UNITED NATIONS

EP

United Nations Environment Programme

Distr.
LIMITED

UNEP/OzL.Pro/ExCom/45/Inf.4
7 March 2005

ORIGINAL: ENGLISH

EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Forty-fifth Meeting
Montreal, 4-8 April 2005

REVIEW OF THE EXECUTIVE COMMITTEE'S ACTIVITIES IN THE CHILLER SECTOR

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Introduction

1. At its 44th Meeting, the Executive Committee discussed matters arising out of the decisions of the Sixteenth Meeting of the Parties to the Montreal Protocol. One member recalled that a decision by the Sixteenth Meeting of the Parties had requested the Executive Committee to consider "(a) Funding additional demonstration projects to help demonstrate the value of replacement of CFC-based chillers, pursuant to relevant decisions of the Executive Committee; (b) Funding actions to increase awareness of users in countries operating under paragraph 1 of Article 5, of the impending phase out and options that may be available for dealing with their chillers and to assist Governments and decision makers; (c) Requesting those countries preparing or implementing refrigerant management plans to consider developing measures for the effective use of the ozone-depleting substances recovered from the chillers to meet servicing needs in the sector." He suggested that the Executive Committee urge the bilateral agencies and implementing agencies to propose further demonstration projects in the chiller sector. Following a discussion, the Executive Committee decided to defer consideration of the topic to the 45th Meeting.

2. To facilitate the Committee's discussion the Secretariat has prepared an information document providing the historical background on Executive Committee activities in the chiller sector and highlighting the major findings of the report of the TEAP Chiller Task Force submitted to the Sixteenth Meeting of Parties in Prague.

Chiller sector in Article 5 countries

3. Chillers are refrigeration systems that cool water or a water/antifreeze mixture, which is circulated providing comfort air-conditioning in buildings, or is used in industrial processes, or for food preservation. The most common CFC-based chillers used in Article 5 countries are centrifugal chillers above 700 KWt capacities. Centrifugal chillers manufactured prior to 1993 are based on CFC-11, CFC-12, R500, and HCFC-22 refrigerants. CFC-11 is the most common refrigerant. Typically, chillers within the range of 1,000 KWt to 1,700 KWt have a charge of 300 to 500 kg of the CFC-11 refrigerant.

4. There are no accurate statistics regarding the total number of CFC-based chillers in all 139 Article 5 countries. The TEAP report provides an estimate of the total number of CFC-based chillers which varies from 15,000 units to 20,000 units depending on the source of information used. On the basis of analysis of CFC consumption for chiller servicing in several Article 5 countries, the report made an assumption that 5% to 10% of the total CFC consumption for refrigeration servicing would be attributed to servicing chillers use in Article 5 countries.

5. If the average inventory of CFC refrigerant per chiller (400 kg) is applied to the total number of CFC based chillers, the global inventory of CFCs in Article 5 chillers would be within the range of 6,000 to 8,000 ODP tonnes.

6. The database available in the Secretariat indicates that the total current level of CFC consumption in refrigeration servicing in Article 5 countries is slightly over 35,000 ODP tonnes.

Using the estimate in the TEAP report of about 5% to 10% of the total consumption for refrigeration servicing, being in the chiller sector, the CFC consumption for chiller servicing needs could be within the range 1,750 to 3,500 ODP tonnes.

7. Again on the same basis, if after 2007, the number of CFC-based chillers in Article 5 countries remains unchanged, the CFC consumption for chiller servicing needs would represent 7.7% to 15% of the total global CFC consumption in Article 5 countries.

Historical background and decisions

8. At its 8th Meeting, the Executive Committee approved four projects in Venezuela for the World Bank for retrofitting 25 chillers and replacing four chillers at the total value of US $1.1 million. The incremental cost of replacement was calculated on the basis of the difference in price between new CFC-12 and HFC-134a equipment quoted by suppliers at that time. The incremental cost for retrofitting and adoption of HFC-134a refrigerant in existing chillers was based on the cost of parts, material and labour. Subsequently, one project involving retrofitting of 21 chillers was cancelled, one project for replacement of three chillers was implemented without assistance from the Multilateral Fund and two projects were completed by the World Bank resulting in the replacement of one chiller and retrofitting of 4 chillers. In total, US $184,000 was disbursed by the World Bank, and 6.0 ODP tonnes were phased out.

9. At its 11th Meeting (November 1993), the Executive Committee discussed an interim report prepared by the Secretariat on retrofits of MAC and chillers (UNEP/OzL.Pro/ExCom/11/35). Subsequently the report was finalized incorporating the comments made during the discussion of the interim report and peer reviewed by industry experts and TEAP. At its 12th Meeting (March 1994), the Executive Committee discussed a revised report (UNEP/OzL.Pro/12/33).

10. In the Secretariat's report it was demonstrated that CFC reductions and/or phase out in the chiller sector may be achieved by one or a combination of the following options:

(a) Improving refrigerant containment and service practices to minimize CFC emissions and conserve the existing refrigerant;

(b) Replacing CFC based equipment with non-CFCs alterative;

(c) Retrofitting (converting) existing chiller to a non-CFC alternative; and

(d) Converting manufacturing facilities producing CFC based chillers to non-CFC based chillers.

11. After considering the report, the Executive Committee adopted a decision with the following set of recommendations on chiller project proposals:

(a) When selecting an alternative technology, consideration should be given to the global warming potential of the refrigerant, system energy efficiency, human health and safety aspects.

(b) Refrigerant containment and better operation and maintenance practices, including recovery, recycling and reclamation should be considered as a strategic option in ODS phase-out in the chiller sub-sector.

(c) The Executive Committee approved a recommendation on conversion of CFC-based chiller manufacturing facilities as a strategic option for ODS phase out in the chiller sector. The implementing agencies were requested to increase their activities in identifying and preparing project proposals in this area.

(d) The Executive Committee approved replacement of CFC chillers as a first priority for strategic options in ODS phase out in the chiller sector, taking into consideration energy savings when calculating the incremental costs of replacement; however, the Executive Committee deferred consideration of projects to retrofit chillers, except in special cases and when definite substitutes were used; and

(e) Finally, the Executive Committee encouraged Article 5 countries to give full consideration to appropriate regulatory and legislative action facilitating the implementation of CFC phase-out projects in the chiller sub-sector.

12. Subsequently, two projects were approved for conversion of manufacturing CFC-based chillers to HCFC-123 and HFC-134a technology respectively in India (10th Meeting) and China (20th Meeting). One project on emission reduction, refrigerant containment, recovery and recycling in chillers installed at six spinning mills in Vietnam and a project on emission reduction and refrigerant containment in four chillers installed in hotels in Damascus, Syria were also approved as part of France's bilateral activities. Two chiller replacement projects using loan mechanisms were approved for Thailand (at the 26th Meeting) and for Mexico as part of the United Kingdom's bilateral assistance project (at the 28th Meeting). One additional chiller replacement project was approved at the 37th Meeting for Côte d'Ivoire as part of France's bilateral assistance project. The Executive Committee approved the latter project on the understanding that the project having a significant cost-share component, and being a demonstration project for the African region, would complete the cycle of demonstration projects in the chiller sub sector for each region, and that no further chiller demonstration projects would be forthcoming (decision 37/27).

13. At the same meeting in July 2002, the Executive Committee also decided to request the Secretariat to re-examine the issues raised in the chiller sector, providing a clarification of the nature of savings that could be envisaged as a result of increased energy efficiency and how soon those energy savings might be realized. As per decision 37/21, the Executive Committee requested the Secretariat:

(a) To re-examine the issues raised in the chiller sub-sector, taking into account the views expressed by the Executive Committee at the 37th Meeting; and

(b) To report to a future meeting of the Executive Committee on:

(i) a possible update of policy guidance;

(ii) clarification of the nature of savings that could be envisaged as a result of increased energy efficiency;

(iii) how soon those energy savings might be realized.

14. The Secretariat deferred reporting back to the Executive Committee on decision 37/21 pending the provision of guidance from the Parties to the Montreal Protocol. At their Fourteenth Meeting in November 2002, the Parties requested the TEAP to collect data and assess the portion of the refrigeration-servicing sector made up by chillers and identify incentives and impediments to the transition to non-CFC based chillers, and prepare a report (decision XIV/9). The report by the TEAP Chiller Task Force was presented to the Parties at their Sixteenth Meeting. The Conclusions of the report are presented in Annex I to the present document.

15. The Parties subsequently requested (decision XVI/13) the Executive Committee to consider:

(a) funding of additional chiller demonstration projects to help demonstrate the value of replacement of CFC-based chillers, pursuant to relevant decisions of the Executive Committee;

(b) funding activities to increase awareness of users in Article 5 countries of the impending phase out and options that may be available for dealing with their chillers and to assist Governments and decision makers;

(c) requesting those countries preparing or implementing refrigerant management plans to consider developing measures for the effective use of CFCs recovered from the chillers to meet servicing needs in the sector.

16. The full text of decision XVI/13 is provided in Annex II.

Current CFC phase-out activities

17. A total of 35 mostly non-LVC article 5 countries have already been funded for complete phase-out of CFCs through national CFC phase-out plans (NPP), terminal CFC phase-out management plans (TPMP) or refrigerant management plans (RMP). The list of these Article 5 countries is provided in Annex III. According to data in the TEAP Report, the inventory of CFC chillers in 12 Article 5 countries included in the above list represents over 13,000 units with the annual level of CFC emissions of about 2,000 ODP tonnes.

18. None of the approved CFC phase-out plans or RMPs for non-LVC countries included specific allocations for implementation of chiller replacement programmes on a grant basis. Some countries included activities in the chiller sector associated with development of a strategy, refrigerant containment measures, and reduction of emissions through potential retrofits and recovery /recycling programmes. All CFC phase-out plans included allocations for raising awareness in relation to non-CFC based technologies in the refrigeration-servicing sector.

19. Two countries (Turkey and Mexico) opted to use a portion of the total approved funds for implementation of chiller replacement programmes under the flexibility clause included in the agreements between the Executive Committee and the respective government. The Government of Mexico will extend a chiller replacement project initially approved as a United Kingdom bilateral assistance demonstration project to be implemented through the World Bank using a loan mechanism and co-financing from the chiller owners. The Government of Turkey is using a portion of the total funding under the National CFC Phase-out Plan and co-financing from the chiller owners for the implementation of a chiller replacement programme using a revolving fund mechanism. The detailed information regarding the three on-going chiller replacement programmes is provided in Annex IV.

20. As of today, no specific sub-project components for chillers have been included in RMPs approved in accordance with decision 31/48 or in TPMP projects for LVC countries. However, the training programmes for refrigeration-servicing technicians in good service practice and the technical assistance programmes for the servicing sector included in the RMP or TPMP support the strategic option of CFC containment and better operation and maintenance practices in the chiller sector. The issue of remaining CFC consumption in LVC countries beyond 2007 and the existing RMPs is addressed by the Secretariat in its document under agenda item 9 – "Review of requirements for further assistance for the post-2007 period in low volume-consuming countries (follow up to decisions 31/48 and 43/37)."

21. The Executive Committee may wish to take into account the information provided in this paper in its deliberations on the options available to address the ODS phase out in the chiller sector in Article 5 countries.

22. The Executive Committee may also wish to consider requesting the Secretariat to prepare a paper on modalities for implementation of decision XVI/13 of the Parties taking into account views expressed by members of the Executive Committee, and to submit such a the paper for its consideration at the 46th Meeting.

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Annex I

Extract from Report of the TEAP Chiller Task Force – May 2004

10 Conclusions

This report considers the servicing needs for CFC centrifugal chillers in the Article 5(1) countries. As is the case in many developed countries, there are still a significant number of CFC chillers operating in the Article 5(1) countries.

The report has been prepared on the basis of very limited data available on the chiller sector in Article 5(1) countries. In many cases, the information is incomplete and some of the data presented in the document could not be verified in the field. To address the reliability of the data, sound assumptions were made based on the experience of field experts and the situation prevailing in non-Article 5(1) countries.

The report describes the different types of chillers and notes that the transition of the average CFC centrifugal chiller will be either to screw or dual scroll compressor driven chillers or to new centrifugal chillers operated on HCFC-123 or HFC-134a. This would imply a significant reduction in direct emissions in ODP tonnes, but also a significant energy efficiency increase (i.e. a decrease of indirect global warming emissions).

Where it concerns the number of chillers in operation in Article 5(1) countries, certain studies have produced figures in the range of 15-20,000 and even higher. Material investigated for this report leads to the conclusion that the number of centrifugal chillers still in operation in Article 5(1) countries is about 15,000. Of these chillers, and actually in most countries, 90% is CFC-11 and 10% is CFC-12 based. If the majority were imported from European countries the percentage of CFC-11 centrifugal chillers would vary between 50 and 80% (which would be between 7,500 and 12,000 units).

For an individual chiller, the transition out of CFC can be accomplished in two ways, (a) via retrofits, and (b) via replacements. Retrofits have been considered in the developed countries when chillers were relatively new, retrofits are not very useful anymore when the lifetime of the chiller has exceeded 10 years, which is demonstrated by the number of retrofits in the United States in the period 1993-2003. Centrifugal chillers in the Article 5(1) countries are generally older than 10 years, and can be as old as 35 years; in this case the replacement of the centrifugal chiller (by either a centrifugal chiller or by combinations of screw chillers) is the only useful option.

In considering options for the transition out of CFC chillers at the national level, a primary objective may be to reduce current CFC-11 consumption for servicing through training and better servicing practices. Gradual replacement of the oldest/least efficient chillers first together with recovery of the refrigerant can make CFC available to prolong the service life of newer CFC-based chillers. This would assist in minimising premature retirement of chillers in a pattern similar to that adopted in non-Article 5(1) countries. It should also be considered that a

larger number of CFC based chillers might now be between 20 and 30 years old and will be replaced by the owners over the coming years.

Hence a good recovery program might allow recovering of CFC for servicing of remaining chillers and the phase-out of the total inventory of CFC based chillers in Article 5(1) countries might take place over a longer period. Recovery programmes will need to focus on training and logistics since much of the equipment needed to recover CFC-11 will already be in use by the enterprises and personnel that currently service the chillers.

There are a number of impediments and incentives to the replacement of centrifugal chillers in the Article 5(1) countries. Major ones are the availability of investment capital at a (very) moderate interest rate, and the uncertainty of economic conditions throughout the payback period for the new chiller (electricity prices, government policies, the operating conditions of the entire cooling system, including pipes, pumps, cooling towers and others).

Chiller replacement programs have been approved or started in four countries, i.e. Cote d'Ivoire, Thailand, Mexico and Turkey, using grants and revolving funds and different combinations of these. Programs have addressed a certain number of chillers that were identified as primary candidates, where in Cote d'Ivoire virtually all chillers installed were addressed. It should, however, be realised that a large number of the remaining CFC based chillers in the last three countries might not meet the stringent criteria set in the program and might not provide the same high energy savings. It should also be realised that replacing all CFC chillers in the last three countries would require significant more capital and the centrifugal chillers will eventually have to be replaced at the owners' initiative, in particular where these have reached their end-of-life and are therefore not supported by the Fund.

The average CFC chiller can be characterised by a certain inventory per kilowatt capacity, and by a certain leakage (slightly dependent on whether it is operated on CFC-11 or -12). Furthermore, consumption of the chiller is influenced by servicing practices, whether part of the charge is vented, whether recovery and recycle has been implemented. Whereas the percentages for the losses per year in the developed countries varied between 10 and 25% prior to the adoption of leak minimisation practices, these percentages may go up to 30-50% and even higher in the Article 5(1) countries.

In determining the percentage of the servicing needs for centrifugal chillers in the total refrigeration needs of a country, the above mentioned figures need to be taken into consideration.

When studying project proposals to determine the refrigerant needs for chillers, there are significant uncertainties related to

- whether the real number of chillers installed has been identified and under- or over-estimated, and

- whether consumption has been derived based upon standard figures for inventories and servicing, based upon service market data, or estimated from criteria developed by the agency preparing the project (there is again the potential for under or over estimating).

It seems justifiable to assume that ***5-10%*** of the total consumption for the refrigeration servicing needs of an Article 5(1) country is needed for chiller servicing. This will depend on the infrastructure of the country, the climate, the infrastructure (different sub-sector sizes) for refrigeration servicing, the practices applied by servicing personnel etc. It should be emphasised that these figures are valid for the years 2001-2002, and it is likely that percentages will change substantially if servicing of sub-sectors will be addressed, whilst chiller programs remain on the shelf. However, a change in servicing practices and transition to non-CFC chillers (replacements) may also have a significant impact.

In the near future, replacement programs may (and will) continue, but these will certainly not be able to replace all CFC centrifugal chillers within a short period. However replacement of all CFC chillers is not a prerequisite to the phase-out of CFC-11 consumption and is unlikely to occur in Article 5(1) countries, which may follow a replacement pattern similar to that which has emerged in non-Article 5(1) countries. Countries will need to plan for reductions in CFC-11 sector consumption in the chiller sub-sector (possibly through already-approved refrigerant management plans or national CFC phase-out plans). This planning will need to include:

- an inventory of the existing CFC chillers;

- the impact in terms of reduced CFC-11 consumption of an improvement in servicing practices, and recovery and re-use of the refrigerant;

- determination of the amount of refrigerant which will become available from the dismantling of older or less efficient chillers to extend the operating life of newer, existing CFC chillers beyond 2010;

- determination of the quantities (if any) of CFC-11 or CFC-12 that may become available from other sources, and consideration of the opportunities for the stockpiling of certain amounts of CFCs;

- on the above basis, formulation of a replacement policy which includes the likely replacement rate, the numbers of remaining CFC chillers that may be kept in operation after 2010, stockpiling and other relevant issues.

The above needs further consideration, once an Article 5(1) country has met the 50% reduction from the base level (2005), and once it has to set out strategies to

address the 85% reduction from the base level in 2007. Starting a number of actions following a well-outlined program may be considered as soon as possible. Given the technical aspects of the planning that needs to be carried out and the relatively organised nature of chiller maintenance, even in Article 5(1) countries, the relevant servicing industries or industry associations will need to take a leading role in these activities.

Annex II

Extract from the Report of the Sixteenth Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer (Prague, 22–26 November 2004)

Decision XVI/13. Assessment of the portion of the refrigeration service sector made up by chillers and identification of incentives and impediments to the transition to non-CFC equipment

Noting with appreciation the report of the chiller task force on the collection of data and assessment of the portion of the refrigeration service sector made up by chillers, as decided in decision XIV/9,

Noting that the chiller sector has been and will be a long-term challenge for both developed and developing countries owing to its distinct character, as has been brought out by the report of the Technology and Economic Assessment Panel,

Recognizing the need to develop a management plan for CFC-based chillers in the Parties operating under paragraph 1 of Article 5, to facilitate CFC phase-out in chillers,

Recognizing also the urgent need for effective replacement programmes to phase out consumption of CFCs,

Recognizing further the need for economic incentives for assisting enterprises in these countries to speed up the replacement programme,

Recognizing the impediments and uncertainties brought out by the Technology and Economic Assessment Panel in its report related to the lack of information for decision makers and lack of policies and regulatory measures needed to be set up for CFC phase-out in the chiller sector,

To request the Executive Committee of the Multilateral Fund to consider:

(a) Funding of additional demonstration projects to help demonstrate the value of replacement of CFC-based chillers, pursuant to relevant decisions of the Executive Committee;

(b) Funding actions to increase awareness of users in countries operating under paragraph 1 of Article 5 of the impending phase-out and options that may be available for dealing with their chillers and to assist Governments and decision makers;

(c) Requesting those countries preparing or implementing refrigerant management plans to consider developing measures for the effective use of the ozone-depleting substances recovered from the chillers to meet servicing needs in the sector;

Annex III

Multi-year sector or phase-out plans

#	Country	Sector	Agency	Funds Approved in Principle under the Agreements (US$)	ODP Approved Under the Agreement (ODP Tonnes)
	Consumption sector				
1	Albania	ODS phase-out	UNIDO/UNEP	653,125	68.0
2	Algeria*	RMP	UNIDO	1,424,647	245.0
3	Antigua and Barbuda	CFC phase-out	World Bank	97,300	1.8
4	Argentina	CFC phase-out	UNIDO	7,360,850	1,809.5
5	Bahamas	CFC phase-out	World Bank	560,000	66.0
6	Bangladesh	ODS phase-out	UNDP/UNEP	1,355,000	267.6
7	Bosnia and Herzegovina	ODS phase-out	UNIDO	864,160	121.1
8	Brazil	CFC phase-out	UNDP/Germany	26,700,000	5,801.0
9	China	Refrigeration servicing	UNIDO/Japan	7,885,000	3,902.0
10	Colombia	ODS phase-out	UNDP	4,500,000	805.9
11	Croatia	CFC phase-out	UNIDO/Sweden	379,700	98.0
12	Cuba	ODS phase-out	Germany/UNDP/Canada/France	2,145,000	361.6
13	Ecuador	CFC phase-out	World Bank	1,689,800	246.0
14	India	CFC phase-out (ref. serv.)	Germany/Switzerland/UNEP/UNDP	6,338,120	848.0
15	Indonesia	ODS phase-out (ref. ser.)	UNDP	4,912,300	1,072.0
16	Iran	CFC phase-out (service, sol.)	UNIDO	3,338,086	619.6
17	Kenya	CFC phase-out	France	725,000	138.8
18	Lebanon	CFC phase-out	UNDP	2,091,420	417.0
19	Lesotho	CFC phase-out	Germany	127,300	2.6
20	Libya	CFC phase-out	UNIDO	2,497,947	450.5
21	Malaysia	ODS phase-out	World Bank	11,517,005	1,910.5
22	Mauritius	ODS phase-out	Germany	212,030	4.0
23	Mexico	CFC phase-out	UNIDO	8,794,500	1,535.0
24	Namibia	ODS phase-out	Germany	252,500	12.0
25	Nigeria	CFC phase-out	UNDP/UNIDO	13,130,786	2,489.7
26	Pakistan	RMP	UNIDO	1,139,500	215.0
27	Panama	CFC phase-out	UNDP/UNEP	993,152	168.4
28	Papua New Guinea	ODS phase-out	Germany	700,000	35.0
29	Philippines	CFC phase-out	World Bank/Sweden	10,575,410	1,749.3
30	Serbia and Montenegro	CFC phase-out	UNIDO/Sweden	2,742,544	327.0
31	Sudan	ODS phase-out	UNIDO	1,139,480	217.4
32	Thailand	ODS phase-out	World Bank	14,728,626	3,107.5
33	Trinidad and Tobago	CFC phase-out	UNDP	460,000	77.0
34	Turkey	CFC phase-out	World Bank	9,000,000	977.0
35	Venezuela	CFC phase-out	UNIDO	6,240,555	1,035.0
	Total			**157,270,843**	**31,201.8**

* Country with Multi-Year Disbursement Schedule but without Agreement

Annex IV

Extract from Report of the TEAP Chiller Task Force – May 2004

Summary Table for the Three World Bank Chiller Projects

	Mexican chiller project	**Thai chiller project**	**Turkey chiller project**
Objectives	Demonstration project for chiller replacement showing it can be financed through energy savings	Remove market barriers by showing it is possible to finance chiller replacement through energy savings	Reduce CFC demand and recover CFC for servicing through energy savings
Estimated total CFC chiller population in the country	Not known	App 2,500 CFC chillers	App 1,400 CFC chillers Hereof app. 200 centrifugals
Number of chillers replaced by the project	12 chillers	17 chillers	18 chillers (1st round: 6 and 2nd round: 12)
Financing	MLF financed UK bilateral project implemented through the Bank	Co-financed by MLF and GEF 50% MLF financed and 50% MLF financed	Financed through the Turkish revolving MP fund and MLF
Total cost (as of Dec 2003)	US$ 1,392,300	US$ 2,153,836	US$ 1,483,284
Total MLF funding allocated	US$ 500,000	US$ 995,000	US$ 1,000,000
Financed by owners	US$ 692,300	US$ 1,258,836	US$ 483,284
Repayment terms	Fixed duration of 3 years and no interest	Linked to energy savings and no interest	Fixed duration, 5 instalments and no interest. First payment starts 6 months after installation completed.
Repayment period	3 years	Depending on energy savings	3 years
Interest	0%, 2% for older than 20 year old chillers	0%	0%
Management fee			3%
Criteria for chiller replacement financing	CFC centrifugal chiller Past financial performance of the chiller owner Meeting set financial criteria	CFC centrifugal chiller Power consumption higher than 0.8 kW/TR Cooling capacity higher than 250 TR Less than 15 year old*	CFC centrifugal chillers Owner willing to participate Financial qualified
Average costs per chiller	US$ 108,800	US$ 126,696	US$ 118,850 (1st round)
Average costs per RT	US$ 27.34	US$ 16.37	
Total RT	3,980 RT (based on 10 chillers)	7,740 RT	2,843 RT (1st round)
Average RT	398 RT	455 RT	474 RT (1st round)
Average costs per RT			251 US$/RT (1st round)
CFC emission reduction per year	812 kg (estimate)	2,271 kg	730 kg CFC-11 (1st round)
CFC recovered and recycled from replaced chillers	7,800 kg (estimate 6,787 kg)	9,160 kg	2,415 kg CFC-11 (1st round)

	Mexican chiller project	Thai chiller project	Turkey chiller project
CFC emission reduction per RT			0.26 kg CFC-11/RT (1st round)
CFC recovery per RT			0.85 kg CFC-11/RT (1st round)
Energy savings per RT	NA	0.38 kW/RT	NA
Energy saving per year	7,387,902 kWh/year	2,941,000 kWh/year	NA
CO2 emission reduction (due to reduced energy consumption)	NA		NA
CO2 emission reduction (due to reduced leakage)	NA	4.310 ktC/year	NA
Energy Consumption Reduction (MWh/year)	7,387 (12 chillers)	15,503 (17 chillers)	
CO_2 Emission KtC per year		113.25 (17 chillers)	
Leakage Reduction (ODP Tons per year)		38.615 (17 chillers)	