

UNITED NATIONS DEVELOPMENT PROGRAMME
Project of the Government of Trinidad and Tobago
PROJECT DOCUMENT

Project Number: TRI/03/G62/A/2G/99
 Project Title: **Terminal Phase – Out Management Plan for CFC in Trinidad and Tobago**
 Project Short Title: TPMP for CFCs
 Estimated Start Date: December 2003
 Estimated End Date: December 2008
 Management Arrangement: National Execution
 Executing Agency: Environmental Management Authority (EMA) Government of Trinidad and Tobago
 Total Budget: US\$460,000¹

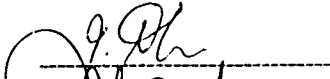
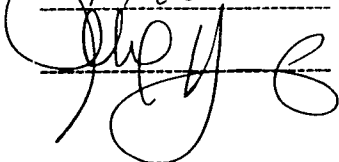
Brief Description:

The Terminal Phase-out Management Plan (TPMP) for CFCs in Trinidad and Tobago covers the period 2003-2008, with zero consumption of CFC targeted by January 1, 2008. The TPMP, a performance-based programme that contains specific phase-out targets, will be implemented through two action programmes and will result in the complete phase-out of CFCs in Trinidad and Tobago within 4.5 years. The TPMP will ensure timely, sustainable and cost-effective phase-out of CFCs through a combination of technology transfer, training, technical support and policy/management support components. The TPMP will consist of the following components:

- Supplemental recycling for MAC, domestic and commercial refrigeration and air-conditioning, and activation of central recycling facilities;
- Conversion programme for commercial refrigeration systems;
- Demonstration retrofit programme for MAC, domestic refrigeration and mini-food market refrigeration;
- Training programme for existing and new recycling and recovery programmes;
- Other technical assistance (policy and legislation actions);
- Conversion/recycling programme for building chillers; and,
- Local project management for implementation/supervision

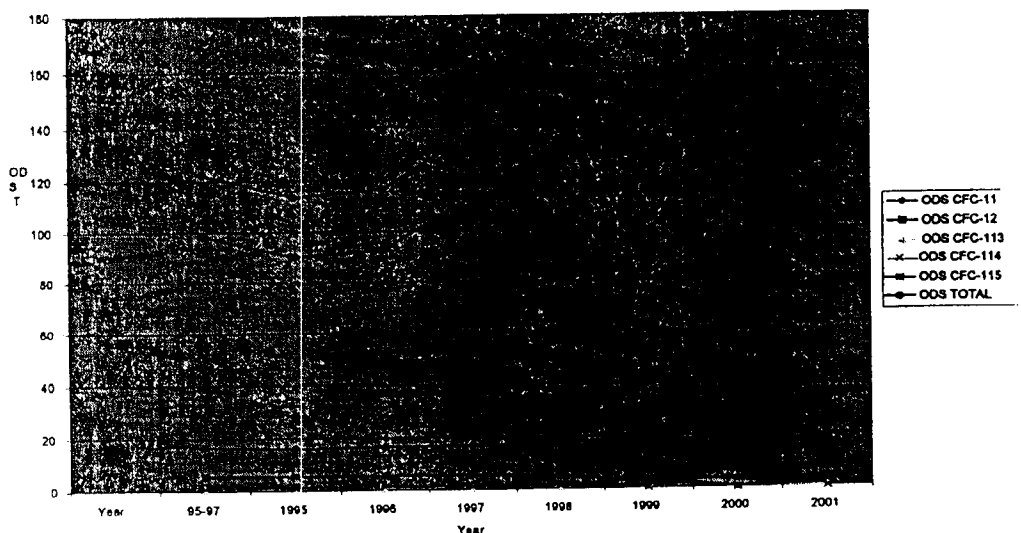
IMPACT OF PROJECT ON COUNTRY'S MONTREAL PROTOCOL OBLIGATIONS

The project will enable the Government of the Trinidad & Tobago to meet all its Montreal Protocol obligations.

Signed on behalf of:	Signature	Name and Title	Date
Government:		ISRAEL ALI PERMANENT SEC.	03/12/03
UNDP/Trinidad & Tobago		DR. INYANG EBONG-EBARSTRUA RESIDENT REPRESENTATIVE	03/12/03

¹ Total amount approved at 40th Executive Committee meeting however, only US\$ 220,000 approved for First Action Plan (July 1, 2003 - June 30, 2006) is being disbursed under the attached budget.

Trinidad and Tobago, Trend Analysis for Annex A Group 1 ODS



B. ODS Consumption Other Than CFC

T&T has made substantial progress in reducing its consumption of ODS since the CP was approved in 1996. T&T has completed the phase-out of halons thanks to local efforts, with the last year of consumption being 2000 with imports of 1.84 tonnes halons, compared with 6.7 tonnes in 1995. The import of halons was restricted effective January 1, 2002. Existing stocks of halons will be recycled as part of a local programme initiated within the context of the Regional Caribbean Halon Bank Management programme.

There has been no reported use of CTC in recent years. TCA consumption has been reduced from about 11 tonnes in 1995 to 0.9 tonnes in 2001. TCA was used primarily for metal cleaning and most of those uses have been eliminated by local efforts. HCFC-22 use has grown over the past six years, since HCFC-22 is a major component in the T&T programme for substitute technology. In 2001, HCFC-22 consumption was about 187 tonnes, compared with about 74 tonnes in 1995. That trend is expected to continue over the next few years, since HCFC-22 is one of the substitute materials in the country's phase-out programme.

C. CFC Consumption

Consumption of CFC in foam applications has been eliminated by local efforts that early on switched the foam industry to methylene chloride. Consumption of CFC in aerosol products was eliminated in 1999, following a consumption of about 10 tonnes in 1995. This reduction was achieved, in part, through support from the MLF. Overall, CFC use has decreased from about 158 tonnes in 1998 (the highest year of consumption) to 80.7 tonnes total CFC in 2001.

As of 2001, there are no equipment manufacturing facilities in T&T based on use of ODS. Thus, all remaining CFC consumption in the country is in the refrigeration/air conditioning servicing sectors. The

disaggregation of 2001 data for CFC consumption in the various remaining sub-sectors within the refrigeration and air conditioning industry is shown below:

Table 2: T&T - CFC Consumption by Subsector in 2001

Sub-sector	Tonnes CFC	% of total
Domestic Refrigeration	12.0	15
Retail Food Industry refrigeration	14.0	17
Other Commercial Refrigeration	5.7	7
MAC	44.0	55
Building Chillers	5.0	6
Total	80.7	100

In 1999, T&T promulgated an import control quota and licensing system to control imports of ODS, with the initial emphasis on CFCs (Chapter V).

D. Industry Structure for Refrigeration/Air Conditioning

1) Domestic Refrigeration

At present, all domestic refrigerators are imported. In the early 1990's there were two local manufacturers of domestic refrigerators as reported in the Country Programme. However, both ceased production by the mid 1990's. Since 1999, all imports have been based on HFC-134a refrigerant. In 2001, there are estimated to be about 300,000 domestic refrigerators in the country, of which about 100-120,000 are estimated to be based on CFC-12 refrigerant and the balance are based on HFC-134a. The typical size is from 10-23 cubic feet. The life of domestic refrigerators is about 20-25 years with major service of the refrigeration system required about every 7-10 years. (However, in some cases, "repairs" are done by service technicians, who recharge the system with little attempt at leak repair.) Repair work on domestic refrigerators is carried out by about 60-80 large and medium service shops and by the informal sector (about 100 small service shops and other individual technicians. The informal sector work volume generally would not support a recycling programme but would warrant actions focusing on enhanced leak reduction and improved training.

The sector consumed an estimated 12 tonnes of CFC-12 in 2001, or 15% of the 2001 consumption of CFC. This amount is expected to decline gradually over the next decade due to attrition/retirement of the older refrigerators. The forecast of CFC refrigerators and CFC used, in the absence of a concerted recycling/recovery/retrofit programme in domestic refrigeration sector is shown below. If no action is taken, then the sector is estimated to consume about 5-6 tonnes CFC in 2010. This amount would have to come from recycled sources and that level is considered beyond local availability/capability. A strong proactive programme aimed at CFC recycling and leak reduction, and retrofit of a portion of domestic refrigerators to non-CFC refrigerant is warranted. In addition, a recovery/recycling programme in other CFC using sectors will be needed to provide a source of recycled CFC.

2) Retail Food Industry Refrigeration

The retail food industry has made some progress in switching to non-CFC technology, but the primary effort to date has been in complying with the 1999 import ban on CFC-based technology and equipment. There have been several super markets built since the late 1990's, and all of these recent projects have

40th Meeting of the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol relied on non-CFC for refrigerant systems, primarily R-507. There remains a large number that continue to use CFC cooling systems.

The retail food industry comprises a wide variety of sizes, ranging from relatively large, modern supermarkets to medium sized markets and a large number of small, family-owned markets. The larger markets are all located in Trinidad and the medium and smaller markets are located throughout both islands. There are an estimated 35 large, 55 medium/small super markets and 1516 mini markets (about 5% of the latter are in Tobago). All of these markets are locally owned. There is one large chain – Hi-Lo – that owns 18 super markets, including six new ones that are CFC-free. Hi-Lo's remaining systems based on CFC have a combination of CFC-12 and R-502 refrigerant. The company is aware of the ozone issue and has long term plans to modify its existing refrigeration systems but has not set a specific target to comply with the MP targets. A major constraint is financial considerations. Other markets are reported to be in a similar situation. The family-owned markets are even less able to afford replacing their refrigerant systems. For those large super markets with CFC refrigeration systems, the average size of the refrigeration systems installed in these markets is about 75-90 hp with a charge of 450 kg CFC (or R-502). The average age of these systems is about 18 years with an estimated total life of about 25 under local conditions and considering that the larger markets undertake continuing maintenance and upgrade programmes. The sector consumed an estimated 14.0 tonnes CFC in 2001, inclusive of the CFC-12 in those that use R-502 blend.

3) Other Commercial Refrigeration

Fisheries Industry Refrigeration. None of the government owned facilities have CFC equipment that is functional. Ice is used for cold storage. There are estimated 12-15 private owned companies still operational. The majority of these systems use HCFC-22 and a few utilize ammonia, R-404 and R-507. These companies are involved in exportation of frozen goods. To meet international or regional standards, most of the systems are not CFC dependent. Those that contain CFC dependent systems consist primarily of a small walk in freezer holding a maximum of 25 lbs. The estimated total CFC consumption in this sector is 0.02 tonnes total CFC.

Food Manufacturers and Processors. There are several foods manufacturing companies in T&T producing and processing a wide range of goods from meats and dairy products to ice cream and beverages. These companies utilize cold storage facility or chill room relying on CFC technology (CFC-12 and R-502) or non-CFC technology (Ammonia, R-507, HFC-134a). The estimated total CFC consumption in this sector is 3 tonnes total CFC.

Hotels. There are approximately 15 large hotels in T&T utilizing CFC refrigeration systems of substantial size. These systems would include walk-in freezers and chill rooms. These systems use CFC-12 and R-502 for low temperature refrigeration and HCFC-22 for medium and low temperature ranges. Some alternatives used are HFC-134a and R-507. The estimated total CFC consumption in this sector is 0.85 tonnes total CFC.

Ice Manufacturers. There are about 15 large ice manufacturers in T&T using a range of systems. They use CFC-12, R-502, HCFC-22 or ammonia, R-507, HFC-134a and R-404. The estimated total CFC consumption in this sector is 0.45 tonnes total CFC.

Hospital Mortuaries and Funeral Homes. Most systems are old (>10 years) and therefore assumed to be CFC dependent. The systems used are very small using less than 10-50lbs of gas each. A few

funeral homes have converted their CFC-12 systems to HFC-134a or HCFC-22. The estimated total CFC consumption in this sector is 0.095 tonnes total CFC.

Transport Refrigeration. There are two types of refrigerants used for transport of perishable goods, either CFC-12 or HFC-134a. Two companies - Mecalfab Ltd. and Ice Connections Ltd - install insulation/refrigeration systems. The majority would be HFC-134a as these companies no longer install CFC systems and promote conversion of old systems to HFC-134a. The estimated CFC consumption in this sector is therefore, included under the MAC sector.

4) Air-conditioning

There are an estimated 85-100 air-conditioning service shops in T&T, including MAC and building chillers, and domestic air-conditioning. The majority of these shops do not deal solely in air-conditioning but rather a combination of air-conditioning and refrigeration services. Most service CFC systems in MAC (described below) and the balance primarily work with HCFC-22 or other non-CFC refrigerants. Most install imported equipment and one company - Thomas Peake's and Co. manufactures systems, largely from imported components. All technology utilized in domestic and small building air-conditioning is HCFC-022 based, including split and window units and some central systems.

5) MAC

In 1999, T&T stopped import of equipment/systems containing CFC, thus entry of used (or new) vehicles equipped with CFC-12 MAC was stopped. Although it is legal to locally install CFC-12 MAC systems (with imported parts, the practice does not represent a significant factor. Thus, existing stock of CFC-12 based MAC vehicles is expected to decline over the next few years at a rate based on the normal repair practices in the country (plus accidents, etc). Typically, cars are kept for long periods and a life of 20 years is common. A large number of CFC vehicles remain. In addition, there is a large marine (ports and marinas) MAC industry.

The MAC Demonstration Project (Chapter II) has shown that MAC recycling is a workable proposition in T&T, but some design changes are needed to reach a larger market portion. On-site recycling works with 1) well trained technicians 2) equipment large enough to unload and reload the MAC in a short period, 3) well maintained equipment, 4) project design that recognizes that a portion of MAC enter the shop with CFC-12 charge already lost. Additional actions are needed to reach the informal sector. Awareness programmes to eliminate "topping off" the MAC without a leak repair being made, and steps to eliminate "reverse" filling with CFC-12 in HFC-134a systems or replacing HFC-134a parts with CFC-12 parts are needed.

There are about 72 MAC service shops in Trinidad and Tobago, including about 24 other service shops that are part time in MAC, including private and public sector. These shops would be able to make a contribution to the MAC recycling component. In addition, there are a large number of technicians in the informal sector that also undertake MAC repairs, sometime only doing minimal repairs and "topping off" systems. This group will be much more difficult to reach and are not likely to have enough MAC business to justify distribution of recycling machines. They would however, benefit from training and awareness programmes.

CFC service requirements for MAC are expected to come from: 1) imports and 2) local recycling efforts until CFC imports are stopped in 2009. Afterwards, CFC service requirements would come from local recycling programmes and some MAC retrofits to non-CFC technology. The consumption of CFC-12 in

MAC in 2001 is estimated at 44 tonnes; or 55% of total CFC consumption. Thus, MAC is an important component in the remaining CFC phase-out programme.

6) Building Chillers

There are a number of large buildings remaining that continue to use CFC-based cooling systems - central air-conditioning units made up of either low-pressure CFC-11 centrifugal system or high pressure CFC-12 reciprocating systems. Approximately 15 of these systems remain operational and data was collected for 10 of them. System capacity ranges from 130lbs to 300lbs of refrigerant and average age of a system is 15-20 years, with estimated remaining life of about 5-10 years.

Total capacity of R-12 = 1.5 tonnes

Total capacity of R-11 = 3.3 tonnes

The estimated building chillers consumption is 4 tonnes of CFC-11 and 1.1 tonnes of CFC-12 in 2001. Thus, total CFC consumption was 5.1 tonnes.

E. Substitute Technology

The remaining phase-out strategy for T&T will rely primarily on appropriate, commercially available, substitute technology for the various refrigeration and air conditioning sub-sectors that continue to use CFCs. MAC will rely on HFC-134a, domestic refrigeration will rely primarily on HFC-134a refrigerant, commercial refrigeration will rely on a combination of refrigerants, namely absorption systems, HCFC-134a, HCFC-22 and ammonia, and, building chillers will rely primarily on HFC-134a. Domestic air conditioning will rely on HCFC-22. ? ?

F. Analysis of Country Programme Results

The CP has provided a satisfactory basis to guide T&T's implementation of its obligations under the Montreal Protocol and the several projects supported by MLF. It has been used in setting policy and the required institutional framework, particularly the import control system. Substantial progress has been made in reducing CFC and other ODS consumption. CFC consumption in 2001 was about half of the country's consumption in 1998 (year of highest consumption) and the target for 50% reduction from the freeze level in 2005 is expected to be achievable.

However, the CP set an unrealistically high target for achieving complete CFC phase-out by 2000, an occurrence that has been seen in other countries as well. Phase-out in the service sector has universally proven to be difficult and costly, and T&T is no exception. Similarly, the CP underestimated the cost of phase-out. The CP provided an estimate of US\$430,495 for six projects to be implemented during 1996-98. It recognized that there would also be a significant amount of financing from local sources but did not quantify that level. It gave no indication of any further action and costs required. It did not specifically mention recycling in MAC sector and the actions required to phase-out CFC use in commercial refrigeration and building chillers. The short falls have been taken into consideration in the design of the TPMP.

IV. Forecast of CFC Demand

A. Import Quota System for ODS

T&T launched an import quota and licensing system, starting in 1999, that covers all ODS. The policy is based on existing T&T law covering import/export controls through a “negative list” procedure. Import of all ODS requires an import license to be issued by the Ministry of Trade. A quota system for ODS has been incorporated into the policy. The ODS quota is agreed annually between the Ministry of Trade, Environmental Management Agency (EMA) and importers through an informal system with a starting point based on the allowable limits as set under country’s freeze level as mandated by the MP. The initial quota in 2000 was allocated to importers in business in 1999 and was set at the prorated amount of

each importers 1999 import volume minus 10%, with EMA retaining about 10% of the quota for contingency purposes. Informally, no new importers would be allowed/encouraged, but legally the policy cannot enforce that provision. At present there are 8 registered ODS importers, all in Port of Spain, and they handle all imports into the country, including those destined for Tobago. So far, there has been no request from other importers to participate. The current informal agreement is to reduce each quota by 10% in order to meet the next year’s quota. Once the annual import allocation is agreed, the individual importers then can apply for an import license from the Ministry of Trade. The Customs Department then checks actual imports against the issued licenses and reports to EMA on the results. The system works well and has the support of all importers and ARIA. The recent quota allocations are shown below and compared with actual imports and MP limit:

Table 3 - CFC Imports and Quotas during 1999 - 2003, in tonnes CFC

Year	Total quota	Quota allocated	Actual imports	MP limit
1999	116	104	82.8	122
2000	104	93	101.45	122
2001	94	81	80.7	122
2002	85	74	63.90	122
2003	77	69	Na	122

B. Forecast of CFC Demand

The “T&T Quota under TPMP” is shown below for 2004-2008. This quota represents the country’s obligation to MLF under the TPMP. The annual quota amount to be actually allocated to importers for any year would be set at about 10% lower than the TPMP target for that year. However, if exceeded, then EMA/Trade Officer could permit limited additional imports from the reserve category, if the import request is documented as essential to meet immediate needs and the increase would typically be deducted from that importers next year allocation, provided the aggregate quota for that year would not exceed the TPMP agreed maximum. Also, after 2005, it is expected that there will be some amount of recycled CFC available as a result of additional and enhanced recycling and recovery efforts (particularly in commercial refrigeration and building chillers).

Table 4 – Proposed Quota to Meet MP and TPMP targets, in tonnes CFC

Year	MP limit	Year Quota under TPMP
2001	122	--
2002	122	--
2003	122	77
2004	122	54.2/
2005	61	34.1
2006	61	19
2007	18.3	10
2008	18.3	0

C. Forecast of CFC Demand by Sub-sector.

CFC demand by sub-sector, based on the actions in Chapter VI, is shown below:

Table 5 - CFC Use by Sub-sector Under TPMP, in tonnes CFC

Sector/year	2001	2002	2004	2005	2006	2007	2008	2009
MAC	44.0	34.0	26	18	10	8	3	1
Domestic	12.0	9.7	9	7	6	4	3	2
Retail Food	14.0	10	7	4.6	2	1.0	0	0
Other Com. Ref	5.7	5	4	3	2	1	0	0
Chillers	5	5	5	3	2	1	0	0
Total	80.7	63.7	55	35.6	22.0	15	6	3
From recycle	0	0	0.8	1.5	3.0	5.0	6	3
Quota amt		69	54.2	34.1	19	10	0	0

Note: breakdown of 2002 data is not available

The phase-out actions proposed in Chapter VI are based on the above schedule.

V. Policy Actions

The Government fully supports the MP, including meeting all CFC phase-out targets. Policy actions taken to date include: 1) following the T&T ODS Country Programme as a strategy and policy guide; 2) establishing a CFC import control quota system, and agreeing under the proposed TPMP to sharply increase the rate of reduction of those quotas starting in 2004. The Government recognizes the

importance of providing incentives/disincentives to the private sector and individuals to limit supply of CFCs and/or increase their retail price relative to alternates and promote availability of alternates. But the Government is also concerned that the future CFC phase-out actions may have a negative impact on the economy, particularly for lower income people. Steps will be taken to ensure that the impact of the remaining CFC phase-out actions are minimized and the TPMP will address this issue, particularly through promotion of recycling in all areas, and a demonstration for retrofit components in domestic refrigeration, small mini food market refrigeration and in the MAC sector.

Policy actions under development/ consideration include: 1) draft ODS-labeling legislation prepared, now needs to be approved, adopted and enforced; 2) consider imposing import tariffs as a means of increasing CFC price; 3) consider system for service technician certification; and 4) take actions to accede to the Beijing Convention of the MP.

The country has agreed to stop imports of halons effective January 2002, so no quota was issued and the Ministry of Trade has agreed to issue no import license for halons from now on. Similarly, there will be a "ban" imposed on import of methyl chloroform in January. All remaining imports are CFCs, including blends (the CFC content of blends is included in the quota determination). The CFC quota has been in place since 1999 and has served well in reducing CFC consumption to date.

A. CFC Pricing and Availability

All CFCs used in the country come from imports, typically from Europe, but increasingly from Asia. These latter sources are often available at lower prices and the CFC wholesale price trend in T&T has remained relatively low. Import tariffs in T&T are primarily designed as protection for domestic enterprises, not revenue, (and to conform with CARICOM guidelines) and typically chemicals, including CFCs, not produced in the country are not taxed.

The wholesale price of CFC-12 in Port of Spain is estimated at US\$ 2.00/lb in 2002. By comparison, the price for the main substitute – HFC-134a – is about 1.8-2 times higher. The substitute is also not subject to import taxes. The higher relative price of the substitute continues to represent a deterrent to rapid phase-out. Although the import system is reducing local supply of CFC, it has not yet produced a market constraint, so importers have yet to realize an opportunity to increase prices and thereby promote lower consumption. Further action is warranted, such as substantially higher annual reductions in future import quotas and/or introduction of substantial import tariffs on CFC.

Table 6. Wholesale Refrigerant Prices in T&T in 2002 (TTS)

Refrigerant	Container size						
	12 ounce	15lb	30lb	50lb	82	11kg	165lbs
CFC-11	*	"	600-700	*	*	*	2100
CFC-12 (avg.)	32	290	325	650	*	*	*
R-502	*	"	1500-1750	*	*	*	*
HCFC-22	*	"	250-385	415-660	*	*	*
HFC-134a (avg.)	75	525	560	*	113	*	*
R-404a	*	*	*	*	*	1000-1400	*

* Sizes not sold

B. Legal Framework

The most important policy steps will be the accelerated quota reduction, coupled with a possible import tariff on CFCs. These two actions will be the driving force in causing consumers to respond to the action programme under the TPMP.

However, there are additional actions that will provide for long-term sustainable phase-out results. Labeling legislation has been drafted and once enacted, will promote consumer awareness of ozone issues and provide a consumer guide of the optimum products to buy and use. The TPMP proposes that technician training be institutionalized through the combination of a certification programme and encouragement to local training institutes to offer training courses on a continuous basis. Both of these steps will contribute substantially to improving the quality of service in the refrigeration and air-conditioning service business. The TPMP, largely through an intensive training programme and consumer awareness within the context of the on-going IS project will assist in better reaching the informal sector.

Possible additional legislation could include 1) making it illegal to fill non-CFC equipment with CFCs and/or to import/use only cylinders that can be recycled; and, 2) a vehicle inspection system to include CFC detection/permit. However, these actions would be burdensome and should be considered only if needed to ensure that MP and TPMP targets are met.

VI. Project Scope, Phase-out Costs and Action Plan

A. Strategy

The country's CFC phase-out strategy relies on:

- 1) Use of substitute technology and chemicals, primarily HFC-134a and HCFC-22;
- 2) Encouraging other technical innovations as appropriate;
- 3) Promoting CFC recycling and recovery in refrigeration and air conditioning sectors;
- 4) Improving repair/leak detection to reduce CFC use and extend existing equipment life;
- 5) Providing additional training of technicians, including a certification programme; and
- 6) Providing technical assistance to promote awareness, policy and regulatory actions.

The import quota system will continue to be an important element of the strategy, primarily through an accelerated schedule that will limit supply more sharply than has been in the past, and provide an added incentive for CFC users to take phase-out action. Another important part of the strategy will be to ensure that CFCs from converted facilities in all commercial refrigeration and air-conditioning systems are recovered and recycled using the central facilities provided under the R&R project or from other workable measures.

B. Project Scope

The TPMP consists of the following components:

- 1) Supplemental recycling for MAC, domestic and commercial refrigeration and air-conditioning, and activation of central recycling facilities;
- 2) Conversion programme for all commercial refrigeration systems;
- 3) Demonstration retrofit programme for MAC, domestic refrigeration and mini-food market refrigeration;
- 4) Conversion/recycling programme for building chillers (included but not funded);
- 5) Training programme for existing and new recycling and recovery programmes;
- 6) Other technical assistance (policy and legislation actions); and
- 7) Local project management for implementation/supervision

I. Recycling Component

The recycling component of the TPMP will include two coordinated actions - MAC-2 project and RRP-2 project. These projects will supplement actions taken under MAC-1 and R&R-1 projects, including additional recycling equipment and coordinated project supervision/follow-up for a 2-3-year period, and activation of the central recycling and recovery facilities provided for under the R&R-1 project as needed to achieve the objectives of the TPMP. Local contractors under the general coordination of EMA will implement both projects, and provide on-going follow-up. A brief review of the previous recycling projects and lessons learned are outlined in Annex 2.

MAC-2 CFC Recycling and Recovery Project

The objectives are to:

1. assist Trinidad and Tobago in meeting targets under the Montreal Protocol;
2. provide equipment, support, and training to MAC and refrigeration service sector;
3. promote project sustainability in use of recovery and recycling equipment:

40th Meeting of the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol

- Reduce CFC consumption to 10 tonnes by 2006 (with maximum of 50% from imported CFC) and 3 tonnes in 2008 with zero tonnes CFC from imports;
- Improve maintenance by shops and service provider;
- Establish availability of spares, service and follow-up training;
- Ensure proper use of recovery/recycling equipment;
- Increase number of shops providing recovery and recycling services;
- Provide for servicing of equipment provided under MAC-1; and
- Increase consumer awareness for recovery and recycling of refrigerants¹

There are about 71 MAC service shops in the country in air-conditioning and refrigeration, including port/marina facilities and bus/truck service facilities, plus five training institutions providing training. These shops are divided as shown in Table 7:

Table 7: Profile of MAC Sub-sector in Trinidad and Tobago

Capacity/Responsibility	Number of Shops	Technicians per shop	Total Technicians	Required Recycling Units per shop	Total units
100-50cars/mo.	5	7	35	2	10
50-100cars/ mo	20	5	125	1	20
Less than 50 cars/ mo	5	3	15	1	5
Multi-Service shops: 20-30 Cars/Mo.	24	3	72	1	24
Public transport bus service	4 ²	3	12	1	4
Ministry of Transport Service Stations	3	2	6	3	3
Marine Industry Ports	4 ³	5	20	2	8
Marinas	6 ⁴	3	18	6	6
Training Institute (ARIA) ⁸	5 ⁵	15 ⁶	5 ⁷	5	5
Total Technicians	-	-	308	-	-
Total Units	-	-	-	-	86
Units in MAC-1					18
Potential Units required					68
Estimate 50% qualified					
Units for MAC-2					34

The 24 multi-service shops provide air-conditioning and refrigeration services to all sectors including MAC, industrial/domestic air-conditioning and refrigeration. The ratio of servicing will be in variation to

¹ Public Education and Awareness will also be supported under the IS project.

² In Port of Spain, San Fernando, Sangre Grande and Tobago, and conducts all A/C servicing in-house

³ Port of Spain, San Fernando, Point Lisas and Tobago

⁴ Four in Port of Spain, one in San Fernando and one in Tobago

⁵ Training Institutes in Trinidad in Port of Spain, San Fernando and one in Tobago. Other Government Institutes to be included are with the Metal Industries Limited and Institute of Technology.

⁶ Number of students per class requiring the training of each tutor

⁷ One training equipment per institution that participates and is qualified under TPMP

⁸ Air conditioning and Refrigeration Industry Association - To be used as training equipment

40th Meeting of the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol demand. However each of these shops can support recovery and recycling machines that would be used in all sectors and these recycling machines will be larger than the other MAC units to give flexibility in use.

In addition to service shops providing MAC servicing, there is an active informal (non-registered) MAC servicing sector, typically one or two person operations. The number of service technicians engaged in the informal sector is estimated to be about 200. Generally, service volume at each of these operations is too small to warrant supply of a recycling machine, but the training programme would be open to these technicians to promote leak reduction and discourage topping off without repair of system.

Table 8: Reduction in CFC-12 Use with MAC-2 project

Year	R-12 use	R-12 use MAC	R-12 use MAC2	R-12 from retrofit	Net R-12	Imports	Recycle
2001	44.0	-	-	0	44.0	44.0	0
2002	40.0	-	-	0	40.0	40.0	0
2003	37.0	3.0	-	0	34.0	34.0	0
2004	34.0	3.0	6.0	0	26.0	22.0	4.0
2005	31.0	4.0	9.0	0	18.0	13.0	5.0
2006	26.0	4.0	12.0	0	10	5.0	5.0
2007	25.0	4.0	12.0	1.0	8.0	3.0	5.0
2008	21.0	4.0	12.0	2.0	3.0	0	3.0
2009	15.0	3.0	10.0	2.0	0	0.0	0
2010	12	4.0	7.0	1.0	0	0.0	0

Details of table:

1. Year starting at 2001
2. R-12 use – refrigeration use in tonnes CFC, from vehicle attrition only
3. R-12 use from MAC 1 project, in reduced CFC for that year
4. R-12 from retrofit – estimated CFC reduction come from retrofit in that year
5. R-12 use from MAC-2 - in reduced CFC use for that year
6. Net R-12- remaining CFC needed from imports/recycle/retrofit for that year
7. Imports- estimated amount that would come from imports
8. Recycling- CFC that could come from local recycle programme excluding MAC internal recycling

Project Deliverables

- Provide recycling equipment to all remaining qualified MAC service shops including those with sufficient volume of MAC (and other CFC) repair business;
- Provide incentive for R-12 MAC retrofit to HFC-134a through a demonstration project;
- Monitoring and data collection, verification of data and follow up for 3 years for all participating service shops, including those in MAC-1 project (and in RRP-2 project);
- Provide 2-3-year technical support, ensuring all recycling machines are in proper use;
- Training to promote capacity building and sustained continuity;
- Development of ownership on project deliverables;
- Public education and consumer awareness;
- Legislative development and enforcement of existing legislation;
- Economic incentives, disincentive in trade on ODS and related technologies;
- Voluntary compliance; and
- Sustained reduction of use of R-12.

During 2006-2009, as CFC supply is greatly diminished and with corresponding increase in local retail price (due either to import duty being imposed and/or market forces), it is expected that there will be an

40th Meeting of the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol
 emerging market for some retrofit of the remaining CFC-based MAC systems still in service to HFC-134a refrigerant. To promote this activity, the MAC-2 project contains a small retrofit demonstration component starting from 2005. The proposed budget would correspond to the incremental cost to convert about 100 cars to HFC-134a; compared to a major repair of a CFC-12 based system. Once the technical and commercial viability of the retrofit concept is established, then it is expected that car owners will begin to increasingly turn to this option to extend the life of cars after CFC is no longer available locally.

The MAC- 2 Project cost estimate is:

• Recovery/Recycling MAC Machines- 30@ US \$2,400 ⁹ each, avg.	US\$ 72,000
• Retrofit of R-12 vehicles, 100 MAC @ US \$100/unit	US\$ 10,000
• Project monitoring/technical support; 18 months @ US \$12, 000/year	US\$ 18,000
TOTAL,	US\$ 100,000

Recycling and Recovery Project – 2 (RRP-2). The objective is to implement a project aimed at reducing the use of CFC-12 in the refrigeration and air-conditioning service sector in Trinidad and Tobago. This project will complement the MAC-2 project described above and builds on achievements and lessons learned from R&R-1. The objectives are:

- Assist Trinidad and Tobago in meeting targets under the Montreal Protocol and TPMP;
- Provide equipment, support and training to air-conditioning and refrigeration servicing;
- Promote use of recovery and recycling equipment providing for:
- Reduced consumption of CFC from imports to zero in 2008 (some recycle CFC will likely continue to be used).
- Sustainability of project including:
- Improved maintenance by clients and service provider;¹⁰
- Establish system for availability of spares, service and follow-up training
- Ensure proper use of recovery/recycling equipment;
- Increase number of shops providing recycling services and alternate technology;
- Repairs and servicing of recovery equipment provided under R&R-1; and
- Increase consumer awareness for recycling of CFC alternative technologies¹¹

Considering the small volume of CFC-12 charge, it is difficult to design and implement an effective recycling programme for domestic refrigeration, but the large and medium service shops and possibly some of the smaller shops are expected to be able to undertake some recovery and recycling as part of their repair programme. These larger shops will focus on leak reduction, some recycling and some retrofit to non-CFC refrigerant. The remaining informal sector technicians will need to focus on eliminating refrigerant leaks during repair and retrofitting some refrigerators to use HFC-134a and new lubricant and/or to use a drop-in blend such as MP-40. (This latter action is feasible in most existing refrigerators.)

The following table shows the forecast of CFC use in domestic refrigeration with no action taken and as a result of the proposed RRP-2 project:

⁹ This cost will include implementation costs and reasonable profits to local agent of selected equipment

¹⁰ For example reduction in “topping-off” refrigerants so customers will repair unit before added refrigerant.

¹¹ Public education and awareness will also be supported under the IS project

Table 9 – Forecast of CFC Use in Domestic Refrigeration, in tonnes

	2001	2003	2004	2005	2006	2007	2008	2009	2010
CFC use	12	9.7	9.0	7.0	6.0	4.0	3.0	1.0	1.0
W/leak repair/recy	12	9.7	8.0	6.0	4.0	3.0	2.0	0.5	0
W/retrofit	12	9.7	8.0	6.0	4.0	2.0	1.0	0	0
CFC from recycle	-	0	1.0	2.0	2.0	1.0	1.0	0	0
CFC from imports	12	9.7	7.0	4.0	2.0	1.0	0	0	0

CFC use: CFC use due to normal attrition
W/leak repair/recy: CFC use with leak repair and recycling actions
W/retrofit: CFC use after recycle and retrofit actions
CFC from recycle: From other sectors

Thus, the action plan for reducing CFC consumption in domestic refrigerators consists of:

- Improving training programme to recycle CFC, if possible, and to detect and eliminate leaks during repairs (to reduce future CFC use),
- Promoting recycling and leak reduction in all large/medium service shops
- Promoting leak reduction (and some recycling) in small shops and other technicians;
- Demonstration retrofit programme for CFC refrigerators to use HFC-134a or blend, and
- Making recycled CFC-12 available; even after CFC imports are restricted.

The RRP-2 project will also focus on recycling CFCs in other refrigeration service such as commercial refrigeration and air-conditioning including building chillers. The actions will include repair, leak reduction and recycle CFC in service operations, recycle actions in the retrofit/conversion components described later, and activation of the existing central recycle facilities provided under R&R-1.

The project scope of RRP-2 includes:

- 1) Improved dissemination and utilization of recovery machines provided in R&R-1;
- 2) Improved use of central recycling equipment in R&R-1;
- 3) Provision of additional recycling machines (larger tanks, etc., as needed, to enable wider use, in commercial repairs and retrofit/conversion operations;
- 4) Retrofit of 100 R-12 fridges as demonstration project,
- 5) Technical support for activation of central recycling and recovery units, provision of local expert for 1-2 year (this activity will be combined with the technical support under MAC-2); and
- 6) Additional training (included in training component)

The costs of the RRP-2 project is shown below:

1) 6 recycling and recovery machines: @ US \$3,000/unit:	US\$ 18,000
2) Technical support for recycle action programme	US\$ 22,000
3) Retrofit 100 refrigerators @US \$100/unit	<u>US\$ 10,000</u>
TOTAL	US\$ 50,000

40th Meeting of the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol

The total cost of the recycling component proposed for the TPMP is summarized as follows:

1) MAC-2 project:	US\$ 100,000
2) RRP-2 project	<u>US\$ 50,000</u>
TOTAL	US\$ 150,000

Note that allocation of funds within the recycling components should be flexible. As implementation of the TPMP proceeds it may be desirable to shift scope and funds between these components.

2. Commercial Refrigeration Component

The commercial refrigeration sub-sector consists of a substantial number of retail food markets that still have CFC-based refrigeration systems that accounted for 14 tonnes CFC consumption in 2001 and a wide variety of other industrial/commercial CFC-based refrigeration systems that accounted for 5.9 tonnes CFC use in 2001. A summary of the systems, average age and replacement costs are shown below for the several groupings of commercial refrigeration systems in the country:

Table 10: CFC-based Commercial Refrigeration - Conversion Scope and Costs, in 1000 TTS

Market size category (CFC)	Refrig. System size, HP	Charge, kg CFC	Avg. life, year	Useful life, left	Cost to replace each STU	Total cost, TTS	Incremental part	Total incremental cost
Food markets								
4 large	88-90	850	16-18	8	900	3,600	0.32	1,152
10 large	75-80	450	17-19	7	400	4,000	0.28	1,120
12 medium	10	45-50	13-15	8-10	60	720	.36	260
20 small	3-5	2-8	12-16	9-13	4	120	0.44	53
Sub-total								2,585
900 mini	3-5	2-6	13-18	7-12	4	3,600	0.36	1,296
TOTAL								3,881
Industrial systems								
4 large		650	17-18	7-8	650	2,600	0.3	780
8 medium		50	13-15	8-10	60	480	0.36	172
15 small		6-12	12-16	9-13	6	90	0.44	40
Sub-Total								992
TOTAL								4,873

Assumptions: Mini market refrigeration @ 20-40 ft3 capacity = TTS 4,000
 Small supermarket @ 30-60 ft3 capacity = TTS 4,000
 Commercial units = comparable to food markets systems

Financing Plan: total incremental cost	TTS 4,873,000 (US\$ 812,200)
Assume mini market conversion funded locally:	<u>-TTS 1,296,000</u>
Balance	TTS 3,577,000
Balance in US currency	US \$596,200
- Local funding	<u>-US \$336,200</u>
Proposed for MLF funding	US \$260,000

3. Building Chiller Component

N.B. This component will not be funded by MLF. Funding will be provided from local sources. There are 12 large buildings in T&T that continue to use CFC-based cooling systems, 4 charged with R-12 and 8 with R-11, as shown in Table 10 below:

Table 11: **CFC-based Building Chillers - Conversion Scope and Costs**

Building Chiller /Location	Gas	Charge (kg CFC)	Age (years)	Remaining life (years)	Capacity (tonnes ref.)	Replacement cost (TT\$)
Deluxe Cinema/POS	R-12	135	18-20	6-7	80	600,000
Colsort Mall/POS	R-12	720	18-20	6-7	480	4,500,000
Republic Bank Promenade Centre /POS	R-12	90	18-20	6-7	90	700,000
NEMWILL/POS **	R-12	540	25	1-2**	160	1,000,000
Eric Williams Financial Building /POS	R11	1,350	21	5-6	759	4,000,000
TSTT /Laventille *	R11	405	22	4-5	250	1,600,000
TATIL Group/POS	R11	405	22	4+5	250	1,600,000
Petrotrin Admin Bldg Pointe-a-Pierre *	R11	450	15	10+	250	1,600,000
UWI Eng. bldg/ St. Augustine *	R11	810	18-20	6-7	500	4,500,000
Hilton Trinidad POS **	R11	450	25	1-2**	250	1,600,000
Hall of Justice/POS	R11	450	18-20	6-7	250	3,000,000
TSTT Nelson St. Exch.	R11	360	18-20	6-7	200	1,000,000
Totals	-	6,165	-	6-7	-	25,700,000
Total w/o Hilton & NEMWELL *						23,100,000

ASSUMPTIONS:

Energy Consumption: Electricity Rates for Trinidad and Tobago: TT\$ 0.24/KW or US\$ 0.04/KW

Specifications for a 200-ton new non-CFC chiller system:

Chiller peak efficiency @ 0.6 KW per ton

Chiller Integrated Part Load Value @ 0.65 KW per ton

These systems unload to a lower capacity during off-peak hours and are more efficient energy users.

Specifications for a 200-ton old CFC chiller system:

Average chiller efficiency @ 0.85 KW per ton

Old systems do not unload to a lower capacity. They cycle on and off and use much more energy.

* TSTT: Telecommunication Services of Trinidad and Tobago

Petrotrin: Petroleum Co. of Trinidad and Tobago Ltd

UWI: University of the West Indies

NEMWELL: West Indies Insurance Ltd

**Already surpassed expected life however, owners continue to operate and accept higher operating and maintenance costs. Hilton has three cooling units, of which one has been converted to non-CFC refrigerant. It is assumed that these two systems will be replaced outside the TPMP.

Issues in converting chiller systems to non-CFC technology have been 1) financial, 2) relative unimportance of energy efficiency, and 3) lack of concern for CFC reduction. Replacement costs are relatively high and owners typically prefer to temporarily fix a problem and prolong system life until it is

40th Meeting of the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol absolutely necessary to change. Some owners are not aware of energy and maintenance costs that could be saved from changing systems now rather than later. The systems typically have recurring CFC leak problems and ultimately have a high maintenance cost. Although there would be energy savings generated in converting to newer technology, most owners indicate that the cost of electricity is too low to give a reasonable return on investment for energy savings to offset the high capital cost and difficulties this causes with initial cash flow of the investment. And many do not keep detailed energy operating costs to make that determination. The estimated energy savings, under T&T electricity prices, would yield a pay back of about 10 years, or about twice the level needed to induce owners to take rapid action.

Approximately half of the chiller systems are government owned. Funding for change of these systems is particularly difficult to get because whenever a government changes, priorities change and projects such as these are cancelled or deferred for budgetary reasons.

Remaining life is difficult to determine, given the current maintenance practices as illustrated in Table 10. The units have a nominal life of 25 years, but that is often exceeded and will likely continue to be the practice over the next few years, unless there is an incentive provided for more rapid conversion to non-CFC systems. A reasonable estimate for remaining average life for the CFC-based chillers under current conditions in T&T is about 5-7 years in practice. An earlier phase-out of these units is essential for T&T to meet the proposed CFC reduction schedule in the TPMP and to help ensure meeting the MP targets.

Total replacement cost for 10 chillers: (excluding Hilton & NEMWELL)	US\$ 3.850 million
Estimated energy savings over 5 years:	US\$ 1.925 million
Capital cost not recovered at end of 5 years:	US\$ 1.925 million

4. Training Component

Training will consist of two projects, both supplementary to previous projects funded by MLF:

- Training for all air-conditioning and refrigeration service technicians, including MAC, building chillers, commercial refrigeration, and domestic refrigeration; and
- Customs training designed to strengthen CFC import quota and control policy.

The target audience for the training will be: 1) air-conditioning and refrigeration service industry, 2) Customs and Excise, Trade, Standards, and Environmental Officers and, 3) private sector in Import/Export of CFC and CFC dependent technologies.

4 a) Project 1: Training of Service Technicians for Air-conditioning and Refrigeration Industry

The air-conditioning and refrigeration technologies range from those that have to be phased out under the MP using CFC/HCFC-technologies to natural gas absorption cooling technologies for larger air-conditioning systems¹². The industry's human resource capacities span from single service personnel to an industrialised air-conditioning and refrigeration sector extending outside the country. Any training project for this sector must take into consideration this complexity. The Air-conditioning and Refrigeration Industry Association (ARIA represents the industry. Other details are:

- Number of companies (2001) in air-conditioning and refrigeration servicing: 101¹³

¹² In May 2001, York International held a seminar on Absorption Cooling using Natural Gas. Two papers presented at this seminar were prepared and delivered by nationals working in the local industry.

¹³ This estimate does not include part-time and or occasional workers.

40th Meeting of the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol

- Number of air-conditioning and refrigeration technicians employed full time: 1133¹⁴
- Average number of A/C technicians employed in informal sector: 1200¹⁵

Deliverables of previous air-conditioning and refrigeration technicians training programme:

- Develop Training/Certification Programme for air-condition and refrigeration technicians.
- Number of trainers trained under Train the Trainers - 25
- Number of technicians trained by ARIA in Good Refrigeration Practices¹⁶: 482
- Number of technical/vocational teachers trained - 13

The human resource expertise required for training will be local and will include:

- A train the trainer programme that will provide for retraining and training of trainers to provide for project deliverables to train 300 service technicians over three years and to continue with this training to meet industry needs.
- To train and certify 300 service technicians in Good Refrigeration Practices (the selected training institute should have prior experience in this area and develop the training programme that will support the time schedule of working technicians with varying academic technical and working capacities and experiences).
- To develop and implement 2 advanced training courses for senior technicians, trainers and service engineers that will provide for development of an institutionalised training and publicly recognized Certification Programme for the sector (Training should be conducted by a recognised/certified Training Institute).

Schedule for training for service technicians for air-conditioning and refrigeration:

Year 1:	1 Train the Trainer session and 4 training sessions ¹⁷
Year 2:	4 Training sessions of A-C & refrigeration technicians 1 Advance Training Course for senior technicians
Year 3:	4 Training Sessions of A-C & refrigeration technicians 1 Advance Training Course for senior technicians

National Project Resources:

- Project Manager: Metal Industries Company Limited/ ARIA, or other
- Training Secretariat/facilities: Metal Industries Company Limited/ ARIA or other
- National Project Supervisor: EMA

Budget

2 x 50	Train the Trainer @ US \$100.00/participant:	US\$10,000
12 x 25	Technicians training programmes @ US \$40.00/participant:	US\$12,000
2 x 25	Advance Training Course @ US \$240.00/ participant:	<u>US\$12,000</u>
TOTAL:		US\$34,000

¹⁴ Including MAC sector service technicians

¹⁵ This will include part-time, un-registered self employed and occasional service technicians

¹⁶ Adopted from the UNEP's Training Manual in Good Refrigeration Practices, ARIA has prepared and institutionalized a Training and Certification Programme in Good Refrigeration Practices. This course is offered at \$ TT225.00 (\$US35.00) per technician.

¹⁷ Estimated class size of 25 technicians

40th Meeting of the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol

4 b) Project 2: Training of Customs Officers for CFC Import Quota Control Policy

Justification:

- Training of new trainers and officers and retraining of previous officers
- Supporting institutional capacity within Customs Department
- Monitoring of Import/Export Trade ODS and CFC- Dependent Technologies and awareness on illegal trade in ODS

National Project Resources:

- Project Manager: Customs and Excise Division of the Ministry of Finance
- Secretariat and Facilities: Customs and Excise Department Training School
- National Project Supervisor: EMA/ Ministry of Environment
- Trainers: Trainers previously trained and other local experts
- Private Sector: Customs Brokers and Customs Clerks Association

Duration of Project: three years

Scope of Project:

Year 1: Train the Trainers and 1 Training programme
Year 2- Training Programmes
Year 3- Training programmes

Budget:

4 x 25	Training Programmes @ US \$40.00/ participant:	US\$ 4,000
1 x 8	Train the Trainers @ US \$250.00/ participant:	US\$ 2,000
TOTAL		US\$ 6,000

4 c) Summary of costs for Training Component under TPMP:

Project 1 – Service technicians training	US \$34,000
Project 2 - Customs training	<u>US \$ 6,000</u>
TOTAL	US \$40,000

5. Policy and Legislation Development Component

Legal Framework

The CP made recommendations on legislative and policy development activities required to meet the country's mandate under the Montreal Protocol, including:

- Mandatory registration of registration and air conditioning service companies
- Licensing for permission to wholesale, retail and use of ODS
- Licensing of service personnel to operate in the specific field (e.g. domestic or commercial refrigeration, domestic or commercial air conditioning, etc.)
- Mandatory annual reporting by companies dealing in controlled substances or consumption of such substances.
- Classification of ODS as an environmental pollutant

40th Meeting of the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol

- Establishment of trade incentives for the import/export of non-ODS and trade disincentives for ODS and ODS dependent technologies
- Mandatory labeling of goods containing ODS.

In addition, there is a need to consider an import tariff on CFC's, to discourage CFC use relative to substitutes such as HFC-134a to meet future CFC phase-out targets.

The legal infrastructure available to support implementation of the Montreal Protocol is:

- 1999- Establishment of Import Permit for Importation of ODS and dependent technologies. Import quota permits are made for CFCs, Methyl bromide, Halons and 1,1,1-trichloroethane.
- 2001 - Establishment of Certificate of Environmental Clearance- which can control use of ODS and ODS dependent technologies for new (and upgrading) developments
- 1987- Pesticides and Toxic Chemical Act¹⁸ for importation, use and storage of Methyl Bromide as a pesticide.
- Identification and Labelling of Refrigerants – Bureau of Standard (TTBS)

Legislation developed and awaiting implementation includes the Labelling of Goods Containing ODS.

The draft standard has been prepared and is in the final stages of approval by the Board of Directors of the TTBS. A draft standard has been prepared as 'TTS 76: Part 16:2001 Labeling of Products and Equipment Containing or Manufactures using Ozone Depleting Substances and/or their substitutes'.

Legislation that remains to be developed includes the following legislative actions as recommended under CP:

- National registration of companies importing, exporting, retailing, using ODS
- National certification for air/condition and refrigeration technicians
- Legislation to ensure that that only certified technicians are permitted to use ODS
- Legislation concerning import tariffs on CFCs

Ratification of Amendments to the Montreal Protocol:

Amendments ratified in 1999:	London Amendment (1990)
	Copenhagen Amendments and adjustments (1992):
	Vienna Adjustments (1995)
	Montreal Amendments and Adjustments (1997)

Ratification Outstanding: *Beijing Amendment (1999)* The Eleventh Meeting of the Parties to the Montreal Protocol listed bromochloromethane as a controlled substance. It introduced production and consumption controls for bromochloromethane, production controls for HCFCs and reporting requirements for methyl bromide for quarantine and pre-shipment applications. This amendment should be ratified as soon as possible.

Voluntary Industry Standards: It is important that industry standards be established and enforced by industry. One example is use of training practices in "Good Refrigeration Practices" as part of Environmental Policy. The skills acquisition in "Good Refrigeration Practices" is recognised as a requirement in issuance of contracts by companies that have established Environmental Management Systems such as ISO 14000. This process is proven successful in larger industries and in particular the multi-national companies operating in T&T.

¹⁸ The Pesticide and Toxic Chemicals Act, 1979 considers methyl bromide as a pesticide. Any national importer, wholesaler or user of methyl bromide must fulfill the legal requirements of this act.

40th Meeting of the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol

Institutional Arrangements: Institutional arrangements with other governmental agencies¹⁹, and as included in the CP, will need to be completed. To meet the objectives of the TPMP the following governmental agencies will need to consider:

1. Ministry of Finance: to consider reducing tariffs and introduce incentives/disincentives in respect to import of non-ODS using equipment and supplies; and consider introducing import tariffs on CFC's;
2. Customs and Excise Division, Ministry of Finance: to keep updated with the World Customs Organization (WCO) and World Trade Organization (WTO) international trading requirements and classification of goods control under the Montreal Protocol;
3. Ministry of Labour and Cooperatives (Factory Inspectorate Division): to be strengthened to include jurisdiction to license service companies and service personnel using ODS equipment, and development of a code of practice for industries using ODS in collaboration with TTBS. This mandate may require legislative support.
4. Ministry of Consumer Affairs: to continue conducting consumer education activities that will encourage the use of ozone friendly technologies.
5. Ministry of Trade and Industry: to obtain technical support in administrating and monitoring the various import controls/bans on ODS and on ODS using equipment;
6. Ministry of Agriculture: to obtain guidance for alternatives to Methyl Bromide
7. Ministry of Education: to institutionalize skills development in training institutions, recognition of certification programmes being offered under TPMP. National Training Board to introduce a revised syllabus for training technicians in use of CFC substitutes and recycling techniques, National Training Agency to set certification requirements.
8. University of the West Indies: to introduce modules that will incorporate the Science of Ozone Layer Depletion to understand this global issue.
9. Ministry of Health: to provide health statistics on human health as environmental indicators of Ozone Layer Depletion, encourage proper sun habits.
10. Ministry of Health, Chemistry Food and Drugs Division: to provide Import/Export data on Methyl Bromide, laboratory services to Customs for ODS in cases where shipments may require legally supporting analysis for composition.
11. Trinidad and Tobago Bureau of Standards: to develop and implement standards for ODS and ODS containing technologies and goods.

Public Education and Awareness: Other aspects of institutional support such as public education will be supported through the Institutional Strengthening Project (Phase 3 and 4).

Budget: Implementation of this policy and legislative development work will principally involve national consultants who will have the responsibility for the development of (or assist in) draft legislation and supporting documentation for the several items included for consideration.

Total cost associated with upgrading and enhancing legislative and regulatory framework is **US \$ 10,000.**

¹⁹ Some governmental responsibilities recommended in CP may require legislative support to their respective Act.

C. Phase-out Costs and Proposed MLF Funding

The estimated phase-out costs for the TPMP and proposed MLF funding are summarized below:

Table 12 - Summary of Incremental Costs, in US\$

Component	Total incremental costs to TPMP	Proposed MLF funding
Recycling		
MAC-2	250,400	100,000
RRP-2	94,400	50,000
MAC retrofit/replace	8,250,000	Incl. in MAC-2
Domestic Refrigeration retrofit /replace	4,000,000	Incl. in RRP-2
Commercial refrigeration	812,200	260,000
Commercial refrigeration retrofit /replace	Incl. in com. ref	Incl. in com. ref
Building Chillers	3,850,000	0
Training*	43,500	40,000
Policy and legislation*	10,000	10,000
TOTAL	17,270,000	460,000

* does not include any direct/indirect expenses incurred by EMA/government

D. Financing Plan and Incentive Programme

The several components will be financed by a combination of local funds, primarily from private sector and from the proposed MLF grant. The MLF grant will be used as an incentive to promote enterprises and individuals to take more rapid action regarding CFC phase-out and thus enable T&T to meet the TPMP targets. The several components will use different approaches.

Recycling (MAC-2 and RRP-2): The recycling machines will be provided to the qualified service industry enterprises at a cost of about 10-15% of the total purchase price.

Demonstration retrofit projects in domestic refrigeration, small food market refrigeration and MAC will enable a small number to retrofits to be technically and commercially proven. The MLF funds proposed for this demonstration will cover the incremental costs of the retrofit, but the costs of the large majority of either retrofits or early retirement of the remaining CFC-based units in these categories will be borne by local consumers.

Commercial and Building Chiller Components: The MLF grant will provide only a small portion of the conversion/retrofit costs. The MLF grant will be given to the participating enterprises as incentives to the firms to proceed quickly with the CFC phase-out action. Each firm will provide the balance of costs required from its own resources or from borrowed funds.

Training and Policy Components: The MLF funds will pay the direct costs incurred in these components. The Government and private sector will provide significant services at no direct cost to the TPMP.

E. Action Programme

The TPMP will be implemented in two phases, from July 2003 until December 31, 2007. Two Action Programmes will be prepared. The first Action Programme will cover July 2003 through July 1, 2006, a period of 36 months. A second Action Programme will cover July 2006 through December 31, 2007, a

40th Meeting of the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol period of 18 months. The First Action Programme is shown in Annex 3 and summarized below. It forms the basis for the first tranche of proposed funding to be released by the MLF for the implementation of the TPMP.

Summary of First Action Programme

Actions during July-December 2003:

- Set and allocate CFC quota for 2004
- Appoint MAC-2 Recycle Equipment Contractor
- Appoint Recycle Operations Contractor (combined with RRP-2 actions)
- Prepare pro forma MAC-2 and RRP-2 recycle equipment contracts
- Prepare lists of qualified MAC-2 and RRP-2 service shops
 - (Firms will be selected on the basis of the following main points:
 - Employ trained/certified technicians
 - Agree to maintain and insure equipment
 - Maintain records regarding CFC use and recycled
 - Provide data to EMA (or EMA agent) as required)
- Initiate procurement for first batch of MAC-2 recycle machines
- Initiate installation on first 2-4 commercial refrigeration conversion projects

Performance indicators to be met by December 31, 2003 and given in April 2004 progress report:

- Meet CFC import quota for 2003
- Satisfactory progress on the above implementation steps
- Satisfactory progress report

Actions during January 2004 - December 2004:

- Complete procurement and installation of first batch of MAC-2 recycle machines
- Initiate and complete procurement and installation of all RRP-2 recycle machines
- Initiate procurement for second batch of MAC recycle machines)
- Complete installation on first 2-4 commercial refrigeration conversion projects
- Complete installation on two additional commercial refrigeration conversion projects
- Complete installation on first 2-3 building chiller conversion projects
- Completion of training sessions as scheduled for year
- Issue CFC quotas for 2005 by August 2004

Performance indicators to be met by December 31, 2004 and given in April 2005 progress report:

- Meet CFC import quota for 2004
- Satisfactory progress on the above implementation steps
- Satisfactory progress on policy and legislation component
- Completion of training sessions as scheduled for year
- Audit report on TPMP for 2004

Actions during January 2005 - December 2005:

- Complete procurement and installation of second batch of MAC recycle machines
- Complete procurement and installation of final batch of MAC recycle machines
- Start activation of central recycling facilities
- Complete installation on 4-6 additional commercial refrigeration conversion projects
- Complete installation on 3-4 building chiller conversion projects

40th Meeting of the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol

Completion of training sessions as scheduled for year
Issue CFC quotas for 2006 by August 2005

Performance indicators to be met by December 31, 2005 and given in April 2006 progress report:

Meet CFC import quota for 2005
Satisfactory progress on the above implementation steps
Satisfactory progress on policy and legislation component
Completion of training sessions as scheduled for year
Audit report on TPMP for 2005

Actions during January 2006 – July 1, 2006:

Complete all actions under **First Action Programme**
Complete installation (by end calendar 2006) on 4-6 additional commercial refrigeration conversion projects
Complete installation (by end calendar 2006) on 2-3 building chiller conversion projects
Undertake actions to prepare for implementation of **Second Action Programme**
Prepare **Second Action Programme** and submit to UNDP/EXCOM by April 1, 2006

Implementation of the above tasks in the **First Action Programme** is based on the agreed initial funding level of \$220,000. The balance of the proposed funding would be made available at the beginning of the **Second Action Programme**.

Table 13 - Proposed Funding Schedule for First and Second Action Programmes in US\$

Component	Total Proposed funding	First Action Programme	Second Action Programme
Recycling			
MAC-2	100,000	50,000	50,000
RRP-2	50,000	10,000	40,000
MAC retrofit	0	0	Incl. in MAC-2
Domestic Refrigeration retrofit	0	0	Incl. in RRP-2
Commercial refrigeration	290,000	115,000	145,000
Commercial refrigeration retrofit	0	0	Incl. in com. ref
Building Chillers	0	0	0
Training	40,000	35,000	5,000
Policy and legislation	10,000	10,000	0
TOTAL, in US\$	460,000	220,000	240,000

VII. Operational Arrangements

A. Approach

The TPMP will be implemented through a performance-based system of:

- 1) Policy-based actions by the Government including import quota system;
- 2) Technical assistance programme, including training and policy support; and
- 3) Locally managed action plan to phase down CFC imports and implement specific CFC phase out activities, including performance based indicators and contracts.

40th Meeting of the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol

The TPMP will be monitored with annual progress reports, periodic audited reports and a system of performance-based indicators. EMA, providing overall coordination, through its NOU, will manage the TPMP locally. EMA will develop and implement a series of CFC phase out Action Programmes. The TPMP will be implemented during July 2003 through December 2008. Two Action Programmes will be prepared. The First Action Programme will cover July 2003 – July 1, 2006; - a period of 36 months. The Second Action Programme will cover July 1, 2006 – December 2007; – a period of 18 months.

UNDP will provide technical and policy guidance and oversight for the TPMP at the national level that will include periodic performance-based milestones with the Government, with EMA acting on behalf of the Government. Each Action Programme will clearly designate the responsibilities of EMA and those actions to be delegated to any other entity. The Action Programmes will give EMA the overall coordination and management role, describe the responsibilities of EMA and operational role of EMA (and other local entities as may be required) to implement the Action Programmes. The Action Programmes will list the performance indicators that will need to be met periodically (typically on yearly basis). Disbursements will be tied to achieving performance indicators. The Action Programmes also describe policy action being undertaken by the Government, import control system, technical assistance activities, and project component phase out actions needed to achieve the annual reductions in CFC imports and consumption. UNDP will monitor overall implementation, primarily through performance indicators in annual progress reports to be submitted by EMA.

The second Action Programme would not be approved until EMA can confirm that the key indicators, namely CFC import (or consumption) level, is in full compliance with the Action Programme under the TPMP and any progress and audit reports that are due have been submitted and approved by UNDP. In addition, if the annual progress reports indicate any significant non-compliance with the TPMP, disbursements would be suspended until substantive corrective action has been taken and completed by EMA and local entities and as may be directed by the agreement with UNDP on the approval of the TPMP.

Performance based contracts, using agreed performance indicators, will be the key management and operational tools for measuring progress, monitoring, disbursements, determining any corrective actions, and reporting between EMA, UNDP and EXCOM.

The TPMP scope includes all Annex A ODS under the MP. In practice, Trinidad and Tobago has already banned import of halons and no halon phase-out action is included. Trinidad and Tobago has no consumption of CFCs except in the refrigeration and air conditioning sector (minor amounts of CFC are imported in medical inhalants, but these imports will be banned once a technical alternative is available.) So the TPMP will focus entirely on the refrigeration and air conditioning sector. The draft EXCOM paper on terminal refrigeration sector projects was followed in broad terms in preparing the TPMP.

B. Agreement between UNDP and EMA

The Memorandum of Understanding between UNDP and EMA will include the following:

EMA

The responsibilities of EMA include:

- Prepare and submit Action Programme (based on TPMP) to UNDP
 1. Set quota for next two (or three) years (tonnes CFC import level)
 2. Allocate quota to licensed importers (prorated basis) on annual basis
 3. List major policy/TA actions
 4. List major component level projects that are anticipated

40th Meeting of the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol

5. Report on CFC imports in current year/current Action Programme
 - Audit report on CFC imports in previous year(s)
(on annual basis as part of progress reports)
 - Audit report on funds used in previous year(s)
(on annual basis as part of progress reports)
 - Establish and implement system for local activities
 1. Subprojects
 2. Training/TA/institutional support
 3. Hire consultants (as required) for implementing Action Programme
 - Implement Action Programme
 1. Prepare and implement supplemental CFC phase out project for MAC sector (MAC-2, to include recycling, and retrofit;
 2. Prepare and implement supplemental CFC phase out project for domestic and commercial refrigeration and air conditioning sectors (RRP-2) from 2003 onwards, to include recycling, and retrofit in all sectors;
 3. Prepare and implement CFC phase out project for commercial refrigeration sector (food industry plus other commercial refrigeration) to include recycling, and retrofit, from 2003 onwards;
 4. Prepare and implement CFC phase out project for building chillers sector to include recycling, and retrofit from 2003 onwards;
 5. Prepare and implement training programme for all sectors from 2003 onwards;
 6. Implement TA programme for policy and legislation actions;
 7. Promote and coordinate all subprojects;
 8. Supervise implementation of local projects; and
 9. Prepare annual progress reports and timely submit to UNDP

UNDP

The responsibilities of UNDP include:

- Agree with EMA on Action Programme
- Disburse funding to EMA's local account
- Provide technical and policy guidance during implementation
- Approve progress report in current Action Programme (annual basis)
- Approve audit report on previous Action Programme on annual basis
- Monitor overall implementation based on performance indicators and targets as in TPMP and to keep MP targets on track (no subproject approval, but occasional review of individual actions in Action Programme on spot basis).

C. Agreement Between EMA and Local Enterprises/Agencies/Consultants.

EMA will be responsible for executing all local contracts (Performance contracts for all activities) and that responsibility for this role will be clearly shown in the Action Programme.

1) Enterprise/Agency/Consultant

- Describe existing CFC facilities
- Confirm installed before July 1995 and local ownership portion.
- Describe project to phase out CFC
- Give date at which project is to be complete
- Give date at which CFC use will stop

40th Meeting of the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol

- Confirm that best efforts will be used during implementation to limit CFC leaks
- Recycle remaining CFC or make CFC available as directed by EMA to others
- Sign and implement contract according to terms
- Submit completion report to EMA, as applicable

2) EMA

- Provide any agreed technical assistance (TA) support to enterprise
- Determine eligible portion of project based on EXCOM guidelines
- Confirm parameters of contract and viability of enterprise
- Sign contract
- Disburse agreed funding to enterprise/agency/consultant as in contract.

D. Agreement Between EMA/Trade Office and Importers/Customs

1) Importers

- Report on current and last year CFC and other ODS and ODS substitute imports
- Request next year (or agreed period) CFC quota
- Agree to not exceed quota
- Agree to penalties for exceeding quota, as appropriate
- Cooperate with EMA concerning information on any illegal CFC imports/exports

2) Customs

- Action plan for controlling imports and monitoring system
- Overall control of CFC imports including in equipment
- Enforce any agreed programme on controlling illegal CFC imports or exports
- Implement programme for monitoring imports of CFC, including equipment
- Implement any agreed programme on controlling illegal CFC imports/exports

3) EMA/Trade Officer

- Determine level of next year CFC imports to meet TPMP
- Issue next year (or agreed period) CFC quotas to licensed importers (specify quota being held in reserve)
- Impose penalties on any excess quota according to local regulations (e.g., withdraw license, deduct from next year)
- Agree to cooperate with local importers concerning information on any illegal CFC imports coming into country or ODS exports

E. Targets for Action Programmes

The targets and budgets for implementing the Action Programmes are highlighted below:

Targets and Schedule and Budget for Implementing the Action Programme						
Programme	Time period		ODS Consumption (MT)		ODS Reduction (GDP)	Funding requested (US\$)
	Start	End	Start	End		
First Action Programme	July 1 2003	June 30 2006	81(2001)	36(2005)	45	220,000
Second Action Programme	July 1 2006	December 31 2007	36	0 (2007)	36	240,000
End of Action Programmes		Jan 1, 2008	-	0 (2008)	81	-
TOTAL						460,000

F. Monitoring and Reporting

UNDP-Montreal Protocol Unit (MPU), in collaboration with the EMA and UNDP-Trinidad & Tobago, will prepare annual progress reports to be submitted to the ExCom in time for the final meeting of every calendar year, for the duration of the project. Such reports will include review and approval of the annual reports submitted by EMA to UNDP, including confirmation of actual CFC imports and consumption for the previous calendar year, quotas issued for the current and following year, report on progress under the several TPMP components and performance indicators and milestones, review of financial audit for the previous calendar year as required and any adjustments in the following year action programme.

EMA will prepare annual progress reports and submit to UNDP-MPU by August 1 of each year, including confirmation of actual CFC imports and consumption for the previous calendar year, quotas issued for the current and following year, report on progress under the several TPMP components and performance indicators and milestones, review of financial audit for the previous calendar year as required and any adjustments in the following year action programme.

EMA will require periodic progress reports from the contractors/consultants implementing the several projects components as needed to prepare its progress reports. EMA will undertake financial and technical audits of the TPMP and MLF funds and accounts on an annual basis as required under UNDP national implementation guidelines.

EMA will prepare a detailed Second Action Programme, including funding request and submit to UNDP-MPU by March 1 2006, in sufficient time to meet the ExCom meeting deadline for its mid-year meeting of 2006.

Annex 1

Summary of Approved MLF Projects

1. Institutional strengthening (phases 1, 2 and 3):

Agency: United Nations Development Programme (UNDP)
Approved: Phase I approved in August 1997. Phase III renewed in November 2002.
Project Budget: US \$167,200 total for Phases I-III
Objective: Implement ODS Country Programme and coordinate all projects
Status: Activity will continue during implementation of TPMP

2. Mobile Air Conditioning (MAC) Project

Agency: UNDP and the US Environmental Protection Agency (USEPA)
Approved: November 1997
Budget: US \$117,000
Objective: Establish recovery and recycling facilities for R-12 in MAC
Project status: EMA responsible to monitor and ensure that project is sustained

3. Conversion of CFC Aerosol Filling Facility to non-CFC at the Hand Arnold Industries

Agency: UNDP
Approved: July 1998
Budget: US \$119,570
Objective: Conversion of CFC-based filling facility to non-CFC technology
Project status: All CFC in aerosol sector has been phased-out

4. National Refrigeration Recovery and Recycling Management Plan

Agency: UNDP
Approved: November 1997
Budget: US \$213,990
Objective: Establishment of recovery and recycling centers for industrial and domestic users of R-12 refrigerants
Status: The Project was projected to recover 20.54 ODP tons/year of CFC-12, however latest estimate from the ODS Sub-unit is that about 3.5 tonnes of CFC-12 are being recovered. Recycling centres must become fully operational.

5. National Train the Trainer Programme in Good Refrigeration Practices

Agency: UNEP
Approved: November 1997
Budget: US \$50,000
Project Status: 20 Trainers and 400 Air-conditioning and refrigeration technicians and 13 Ministry of Education-Technical Vocational Teachers were trained;

6. National Train the Trainer Programme for Customs Officers on Control/Monitoring of ODS

Agency: UNEP
Approved: November 1997
Budget: US \$26,500
Project Status: Project closed in March of 2002.
Officers trained under this project: 431 customs officers; 12 trade officers and government staff; and, 21 private industry staff and importers.

Annex 2

Brief Review of Previous Recycling Projects in T&T

Brief review of MAC Recycling and Recovery Project (MAC-1).

A total of 47 technicians and supervisors from 26 MAC service shops were trained in the use of recovery/recycling machines and other techniques to reduce CFC emissions during operations, maintenance and repairs of MAC systems. The project provided equipment to 18 shops distributed to: service shops-17 and technical support provider-1. Equipment for each shop included recycling machine, leak detector, and other parts. The training took place in May 1999. Expected impact was an annual consumption reduction of 10 tonnes of CFC-12. Of the larger shops specifically involved in MAC-servicing, the average shop consumes about 90kg of CFC-12 per month with the largest shop consuming 160kg/month. There was an estimated impact of about 2-3/yr tons CFC reduction during 1999-2000, resulting in a net consumption of 44 tons CFC in MAC in 2001. The continuing impact of the first MAC recycling project is estimated at about 4 tons CFC reduction per year measured from the 2001 consumption figure of 44 tons CFC 12. Thus, total impact of MAC-1 is estimated at about 6-7 tons compared to the expected 10 tons CFC per year reduction. The MAC-2 project will also help to increase efficiency of the MAC-1 equipment, but that is credited under the MAC-2 project.

Brief review of Recycling and Recovery Project (R&R-1).

The project included three central recycling units and 75 recovery machines, plus some technical support. Equipment was provided to 69 service shops. Equipment for each shop included recovery machine, 30lb. holding tank plus parts. A total of about 150 technicians and supervisors from 75 service shops were trained (in three one day workshops) in the use of recovery/recycling machines and other techniques to reduce CFC emissions during operations, maintenance and repairs of air conditioning and refrigeration systems. The training took place during 1999-2002. Expected impact was a total consumption reduction of 18.49 tonnes CFC-12. However, actual use of these facilities has been low and the latest estimate from the ODS Sub-unit is that about 3.5 tonnes of CFC12, and a slightly larger amount of HCFC22, are presently being recovered per year, though the number of machines presently being employed is not reported.

The implementing agencies involved were:

- United Nations Development Programme (UNDP)
- United States Environmental Protection Agency (USEPA)
- Environmental Management Authority (EMA)

Other Local Project Stakeholders:

- Metal Industries Company Limited/National Skills Development - training facilities and three months monitoring service
- Ultra Cool Limited- Local Agent for Skye and equipment support provider
- ARIA
- Service shops and training institutes

40th Meeting of the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol

Lessons learned from MAC-1 and R&R-1 include:

- Low price and availability of CFC continues to be a deterrent to recycling;
- Specific policy actions to make price and availability of R-12 unattractive compared to R-134a and other alternate refrigerants is critical;
- Amount of training was inadequate;
- Low CFC volume in domestic refrigerators works against recycling;
- Availability of parts, service and training on continuous basis is essential;
- Sustained governmental support, including institutionalizing commitments to Montreal Protocol; rather than project by project approach is needed;
- Follow-up by NOU with equipment distributor and shops is critical;
- Follow-up data collection and monitoring is needed on a continuous basis;
- Service shops need a culture of ownership for project and equipment;
- Flexibility in recovery/recycling capacities of MAC and RRP machines to adjust to different volumes of use by different service shops is needed; and
- Continuous public awareness and education are important.

Annex 3

First Action Programme For T&T TPMP

Activity	2003 (6 mo)	2004	2005	2006 (6 mo)
Quota allocation	Issue 2004 quota by August Prepare report on 2002 data by June	Issue 2005 quota by August Prepare report on 2003 data by March	Issue 2006 quota by August Prepare report on 2004 data by March	Issue 2007 quota by August Prepare report on 2005 data by March
Recycling	Appt contractors* Prepare list of qualified shops** Start procurement of recycling units**	Install x MAC units Install x RRP units Start activation of central recycling Determine status of R&R-1 units	Install x MAC units as needed Activate and operate central recycling	Install x MAC units as needed Operate central recycling
Commercial Refrig.	Start procurement	Complete installation of 2-4 conversions	Complete installation of 4-6 conversions	Complete installation of 4-6 conversions****
Chillers	Start procurement	Complete installation of 2-3 conversions	Complete installation of 3-4 conversions	Complete installation of 2-3 conversions****
Training	Appoint contractors Prepare all course work	Complete x courses for service tech. Complete x courses for Customs	Complete x courses for service tech. Complete x courses for Customs	Complete x courses for service tech. Complete x courses for Customs Establish system for ongoing training programmes on local basis
Policy/legislation	Prepare TOR	Start studies	Complete studies	Implement agreed policy/legislation actions
Reporting		Progress report for 2003 by April 1 Each recycle contractor submit progress report by March 1	Progress report for 2004 by April 1 Audit report for 2004 by June 1 Each recycle contractor submit progress report by March 1	Progress report for 2005 by April 1 Audit report for 2004 by June 1 recycle contractor progress report by March 1 Submit draft Second Action Programme to UNDP by April 1***

* MAC equipment contractor, Recycle operations contractor,

** For MAC and RRP equipment

*** Key performance indicators that must be met are:

1) quota targets for 2003, 2004 and 2005 met

2) quota issued for 2006 within agreed 2005 TPMP limits

3) TPMP technical and financial audit reports through 2005 acceptable to UNDP

**** Completion times for some tasks may extend to end 2006