所述金额的资金。执行委员会将针对国家未能履行协定的具体案例进行讨论，并做出相关决定。根据上文第 5 款，一旦这些决定被采纳，这个具体案例将不会妨碍未来的付款。

11. 对本协定的资金，不得根据执行委员会今后做出的可能影响为其他消费行业项目或国家任何其他相关活动所作供资的任何决定进行修改。

12. 国家应遵照执行委员会、牵头执行机构、行业牵头执行机构及合作执行机构为促进本协定的执行而提出的任何合理要求行事。国家尤其应该让牵头执行机构、行业牵头执行机构及合作执行机构有了解为核查本协定的遵守情况所必需的信息的途径。

13. 继上一年在附录 2-A 中规定了最高允许消费总量之后，在本年底将完成氟氯烃淘汰管理计划的第一阶段及相关协定。如果届时仍有未按照行业计划的预期以及第 5(b)(三)款和第 7 款规定的嗣后修订完成的活动，则应在执行了剩余活动后，推迟到年底完成。根据附录 4-A 的第 1(a)、(b)、(d)、(e)和(g)项的报告要求在完成前应继续执行，除非执行委员会另有规定。

14. 本协定所规定所有条件仅在《蒙特利尔议定书》范围内并按本协定的规定执行。除本协定另有规定外，本协定所使用所有术语均与《蒙特利尔议定书》赋予的含义相同。

15. 经订正的本协定取代中国国政府与执行委员会在执行委员会第六十五次会议上达成的协定。

附录

附录 1-A：物质

物质	附件	类别	总体消费量削减起点（ODP吨）
HCFC-22	C	一	11,495.31
HCFC-123	C	一	10.13
HCFC-124	C	一	3.07
HCFC-141b	C	一	5,885.18
HCFC-142b	C	一	1,470.53
HCFC-225	C	一	1.22
共计			18,865.44

附录 2-A：目标和供资

		2011 年	2012 年	2013 年	2014 年	2015 年	共计
消费目标							
1.1	《蒙特利尔议定书》削减附件 C 第一类物质的时间表（ODP 吨）	暂缺	暂缺	19,408.8	19,408.8	17,468.0	暂缺
1.2	附件 C 第一类物质的最高允许消费总量（ODP 吨）	暂缺	暂缺	19,408.8	19,408.8	17,468.0	暂缺
1.3.1	工商制冷行业附件 C 第一类物质的最高允许消费量（ODP 吨）	暂缺	暂缺	2,360.0	2,360.0	2,124.0	暂缺
1.3.2	聚苯乙烯泡沫塑料行业附件 C 第一类物质的最高允许消费量（ODP 吨）	暂缺	暂缺	2,540.0	2,540.0	2,286.0	暂缺
1.3.3	聚氨酯行业附件 C 第一类物质的最高允许消费量（ODP 吨）	暂缺	暂缺	5,310.0	5,310.0	4,340.0	暂缺
1.3.4	制冷和空调行业附件 C 第一类物质的最高允许消费量（ODP 吨）	暂缺	暂缺	4,109.0	4,109.0	3,698.0	暂缺
1.3.5	溶剂行业附件 C 第一类物质的最高允许消费量（ODP 吨）	暂缺	暂缺	494.2	494.2	455.2	暂缺
为工商业制冷和空调行业计划的供资							
2.1.1	行业牵头执行机构（开发计划署）议定的供资（美元）	25,380,000	6,900,000	8,495,000	11,075,000	9,150,000	61,000,000
2.1.2	给开发计划署的支助费用（美元）	1,903,500	*	*	*	*	*
为挤塑聚苯乙烯泡沫塑料行业计划的供资							
2.2.1	行业牵头执行机构（工发组织）议定的供资（美元）	21,372,000	10,217,000	3,998,000	6,330,000	6,733,000	48,650,000
2.2.2	给工发组织的支助费用（美元）	1,602,900	*	*	*	*	*
2.2.3	行业合作机构（德国）议定的供资（美元）	459,023	390,977	-	-	500,000	1,350,000
2.2.4	给德国的支助费用（美元）	51,260	*	*	*	*	*
为聚氨酯泡沫塑料行业计划的供资							
2.3.1	行业牵头执行机构（世界银行）议定的供资（美元）	38,859,000	5,520,000	13,592,000	4,079,000	10,950,000	73,000,000
2.3.2	给世界银行的支助费用（美元）	2,914,000	*	*	*	*	*
为室内空调行业计划的供资							
2.4.1	行业牵头执行机构（工发组织）议定的供资（美元）	36,430,000	9,200,000	8,495,000	9,625,000	11,250,000	75,000,000
2.4.2	给工发组织的支助费用（美元）	2,732,250	*	*	*	*	*

为维修行业计划的供资，包括扶持方案							
2.5.1	行业牵头执行机构（环境规划署）议定的供资（美元）	1,579,000	598,000	1,104,000	1,173,000	786,000	5,240,000
2.5.2	给环境规划署的支助费用（美元）	176,703	*	*	*	*	*
2.5.3	行业合作机构（日本）议定的供资（美元）	80,000	80,000	80,000	80,000	80,000	400,000
2.5.4	给日本的支助费用（美元）	10,400	*	*	*	*	*
为国家协调的供资							
2.6.1	全面牵头执行机构（开发计划署）议定的供资（美元）	360,000	-	-	-	-	360,000
2.6.2	给开发计划署的支助费用（美元）	27,000	-	-	-	-	27,000
为溶剂行业计划的供资							
2.7.1	全面牵头执行机构（开发计划署）议定的供资（美元）	2,500,000	0	2,000,000	0	500,000	5,000,000
2.7.2	给开计划署的支助费用（美元）	187,500	0	*	0	*	*
总体供资							
3.1	议定的总供资（美元）	127,019,023	32,905,977	37,764,000	32,362,000	39,949,000	270,000,000
3.2	总支助费用（美元）	9,605,513	*	*	*	*	*
3.3	议定的总费用（美元）	136,624,536	*	*	*	*	*

附录 2-A：目标和供资－续

淘汰和剩余符合资助条件的消费量		
4.1.1	本协定下要完成的议定的 HCFC-22 淘汰总量（ODP 吨）	1,443.73
4.1.2	之前核准项目中要完成的 HCFC-22 淘汰量（ODP 吨）**	35.99
4.1.3	剩余的符合资助条件的 HCFC-22 消费量（ODP 吨）	10,015.59
4.2.1	本协定下要完成的议定的 HCFC-123 淘汰总量（ODP 吨）	0.00
4.2.2	之前核准项目中要完成的 HCFC-123 淘汰量（ODP 吨）	0.00
4.2.3	剩余的符合资助条件的 HCFC-123 消费量（ODP 吨）	10.13
4.3.1	本协定下要完成的议定的 HCFC-124 淘汰总量（ODP 吨）	0.00
4.3.2	之前核准项目中要完成的 HCFC-124 淘汰量（ODP 吨）	0.00
4.3.3	剩余的符合资助条件的 HCFC-124 消费量（ODP 吨）	3.07
4.4.1	本协定下要完成的议定的 HCFC-141b 淘汰总量（ODP 吨）	1,681.25
4.4.2	之前核准项目中要完成的 HCFC-141b 淘汰量（ODP 吨） ***	16.71
4.4.3	剩余的符合资助条件的 HCFC-141b 消费量（ODP 吨）	4,187.22
4.5.1	本协定下要完成的议定的 HCFC-142b 淘汰总量（ODP 吨）	260.81
4.5.2	之前核准项目中要完成的 HCFC-142b 淘汰量（ODP 吨） ****	6.66
4.5.3	剩余的符合资助条件的 HCFC-142b 消费量（ODP 吨）	1,203.06
4.6.1	本协定下要完成的议定的 HCFC-225 淘汰总量（ODP 吨）	0.00
4.6.2	之前核准项目中要完成的 HCFC-225 淘汰量（ODP 吨）	0.00
4.6.3	剩余的符合资助条件的 HCFC-225 消费量（ODP 吨）	1.22

* 待嗣后确定

** 与第 3 行未包括的以往所核准的资金 12,081,951 美元相关，包括一个压缩机制造转型项目，以及为消费 HCFC-22 和 HCFC-142b 的一个聚乙烯项目供资的 50%

*** 与第 3 行未包括的以往所核准的资金 2,753,079 美元相关

****与第 3 行未包括的以往所核准的资金 986,650 相关，包括为消费 HCFC-22 和 HCFC-142b 的一个聚乙烯项目供资的 50%

附录 3-A：资金核准时间表

1 资金核准时间表包括几次付款。根据本协定，一次付款的定义是每年分别为附录 2-A 所述每一行业计划或国家协调所规定提供的资金。

2 将于附录 2-A 所述年份的最后一次会议上审议核准未来供资的付款。

附录 4-A：年度执行情况报告和计划格式

1 牵头执行机构代表国家将至少在任何规定年份的执行委员会的第三次会议之前 8 周[2] 向多边基金秘书处提交以下报告，供该次会议审议：

(a) 根据《协定》第 5(a)(二)款提交的附录 1-A 所提每一物质的消费量的核查报告。如果执行委员会没有另做决定，此项核查必须与各付款申请一起提交，并应包括对本协定第 5(a)(一)款列出的委员会尚未确认收到核查报告的所有相关年份消费量的核查；

(b) 就上一次报告之前一年以来所取得的进展情况，为每一行业计划提供一份反映该行业的陈述报告，并按日历年提供数据，介绍国家在淘汰各种物质方面的情况，不同活动对其的影响以及这些活动之间的关系。报告应包括：按物质分列的由于执行各项活动的结果淘汰消耗臭氧层物质的情况，以及所使用的替代技术和所使用的相关替代办法，以便让秘书处能够向执行委员会提供有关所导致气候相关排放的变化的信息。报告还应进一步突出关于列入计划的各种活动的成功、经验和挑战，介绍国家情况的任何变化并提供其他相关资料。报告还应包括相对于以往呈交的年度执行计划的任何变化的资料以及调整的理由，例如拖延、按照本协定第 7 款之规定在执行付款期间运用资金重新分配方面的灵活性，或其他变化。陈述报告将包括本协定第 5(a)(一)款中列出的所有相关年份，此外还可能包括有关本年度活动的资料；

(c) 就每一行业计划，以书面形式说明根据第 5(b)(三)款计划提交下一次付款申请之前和包括提交该年将要开展的各项活动。说明应重点说明这些活动之间的相互依存性，同时考虑到在执行前几次付款中积累的经验和取得的进展；计划中的数据应按日历年予以提供。说明还应提及总体计划和取得的进展，以及预期的总体计划可能进行的调整。说明还应具体列出和详细解释对总体计划做出的改变。对今后活动的说明，可作为上文 (b)分段所述陈述报告相同的文件予以提交；

(d) 就包括生产线转产活动的每一行业计划而言，提交与本协定 5(b)(一)款所述已完成转产相关的核查报告；

(e) 就每一行业而言，通过在线数据库提交所有年度执行情况报告和年度执行计划的量化信息。按各次付款申请的日历年提交的量化信息将对报告（见上文第 1(b)和(c)款）的陈述和说明、年度执行计划和对整个计划的任何修改进行修订，并将涵盖相同的时段和活动；以及

(f) 就五条款项的执行摘要而言，概述上文第 1（a）至第 1（e）款的信息。

[2] 根据第 20/7 号决定，金额超过 500 万美元的付款申请应在所适用执行委员会会议之前满 12 周之前提交。

附录 5-A：监测机构和作用

1. 环境保护部对外经济合作办公室（环保部对外经济合作办公室），在牵头执行机构的协助下，负责整体协调氟氯烃淘汰管理计划将要开展的活动，并作为国家臭氧机构，负责实施消耗臭氧层物质管制的国家政策和立法。

2. 将根据有关政府部门根据本协定第 5(a)(二)款所记录的生产数据和正式进出口数据，监测和确定国家的消费量。

3. 除了第 5(a)(三)款提到的国家氟氯烃进口、生产和出口许可证和配额制度外，将建立面向有关不同消费行业内大量使用氟氯烃的企业的配额制度，以便控制消费量增长，实现上述企业消费量的削减和收集消费数据。

4. 对拥有大量中小企业（例如：聚氨酯泡沫塑料行业、溶剂行业、聚乙烯泡沫塑料行业和工商业制冷行业）的行业，将通过限制将要销售到国内市场的相关物质的数量对消费量进行管理。

5. 环保部对外经济合作办公室将密切监督在氟氯烃淘汰管理计划第一阶段开展转型活动的企业，以确保这些企业实现淘汰目标。

6. 环保部对外经济合作办公室将与牵头执行机构和合作机构协调，为核查本协定所规定的目标提供便利。

7. 环保部对外经济合作办公室将与牵头执行机构和合作机构合作，编制本协定第 5(b)(二)款和附录 4-A 所要求的报告。

附录 6-A：牵头执行机构的作用

1 氟氯烃淘汰管理计划第一阶段的牵头执行机构是开发计划署。该牵头执行机构将负责一系列活动，至少包括以下活动：

(a) 同国家协调相关的活动；

(b) 确保按照本协定及国家氟氯烃淘汰管理计划所规定的具体内部程序和要求，进行绩效和财务核查；

(c) 协助国家根据附录 4-A 拟订年度执行计划和后续报告；

(d) 向执行委员会提供独立核查，说明目标已实现（但附录 2-A 第 1.2 行所述整体消费目标除外）且相关年度活动已根据附录 4-A 按照年度执行计划的要求完成。这一独立核查可包括对各自行业的牵头执行机构进行的行业独立核查所作的汇编；

(e) 确保根据附录 4-A 将经验和进展反映在最新总体行业计划和未来的年度执行计划中；

(f) 完成年度执行情况报告、年度执行计划以及附录 4-A 所列整体计划的报告要求，以提交执行委员会；

(g) 确保由胜任的独立技术专家进行技术审查；

(h) 按要求完成监督任务；

(i) 确保拥有运作机制能够以有效透明的方式执行年度执行计划和准确报告数据；

(j) 确保向国家付款以指标为依据；以及

(k) 需要时提供政策、管理和技术支持等援助。

2 经与国家协商后，并考虑到提出的任何看法后，牵头执行机构将根据本协定第5(b)(一)款和附录 4-A 第 1（d）款选择并授权一独立实体，对氟氯烃淘汰管理计划的结果进行核查。牵头执行机构可将本款所述任务委托各自行业的牵头执行机构执行，但有一项谅解，即：这种授权不应干扰牵头执行机构对氟氯烃淘汰管理计划结果进行核查的责任。

附录 6-B：开发计划署的作用

1. 作为工商制冷行业和溶剂行业的行业牵头执行机构，开发计划署将负责开展这些行业计划所述一系列活动，并至少包括以下活动：

(a) 在需要时，提供这些行业所规定的政策发展、规划和行业方案制定的管理方面的援助；

(b) 确保根据本协定及其具体内部程序以及这些行业规定的要求，对业绩以及资金发放的进展情况进行核查，并协助国家实施和评估各项活动；

(c) 协助国家根据 4-A 编制制冷和空调行业年度执行计划；

(d) 编制根据 4-A 向牵头执行机构提交关于这些活动的报告；以及

(e) 确保对已实施活动进行财务核查。

2. 开发计划署还将作为同本协定未专门提及的任何氟氯烃消费行业所产生义务相关的任何行业的行业牵头执行机构，并担负与上文第 1 款极为相近的责任。

附录 6-C：工发组织的作用

1. 作为制冷和空调行业以及挤塑聚乙烯泡沫塑料行业的牵头执行机构，工发组织将负责开展这些行业计划所述一系列活动，并至少包括以下活动：

(a) 在需要时，提供制冷和空调以及聚乙烯行业计划所规定的政策发展、规划和行业方案制定的管理方面的援助；

(b) 确保根据本协定及其具体内部程序以及国家的制冷和空调以及聚乙烯泡沫塑料行业计划的要求，对业绩进行核查，并协助国家实施和评估各项活动；

(c) 确保根据本协定及其具体内部程序以及国家的制冷和空调以及聚乙烯泡沫塑料行业计划的要求，在资金发放方面取得进展；

(d) 协助国家编制附录 4-A 所要求的制冷和空调以及聚乙烯行业年度执行计划；

(e) 向牵头执行机构提交关于附录 4-A 所要求开展的这些活动的报告；以及

(f) 确保对已实施活动进行财务核查。

附录 6-D：德国政府的作用

1. 作为聚苯乙烯泡沫塑料行业的合作执行机构，德国政府将负责该行业计划所述一系列活动，并至少包括以下活动：

(a) 在需要时，提供聚乙烯泡沫塑料行业计划所规定的政策发展、规划和行业方案制定的管理方面的援助；

(b) 协助国家执行和评估各项活动；

(c) 向牵头执行机构提交关于附录 4-A 所要求开展的这些活动的报告；以及

(d) 确保对已实施活动进行财务核查。

附录 6-E：世界银行的作用

1 经与国家协商后，并考虑到所表达的任何意见，世界银行将根据本协定第 5(a)(二)款和附录 4-A 第 1(a)(一)款选择并授权一独立实体，对附录 2-A 第 1.2 行所述国家的消费情况进行核查。

2 作为聚氨酯泡沫塑料行业的行业牵头执行机构，世界银行将负责该行业计划所述一系列活动，并至少包括以下活动：

(a) 在需要时，提供聚氨酯行业计划所规定的政策发展、规划和行业方案制定的管理方面的援助；

(b) 确保根据本协定及其具体内部程序以及国家聚氨酯行业计划规定的要求，对业绩以及资金发放的进展情况进行核查，并协助国家实施和评估各项活动；

(c) 协助国家编制附录 4-A 所要求的聚氨酯行业年度执行计划；

(d) 向牵头执行机构提交附录 4-A 所要求的关于这些活动的报告；以及

(e) 确保对已实施活动进行财务核查。

附录 6-F：环境规划署的作用

1. 作为制冷维修行业的行业牵头执行机构，环境规划署将负责该行业计划所述一系列活动，并至少包括以下活动：

(a) 在需要时，提供政策发展方面的援助；

(b) 协助国家实施和评估由其负责的各项活动，并提请氟氯烃淘汰管理计划的牵头执行机构应确保活动有协调的顺序；

(c) 协助国家编制附录 4-A 所要求的维修行业行业年度执行计划；

(d) 向牵头执行机构提交根据附录 4-A 所要求的关于这些活动的报告；以及

(e) 确保对已实施活动进行财务核查。

附录 6-G：日本政府的作用

1. 作为制冷维修行业的合作执行机构，日本政府将负责该行业计划所述一系列活动，并至少包括以下活动：

(a) 在需要时，提供政策发展方面的援助；

(b) 协助国家实施和评估由合作执行机构资助的各项活动，并提请行业牵头执行机构应确保活动有协调的顺序；

(c) 向行业牵头执行机构提交根据附录 4-A 所要求的关于这些活动的报告；以及

(d) 确保对已实施活动进行财务核查。

附录 7-A：因未履约而减少供资

1 按照本协定第 10 款，如果每年没有达到附录 2-A 第 1.2 行具体规定的目标，超出附录 2-A 第 1.2 行规定数量的，供资数额将按每一 ODP 公斤消费量减少 160 美元。

附录 8-A： 国家就制冷和空调行业转产所作承诺

1 在氟氯烃淘汰管理计划的第一阶段，国家同意作为制冷和空调行业计划的一部分，至少将 18 条生产制冷和空调设备的生产线改造为碳氢技术。

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MULTILATERAL FUND FOR THE IMPLEMENTATION OF THE MONTREAL PROTOCOL ON SUBSTANCES THAT DEPLETE THE OZONE LAYER				
PROJECT COVER SHEET				
COUNTRY	People's Republic of China		**IMPLEMENTING AGENCY**	UNIDO JAPAN
PROJECT TITLE	Pilot Demonstration Project on ODS Waste Management and Disposal			
PROJECT IN CURRENT BUSINESS PROJECT			Yes	
SECTOR			ODS destruction	
SUB-SECTORS			Refrigeration and Air Conditioning sub-sector	
ODS DESTROYED	CFC-11		183.63	ODP tonnes
	CFC-12		8.37	ODP tonnes
	Total		192.00	ODP tonnes
PROJECT IMPACT	Net ODP value per annum		76.8	ODP tonnes
	Annual emissions in CO_2 equivalent		322,000	tonnes CO_2e
PROJECT DURATION – Demonstration Project				30 months
PROJECT COSTS -				
	Incremental Capital Costs		US$	2,018,375
	Contingencies		US$	100,920
	Incremental Operating Costs		US$	
	Policy and Management Support		US$	280,000
	Total Project Costs		US$	2,399,295
LOCAL OWNERSHIP				100%
EXPORT COMPONENT				0%
REQUESTED MLF GRANT				
	UNIDO		US$	1,297,885
	JAPAN		US$	900,000
	TOTAL		US$	2,197,885
COST EFFECTIVENESS			US$/kg	11.45
IMPLEMENTING AGENCY SUPPORT COSTS				
	UNIDO (7.5%)		US$	97,341
	JAPAN (13% / 11%)		US$	109,000
	TOTAL		US$	206,341
TOTAL COST OF PROJECT TO MULTILATERAL FUND			US$	2,404,226
STATUS OF COUNTERPART FUNDING			Committed – Provided by project participants to support main project activities (100,490 USD), plus contingency costs (100,920 USD)	
PROJECT MONITORING MILESTONES (Y/N)				Y
NATIONAL COORDINATING BODY			Foreign Economic Cooperation Office, Ministry of Environmental Protection of the People's Republic of China (FECO / MEP)	

Project summary:

The Foreign Economic Cooperation Office of the Ministry of Environmental Protection of the Government of China (FECO/MEP) and UNIDO are submitting a pilot demonstration project on ODS waste management and disposal to the 67th Meeting of the Executive Committee.

The main objective of the project is to contribute to set up a sustainable model for ODS destruction in the country by providing key information and lessons learned relevant to the various relevant aspects of ODS destruction (technical, financial, regulatory and operational).

In order to achieve this objective, the project will cover the disposal of **192 ODP tonnes of CFCs** over a period of three years. The amount of CFCs to be destroyed is distributed as follows:

- 8.37 tonnes of CFC-12 refrigerant;
- 59.86 tonnes of CFC-11 previously extracted from foams;
- 123.77 tonnes of CFC-11 contained in foams.

This amount of CFCs has already been collected or will be available during the implementation period as a result of well-documented on-going collection initiatives. The main source of CFCs to be destroyed are ODS waste collection activities targeting household appliances; a small share of the ODS waste destroyed under this project comes from the disposal of decommissioned vehicles and ships and refrigeration servicing.

The **project strategy** consists of three components

- Component #1 (Destruction of CFC-12 refrigerant): this component will focus on the destruction of CFC-12 refrigerant obtained from the disassembling of domestic refrigerators, and stored in cylinders. Implementation of this component will take place in two local destruction facilities using two different technologies (plasma and rotary kiln).
- Component #2 (Destruction of CFC-11 contained in foams): this component will focus on the destruction of CFC-11 used as blowing agent in foams obtained from disassembled domestic refrigerators applying two different foam management strategies:
  - Strategy #1: extraction of CFC-11 for destruction in a local hazardous waste treatment facility operating with a rotary kiln;
  - Strategy #2: direct destruction of foam containing CFC-11 in two different types of destruction facility.
- Component #3 (Synergies with POPs destruction): this component will focus on the destruction of both CFC-12 refrigerant and of foams containing CFC-11 in a facility with on-going POPs destruction activities.

Implementation of the project will take place in three provinces and one municipality in China, with ODS destruction being undertaken in four facilities showcasing various technologies and ODS management and disposal strategies.

The **demonstration value** of the project can be summarized as follows:

- For each of the technologies applied, the project will draw conclusions relevant to various aspects of the practical implementation of ODS waste disposal, which can be replicated in similar facilities throughout the country after the conclusion of the project;
- Comparison between different management and disposal strategies for CFC-11 contained in foams, based on cost-effectiveness, logistic aspects and technology-related issues;
- Development of a suitable sampling and chemical analysis protocol to determine the amount of CFC-11 destroyed by direct foam destruction;
- Analysis of the impact of combining POPs and CFCs destruction on the incremental costs associated to the latter, and technical aspects where potential synergies between both activities can be found.

PREPARED BY FECO (Z. Zhong)
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UNIDO (M. Caballero)

DATE 8 June 2012

Project Document

Ministry of Environmental Protection, People's Republic of China

United Nations Industrial Development Organization

Pilot Demonstration Project on ODS Waste Management and Disposal

May 2012

Table of Contents

Abbreviations

CFCs	Chlorofluorocarbons
CHEAA	China Household Electric Appliances Association
CRAA	China Refrigeration and Air-Conditioning Industry Association
EPB	Environmental Protection Bureau
ExCom	Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol
FECO	Foreign Economic Cooperation Office, Ministry of Environmental Protection of the People's Republic of China
GDP	Gross Domestic Product
GWP	Global Warming Potential
HCs	Hydrocarbons
HCFCs	Hydrochlorofluorocarbons
HPMP	HCFC Phase Out Management Plan
IEC	Information, Education and Communication
MEP	Ministry of Environmental Protection of the People's Republic of China
MP	Montreal Protocol
Mt	Metric ton
ODP	Ozone Depleting Potential
ODS	Ozone Depleting Substance
PMO	Project Management Office
RAC	Refrigeration and Air Conditioning
UNIDO	United Nations Industrial Development Organization
WEEE	Waste Electrical and Electronic Equipment

1. INTRODUCTION

The Executive Committee, at its 59th meeting, provided funds to prepare a pilot demonstration project on ODS waste management and disposal in China, to be developed in line with the criteria and guidelines for the selection of ODS disposal projects as reflected in Decision 58/19.

The project document has been prepared by experts coordinated by UNIDO and the Foreign Economic Cooperation Office of the Ministry of Environmental Protection of the Government of China (FECO/MEP). During the preparatory phase of the project, UNIDO and FECO staff and external experts have visited various provinces and have organized seminars and workshops attended by representatives from local Environmental Protection Bureaus (EPBs), appliance disposal enterprises, and industry experts. The present project document has been prepared based on the outcome of these activities.

As a result of this process, FECO/MEP and UNIDO submit the present project document to the 67th Meeting of the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol.

The main objective of the project is to contribute to set up a sustainable model for ODS destruction in the country by providing key information and lessons learned relevant to the various relevant aspects of ODS destruction (technical, financial, regulatory and operational).

In order to achieve this objective, the project strategy consists of three components, which address a number of issues that have been identified during the preparatory phase of the project as key areas to secure the long-term sustainability of ODS destruction activities in the country (see Section 6).

To ensure efficient implementation of the three project components, the project will proceed to the destruction of 192 tonnes of CFCs over a period of three years. The amount of CFCs to be destroyed is distributed as follows:

- 8.37 tonnes of CFC-12 refrigerant;
- 59.86 tonnes of CFC-11 previously extracted from foams;
- 123.77 tonnes of CFC-11 contained in foams.

This amount of CFCs has already been collected or will be available during the implementation period as a result of the on-going collection initiatives described in Section 3.2. of this document. The main source of CFCs to be destroyed are ODS waste collection activities targeting household appliances; a small share of the ODS waste destroyed under this project comes from the disposal of decommissioned vehicles and ships and refrigeration servicing.

Implementation of the project will take place in three provinces and one municipality in China, with ODS destruction being undertaken in four facilities showcasing various technologies and ODS management and disposal strategies.

In addition to the main project activities (those directly supporting on ODS destruction), the project includes a technical assistance component aimed at facilitating the integration of this pilot demonstration project into an overall strategy to ensure long-term sustainability of ODS destruction efforts in China. These supporting activities will address the following areas:

- Assistance on the development of an appropriate policy framework;
- Training activities;
- Supervision, verification and management information system (MIS).

2. COMPLIANCE OF THE PROJECT CONCEPT WITH THE FUNDING GUIDELINES (DECISION 58/19)

The Executive Committee, at its 58th Meeting, approved a set of interim guidelines for the funding of demonstration projects for the disposal of ODS in accordance with paragraph 2 of decision XX/7 of the Meeting of the Parties. The following information is provided to show the project's compliance with all the requirements as set out by the above mentioned Decision 58/19.

a) Updated and more detailed information for all issues mentioned under project preparation funding

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

The project includes all categories of activities for the disposal of ODS namely: collection, transport, storage and destruction, however it only seeks funding from the MLF for the later three activities in line with the interim guidelines for the funding of demonstration projects for the disposal of ODS.

A detailed description of the activities to be undertaken during the project implementation can be found in Section 7 of this project document.

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

During the preparation of the project document, on-going disposal programmes for other chemicals in China have been analyzed; the project document includes information on these programmes in Section 3.4.

One of the three components taken into consideration in the project strategy will explore synergies between POPs and ODS destruction activities through the destruction of both CFC-12 refrigerant and of foams containing CFC-11 in a facility with on-going POPs destruction activities. A detailed description of this project component can be found in Section 6.3. of this project document.

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

In order to achieve the project objectives, the project will cover the disposal of 192 ODP tonnes of CFCs over a period of three years. The amount of CFCs to be destroyed is distributed as follows:

- 8.37 tonnes of CFC-12 refrigerant;
- 59.86 tonnes of CFC-11 previously extracted from foams;
- 123.77 tonnes of CFC-11 contained in foams.

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

The amount of ODS to be destroyed has already been collected or will be available during the implementation period as a result of well-documented on-going collection

initiatives in the four provinces participating in the project implementation. Section 3.2. includes detailed information on these collection activities; Section 5.3. provides data on the available ODS banks in these four provinces.

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

Existing collection activities focused on the disposal of electric household appliances are described in Section 3.2.1. of this document; collection activities linked to the disposal of decommissioned vehicles and ships and refrigeration servicing are described in Section 3.2.2.

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

The project will focus on the destruction of CFCs; neither CTC nor halon disposal will be addressed during the implementation of this project.

b) Specific information required for project submissions

i. A detailed description of the foreseen management and financial set up.

In line with the guidelines for the funding of demonstration projects included in Decision 58/19, the project document has to include information on the following aspects:

- Total cost of the disposal activity including costs not covered by the Multilateral Fund, as well as the sources of funding for covering these costs: the following table summarizes this information, for which further details is provided in Section 9.2.4. of this project document:

Table 1: Total cost of the disposal activity

Item	Cost (USD)
Project Costs	
- Main project activities	2,018,375
- Supporting project activities	280,000
- Contingencies (5% of main project activities)	100,920
Total Project Costs	**2,399,295**
Project Costs not covered by the Multilateral Fund	
- Foam transportation	50,490
- Technical validation of the plasma destruction facility	50,000
- Contingencies	100,920
Total Project Costs not covered by MLF	**201,410**
Requested MLF grant	**2,197,885**
Cost-efficiency (USD/kg.)	**11.45**

- The sources of funding for covering costs for which MLF grant is not requested: Section 9.2.3. contains information on the co-financing sources;
- Description of the sustainability of the underlying business model: the implementation of this project will contribute to the long-term sustainability of ODS destruction activities in China by providing a comprehensive set of technical, economic, logistic and managerial data and lessons learned which will be an input

for the adaptation of the current legislative framework addressing ODS management and disposal. Section 8 of the project document describes how sustainability will be achieved by clearly defining the expected areas of intervention, the project beneficiaries, the environmental benefits and the issues that have been identified as key factors to ensure sustainability of the business model;

- Identification of time-critical elements of the implementation: these elements are outlined in Section 7.3.3. of this project document.

ii. A clear indication how the project will secure other sources of funding.

Section 9.2.3. describes how the project strategy secures co-financing for both its implementation and beyond, in line with the objective of the outlined business model of ensuring long-term sustainability of ODS destruction activities in China.

iii. A concept for monitoring the origin of recovered ODS for future destruction, with the objective of discouraging the declaration of virgin ODS as used ODS for destruction.

The project concept highlights the importance of this issue by including it as one of the main project activities, as described in Section 7.1.2. of this project document.

iv. Valid assurances that the amount of ODS mentioned in the proposal will actually be destroyed, and the agencies should submit proof of destruction with the financial closure of the project.

In order to ensure that this requirement is met during project implementation, detailed procedures have been designed as described in Section 7.1.6. of this project document.

v. An exploration of other disposal options for the used ODS such as recycling and reuse opportunities;

Exploration of alternative disposal options for ODS waste is undertaken by the recycling and recovery centres. The centres perform a qualitative characterization of the collected ODS waste and, should the purity be high enough and depending on existing demand, they promote reusing these relatively pure CFCs. Therefore, the amounts of ODS waste reported for destruction reflect those stocks for which alternative uses are not feasible.

3. BACKGROUND

3.1. ODS Waste-Related Legislation

The Government of China considers environmental issues in economic development of great importance; the current legislative framework in the country includes provisions for the recycling and destruction of ODS in the regulation addressing the management of ozone depleting substances.

The preparatory phase of the project has shown two important factors to be taken into consideration:

- The existing regulation only deals with ODS destruction in a limited way;
- The implementation of the ODS-related regulation is linked to other environmental regulations such as those regulating solid wastes and atmospheric pollutants.

The existing regulatory framework related to ODS recycling and disposal of vehicles and appliances in China consists of the following pieces of legislation:

1. *Scrap Automobile Recycling Administrative Policy*: the policy was passed on 13 June 2001 and determines that the State manages the automobile scrapping as a special profession, and practices a qualification system. Any firms or individuals other than those which obtained the qualification for recycling decommissioned automobiles shall not participate in the business.
2. *Announcement on Prohibiting the Production, Sales, Import and Export of Household Appliances that Use CFCs as Refrigerant or Foaming Agent*: the announcement points out that from 1 September 2007, no enterprise should sell household appliances using CFCs as refrigerant or foaming agent; from this same date, the import and export of household appliances using CFCs as refrigerant or foaming agent is banned, as well as the import and export of compressors for household appliances that use CFCs as refrigerant. The announcement emphasizes that it applies to products including refrigerators, freezers, household ice machines, household ice cream machines, rice cookers, and water heaters.
3. *Circular on Conducting Dichlorodifluoromethane (CFC-12) Recycling and Reuse in the Automobile Servicing Sector*: the Circular states that from 1 January 2008 enterprises in the automobile air-conditioner servicing business should gradually be equipped with CFC-12 refrigerant recycling equipment, and must recycle and reuse CFC-12 when servicing automobile air-conditioners.
4. *Circular Economy Promotion Law of People's Republic of China*: this law was issued on 29 August 2008 and came into effect on 1 January 2009. The law aims at improving the efficiency of resource utilization, protect and improve the environment, and achieve sustainable development through promoting the concept of circular economy, based on three pillars:

   - Reduce: minimization of resource consumption and generation of wastes in production, distribution and consumption processes;
   - Reuse: waste processing in order to make waste usable for productive purposes, or use the whole or a part of the waste as parts of other products;
   - Reclamation: using the waste as raw material or recycle the waste.

   This law established a series of incentives to support and push entities such as enterprises to voluntarily develop a circular economy, and penalties for behaviors of not fulfilling its obligations.
5. *Implementation Measures for the Used Household Appliances Trading Policy*: issued on 28 June 2009, the policy stipulated the subsidies for trading of appliances, the implementation steps, and responsible parties in detail. Products that are accepted include TV sets, refrigerators, washing machines, air-conditioners, and computers.
6. *Guidelines on Implementing Household Appliance Trade-in and Enhance Environmental Management of Waste Appliance Disposal*: announced on July 1st, 2009 the guidelines include the following elements:

   - Recognition of the need to develop disassembling and disposal technologies and equipment that suit China's situation;
   - Consumers who buy new appliances can enjoy subsidies by returning the replaced waste appliance to appointed recycling enterprises;
   - During the effective period of the policy the qualified enterprises that buy waste appliances from the consumers and send them to appointed disposal enterprises for disassembling can enjoy reimbursement of transportation expenses, while disposal enterprises that complete the disposal of waste appliances sold by the consumers can enjoy subsidies for disposal

Over 90 million appliances including TV sets, refrigerators, washing machines, air-conditioners and computers were disposed in 2009. The policy significantly promoted the recycling and responsible treatment of waste appliances.

7. *Regulation on Ozone Depleting Substances*: this regulation, which came into effect on June 1st, 2010, states that enterprises involved in the servicing and disposal of refrigeration equipment and systems and firefighting systems should proceed as follows:

   - They shall register at the local competent environmental protection department of the government;
   - They shall recycle and reuse ODS according to regulations of the environmental protection department of the State Council, or hand them over to enterprises specialized in recycling, reusing and destruction to render them harmless, and do not directly discharge them.

   Those who violate the regulation should be fined by the competent environmental protection department of the local government.

8. *Administrative Rules on Certifications for Waste Electrical and Electronic Equipment*: the rules were issued on November 5th, 2010 and came into effect on January 1st, 2011, with the following goals:

   - Regulate the certification of waste electrical and electronic equipment (WEEE) disposal;
   - Prevent WEEE from polluting the environment.

   The rule focuses on the application, approval and monitoring of the qualification for processing WEEE. The rule stipulates that enterprises processing WEEE must follow a specific local planning. The rule also provided information on application process, management of the certification, monitoring and legal responsibilities.

9. *Regulation on the Administration of the Recovery and Disposal of Waste Electrical and Electronic Equipment*: this regulation was issued on August 20th, 2008 and came into effect on January 1st, 2011. Its rationale is to regulate the recovery and disposal of WEEE, promote the comprehensive utilization of resources and development of a circular economy, and protect the environment and human health. This regulation applies to products including TV sets, refrigerators, washing machines, room air-conditioners, PCs, etc. The regulation specified the administrative departments for recycling WEEE, certification system, subsidies etc., as well as each stakeholder's management and legal responsibilities.

3.2. ODS Waste Collection Activities

3.2.1. Household Appliances

The most relevant on-going ODS waste collection activities in China are those targeting household appliances. As pointed out in the previous section, the *Implementation Measures for the Used Household Appliances Trading Policy* were issued on 28 June 2008 in order to encourage domestic demand through a subsidy system for the purchase of a number of appliances (including TV sets, refrigerators, washing machines, air-conditioners, and computers). This nation-wide piece of legislation has been implemented at provincial level by the corresponding Environmental Protection Bureaus (EPBs).

This programme has helped to define those parties involved in collection efforts as well as their respective capabilities and responsibilities in detail. The implementation of the programme has allowed for the set up of a collection, transportation and dismantling system targeting used

household electric appliances in provinces and cities[1].

The key elements of the programme are listed below:

- Certification: the sales, collection and dismantling enterprises have been chosen by bidding and certified by the local government through its EPB;
- Subsidy scheme: a consumer, whose used appliance was collected by the certificated collection enterprise, can get the subsidy for the procurement of the new appliance in the certificated sales enterprise;
- Responsibility: the collection enterprise is responsible to the collection of the used appliances from the consumers and the storage, as well as the transportation of the used appliances to the dismantling enterprises, in which the appliances will be dismantled;
- Monitoring: the sales and collection enterprises are monitored by the local commercial department and the dismantling enterprises are monitored by the local EPBs;
- Reporting requirements:
  - The information on the collection and transportation of the used appliances, as well as the delivery to the dismantling stations, should be reported by the collection enterprise;
  - The information on the receipt of the used appliances from the collection enterprise, as well as the dismantling numbers, should be reported by the dismantling stations;
  - The local commercial and environmental protection departments, as well as the local financial department, should double-check the consistency of the information from the stakeholders;

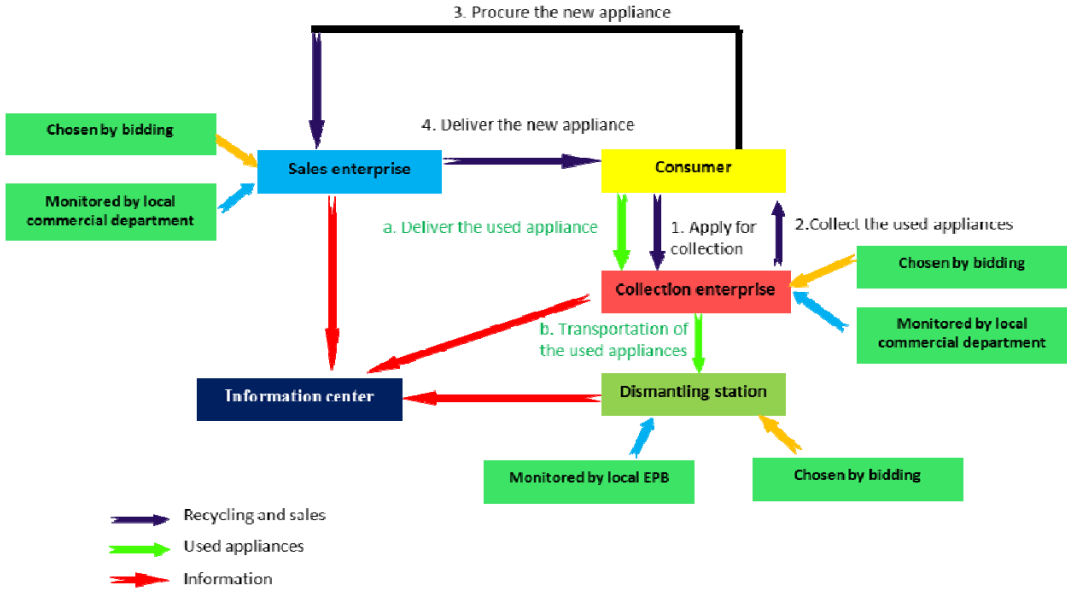
In line with the above, the key stakeholders involved in the collection programme are the following:

- Consumers;
- EPBs;
- Other departments within the local government (commercial, financial);
- Sales enterprises;
- Collection enterprises;
- Dismantling stations.

The following figure summarizes the procedure for the collection, transportation and dismantling of the used household electric appliances set up under the programme, as well as the relationships among key stakeholders:

[1] The People's Republic of China is organized in four different types of administrative divisions: provinces, autonomous regions, special administrative regions and municipalities. For the sake of simplicity, this document groups both provinces and autonomous regions under the term "province", and special administrative regions and municipalities under the term "city".

Figure 1: Collection, transportation and dismantling of household appliances in China



During the implementation of the programme, the number of refrigerators recycled, disassembled, and stored in disposal enterprises in some relevant provinces and cities can be found in Table 2. According to statistics, over 90% of the recycled refrigerators use CFC-12 as refrigerant, and CFC-11 as foaming agent, mainly due to the long life of refrigerators.

Table 2: Refrigerator collected in some relevant provinces and cities

Province / City	Number of refrigerators		
	Disassembled	Stored	Total
Beijing	30,712	197,398	228,110
Fuzhou	11,957	60	12,017
Guangdong	244,372	21,273	265,645
Jiangsu	248,393	7,120	255,513
Shandong	188,682	12,007	200,689
Shanghai	82,396	865	83,261
Tianjin	35,644	26,558	62,202
Zhejiang	104,749	39,934	144,683

3.2.2. Other Collection Activities

Besides the household appliance sector, the CFC phase-out plan for China's refrigeration servicing sector also initiated refrigerant recycling and reclamation in the automobile, industrial and commercial refrigeration and ship disassembling sub-sectors.

In the **automobile air conditioning subsector**, automobile servicing and disposal enterprises must obtain refrigerant recycling or refrigerant recycling and reclamation equipment before they can start operation. In addition to this, refrigerants must be recycled during servicing and disposal and careless discharge is forbidden.

Technological assistance activities such as policy making, standard making and public awareness have been conducted in this sub-sector. Funding from the Multilateral Fund has been used to undertake the following activities:

- Over 1,000 air conditioning systems have been recycled;

- Identification and reclamation devices have been provided;
- A data management system has been established;
- Over 6,000 technicians have been trained.

All these activities promoted refrigerant recycling and reclamation in the process of automobile servicing and decommissioning, and reduced the discharge of refrigerant.

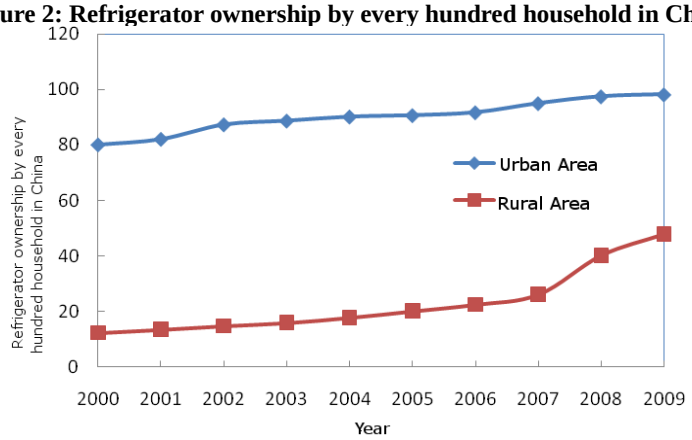
In the **industrial and commercial refrigeration** and **ship disassembling sub-sectors**, some servicing enterprises and ship disassembling enterprises have been equipped with refrigerant recycling devices. However, it is worth noting that the refrigerant recycling activities in these two sub-sectors are just starting, and have not reached the scale of the automobile air-conditioning sector. Refrigerants recycled from ship disassembling generally are sold to local servicing enterprises, where they are reclaimed and reused. Due to lack of supply, some industrial and commercial refrigeration servicing enterprises also recycle and reclaim CFC refrigerants, but the volume is small. Many large servicing enterprises recycle all ODS refrigerants when the cost is acceptable.

For refrigerants which are not recyclable, some are stored in enterprises or servicing shops, but still some are discharged into the atmosphere due to lack of destruction capability, lack of supervision, and high cost of destruction.

3.3. Forecast

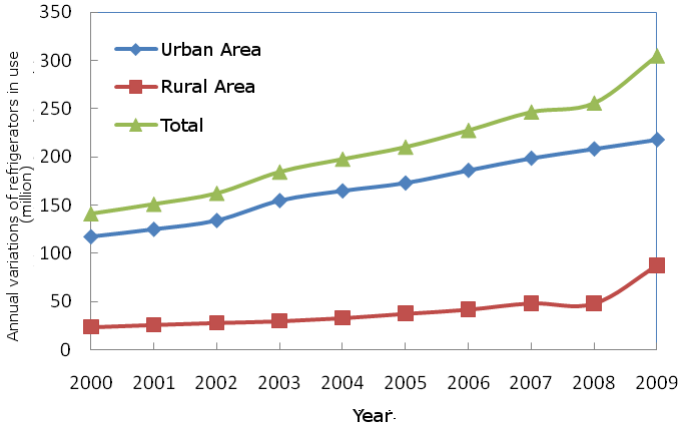
With the improvement of people's life standards in China, the number of refrigerators in use and in the market also rises. Figure 2 shows the ownership of refrigerators by every hundred families in the urban and the rural areas in China. The mean annual growth rate of refrigerator ownership for every hundred households is around 2.3% from 2000 to 2009 in the urban area and around 16.8% for rural areas, which is far higher than the urban area. This is due to the implementation of projects such as "Appliances for the Rural Areas" in the period from 2007 to 2009.

Figure 2: Refrigerator ownership by every hundred household in China



The average life of a refrigerator in China is 11-14 years, and Figure 3 shows the increase in refrigerators in use based on the production and sales figures of China's refrigerators. As shown, the average growth rate of refrigerators in use in China in the period from 2000 to 2009 is about 10.8%.

Figure 3: Annual variations of refrigerators in use (Million Units)



Using a market supply model, the number of refrigerators that can potentially be disposed from 2011 to 2017 in each province or city can be deducted from the apparent annual consumption of refrigerators in these places, as shown in Table 3.

Table 3: Forecast of refrigerator decommissioned in 2011-2017 for each province

Province	Year						
	2011	2012	2013	2014	2015	2016	2017
Anhui	491,600	544,100	492,800	544,300	784,800	1,116,900	1,422,900
Beijing	368,400	427,500	481,600	524,800	587,900	665,000	662,700
Chongqing	239,600	244,300	338,300	429,200	526,700	658,500	797,400
Fujian	261,800	324,500	418,900	514,600	654,300	890,600	1,035,100
Gansu	221,400	214,800	204,300	191,800	217,900	287,400	380,500
Guangdong	847,100	1,070,000	1,302,900	1,541,000	1,744,500	1,998,800	2,278,100
Guangxi	356,200	400,100	394,400	345,800	481,200	653,400	828,100
Guizhou	293,000	322,000	331,200	295,500	281,900	317,900	410,300
Hainan	62,600	59,400	67,400	79,900	93,500	111,700	154,900
Hebei	513,500	519,300	705,500	920,300	1,204,500	1,479,200	1,816,600
Helongjiang	299,600	289,400	301,600	379,200	496,900	626,800	788,900
Henan	769,600	803,300	728,900	942,200	1,312,200	1,752,800	2,207,800
Hubei	474,200	457,000	478,000	586,100	743,100	956,200	1,213,700
Hunan	566,700	549,400	506,600	567,600	699,900	923,000	1,208,800
In. Mongolia	181,700	258,600	395,200	556,800	673,700	814,400	948,700
Jiangsu	755,300	1,161,500	1,429,200	1,724,100	2,039,600	2,368,700	2,772,400
Jiangxi	364,800	322,600	366,700	480,000	596,500	729,400	1,004,300
Jilin	204,200	202,000	253,700	386,800	560,100	739,200	934,600
Liaoning	340,000	457,100	661,300	902,100	1,152,800	1,406,600	1,722,500
Ningxia	48,500	70,400	83,600	98,000	109,500	129,000	167,700
Qinghai	50,500	56,100	64,000	73,300	90,300	105,400	124,000
Shandong	738,400	1,180,900	1,539,400	1,995,100	2,309,800	2,537,600	2,966,100
Shanghai	446,300	495,300	574,800	637,700	688,300	754,000	800,400
Shanxi	297,700	275,200	324,300	415,100	551,000	741,300	952,900
Sichuan	738,600	688,600	652,200	779,000	976,700	1,252,200	1,555,000
Tianjin	177,700	221,900	257,800	297,900	346,800	417,900	537,700
Xinjiang	173,100	214,600	254,900	297,400	345,900	403,300	479,700
Xizang	22,800	29,500	36,100	40,300	50,800	58,400	65,600
Yunnan	355,300	367,000	339,100	380,400	486,100	613,300	759,000
Zhejiang	768,700	1,014,900	1,194,300	1,321,300	1,486,700	1,611,800	1,735,600

As shown in the table, it is expected that the number of decommissioned refrigerators will show an upward trend for all provinces and cities. Due to causes such as economy size, population size and area of the region, places such as Shandong, Jiangsu, and Guangdong have higher numbers than other provinces or cities. It is also observed that the number of refrigerators decommissioned descends when moving from East to West throughout the country.

3.4. Disposal Programmes for Other Chemicals

Two programmes addressing disposal of Persistent Organic Pollutants (POPs) are currently being implemented in China:

a) POPs disposal project by FECO

The Foreign Economic Cooperation Office of the Ministry of Environmental Protection (FECO/MEP) and the United Nations Industry Development Organization (UNIDO) jointly developed the project of "Environmentally Sound Management and Disposal of Obsolete POPs Pesticides and Other POPs Wastes in China". The project has already been approved by the CEO of the Global Environment Facility (GEF).

The project will utilize environmentally sound technology recommended by the Stockholm Convention, collect and process pesticide POPs wastes, explore management and disposal technologies for dioxin flying ash that are technically and economically practical, and conduct a series of technology assistance activities.

At the moment, in Hubei Province and Hebei Province, where the largest stockpiles of POPs pesticides are located, the collection and disposal of POPs wastes is under way. In the two provinces about 3,000 tons of pesticide POPs wastes have been disposed using co-processing in cement kilns.

b) POPs disposal in Tianjin's Hejia Velia facility

Hejia has carried out nearly 100 industry service projects involving field clean up, collection and safe disposal of various hazardous industry wastes for a range of hazardous waste generating enterprises all over China. The total amount of industry hazardous wastes cleaned, collected and disposed has exceeded 10,000 tons.

Since September 2003, the corporation has safely disposed about 1,602 tons of POPs wastes such as pesticides and PCBs. The safe disposal approach has been incineration, with discharge of gases conforming to the standards and remains sent to the landfill.

4. PROJECT OBJECTIVES

The Pilot Demonstration Project on ODS Waste Management and Disposal in China aims to achieve the following objectives:

- The project will contribute to set up a sustainable model for ODS destruction in the country by providing key information and lessons learned relevant to the various relevant aspects of ODS destruction (technical, financial, regulatory and operational);
- The project will address a number of specific issues that have been identified during the preparatory phase of the project as key areas to secure the long-term sustainability of ODS destruction activities in the country, namely:
    a) Suitability of four local destruction facilities for the destruction of CFC-11 contained in foams and CFC-12;

b) Comparison among various destruction technologies and strategies based on technical, operational and economic criteria;

c) Assessment of two different management strategies for the disposal of CFC-11 contained in foams;

d) Identification of linkages to, and synergies with, on-going initiatives addressing destruction of POPs and other chemicals;

e) Integration of ODS management and disposal into the targets and planning of the existing framework for management of hazardous wastes.

5. PROJECT SCOPE

5.1. Scope of Activities

In order to achieve the objectives listed in the previous section, the project will be implemented following a strategy consisting of three components:

- Component #1 (Destruction of CFC-12 refrigerant): this component will focus on the destruction of CFC-12 refrigerant obtained from the disassembling of domestic refrigerators, and stored in cylinders. Implementation of this component will take place in two local destruction facilities using two different technologies (plasma and rotary kiln).
- Component #2 (Destruction of CFC-11 contained in foams): this component will focus on the destruction of CFC-11 used as blowing agent in foams obtained from disassembled domestic refrigerators applying two different foam management strategies:
- Component #3 (Synergies with POPs destruction): this component will focus on the destruction of both CFC-12 refrigerant and of foams containing CFC-11 in a facility with on-going POPs destruction activities.

A detailed description of these project components can be found in Section 6.

5.2. Geographical Scope

In order to implement the three project components, a total of four provinces will participate in the project, with one destruction facility being used in each province. The following table summarizes the geographical scope of the project for each of the three project components:

Table 4: Geographical scope of the project

Province	Component		
	#1	#2	#3
Guangdong	✓		
Jiangsu		✓	
Shandong		✓	
Tianjin	✓	✓	✓

All four provinces share the following characteristics:

- High level of economic development with a large refrigerator market and a high turnover ratio of refrigerators;
- The established collection system for household appliances shows high recycling rates;

- Locally available destruction facilities.

A representative sample of household electric appliances dismantling stations in the four provinces listed above will be involved in this project.

During the preparatory phase of the project, a number of factors have been taken into consideration when defining the geographical scope of the project and implementation modalities. At an early stage of the project design, trans-provincial transportation of ODS waste was considered as an option in order to explore various pathways for maximizing cost-effectiveness in the implementation.

In this regard, it is worth noting that the current legislative framework *per se* does not represent a barrier for trans-provincial co-operation in the context of this project. However, the existing decentralized model for the transposition of nation-wide environmental legislation seriously hinders such co-operation. The consideration of ODS waste varies from province to province, with some of them referring to it as hazardous waste and some of them not; in this context, obtaining trans-provincial transport permits is at best a challenging task, if not an impossible one.

In the context of the provinces participating in the implementation of the project, consideration of ODS waste varies as follows:

- In Jiangsu, CFC-12 and CFC-11 are not treated as hazardous waste, and in the other three provinces they are treated as hazardous waste;
- In all four provinces, liquid CFC-12 is given the consideration of waste for which special precaution has to be taken during transportation due to the high pressure;
- The foam contained with CFC-11 is treated as normal waste in all four provinces, although some specific requirements on the transportation and storage have to be met due to the flammability of foams.

According to provincial and nation-wide regulation, hazardous waste has to be destroyed in certified waste treatment stations. Similarly, transportation of dangerous waste and hazardous waste should only be done by certified transportation enterprises.

Another factor that has prevented the project concept from advocating for trans-provincial co-operation is the high transportation costs identified during the budget preparation stage of the project design.

5.3. Amounts of ODS to be Destroyed

In order to achieve the objectives listed in the previous section of this document, the project will undertake the destruction of 192 tonnes of ODS waste. The lion's share of this amount comes from the disposal of electric household appliances undertaken under the collection scheme described in Section 3.2.1. of this document. A small share of the ODS waste destroyed under this project comes from the disposal of decommissioned vehicles and ships and refrigeration servicing, as described in Section 3.2.2.

5.3.1. Availability of ODS Banks

The following table shows the latest data concerning **recycled refrigerators** in each of the selected provinces:

Table 5: Number of recycled refrigerators in the relevant provinces

Province	Period	Number of refrigerators		
		Recycled	Dismantled	Stockpiled
Guangdong	2009	89,733	89,733	
	2010	143,547	119,673	
	1st Q of 2011	32,365	34,966	21,273
Jiangsu	2009	98,432	77,984	
	2010	110,218	125,099	
	1st Q of 2011	46,863	45,310	7,120
Shandong	2009	71,893	69,802	
	2010	103,742	102,878	
	1st Q of 2011	25,054	16,002	12,007
Tianjin	2009	24,527	18,000	
	2010	30,086	16,060	
	1st Q of 2011	7,589	1,584	26,558

The following table shows the **currently banked amounts of CFCs** available for destruction in each province:

Table 6: Amounts of CFC-11 and CFC-12 collected in the relevant provinces (*)

Province	CFC-12 (kg.)			CFC-11 (kg.)			
	From refrigerators		Other sources	Pure		In foam	
	Stockpiled	To be extracted		Stockpiled	To be extracted	From stockpiled foams	From foam in stockpiled refrigerators
Guangdong	3,431.32	487.04	468	-	-	*1,879.78*	*19,145.7*
Jiangsu	*1,275.09*	*156.64*	-	-	-	2,143.07	12,379.50
Shandong	*384.04*	*264.15*	-	4,127.26	7,564.41	-	-
Tianjin	235.44	584.28	-	-	-	274.18	23,902.20

(*) Amounts in italics refer to ODS banks which will not be addressed by the project in line with the outlined project strategy

In addition to the amount of CFCs already collected, an assessment was made in order to estimate the **amount of CFCs that will be available on an annual basis** as a result of the on-going collection initiatives in the provinces taken into consideration (see Section 3.2. for a description of these initiatives):

Table 7: Amounts of CFC-11 and CFC-12 to be collected in the relevant provinces (*)

Province	Refrigerators recycled annually	CFC-12 (kg.)	CFC-11 (kg.)	
			Pure CFC-11	In foams
Guangdong	149,444	3,287.77	-	*116,514.00*
Jiangsu	201,780	*4,123.94*	-	181,602.00
Shandong	100,216	*2,204.75*	63,136.08	-
Tianjin	30,276	666.07	-	27,248.40

(*) Amounts in italics refer to ODS banks which will not be addressed by the project in line with the outlined project strategy

The **total amount of ODS waste available for destruction** during the implementation of the project is shown in Table 8, and can be defined as the sum of the following amounts:

- Currently banked amounts of CFCs available for destruction in each province (as per Table 6);
- Amounts of CFCs not collected yet but that will be available during the implementation

period as per the annual estimates included in Table 7, for the following periods of time:

- Second half of 2012;
- 2013;
- First half of 2014 (it is not realistic to assume that amounts collected during the second half of 2014 will be readily available to be destroyed in the context of this project, given the plan to finish destruction activities before the end of 2014).

Therefore, this amount of future available CFCs can be calculated as the amount estimated to be collected over a period of two years (that is, twice the amounts reflected in Table 7 above).

Table 8: Total amounts of CFC-11 and CFC-12 available for destruction in the relevant provinces (*)

Province	CFC-12 (kg.)			CFC-11 (kg.)				
				Pure CFC-11		In foams		
	Currently Available	Estimated	Sub-total	Currently Available	Estimated	Currently Available	Estimated	Sub-total
Guangdong	4,386.36	6,575.54	10,961.90	-	-	*21,025.48*	*233,028.00*	*254,053.48*
Jiangsu	*1,431.73*	*8,247.88*	*9,679.61*	-	-	14,522.57	363,204.00	377,726.57
Shandong	*648.19*	*4,409.5*	*5,057.69*	11,691.67	126272.16	-	-	137,963.83
Tianjin	819.72	1,332.14	2,151.86	-	-	24,176.38	54,496.80	78,673.18
Total	7,286.00	20,565.06	**27,851.06**	11,691.67	126,272.16	59,724.43	650,728.80	**848,417.06**

(*) Amounts in italics refer to ODS banks which will not be addressed by the project in line with the outlined project strategy

The table above shows that 27.8 tonnes of CFC-12 and 848.4 tonnes of CFC-11 will be available for destruction in the four provinces, taking into account the amounts already collected and the ones to be collected during the implementation of the project.

For the amounts already collected, it is important to note that these amounts are lower than what could be expected given the estimated collection capacity in the four provinces; this is due to the fact that the current practice for recovery and recycling centers, in the absence of a ODS destruction scheme in place, is to stockpile foams containing CFC-11 for a limited period of time, and then send some of the stockpiled foams to landfills in order not to go beyond the storage capacity of the centers. However, it is expected that this situation will change in the four provinces through implementation of this project, an in the whole country through the establishment of a sustainable ODS destruction scheme which will make recovery and recycling centers to manage a large share of the stockpiled foams through destruction rather than through landfilling.

In order to provide a comprehensive view of the situation of ODS waste supply in the four provinces participating in the project implementation, vis-à-vis what is already collected and available, a table summarizing the data above is included in the following page:

Table 9: Amounts of ODS Waste Available for Destruction

Province	Substance	Amount already collected (kg.)	Estimated amounts available in the future (kg.)			
			During implementation of the project (kg.)			After implementation of the project (on an annual basis)
			2012 (2nd half)	2013	2014 (1st half)	
Guangdong	CFC-12	4,386.36	1,643.89	3,287.77	1,643.89	3,287.77
	CFC-11	21,025.48	58,257.00	116,514.00	58,257.00	116,514.00
Jiangsu	CFC-12	1,431.73	2,061.97	4,123.94	2,061.97	4,123.94
	CFC-11	14,522.57	90,801.00	181,602.00	90,801.00	181,602.00
Shangdong	CFC-12	648.19	1,102.38	2,204.75	1,102.38	2,204.75
	CFC-11	11,691.67	31,568.04	63,136.08	31,568.04	63,136.08
Tianjin	CFC-12	819.72	333.04	666.07	333.04	666.07
	CFC-11	24,176.38	13,624.20	27,248.40	13,624.20	27,248.40

Substance	Amount already collected (kg.)	Estimated amounts available in the future (kg.)			
		During implementation of the project (kg.)			After implementation of the project (on an annual basis)
		2012 (2nd half)	2013	2014 (1st half)	
CFC-12	7,286.00	5,141.28	10,282.53	5,141.28	10,282.53
CFC-11	71,416.10	194,250.24	388,500.48	194,250.24	388,500.48

Totals (available during implementation of the project):

- CFC-12: 27,851.09 tonnes
- CFC-11: 848,417.06 tonnes

5.3.2. ODS Banks Targeted by the Project

The project will destroy a fraction of the total available amount of ODS described in the previous section, based on the following:

- At the early stages of the implementation, the project will have a limited impact on the current management practices of foams in the recovery and recycling centers. This is mainly due to the time needed for a number of activities such as setting up a project management structure, preparing the Terms of Reference for the subcontracting of some of the activities to be undertaken, conducting the bidding processes (when applicable), undertaking the technical validation in the four facilities, etc. Therefore, it is estimated that the flow of foams directed to destruction will be low at the beginning of the project implementation but it will increase with time.
- Cost-efficiency has to be taken into consideration in the case of destruction of CFC-12 as one of the technologies has a higher cost-efficiency than that allowed under the guidelines established by Decision 58/19; therefore, the amount of CFC-12 destroyed under that option has been reduced in order to fine-tune the overall cost efficiency of the project;
- Timeline of the project versus destruction capacity: it is a fact that facilities have a destruction capacity which is limited by optimal feeding rates, combination of ODS destruction with other destruction activities undertaken in the facilities on a regular basis, etc. That has an impact on the maximum ODS amount that can be processed during the 30 months when the project will be implemented.

Taking into account the criteria outlined above, the following table summarizes the amounts that will be destroyed in each of the provinces:

Table 10: Amounts of CFC-11 and CFC-12 to be destroyed during the project implementation

Province	CFC-12 (kg.)	CFC-11 (kg.)	Sub-total (kg.)
Guangdong	7,016.58	-	7,016.58
Jiangsu	-	98,062.29	98,062.29
Shandong	-	59,862.20	59,862.20
Tianjin	1,352.58	25,712.39	27,064.97
Total	**8,369.16**	**183,636.88**	**192,006.04**

Therefore, a total of 192 tonnes of CFCs will be destroyed in the context of the project, consisting of 8.37 tonnes of CFC-12, 59.86 tonnes of pure CFC-11 and 123.77 tonnes of CFC-11 in foam.

6. PROJECT STRATEGY AND DEMONSTRATION VALUE

6.1. Component #1: Destruction of CFC-12 Refrigerant

This component will focus on the destruction of CFC-12 refrigerant obtained from the disassembling of domestic refrigerators, and stored in cylinders.

Implementation of Component #1 will be undertaken in the provinces of Guangdong and Tianjin; each province will manage CFC-12 refrigerant banked in their own recycling and recovery centers, with destruction taking place in a facility located in each province:

a) Guangdong: hazardous waste treatment station with a plasma facility;

b) Tianjin: hazardous waste destruction facility with rotary kilns.

The demonstration value of this component is twofold:

- For each technology, this component will allow drawing conclusions relevant to various aspects of the practical implementation of CFC-12 disposal, which can be replicated in similar facilities throughout the country after the conclusion of the project. This includes the following:
  a) Definition of a destruction testing protocol for each technology;
  b) Resolution of technical issues for each technology, such as:
     - Optimization of CFC-12 feeding point;
     - Optimization of CFC-12 feeding rate;
     - Analysis of the impact of CFC-12 destruction in the process operation parameters.
  c) Monitoring requirements (continuous end-of-pipe emission monitoring, process operation monitoring).
- Comparison between the two tested technologies based on logistic aspects and cost-efficiency considerations. In spite of the fact that destruction in rotary kiln is more cost-efficient than destruction in a plasma facility, the project will provide an opportunity to assess the impact on costs of a number of activities other than destruction which have to be undertaken in order to ensure efficient destruction.

6.2. Component #2: Destruction of CFC-11 Contained in Foams

This component will focus on the destruction of CFC-11 used as blowing agent in foams obtained from disassembled domestic refrigerators. Implementation of this component will take place in the provinces of Jiangsu, Shandong and Tianjin; each province will manage CFC-11 contained in foams stored in their own recycling and recovery centers, with destruction taking place in facilities located in each province.

Implementation of this component will showcase two different foam management strategies:

Strategy #1

This strategy involves the extraction of CFC-11 with available adequate equipment, and transportation of the CFC-11 stored in cylinders to a local hazardous waste treatment facility operating with a rotary kiln. This strategy will be implemented in a province which already has the adequate extraction equipment; therefore using such equipment does not imply an additional cost to the project.

This strategy will be implemented in the province of Shangdong, more specifically in a hazardous waste treatment station working with a rotary kiln. Shandong is one of the provinces that currently have adequate extraction equipment in operation; therefore, using this equipment does not involve any additional cost to the project, as its operation is part of the current collection scheme currently in place in this province.

Extraction of CFC-11 from foam is considered a collection activity as per decision 58/19 of the Executive Committee, for which this project does not request for funding to the Multilateral Fund (extraction activities are integrated within the on-going collection scheme in Shandong, thus not generating an additional cost to the project).

The following text box provides further details about the extraction activities undertaken in Shangdong:

Box 1: Information on the operation of the extraction equipment in Shandong province

The foams of the refrigerators are crushed into pieces by two stages in two sealed chambers successively. The gas will go through the adsorption device using activated carbon, after which, the carbon will be heated for desorption of the CFC-11. The liquid CFC-11 will be cooled to liquid and tanked.

There are two adsorption and desorption systems. When one is adsorbing CFC-11, the other one is desorbing; when one has adsorbed enough CFC-11, it will turn to the process of desorption, and the other one, which is already finish desorption, will adsorb the CFC-11. The recovery rate of CFC-11 is about 83%.

The waste gas will be purified by another activated carbon device before the venting.

The main operational parameters of the CFC-11 recovery system are the following:

- Power Source: 380V*50HZ;
- Operation Temperature: 0℃-40℃
- Rated Power: 40KW;
- Water Consumption: 3 tonnes.

Strategy #1 ensures lower transportation costs per kilometre due to the fact that the substance to be moved is pure CFC-11 in liquid state. On the other hand, it is worth noting that this strategy can only be applied if the adequate extraction equipment is available, which involves a significant capital cost.

Strategy #2

This strategy involves direct destruction of foam containing CFC-11 in two different types of destruction facility:

- Local municipal solid waste facility using a rotary kiln (located in Jiangsu);
- Local hazardous waste destruction facility using a rotary kiln (located in Tianjin).

Strategy #2 involves higher transportation costs per kilometre due to the low density of CFC-11 in foam, as well as costs related to the establishment of a sampling and testing protocol to determine the CFC-11 content in the foam to be destroyed. However, direct destruction of foam is considered to be more efficient (or less energy-intensive) than that of liquid CFC-11; several studies claim that, from a CFC destruction point of view, it is not advisable to extract CFCs from the foam due to the fact that a significant part of the CFC-11 is dissolved in the matrix and, secondly, because the combustion efficiency of CFC-11 in foam is better than as a gas.

The demonstration value of this project is defined by the following key elements:

- The project implementation will allow drawing conclusions on cost-effectiveness issues for both strategies. A very limited number of provinces in China have access to adequate equipment for extraction of CFC-11 contained in foams, and purchase of such equipment is costly and outside the scope of this demonstration project and of other MLF-funded activities. The implementation of the management strategy addressing direct foam destruction will provide valuable data concerning transportation costs of foam; by doing so, it will be possible to define a “distance threshold” related to the location of the foam stocks relative to the destruction facility, which can be used as a decision criterion to define the best foam management strategy at provincial level;
- Destruction of extracted CFC-11 stored in cylinders will provide information that will facilitate widespread implementation of destruction activities in the country beyond the project. This information is similar to the one to be obtained from implementation of Component #1, that is:

a) Definition of a suitable destruction testing protocol;

b) Resolution of technical issues such as: optimization of CFC-11 feeding point; optimization of CFC-11 feeding rate; and analysis of the impact of CFC-11 destruction in the process operation parameters;

c) Monitoring requirements (continuous end-of-pipe emission monitoring, process operation monitoring).

- Destruction of foam containing CFC-11 will provide similar information to the one provided by destruction of extracted CFC-11. In addition to this, the project will address an issue which is worth noting: direct destruction of foams prevents from knowing the exact amount of CFC-11 which is actually being destroyed. Therefore, the project will develop a sampling and laboratory testing protocol as a means of verification in order to ensure that accurate estimates of the amounts of CFC-11 destroyed are available.

6.3. Component #3: Synergies with POPs Destruction

This component will focus on the destruction of both CFC-12 refrigerant and of foams containing CFC-11 in a facility with on-going POPs destruction activities. In order to design this project component, discussions have taken place with all relevant stakeholders involved in POPs destruction projects in China, namely:

- Owners of the facilities involved in on-going POPs destruction facilities (cement kilns at Hubei and Hebei, hazardous waste treatment plant at Tianjin);
- Relevant staff from the local EPBs and central government monitoring the POPs destruction activities;
- UNIDO staff managing the projects at Hubei and Hebei.

Implementation of Component #3 will be undertaken in the province of Tianjin, where both CFC-12 and foam containing CFC-12 will be destroyed in a facility where POPs are also destroyed; this facility is the same as the one where Components #1 and #2 will be implemented in Tianjin.

During the preparatory phase of this project, an exploration of **potential synergies** between POPs and ODS destruction was thoroughly undertaken in order to define the best approach to this component, given the on-going initiatives addressing POPs destruction in China (see Section 3.4.). The main conclusions of such analysis are included in the text box below:

Box 2: Analysis of synergies between POPs and ODS destruction in China

When considering destruction in a cement kiln or a hazardous waste incinerator, the facility has to meet three main requirements:

1. An adequate feeding system for the substance to be destroyed;
2. A continuous emission monitoring system;
3. Application of a testing protocol prior to the destruction activity.

The second requirement may be subject to synergies, due to the fact that such a system is basically the same regardless of the substance to be destroyed. The cement kilns at Hubei and Hebei provinces where POPs destruction has taken place in the context of the POPs disposal project by FECO will have this system in place; the same applies to the hazardous waste incinerators such as Tianjin Hejia Velia, included in the submitted project proposal.

However, the first and third requirements are not especially prone to synergies with POPs destruction projects. With regard to the feeding system, a facility destroying POPs requires a system designed for feeding liquid streams, whereas a facility destroying ODS may require additional systems for either

gaseous or solid streams (CFC-12 used as refrigerant and CFC-11 contained in foams, respectively). Such systems are found in hazardous waste incinerators due to the wide range of substances they deal with, but this may not be the case for cement kilns already undertaking POPs destruction; for the latter, even if they were using alternative fuels in solid state (e.g. tires), the feeding system may not be adequate for the foams, depending on the location of the entry point.

With regard to the testing protocol, different substances require different protocols; facilities such as cement kilns, whose main line of business is not destruction of ODS or POPs, will most likely have undertaken tests just for those substances which they have been requested to destroy due to the related costs. The cement kilns at Hubei and Hebei, as well as the hazardous waste destruction facility in Tianjin have undertaken test burns as a pre-requisite for initiating POPs destruction facilities.

The analysis above was key on the decision to focus this project component on the implementation of synergies in a local hazardous waste destruction facility using a rotary kiln, given the various constraints (both logistical and technical) to maximize such synergies in cement kilns such as the ones in Hubei and Hebei.

The analysis during the preparatory phase has also focused on **potential problems** related to the combination of POPs and ODS destruction in the same facility; some technical information shows that the change from POPs to ODS destruction for the same rotary kiln makes the equipment less efficient, and also results in higher negative emissions (i.e. fluorine and chlorine).

This issue has been discussed with the technicians of the destruction facility where this component will be implemented. The conclusion is that such problems can be minimized or completely removed by choosing the adequate operational parameters in terms of:

- Operational time of the facility between the destruction of POPs and ODS batches;
- Amount of chemicals destroyed in successive POPs and ODS batches;
- Physical state of the POPs and ODS destroyed in successive batches.

Under this component, the following **activities** will be undertaken:

- Implementation of synergies related to cost-optimization of the logistic aspects of POPs and ODS destruction (transportation, on-site storage, etc.);
- Collaboration with on-going POPs destruction projects in the definition of procedures for the handling of the stored ODS waste, labelling, etc.;
- Collaboration with on-going POPs destruction projects in the definition of a comprehensive set of criteria for environmentally sound disposal of ODS waste;
- Definition of common aspects related to the technical validation of facilities undertaking both POPs and ODS destruction activities.

Therefore, the demonstration value of this component will focus on an analysis of the pros and cons of combined POPs and CFCs destruction, more specifically:

- Impact of combining POPs and CFCs destruction on incremental costs for the latter;
- Technical aspects where potential synergies between both activities can be implemented;
- The implementation of this project component will allow for the development of guidelines for optimized POPs – ODS combined destruction.

6.4. Summary

Taking into account the previous description of the three project components, the following table summarizes the key information concerning each of the components:

Table 11: Summary of Project Components

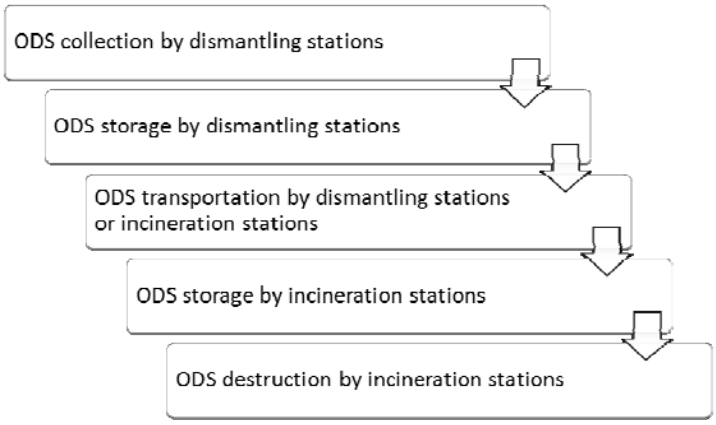
	Component #1	Component #2	Component #3
Title	Destruction of CFC-12 refrigerant	Destruction of CFC-11 contained in foams	Synergies with POPs Destruction
Description	Destruction of CFC-12 refrigerant obtained from the disassembling of domestic refrigerators, and stored in cylinders	Destruction of CFC-11 used as blowing agent in foams obtained from disassembled domestic refrigerators through two different strategies: • Strategy #1: extraction of CFC-11 with available equipment, and transportation of the CFC-11 stored in cylinders to a local hazardous waste treatment facility operating with a rotary kiln • Strategy #2: direct destruction of foam containing CFC-11 in two types of destruction facility	Destruction of both CFC-12 refrigerant and of foams containing CFC-11 in a facility with on-going POPs destruction activities
ODS to be Destroyed - **Amount** - **Type**	 8.37 tonnes CFC-12	 183,67 tonnes CFC-11	 28.05 tonnes (already considered under #1 and #2) CFC-12 (1,35 tonnes) and CFC-11 (25,7 tonnes)
Provinces	Guangdong and Tianjin	Shangdong, Jiangsu and Tianjin	Tianjin
Destruction Facilities	• Hazardous waste treatment station with plasma facility (Shenzen Hazardous Waste Treatment Station, Guangdong) • Tianjin: hazardous waste destruction facility with rotary kilns (Tianjin Hejia Velia, Tianjin)	• Hazardous waste treatment station working with a rotary kiln (Qingdao New World, Shangdong) • Municipal solid waste destruction facility with a rotary kiln (Jiangsu) • Hazardous waste destruction facility with rotary kilns (Tianjin Hejia Velia, Tianjin)	• Hazardous waste destruction facility with rotary kilns (Tianjin Hejia Velia, Tianjin)
Demonstration Value	• For each technology: a) Definition of a destruction testing protocol b) Resolution of technical issues concerning operating conditions at the facilities c) Monitoring requirements (continuous end-of-pipe emission monitoring, process operation monitoring) • Comparison between the two tested technologies based on logistic aspects and cost-efficiency considerations	• Draw conclusions on cost-effectiveness issues for both strategies dealing with destruction of CFC-11 contained in foam (definition of a "distance threshold" indicator) • Draw conclusions relevant to various aspects of the practical implementation of extracted CFC-11 disposal a) Definition of a destruction testing protocol b) Resolution of technical issues c) Monitoring requirements (continuous end-of-pipe emission monitoring, process operation monitoring) • Development of a sampling and laboratory testing protocol as a means of verification in order to ensure that accurate estimates of the amounts of CFC-11 destroyed are available	• Implementation of synergies related to cost-optimization of the logistic aspects of POPs and ODS destruction (transportation, on-site storage, etc.) • Collaboration with on-going POPs destruction projects in the definition of procedures for the handling of the stored ODS waste, labelling, etc. • Collaboration with on-going POPs destruction projects in the definition of a comprehensive set of criteria for environmentally sound disposal of ODS waste • Definition of common aspects related to the technical validation of facilities undertaking both POPs and ODS destruction activities

7. PROJECT IMPLEMENTATION

7.1. Main Project Activities

The following figure describes the main project activities for the destruction of the identified ODS banks:

Figure 4: Main activities for ODS destruction



All these activities will be monitored by the local EPBs according to the existing regulations, as well as the rules and guidelines to be developed under this project.

7.1.1. Collection

On-going collection activities through which the amount of ODS to be destroyed in the context of the project have already been described in Section 3.2. Such activities have been set up by the Government of China and have been provided with adequate funding support. In line with the criteria and guidelines for the selection of ODS disposal projects (ExCom Decision 58/18), this project does not request for funding to support the related collection activities.

Notwithstanding this, collection activities are a key factor for the successful implementation of the project, due to the following reasons:

- Exploration of alternative disposal options for ODS waste is undertaken by the recycling and recovery centres. The centres perform a qualitative characterization of the collected ODS waste and, should the purity be high enough and depending on existing demand, they promote reusing these relatively pure CFCs. Therefore, the amounts of ODS waste reported for destruction reflect those stocks for which alternative uses are not feasible.
- These activities ensure the availability of the ODS amounts to be destroyed in the context of this project;
- These activities determine the starting point for the implementation in terms of:
  - Quantitative and qualitative characterization of the substances to be destroyed;
  - Physical location of the banks available for destruction.

The latter has a direct impact on the first activity to be considered under this project, that is the transportation from the location of the ODS banks to the destruction facility. Table 12 shows the distribution of the identified amounts of ODS to be destroyed among the various recycling and recovery centers in each province.

Table 12: Distribution of CFC-11 and CFC-12 to be destroyed among recycling and recovery centers

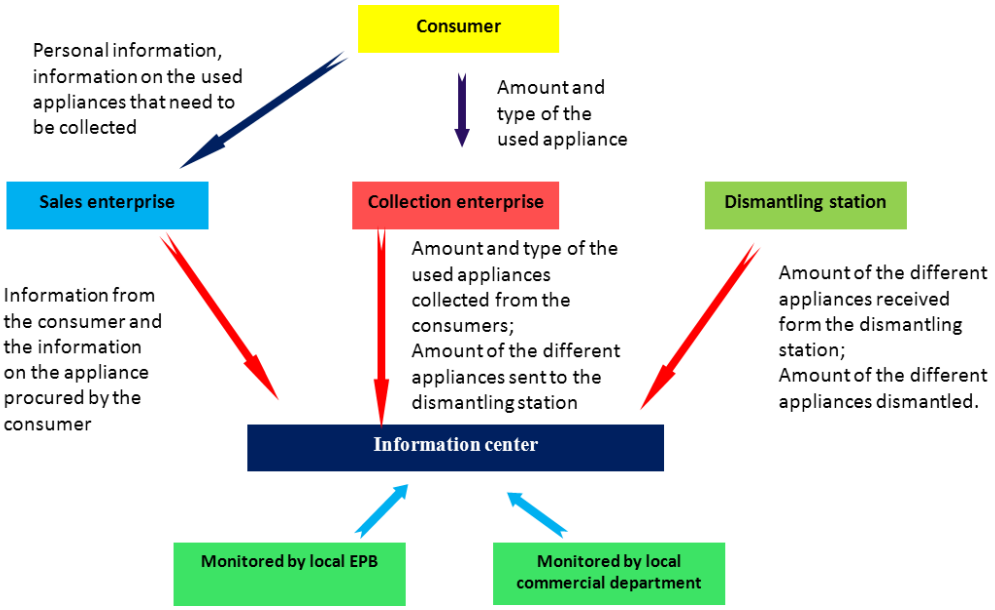
Province	Recycling and recovery center	Location	Refrigerators			CFC-12 Stockpiled (kg.)	CFC-11 Stockpiled			Foam Stockpiled (kg.)
			Recycled	Dismantled	Stockpiled		Pure CFC-11 Stockpiled (kg.)	In stockpiled foams (kg.)	In stockpiled refrigerators (kg.)	
Guangdong	Huizhou Dingchen	Huizhou	195,687	192,354	3,333	3,122.60	-	-	-	-
	Foshan Shundexin	Foshan	69,958	52,018	17,940	40.90	-	-	-	-
	Shenzhen Hazardous Waste Treatment Station	Shenzhen	-	-	-	347.00	-	-	-	-
	Sub-total		**265,645**	**244,372**	**21,273**	**3,510.50**	-	-	-	-
Jiangsu	Nanjing Huanwu	Nanjing	29,146	28,649	497	-	-	220.38	447.30	1,224.32
	Nanjing Kaiyan	Nanjing	129,993	127,976	2,017	-	-	984.43	1,815.30	5,469.06
	Suzhou Tonghe	Suzhou	13,735	12,616	1,119	-	-	97.05	1,007.10	539.15
	Suzhou Weixiang	Suzhou	72,892	70,865	2,027	-	-	545.12	1,824.30	3,028.42
	Yangzhou Ningda	Yangzhou	9,747	8,287	1,460	-	-	63.75	1,314.00	354.15
	Sub-total		**255,513**	**248,393**	**7,120**	-	-	**1,910.72**	**6,408.00**	**10,615.09**
Shandong	Qingdao New world	Qingdao	81,316	77,128	4,188	-	-	593.29	3,769.20	3,296.07
	Yantai Lvhuan	Yantai	66,611	63,895	2,716	-	-	491.50	2,444.40	2,730.56
	Shandong Zhonglv	Linyi	52,762	47,659	5,103	-	4,127.26	366.61	4,592.70	2,036.71
	Sub-total		**200,689**	**188,682**	**12,007**	-	**4,127.26**	**1,451.40**	**10,806.30**	**8,063.33**
Tianjin	TCL Aobo	Tianjin	55,596	29,119	26,477	92.44	-	223.99	23,829.30	1,244.40
	Taiding	Tianjin	5,636	5,636	0	143.00	-	43.35	0.00	240.85
	Hechang	Tianjin	970	889	81	0.00	-	6.84	72.90	37.99
	Sub-total		**62,202**	**35,644**	**26,558**	**235.44**	-	**274.18**	**23,902.20**	**1,523.25**

An important factor to take into account when describing how the collection systems in the four provinces participating in the project have an impact on ODS collection and later destruction is the dismantling capacity if the recycling and recovery centres. A survey conducted among 13 centres in the four provinces shows a wide range of disassembling capacities in terms of refrigerators dismantled per month, ranging from 889 in a small centre in Tianjin to the 127,976 in the largest surveyed centre, located in Jiangsu; in this context, average disassembling capacities can be determined for individual centres, but averages at provincial or project level are not meaningful.

7.1.2. Monitoring the Origin of Recovered ODS

Figure 1 shows that there is an information center in place for the traceability of dismantled household appliances in China. Detailed information about how this information center works is provided in the following figure:

Figure 5: Main activities for ODS destruction



Depending on the province, the information system is monitored and managed by either the commercial department of the local government or the local EPB. The sales department, the collection enterprises and the dismantling stations are requested to submit detailed data to ensure an adequate chain of custody; this way, information on the amount and type of the appliances from the collection enterprises to the dismantling stations can be traced.

In order to provide a simple practical explanation of how the information system works, the following scenario is provided:

- There is a collection enterprise (named “CC”) and a dismantling station (named “DD”);
- CC reports that they have collected 10,000 refrigerators, and only 5,000 refrigerators have been sent to DD;
- DD reports that they have received 5,000 refrigerators from CC and they have only dismantled 3,000 of them;
- Under this scenario, local authorities can then find that a total of 3,000 refrigerators have been dismantled, a total of 5,000 refrigerators are stockpiled in CC and a total of 2,000 refrigerators are stockpiled in DD.

Given the information that the different stakeholders have to submit to the system, the traceability of the ODS waste can be set in the same way as explained for the appliances. The existing monitoring system has been used to collect information on existing CFC stocks at each of the recovery and recycling centers participating in the implementation of the project (see Table 12 above). Such a level of detail and the corresponding verification activities undertaken on the field by the local EPBs prevent the inclusion of virgin ODS as used ODS, given the established requirement for the recycling and recovery centers to provide "cradle to grave" information on collected ODS.

It is worth noting that the implementation of the project will also provide additional tools for monitoring purposes, as detailed in Section 7.2.3.

7.1.3. Transport and Storage

The transportation distances to be covered during the project implementation are determined by the following factors:

- Location of the established recycling and recovery centers where the ODS waste is banked;
- Location of the destruction facilities (one destruction facility per province);
- Existing road network in each province;
- Restrictions to ODS waste transportation (e.g. trans-provincial transportation).

As it has been stated when outlining the project strategy (see Section 6), the project will address transportation of three types of waste:

- CFC-12 stored in high-pressure cylinders;
- CFC-11 stored in cylinders;
- Solid foam containing microencapsulated gaseous CFC-11.

When defining the unitary transportation costs, the following factors have to be taken into consideration, which lead to an increase in such costs:

- CFC waste in liquid state is regulated as dangerous goods or waste, which implies that its transportation can only be undertaken by the existing certificated transportation enterprises or appointed institutions following a specific handling and management protocol.
- Costs of foam transportation are affected by the following issues:
  - The content of CFC-11 per kilogram of foam is very small by definition;
  - Usually, only 2 tonnes of foam can be transported by a vehicle with a capacity of 10 tonnes due to the low density of the foam.

Given the expected operational procedure at the selected destruction facilities, there will be a lag time between reception of each of the ODS waste batches to be destroyed and the beginning of the destruction procedure. Therefore, appropriate storage area and handling practices have to be ensured in the facilities:

- Such conditions are met in three of the facilities (Guangdong, Shandong and Tianjin) as they are dedicated hazardous waste treatment centers properly equipped for the storage of handling of substances in any physical state;
- The fourth facility (Jiangsu) is a municipal solid waste destruction facility which will

receive foam, for which appropriate storage area is ensured.

7.1.4. Verification of ODS to be Destroyed

All four destruction facilities participating in the pilot demonstration project are equipped with the necessary tools to undertake a qualitative characterization of CFC-11 and CFC-12 arriving at the premises prior to destruction.

In the case of the destruction facilities destroying foam containing CFC-11 (located in Jiangsu and Tianjin) qualitative characterization of the foam to be destroyed is of outmost importance, due to the following reasons:

- It is difficult to know the original content of CFC-11 in the insulating foams used in domestic appliances; a recent study[2] shows that the refrigerators decommissioned in China contain foam where the CFC-11 level is high, about 20% of the weight of the foam. Depending on the size of the refrigerator, the mass of foam contained in it varies. As decommissioned refrigerators are generally small now, the weight of foam in them on average is 5 kg, therefore the average amount of CFC-11 in each refrigerator is about 1kg.
- The foams to be destroyed are obtained from a wide variety of appliances, in terms of manufacturer, model, manufacturing date, etc.;
- Depending on how the refrigerator disassembling process has been conducted, a varying amount of the CFC-11 originally contained in the foam will have been emitted to the atmosphere, thus increasing the variability in the composition of the foam to be destroyed.

In order to tackle this issue, the two facilities involved in direct foam destruction will apply an adequate sampling and testing protocols to ensure an accurate characterization of the amount of CFC-11 contained in the foam and thus destroyed.

Sampling protocol

The initial (and perhaps most critical) element in a procedure designed to evaluate the composition of foam waste is the plan for sampling the waste. The uncertainty inherent to any sampling procedure is increased by the fact that the substance to be sampled (the foam) is in solid state.

In a first step, a "gross sample" has to be obtained from the bulk population (this being the foam batch available in the storage area of the destruction facility and ready for destruction). This step, which obviously has to be undertaken at the destruction facility itself, is critical because it can determine the validity of the subsequent chemical analysis.

The "gross sample" will be obtained following a procedure that ensures the following:

- The sample is a representative one, that is, it can be considered an unbiased depiction of the bulk population;
- The sample reflects the variability of the bulk population to be tested;
- The sample will allow measurements of the chemical properties of the foam composition that are both accurate and precise.

Given the nature of the bulk population, the preferred sampling methods will be simple random sampling, or cluster sampling combined with simple random sampling for each cluster. The latter

[2] YANG Yong, LIU Jing yang, etc. (2009) "Release and Residual Mass and Content Distribution of CFC-11 during Shredding of Rigid Polyurethane Foam". Research of Environmental Sciences, Vol. 22, No. 8, p. 961.

will be recommended in those circumstances when the various source points of the foam in the bulk population can be identified and there are reasons to assume that the point of origin can have a systematic effect on the composition of the foam.

An important factor to be taken into consideration is the need to ensure a minimum sample size that will prevent emission of the CFC-11 microencapsulated in the foam at the extent possible. According to different studies on this issue, foam pieces used for sampling purposes should have a minimum size of 2 to 3.2 cm.

Alternatively, larger foam samples can be collected in the storage area of the destruction facility and taken to the testing laboratory, where a sub-sampling procedure should be followed in order to adapt the size of the foam piece to the laboratory testing procedure. This procedure is usually recommended if significant heterogeneity is expected in the composition of the solid waste or if the individuals responsible for the gross sampling are facility staff without advance training in sampling procedures.

Chemical analysis

Chemical analysis will be undertaken in a certified laboratory, in order to determine the average CFC-11 content of each of the foam batches destroyed.

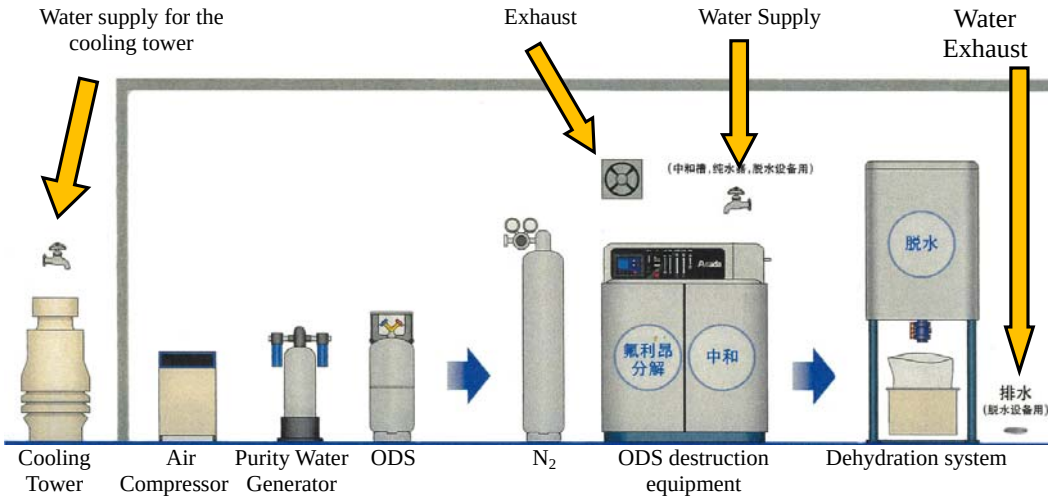
7.1.5. Destruction

Guangdong: Shenzhen Hazardous Waste Treatment Station

Shenzhen Hazardous Waste Treatment Station was founded in 1998, with a total hazardous waste treatment capacity of 350,000 tonnes/year. The facility will be equipped with a small-scale plasma destruction equipment for the destruction of ODS and other F-gases. The equipment will be purchased outside the scope of this project (i.e. purchase of the equipment has no impact on the project budget) and will be available by the time project implementation starts at Guangdong.

The typical process for ODS destruction with plasma technology is shown in Figure 6:

Figure 6: Plasma technology process for ODS destruction



This equipment uses a plasma torch to decompose waste CFC, HCFC and HFC with a temperature of about 1400 ^{o}C. Liquefied gases can be fed directly from their pressurized storage into the reactor, while liquids (e.g. CFC-11) are first transferred to a pressure vessel and then transferred with compressed air to an evaporator before being fed to the reactor.

The thermal plasma is generated by a dc non-transferred plasma torch operating with a water-cooled hafnium cathode and a water-cooled copper cylindrical anode. The plasma gas is nitrogen that has been concentrated from air. The plasma torch power is 200-220V × 60A.

A reactor nozzle of a special alloy is aligned below the anode, and connected to an oxidation tube. Two inlet-pipes are connected to the nozzle: one is located at the upper part for steam, and the other is located at the bottom of the nozzle for air. HCFCs and HFCs are first reacted with steam, being decomposed into carbon monoxide (CO), hydrogen fluoride (HF) and hydrogen chloride (HCl). The CO is subsequently oxidized to carbon dioxide (CO_2) with air in the oxidation tube. The destruction of CFCs is completed without additional air. Immediately after the oxidation tube, the reaction gas mixture is quenched in a scrubber, where the acid gases HCl and HF are absorbed by sodium bicarbonate and the salts generated are settled by flocculant.

Detailed specifications of the operational parameters:

- Decomposition rate of CFCs: more than 99.9%;
- Process capacity: 1kg/h for CFC-12, 2kg/h for HFC-134a and 2kg/h for HCFC-22;
- Power source: 3 phase 220v, capacity of more than 10 KW required;
- Parts: decomposition unit, dehydratation unit, nitrogen generation unit and cooling tower for the torch system.

Jiangsu: Municipal Solid Waste Incinerator

TEAP's *Report of the Task Force on Destruction Technologies* (Volume 3B, April, 2002) states that foams containing CFC-11 can be destroyed in the municipal solid waste incineration facilities.

The first municipal solid waste incinerator was put into operation in 1987 in China. Most of the provinces and cities, especially in the large and medium-sized cities in the South have a municipal solid waste incinerator generation station.

The number and size of the average processing of the incineration plant in China is constantly increased on a yearly basis due to the improvement in installed capacity, supporting technology and management system.

The municipal solid waste incinerator of Jiangsu, with a processing capacity of 100 tonnes/year, is used for the incineration of normal solid waste. The main characteristics of the process are the following:

- The waste is transferred mechanically from the refuse pit to a bin;
- The waste will be fed from the bin into a moving grate with a temperature of 900-1,000^{o}C;
- Ash generated by the combustion will be discharged from the lower end of the moving grated and conveyed to landfill;
- The heat in the gases from the combustion of the waste is used for the electricity generation boiler;
- The cooled gas will be cleaned in an acid-removal reactor followed by an activated carbon addition system and a bag house to remove acid gases, particulate matter and other pollutants.

Shandong: Qingdao New World

New World was founded in 1994 and currently is one of the certificated hazardous waste treatment enterprises in Shandong province. The rotary kiln of New World is used for the incineration of hazardous waste, including ODS. The ODS destruction capacity of the kiln is 89 tonnes/year.

Figure 7: Qingdao New World facilities

The main characteristics of the process are described below:

- A specific feed-in point will be used for the pure CFC-11;
- As the CFC-11 to be destroyed has a very low heat value, additional fuel will be fed to the system, and the calculated quantity of the fuel will help to achieve the required high operating temperatures;
- The whole system is operated at low pressure;
- Operating conditions at the secondary combustion chamber:
  - Temperature ranges between 800 - 1000 ^{o}C and more than 1100 ^{o}C;
  - Residence time of the waste in the secondary combustion chamber will be 4.5s, which ensures the decomposition of the organic waste and dioxins.
- Operating conditions at the heat recovery chamber (placed after the secondary combustion chamber):
  - 3-5% urea will be sprayed in to deoxidize the NO_x to N_2;
  - The waste gas with the temperature of about 550 ^{o}C goes through the cooling tower, where the residence time is less than 1 second with temperature ranging from 200 to 550 ^{o}C to avoid the re-generation of dioxins.
- HF and HCl react with the $NaHCO_3$ in the acid-removal reactor followed by an activated carbon addition system and a bag house to remove particulate matter and other pollutants.

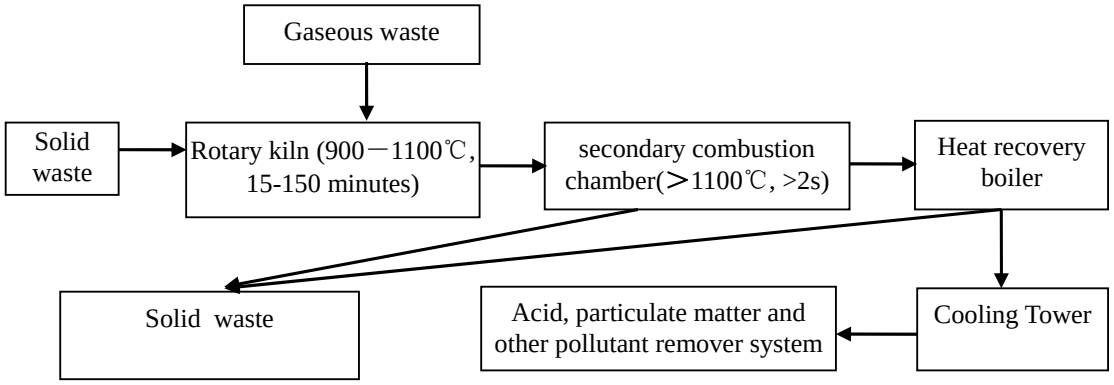
Tianjin: Hejia Velia

This facility was founded in 2001 and it focuses on the treatment of municipal solid waste and hazardous waste with rotary kilns. The processing capacity for hazardous waste is 45,000 tonnes/year.

Figure 8: Hejia Velia facilities

The process is described in the figure below:

Figure 9: Incineration process at Hejia Velia



Technical validation of the destruction facilities

a) Applicable national standards

China has a defined set of applicable emission standards in both municipal solid waste incinerators and hazardous solid waste incinerators; all facilities used for chemicals destruction in China (including the ones that will be used for the implementation of this project) meet these standards.

b) Rationale for the technical validations

In this project, existing waste incinerators will be used for ODS destruction, reducing significantly the equipment costs and corresponding destruction costs.

However, the waste incineration facilities will need adjustment of some operation parameters; this is due to the fact that incineration of different substances usually requires an adjustment of the operating parameters of the facility in order to meet the requirement of the standards. There is a risk that the facility cannot meet the requirements of the standards if there is no technical adjustment especially for CFCs, considering that the concentration of chlorine and fluorine are higher than for other substances. It is thus indispensable to validate the destruction results and emission controls.

The technical validation activities to be undertaken during the implementation of this project aim at ensuring that the destruction facilities participating in the project will continue meeting the standards during ODS destruction activities.

Three technical validations should be carried out under this project, i.e. validation on municipal solid waste incinerator in Jiangsu, rotary kiln in Shandong and Tianjin, as well as the plasma equipment in Guangdong.

The technical validation will consist on the development and implementation of a trial destruction protocol which will make sure the destruction facility to meet the accepted destruction removal efficiency of 99 percent, which is accepted by the TEAP and the Parties to the Montreal Protocol as the standard for ODS destruction, as well as to meet the requirement of the environmental protection regulated by national and local policies and standards.

The trial destruction protocol will consist of the processing of a quantity of the received ODS waste of not less than 5 tonnes in each of the facilities participating in the implementation of the project. Strict monitoring will be applied to the key operating parameters as well as to the characterization of the resulting emissions. The destruction facility shall permit the conduct of verification on these criteria by an independent entity.

Concentrations of chlorine and fluorine will be controlled after treatment to ensure compliance with the performance parameters and emissions requirements set out by the Technology and Economic Assessment Panel of Montreal Protocol (TEAP). In all facilities, calculation on the heat value and concentrations of fluorine and chlorine will also be done before the ODS destruction to ensure adequate operation parameters.

c) Emission monitoring

The selected destruction facilities have an on-line system to monitor the concentration of most of the pollutants in the waste gas flue. The information provided by the system has to be provided to the local EPBs, and if there is any parameter higher than the limit, the system will give an alarm signal so the enterprise and local EPB are aware of the anomalous situation and can apply corrective measures.

For other pollutants which cannot be measured online, there will be regular monitoring.

These measures ensure that the selected facilities meet the requirement for emission standards.

7.1.6. Verification of Destroyed ODS Amounts

The management information system (MIS) established during the implementation of the project (see Section 7.2.3.) will require destruction facilities to provide a destruction verification document, which documents that the materials entering the facility will be destroyed. Copies of these verification documents will also be submitted to the recycling and recovery centres from which they received the ODS waste. This verification document must include:

- Name and address of the destruction facility;
- Date(s) of destruction of the received ODS waste (in case of destruction in several batches, an indication of the amounts destroyed in each batch will be included);
- An indication of the fact that the ODS waste has been destroyed with a DRE of at least 99.99 per cent as established by TEAP;
- Signature of a person entitled to legally represent the destruction facility, as well as of an accredited independent industry leading inspection, verification, testing and certification service.

In addition to individual “proofs of destruction”, the MIS will require the destruction facilities to report on an annual basis the quantities and composition of the ODS waste destroyed during the year.

7.2. Supporting Project Activities

In addition to the activities to ensure the planned destruction of 192 tonnes of ODS waste, the project implementation plan includes a number of activities aimed at facilitating the integration of this pilot demonstration project into an overall strategy to ensure long-term sustainability of ODS destruction efforts in China. These supporting activities will address the following areas:

- Assistance on the development of an appropriate policy framework;
- Training activities;
- Supervision, verification and management information system (MIS).

The figure below shows the relationship among these activities:

Figure 10: Relationship among different supporting activities

7.2.1. Assistance on the development of an appropriate policy framework

ODS destruction activities imply a cost which has to be taken by some of all of the involved stakeholders (production enterprises, servicing enterprises, or even end-users). Therefore, regulations and policies of mandatory nature are necessary for ODS destruction in an efficient and effective manner; the implementation of the project will contribute to improve existing regulations and policies and to develop new ones if needed.

In this context, the project implementation plan considers the following two activities:

Activity 1: *Assistance on the adaptation of the existing regulation, policy and standard systems*

Based on the experience obtained from the implementation of this pilot demonstration project, this assistance will focus on the following issues:

- Development of a strategy to include ODS destruction into the targets and planning of existing systems for home appliances and motor vehicle discarding and treatment, and hazardous wastes management.
- Based on the lessons learned from the implementation of the project:
  - Formulate procedures on ODS destruction, including operation specifications for ODS destruction devices including incineration facilities for destruction of waste, and include the results and standards in a training programme;
  - Validate the regulating effects of these procedures among relevant stakeholders;
  - Provide legal basis for EPBs to implement the procedures.

- Compare and validate the technological, economic and environmental effectiveness of various destruction technologies during the implementation of the project
- Determine the targets and contents of future regulations and policies, and lay the foundation for an improved technological supporting system for ODS destruction.

Activity 2: *Assistance on the definition of a sustainable ODS destruction mechanism*

This activity will focus on the following issues:

- Establish a trial operation mechanism for ODS destruction including collection, reclamation, transportation, storage and destruction in each province;
- Put forward and validate a framework for a long-term funding mechanism for ODS destruction in China;
- Analyze the feasibility of extended-responsibility of the producer (funding system) and construction of a relevant management system.

7.2.2. Training activities

Training activities in the context of this project will ensure that:

- Technical staff at the destruction facilities receive specific training on the specific operation parameters needed to destroy ODS;
- Management staff at local EPBs and other departments are trained on the monitoring of the ODS destruction activities.

The training will make full use of existing job training programmes in China. Experts from different fields (producers, destruction enterprises and technical consultants) will be fully engaged. In addition, the training system established during the CFC phase-out phase shall be employed. Local EPBs will take responsibility in organizing the training activities, which will be integrated with technical validation activities.

Training contents include but are not limited to:

- Facts about ozone layer protection and ODS;
- Regulations, policies and standards related to disposal of ODS waste in China;
- ODS destruction technologies, operation of related equipment and emission control;

In addition to the training activities during the implementation of the project, a key output of the project will be the preparation of complete and comprehensive technical documentation providing details of the processes implemented during the project, in order to provide guidance for the development of ODS destruction activities in other provinces in the country.

7.2.3. Supervision, verification and management information system (MIS)

The management procedure and the supervision system will be mainly based on the existing working mechanism of local EPBs, including but not limited to:

- Explore the feasibility of setting up a recording system for enterprises carrying out ODS collection, storage, transportation as well as destruction, to be managed by local EPBs;
- Set up a management information system for the collection of ODS destruction data, such as destroyed amount as well the progress of the project;

- Set up of a mechanism of regular inspection and supervision on equipment emission to allow local EPBs to supervise the progress of the activities.
- Verification of the amount destroyed during the implementation of the project.

Most of the stakeholders participating in the implementation of this project are already registered in the existing system, and those which exceptionally are not will be requested to register as a pre-condition to participate in the project.

All stakeholders will report on the activities to be undertaken in the context of the project, as well as on those related ones (mainly collection) which are not part of the project implementation but have a relevant impact on it.

7.3. Implementation Schedule

7.3.1. Overall Description

UNIDO will be the international implementing agency of the project, whereas domestic implementation will be coordinated by FECO, which establish a project implementation office.

Other stakeholders involved in the project implementation include:

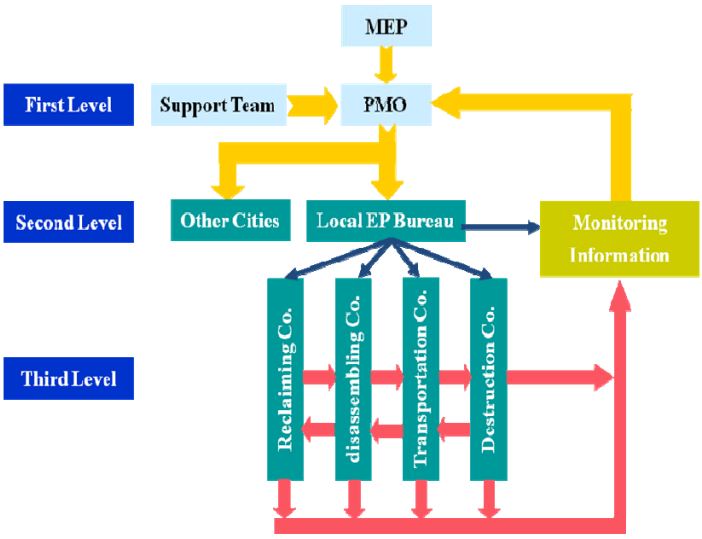
- Local EPBs and specific departments of the national government, which will play a supervisory and managerial role in the project;
- Sectoral associations, which will act as a link to strengthen the cooperation between government and enterprises;
- Independent technical consultants, who will provide the necessary technical support (international consultants will be invited when necessary);
- Relevant scientific institutes and enterprises.

Effective communication will be established among all stakeholders involved to advance the implementation of the project. FECO will organize and be in charge of a special working group of all relevant stakeholders, whose responsibility includes:

- To organize the implementation and supervise the operation and progress of the project;
- To organize local EPBs, institutes and consultants to verify the destroyed amount;
- To organize economic and technological research and feasibility analysis;
- To organize the formulation of laws, regulations, rules, standards and specifications;
- To coordinate the connection, cooperation and progress in the implementation, to remove obstacles;
- To organize the necessary bidding processes for sub-contracting and carry out supervision;
- To supervise the operation of information system and obtain relevant information and make adjustment to the activities and schedule accordingly.

The following figure summarizes the implementation and management structure of the project:

Figure 11: Implementation and management structure of the project



7.3.2. Responsibilities

1. UNIDO

As the international implementing agency, UNIDO is responsible for the overall implementation of this project and the accomplishment of its objectives as approved by the ExCom. UNIDO will:

- Sign the contract with MEP/FECO for the timely implementation of the activities outlined in this document;
- Monitor the implementation of this project and review the annual report prepared by MEP/FECO;
- Report to the ExCom on the implementation of the work plan;
- On behalf of MEP/FECO, request the ExCom to replenish funds;
- Provide necessary technical support, policy advise and managerial support; and
- Conduct necessary monitoring exercises throughout the implementation and verification of achievement of the targets outlined in this document.

2. FECO

As the national implementation agency, MEP/FECO will be responsible for the overall project management and coordination for the implementation of this project. MEP/FECO will:

- Elaborate and coordinate with relevant stakeholders and be responsible for the daily management and monitor of the project;
- Through UNIDO, submit the documents required to the ExCom;
- Submit the progress reports and work plan to UNIDO;
- Select the eligible organizations and/or enterprises to undertake the activities described in this document;
- Establish and operate project management database and system;
- Ensure the implementation of this project as planned, monitor the project implementation;

Verify the achievement of the ODS destruction targets and performance indicators;

3. Local EPBs

The local EPBs of the demonstration provinces and cities will assist UNIDO and MEP/FECO to implement this project. The EPBs will:

- Finalize the local detailed rules on ODS treatment and the implementation plan;
- Strengthen the capacity on the management and monitoring of the ODS treatment;
- Organize the relevant enterprises to participate in this project;
- Assist FECO on the ODS destruction activities;
- Assist FECO on the verification;
- Other activities entrusted by FECO.

4. Industrial Associations and Experts

The industrial associations and experts will assist FECO and UNIDO on the implementation of the project as the technical supporters. They will:

- Assist FECO and local EPBs on the study and finalization of the policies, regulations, standards and guidelines, as well as the detailed rules and feasibilities;
- Provide technical support and information to FECO and local EPBs on training, technical validation and other activities;
- Finalize the verification method and participate in the verification;
- Other activities entrusted by FECO.

5. Project Enterprises

The project enterprises, including the electric household appliances dismantling stations, waste treatment enterprises, transportation enterprises and servicing stations, will be requested to carry out the ODS destruction. They will:

- Carry out the transportation, storage and destruction of the ODS accordingly commissioned and monitored by UNIDO, FECO, local EPBs and the experts;
- Carry out the technical validation commissioned, supported and monitored by local EPBs and the experts;
- Accept the supervision of UNIDO, FECO and/or local EPBs or personnel or team commissioned by FECO UNIDO and/or local EPBs;
- Keep the files and materials as required;
- Other activities entrusted by FECO and local EPBs.

7.3.3. Time Schedule and Time-Critical Elements of the Implementation

The **time schedule** for the implementation of the project can be found in the table below:

Table 13: Time schedule

Year	2012				2013				2014			
Quarter	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Activities	**Schedule**											
- Mechanism of implementation and management												
- Technical validation												
- Destruction												
- Set up the training system												
- Preparation of training materials												
- Training activities												
- MIS												
- Policies and regulations												
- Standards and guidelines												
- Monitoring and verification												

Taking into consideration the proposed timeline for the implementation of the project (30 months, assuming starting date during the second half of 2012), the following **time-critical elements** of the project implementation have been identified per calendar year:

2012 (second half)

- Mechanism for the implementation and management of the project set in place (Steering Committee established and operational);
- Inception meeting with the participation of UNIDO, MEP/FECO and all local stakeholders from the four provinces participating in the implementation of the project;
- Completion of procurement processes for activities scheduled in 2012;
- Technical validation and first destruction trials for one destruction facility.

2013

- Completion of procurement processes for activities scheduled in 2013;
- Technical validation and destruction trials completed for all destruction facilities;
- Monitoring and verification system established and operational for all four provinces;
- Destruction of 50% of the ODS waste undertaken by the end of the year;
- Training schedule agreed upon and training materials prepared;

2014

Completion of the project as scheduled and delivery of expected outputs provided that time-critical elements for 2012 and 2013 meet the proposed schedule.

8. CONTRIBUTION TO THE SUSTAINABILITY OF ODS DESTRUCTION ACTIVITIES IN CHINA

The first condition that has to be met in order to ensure long-term sustainability of ODS destruction activities in China is the existence of a robust collection system, as described in Section 3.2. Although the project does not include activities addressing collection initiatives, these will benefit from the technical and cost-related information provided by the pilot demonstration project.

The implementation of this project will contribute to the long-term sustainability of ODS destruction activities in China by providing a comprehensive set of technical, economic, logistic and managerial data and lessons learned which will be an input for the adaptation of the current legislative framework addressing ODS management and disposal. If ODS destruction can be included in the existing national framework for management of hazardous wastes, destruction activities will be sustainable.

8.1. Expected Areas of Intervention

The project implementation will have an impact on various areas:

1. Technical capacity

The need for the project is based on the fact that there is a large number of equipment containing ODS in China and only a very small portion of them are currently being destroyed.

The project will contribute to establish the appropriate capacity for ODS collection, treatment, transportation, storage as well as destruction based on local ODS inventory and collection difficulties. This is the basis which ensures the successful treatment of ODS.

A long-term ODS destruction in China requires adapting the existing destruction capacity in the country. The project will provide key data needed for the adaptation of municipal solid waste incinerators for ODS destruction based on the improving incineration capacity and technology in cities in China. There is also room for further adoption of specific ODS destruction equipment.

In addition, the management information system, supervision mechanism and training system can play a long-term role as well as be improved and advanced based on changing conditions.

2. Financial support

The project implementation will provide information on cost efficiency issues that can be useful for the establishment of a future financial mechanism to support ODS destruction activities (e.g. producer's fund, revolving fund to support collection activities).

3. Policies and regulations

Policies and regulations are the policy foundation and legal basis. A series of laws and regulations have been issued in China to set a framework, but there are not enough implementing rules. On the other hand, the laws and regulations are independent from each other and their main focus is not on ODS destruction. The system needs to be supplemented and improved. The project aims at obtaining the legal and normative requirements for ODS destruction through activities that will contribute to the definition of guidelines, targets and contents to be included in future regulations and laws.

4. Development of technical standards

Standards and specifications provide the technical support and necessary assurance for ODS destruction. The standard and specification system for ODS destruction in China is not fully developed. There are general requirements stating that ODS which cannot be reused must be

destroyed to avoid secondary pollution; however, there are no specifications on technical requirements such as destruction method, emission values and requirements for emission detection, which poses technical obstacles to ODS destruction. Data on ODS destruction acquired in the project will facilitate the improvement of the technical supporting system for ODS destruction and the determination of guidelines, targets and contents to be included in future regulations and laws.

5. Establishment of an implementing mechanism

Local ODS destruction implementation and management systems will be established in the provinces participating in the project. Based on this experience, a national ODS destruction implementation and management system can be established. The project will also explore the way of integrating the existing regulation system of home appliance and motor vehicle discarding as well as hazardous waste treatment with ODS destruction activities.

8.2. Project Beneficiaries

1. Central government

The project will help the central government to obtain the legal and normative requirements for ODS destruction through activities that will contribute to the definition of guidelines, targets and contents to be included in future regulations and laws.

Also, the data on ODS destruction costs through pilot activities and preliminary studies and validation procedures on a sustainable funding mechanism for ODS destruction in China will contribute to the definition of a funding system based on extended responsibility of producers and a suitable funding management system.

2. Local Environmental Protection Bureaus (EPBs)

Local ODS destruction implementation and management systems will be established in pilot provinces and cities in the project to help the local EPBs and government on the management and monitoring.

3. Destruction facilities

The experiences from the project will promote the adaptation of incineration equipment of urban wastes and hazardous waste for ODS destruction based on the improving incineration capacity and technology in cities in China, as well as the further adoption of specific ODS destruction equipment, like plasma destruction unit.

4. Others

The project will establish a nation-wide system for ODS destruction, including transportation and storage; this will make all identified stakeholders gain experience from the project.

8.3. Environmental Benefit of the Project

The implementation of the project will result in a **direct environmental benefit** that will also provide an incentive to continue ODS destruction activities beyond the scope of this pilot demonstration project. This direct environmental benefit consists of emission reductions of 192 ODP tonnes of ODS or 805,000 tonnes of CO_2 equivalent due to the destruction of the specified amounts of ODS waste.

Table 14: Environmental benefits of the project implementation

Substance	ODP	GWP	Destruction (tonnes)	ODS Reduction (tonnes)	Greenhouse Gas Emission Reduction (tonnes)
CFC-11	1.0	4,000	183.64	183.64	734,548
CFC-12	1.0	8,500	8.37	8.37	71,138
				Total	**805,000**

In addition, the project will provide an **indirect environmental benefit** due to direct foam destruction, due to the fact that the foam's calorific value can be used for heat recovery and therefore for electricity generation, should the adequate co-generation facilities be in place.

Estimates by national experts show that the incineration of the foam contained in one refrigerator can generate about 360MJ and reduce emission of 30kg CO_2; the following table provide further details on this issue:

Table 15: Energy conditions and CO_2 emission for recovering one refrigerator

Process/energy emission	Energy consumption/ MJ	kg CO_2
Collecting waste refrigerator (transportation)	70	5
Energy consumption during dismantling, shredding and sorting	100	7
Distribution of treated materials	15	1.5
Energy production process		
Reuse of mental	900	-70
PU foam and plastic reuse	600	-35
Reuse of glass	-	-
PU foam and plastic incineration	-360	-30

Almost all the municipal waste incinerators (like the one that will be used in Jiangsu during the implementation of this project) have a boiler for either electricity generation or for hot water and/or vapour generation using the heat in the waste gas.

However, very few hazardous waste facilities (none of the ones considered in this project) have such a heat recovery system. The reason is that the heat generated from the incineration of the hazardous waste is not as constant as the one of the municipal waste. For example, some hazardous wastes are flame retardant (like halon and CFCs), which will not generate enough heat when incinerated.

8.4. Sustainability of the Business Model

Taking into account the expected areas of intervention and the beneficiaries of the implementation of this project, the sustainability of the proposed business model for long-term ODS destruction activities in China revolves around the following key elements:

- China has undertaken significant steps in setting up a legislative framework which has resulted in robust collection schemes set up at provincial level; the project will contribute to enhance the existing legislative framework in the most suitable way to make the adequate relevant stakeholders assume the cost of destruction through the implementation of regulations and policies of mandatory nature;
- Development of local capacity is a key issue to ensure sustainability of the model; this is due to the fact that, given the expected amounts of ODS waste to be available for destruction in the short and long run, exports of ODS waste for destruction overseas is not a cost-effective option. In this regard, all data provided by the project about specific

aspects of destruction per se as well as of related logistic activities will contribute to the development of a nation-wide strategy for ODS waste disposal;

- All local stakeholders participating in the project implementation have agreed on their support to the efficient and effective functioning of the proposed system;
- The development of an implementing and management system for ODS destruction will benefit from the already existing procedures of local EPBs. Once the project is implemented, this mechanism will remain in place in the provinces participating in the project, and will be instrumental in the setting up of similar structures in other provinces;
- The project implementation will showcase the use of municipal solid waste incinerators for direct foam destruction, and the related electricity generation by co-generation. Widespread adoption of these practices at country level will provide an economic benefit that can contribute to the long-term sustainability of ODS destruction activities in China.

9. PROJECT BUDGET

9.1. Budget Components

9.1.1. Main Project Activities

1. Transport and storage

Transportation costs for one ton of ODS per kilometer account for 0.16 USD, plus 0.08 USD as empty fare, which makes the transportation cost 0.24 USD /ton/kilometer.

- For transportation of CFC-11 and CFC-12 in cylinders, assuming a transport radius of 100 kilometers, average cost for refrigerant per ton would be 24 USD, excluding the weight of the container.
- For foam transportation, only 2 tonnes of foam can be transported by a vehicle with a capacity of 10 tonnes due to the low density of the foam, which is equivalent to the transportation of 0.4 tonnes of CFC-11. Assuming a transport radius of 50 kilometers, the average cost of ODS per ton would be 300 USD. Foam transportation will be co-financed by the project beneficiaries.

Storage of the CFC-11 will require using metal pail with a capacity of 200 l. and a price of 30 USD, which can be used as much as fifty times. The average cost of storage is3 USD/ton.

2. Fuel

The incineration of pure CFC-11 and CFC-12, which are non-flammable substances, requires additional fuel (for example, diesel oil with a calorific value of 10,000 kcal/kg). The incineration of one ton of pure CFC-11 or CFC-12 will require additional 1.86 tonnes of fuel; assuming a price of waste diesel oil of 919.35 USD per ton, the total cost of extra fuel for incineration sums up to 1,710 USD per ton.

The incineration of CFC-11 in foams requires little extra fuel compared to the additional fuel required for the incineration of pure CFC-11 and CFC-12.

3. Power consumption

On average, incineration of one ton of refrigerant in a rotary kiln takes two hours, consuming 800kwh of power. Calculated on an averagely basis of 0.16 USD/kwh of power in China, total power cost would be 128 USD/ton.

For plasma equipment, it takes on average one hour to incinerate one kilogram of refrigerant, consuming 8kwh of power. Total power consumption cost would be 1,280USD/ton.

4. Emission absorbing materials

Incineration of one ton of CFCs in rotary kiln requires an average of 15 tonnes of sodium carbonate (332.50 USD/ton), 2 tonnes of sodium bicarbonate (698.35 USD/ton) and 20 kilograms of active carbon (1.61USD/kg), which makes the total cost 6,416.40 USD/ton.

Incineration of one ton of CFCs in plasma equipment requires an average of 7 tonnes of sodium bicarbonate (774.20 USD/ton) and 25 kilograms of flocculant (20 USD/kg), which makes the total cost 5,919.40 USD/ton.

5. Waste treatment

Destruction activities will produce 18 tonnes of waste per ton of CFCs (including blends of caustic waste and active carbon). Total cost of waste treatment reaches 2,580.64 USD for destruction in rotary kilns, and 1,146.95 USD in plasma equipment.

6. Depreciation

In order to make the calculations, an incineration facility with an investment of 9.68 million USD has been taken as an example; such investment includes 8.06 million USD of equipment investment and 1.62 million USD of land and infrastructure.

- For rotary kilns, the calculation assumes an operation life of 8 years for the incineration system, assuming a machine life of 20 years with 250 days of operation per year, and daily treatment of 48 tonnes. The residual value is set at 5 percent of the total value. Under these assumptions, depreciation costs are 86.29 per ton, including 79.84 USD of equipment depreciation cost and 6.45 USD for others.
- For plasma destruction equipment, investment is 100,000 USD. The calculation is based on a machine life of 20 years with 250 days of operation per year, and an operation life of 10 hours per day. The residual value is set at 5 percent of the total value. Under these assumptions, depreciation of the plasma equipment accounts for 1,900 USD per ton.

7. Maintenance costs

Maintenance costs are calculated as 20 percent of the depreciation cost, that being 15.97 USD/ton for rotary kilns and 380 USD/ton for plasma equipment.

8. Labor

Total labor cost per ton is 18.06 USD, based on an average wage of 4,838.71 USD/person/year and 45 workers (four shifts, three groups).

9. Technical validation

Technical validation for rotary kiln, municipal solid waste incinerator and plasma equipment should be carried out to confirm the best incineration technology and operation parameters to meet the emission requirements. The main component of the technical validation will be the development and implementation of a trial destruction protocol for the three types of facilities involved in the implementation of the project.

Each technical validation has a cost of USD 50,000. Validation of the plasma will be co-financed by the beneficiaries; therefore, funding requested for this item accounts for 100,000 USD.

9.1.2. Supporting Project Activities

1. Policy assistance

The total cost associated to the group of activities addressing policy issues (as described in Section 7.2.1.) is estimated to be USD 20,000.

2. Training

The cost breakdown for the activities described in Section 7.2.2. is as follows:

- Compilation of the training materials, including training ToR, training materials, testing and evaluation plans as well as exercise set: the cost is estimated to be USD 10,000, including research cost, consultant cost, workshops and printing.
- For each province/city, approximately 25 trainees from the local EPBs and the destruction facilities will be trained (therefore, the total number of trainees will be approximately 100).
- Staff training costs will be used for 100 trainees at all levels, which will add up to USD 40,000 on a standard of 3 days/person, USD 50/person/day for consumables and food and accommodation.

3. Management information system

The cost for the system operation described in Section 7.2.3., estimated to be UDS 10,000, includes system maintenance, upgrade, data analysis, and labor and telecommunication costs. Similar systems currently in place will be enhanced to meet this project's requirements.

4. Consultancy services

The implementation of the supporting project activities outlined in Section 7.2. will require part-time employment of a technical expert, a publicity expert, an evaluation expert, a supervision expert, etc. It is estimated that the total consultant costs would be USD 50,000.

5. Technical documentation

As it has been stated before, the output of this activity will be the preparation of a complete and comprehensive technical documentation providing details of the processes implemented during the project, in order to provide guidance for the development of ODS destruction activities in other provinces in the country.

The cost related to the preparation of this documentation is estimated to be 25,000 USD, taking into account that some of the other supporting activities (e.g. development of training materials, consultants' fee, or implementation and management) will contribute to deliver this output, and therefore budget assigned to those activities will be leveraged to deliver the technical documentation.

6. Project implementation and management

The total cost of this component is USD 150,000, including supporting personnel, traveling, coordination, training, project reviews, project completion acceptance, etc.

9.2. Detailed Budget Breakdown

9.2.1. Budget for Main Project Activities

A. Unit Costs by Technology

In line with the budget components outlined in Section 9.1.1., the following table shows the unit costs associated to the main project activities for each of the substances and technologies taken into consideration in this project:

Table 16: Unit costs by technology

Item	Unit cost (USD/ton)			
	CFC-11 (Pure)	CFC-11 (In foam)	CFC-12 (Rotary Kiln)	CFC-12 (Plasma)
1. Transportation	24	*300* (*)	24	24
2. Storage	3	0	42	42
3. Destruction				
3.1. Fuel	0	0	1,710	0
3.2. Spare parts	0	0	0	6,250
3.3. Power consumption	128	128	128	1280
3.4. Emission absorbing materials	6,416.40	6,416.40	6,416.40	5,919.40
3.5. Waste treatment	2,580.64	2,580.64	2,580.64	1,146.95
3.6. Depreciation	86.29	86.29	86.29	*1900* (*)
3.7. Maintenance	15.97	15.97	15.97	15.97
3.8. Labor	18.06	18.06	18.06	18.06
Total	**9,272.36**	**9,545.36**	**11,021.36**	**16,596.38**
Adjusted total (excluding co-financing component)	**9,272.36**	**9,245.36**	**11,021.36**	**14,696.38**

(*) Budget components co-financed by project participants

The table above excludes costs related to technical validation; these costs are linked to the facility and not to the destruction *per se*. Therefore, technical validation costs have been included in the budget breakdown by province.

B. Breakdown by Province

The following table shows the budget breakdown by province for the main project activities:

Table 17: Budget breakdown of main project activities by province

Provinces	CFC-12			CFC-11			Technical Validation (USD)	Sub-total (USD)
	Rotary Kiln (kg.)	Plasma (kg.)	Unit Cost (USD/kg)	Rotary Kiln (kg.)	MSWI (kg.)	Unit Cost (USD/kg)		
Guangdong		7,016.57	16.6				*50,000* (*)	166,475
Jiangsu					98,062.29	9.55	50,000	986,495
Shandong				59,862.20		9.27	25,000	580,064
Tianjin	1,352.57		11.02	25,712.39		9.55	25,000	285,341
							Total	**2,018,375**

(*) Budget components co-financed by project participants

Taking into account those components which will be co-financed by the project participants, an adjusted budget breakdown by province can be defined as follows:

Table 18: Adjusted budget breakdown of main project activities by province (excluding co-financing)

Provinces	CFC-12			CFC-11			Technical Validation (USD)	Sub-total (USD)
	Rotary Kiln (kg.)	Plasma (kg.)	Unit Cost (USD/kg)	Rotary Kiln (kg.)	MSWI (kg.)	Unit Cost (USD/kg)		
Guangdong		7,016.57	14.7					103,144
Jiangsu					98,062.29	9.25	50,000	957,076
Shandong				59,862.20		9.27	25,000	579,923
Tianjin	1,352.57		11.02	25,712.39		9.25	25,000	277,742
							Total	**1,917,885**

9.2.2. Budget for Supporting Project Activities

The table below summarizes the budget for the supporting activities outlined in Section 7.2. for which budget components have been listed in Section 9.1.2.:

Table 19: Budget for supporting project activities

Item	Unit Cost (USD)	Amount	Budget (USD)
1. Policy research	20,000	1	20,000
2. Training materials	10,000	1	10,000
3. Training	150	100	15,000
4. Information system	10,000	1	10,000
5. Consultant fee	10,000	5	50,000
6. Technical documentation	25,000	1	25,000
7. Implementation and management	150,000	1	150,000
		Total	**280,000**

9.2.3. Co-financing from Project Participants

The project secures co-financing for both its implementation and beyond, in line with the objective of the outlined business model of ensuring long-term sustainability of ODS destruction activities in China.

<u>During implementation of the project</u>

Taking into account the budget breakdown for both main and supporting project activities, project participants will provide co-financing for the following activities:

- Foam transportation costs assumed by the reclaiming and disassembling companies participating in the project (50,490 USD);
- Technical validation of the plasma destruction facility in Guangdong, to be co-financed by the owners of the destruction facility (50,000 USD);
- Contingency costs accounting for a total of 100,920 USD will be assumed by all local stakeholders participating in the project;

The total co-financing amount related to these activities is 201,410 USD.

There are other activities which also imply a co-financing component:

- Acquisition of the plasma equipment that will be used for the implementation of the project at Guangdong will be co-financed by the facility owner and the government (the equipment will be purchased outside the scope of this project);
- Collection costs assumed by the reclaiming and disassembling companies participating in the project: collection activities, despite being outside the project boundary and not being eligible to be included in the funding request to the MLF, also imply a co-financing component; this is due to the fact that recovery and recycling centers incur in a cost for the dismantling of refrigerators.

The following text box provides further details about such costs in the case of China:

Box 3: Information on costs related to ODS waste collection activities in China

The cost to dismantle a single refrigerator in China is the following (based on 2008 data):

i. Power consumption and water consumption: about 8.11 RMB/refrigerator;
ii. Depreciation: about 26.8 RMB/refrigerator;
iii. Maintenance costs and labour cost: about 12.78 RMB/refrigerator;

iv. Taxes: about 0.75 RMB/refrigerator;

v. Waste treatment: except for the treatment of CFCs, foam and oil from the compressor, some plastics and glasses contained with brominated flame retardants also need to be treated with 2.93 RMB/refrigerator.

The total cost of dismantling a refrigerator accounts for about 8.15 USD (6.3 RMB=1 USD), excluding the cost for the treatment of foam, compressor oil and refrigerant.

- Extraction costs: in the case of Shangdong, CFC-11 will be extracted from foams at a cost assumed by the dismantling facility; such cost is detailed in the following text box:

Box 4: Information on costs related to extraction of CFC-11 from foams in Shangdong

The cost is calculated as the designed capacity (240 refrigerators/day, with a work time of 8 hours/day), with total 150kg of CFC-11 collected and a total of 960 kg. of foams (without CFC-11) collected.

The real situation in the station is that only about 60-70 refrigerators can be dismantled per day, so they usually run the machine every 4 or 5 days.

1. Power consumption

About 350kwh of power will be consumed per day. Calculated on an averagely basis of 0.16 USD/kwh of power in China, total power cost would be 56.00 USD/day, i.e. 0.37 UDS/kg.

2. Foam transportation and treatment

The foam without CFC-11 will be filled into the landfill, which costs 0.75/kg. Total cost for the treatment of foam will be 720.00 USD/day, i.e. 4.80 USD/kg. The foam will be transported by the landfill company.

3. Depreciation

The whole facility was imported from Germany with an investment of 1.46 million USD. The calculation is based on a life of 20 years with 250 days of operation per year. The residual value is set at 5 percent of the total value. Under these assumptions, depreciation costs are 277.40 USD/day. For the CFC-11 collection machine, there is no single price since the whole line was procured. But the station assumes that the price of the CFC-11 collection machine is about 20% of the whole, which means the depreciation is 55.48 USD/day, i.e. 0.37 USD/kg.

4. Maintenance costs

Maintenance costs are calculated as 20 percent of the depreciation cost, that being 11.10 USD/day, i.e. 0.07 USD/kg.

5. Labor

Total labor cost per day is 35.71 USD with two workers, i.e. 0.24 USD/kg.

Total cost

The total cost is 5.86 USD/kg. Total 59,862.20 kg. of liquid CFC-11 is planned to be destructed, which leads to a co-finance component of 350,509.14 USD.

The table below shows the details:

Item	Unit cost (USD/day)	Unit cost (USD/kg)
Power consumption	56.00	0.37
Foam transportation and treatment	720.00	4.80
Depreciation	55.48	0.37
Maintenance	11.10	0.07
Labor	35.71	0.24
Total	**878.29**	**5.86**
Co-finance (59,862.20kg)		**350,509.14**

- Energy savings secured through electricity generation in Jiangsu municipal solid waste incinerator.

Beyond implementation of the project

In addition to the continuous costs co-financed by the project participants during the implementation of the project, the following co-financing will be secured:

- Collection costs assumed by reclaiming and disassembling companies at national level;
- Foam transportation costs assumed by the reclaiming and disassembling companies at national level;
- Technical validation of new destruction facilities used for ODS destruction (reduced costs due to the fine-tuning undertaking during the implementation of the project);
- Energy savings secured through electricity generation in all municipal solid waste incinerators involved in direct foam destruction activities, as well as those hazardous waste facilities with co-generation equipment in place;
- Costs related to the maintenance of the supervision, verification and MIS system will be shared by national and provincial governments.

9.2.4. Total Budget

The following table shows the total cost of the disposal activity including costs not covered by the Multilateral Fund:

Table 20: Total cost of the disposal activity (including costs not covered by the Multilateral Fund)

Item	Cost (USD)
Project Costs	
- Main project activities	2,018,375
- Supporting project activities	280,000
- Contingencies (5% of main project activities)	100,920
Total Project Costs	**2,399,295**
Project Costs not covered by the Multilateral Fund	
- Foam transportation	50,490
- Technical validation of the plasma destruction facility	50,000
- Contingencies	100,920
Total Project Costs not covered by MLF	**201,410**
Requested MLF grant	**2,197,885**
Cost-efficiency (USD/kg.)	**11.45**

The breakdown of costs for which funding is requested to the MLF is detailed in the following table:

Table 21: Total budget (funding request to the MLF)

Category	Items	Cost per unit (USD)	Number of units	Amount (USD)
Main project activities	CFC-12 by rotary kiln	11.02	1,352.57	14,902
	CFC-12 by plasma	14.70	7,016.57	103,144
	Pure CFC-11	9.27	59,862.20	554,923
	CFC-11 in foam	9.25	123,774.68	1,144,916
	Technical validation	50,000	2	100,000
	Sub-total			**1,917,885**
Supporting project activities	Policy research	20,000	1	20,000
	Training materials	10,000	1	10,000
	Training	150	100	15,000
	Information system	10,000	1	10,000
	Consultant fee	10,000	5	50,000

Category	Items	Cost per unit (USD)	Number of units	Amount (USD)
	Technical documentation	25,000	1	25,000
	Implementation and management	150,000	1	150,000
	Sub-total			**280,000**
TOTAL (USD)				**2,197,885**
Cost-efficiency (USD/kg.)				**11.45**