



**United Nations
Environment
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UNEP/OzL.Pro/ExCom/32/30/Algeria
8 November 2000

ORIGINAL: ENGLISH

EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Thirty-second Meeting
Ouagadougou, 6-8 December 2000

PROJECT PROPOSAL: ALGERIA

This document consist of the comments and recommendations of the Fund Secretariat on the following project proposal:

Refrigeration:

- Conversion from CFC-11 to HCFC-141b and CFC-12 to HFC-134a technology in the manufacture of commercial refrigeration at the RCA (Societe de Refrigeration et de Conditionnement de l'air)

UNIDO

PROJECT EVALUATION SHEET ALGERIA

SECTOR: Refrigeration ODS use in sector (1999): 863 ODP tonnes

Sub-sector cost-effectiveness thresholds: Commercial US \$15.21/kg

Project Titles:

- (a) Conversion from CFC-11 to HCFC-141b and CFC-12 to HFC-134a technology in the manufacture of commercial refrigeration at the RCA (Societe de Refrigeration et de Conditionnement de l'air)

Project Data	Commercial
	RCA
Enterprise consumption (ODP tonnes)	28.59
Project impact (ODP tonnes)	27.30
Project duration (months)	28
Initial amount requested (US \$)	366,383
Final project cost (US \$):	
Incremental capital cost (a)	258800
Contingency cost (b)	23,800
Incremental operating cost (c)	69,168
Total project cost (a+b+c)	351,768
Local ownership (%)	100%
Export component (%)	0%
Amount requested (US \$)	351,768
Cost effectiveness (US \$/kg.)	12
Counterpart funding confirmed?	
National coordinating agency	Ministere de l'Interieur, des collectivites locale
Implementing agency	UNIDO

<i>Secretariat's Recommendations</i>	
Amount recommended (US \$)	351,768
Project impact (ODP tonnes)	27.30
Cost effectiveness (US \$/kg)	12
Implementing agency support cost (US \$)	45,730
Total cost to Multilateral Fund (US \$)	397,498

PROJECT DESCRIPTION

Sector Background

- Latest available total ODS consumption (1999)	1,737.50 ODP tonnes
- Baseline consumption of Annex A Group I substances (CFCs)	2,119.50 ODP tonnes
- Consumption of Annex A Group I substances for the year 1999	1,502.20 ODP tonnes
- Baseline consumption of CFCs in refrigeration sector	Not available ODP tonnes
- Consumption of CFCs in refrigeration sector in 1999	863.00 ODP tonnes
- Funds approved for investment projects in refrigeration sector as of July 2000 (31st Meeting)	US\$6,956,814.00
- Quantity of CFC to be phased out in investment projects in refrigeration sector as of end of 1999	447.00 ODP tonnes

1. The total consumption of CFCs in the refrigeration sector in 1999, according to information from the government of Algeria, was 863 ODP tonnes.

2. The Executive Committee has approved about US \$6.9 million for 3 projects to phase out 447 ODP tonnes of CFC for enterprises manufacturing refrigeration equipment in the refrigeration sector in Algeria. There are two large manufacturers of commercial refrigeration equipment (ENAPAT and RCA). The project for ENAPAT was approved by the Executive Committee. The remaining commercial refrigeration sub-sector consists of about 40 small-and – medium scale companies.

RCA

3. RCA is one of two major producers of commercial refrigeration equipment in Algeria. The enterprise manufactures commercial refrigeration equipment (display cabinets, commercial freezers, water coolers and chest freezers). The enterprise operates two low-pressure foam dispensers in the baseline.

4. The current project will phase-out 27.77 ODP tonnes of CFC-11 and 5.39 ODP tonnes of CFC-12 in the production of commercial refrigeration equipment at RCA in Algeria. This will be achieved by converting from CFC-11 to HCFC-141b as the foam blowing agent and from CFC-12 to HFC-134a as the refrigerant. Under the current project, the existing low-pressure machines will be replaced by two high-pressure foam dispensers (US \$170,000). The enterprise will require production and portable refrigerant charging units (US \$46,000), vacuum pumps (US \$14,000) and leak detectors (US \$2,000). Other costs include re-design, testing, trials (US \$9,000), installation, commissioning, and transportation (US \$10,000), and training (US \$10,000). Incremental operating costs are requested by the enterprise for a period of one year (US \$70,283) reflecting the higher cost of chemicals and an increase in foam density.

5. The proposed duration of the project is 28 months.

Justification for the use of HCFC-141b

6. RCA has selected HCFC-141b technology to replace CFC-11 in foam blowing operations. It is an interim solution until HFC systems are commercially available. A letter advising the Government decision to use HCFC technology has been received by the Secretariat in accordance with the Executive Committee Decision 27/13 and is attached to this evaluation together with a justification from the implementing agency.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

1. The Secretariat has raised the issue of accurate presentation of ODS consumption data on unit by unit basis. UNIDO has provided explanations of using averaged values of CFC consumption for several groups of products.
2. The Secretariat has discussed with UNIDO the issue of equivalent replacement of refrigerant charging boards and the eligible cost of replacement of vacuum pumps. All the issues have been resolved and the budget has been adjusted accordingly.

RECOMMENDATIONS

1. The Fund Secretariat recommends blanket approval of the commercial refrigeration project from UNIDO with the level of funding and associated support costs as indicated below.

	Project Title	Project Funding (US\$)	Support Cost (US\$)	Implementing Agency
(a)	Conversion from CFC-11 to HCFC-141b and CFC-12 to HFC-134a technology in the manufacture of commercial refrigeration at the RCA (Societe de Refrigeration et de Conditionnement de l'air)	351,768	45,730	UNIDO

UNIDO
Vienna

Attention: Dr. A. Malayeri

Subject: Commitment letters of projects involving HCFCs

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

- a) Verifies that it had reviewed the specific situation at the enterprises (name(s) of company(ies)) Société de Réfrigération et de Conditionnement de l'Air (RCA)

as well as its HCFC commitments under the article 2F;

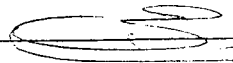
- b) States that based on the prevailing circumstances at (name(s) of company(ies)) Société de Réfrigération et de Conditionnement de l'Air (RCA)

At the present time the conversion of the(se) enterprise(s) requires the use of HCFC-141b for the interim period as stipulated in the Montreal Protocol;

- c) Confirms that the Government and the recipient enterprise(s) understands that no funding would be available from the Fund for future conversion from HCFCs for the said company(ies) whenever such a conversion to other alternatives will be required

Ozone Office Manager

Name: M^{ed} EL HADI Bennac

Signature: 

Date: 27.9.2000



**United Nations
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Distr.
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UNEP/OzL.Pro/ExCom/32/30/Argentina
10 November 2000

ORIGINAL: ENGLISH

EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Thirty-second Meeting
Ouagadougou, 6-8 December 2000

PROJECT PROPOSALS: ARGENTINA

This document consist of the comments and recommendations of the Fund Secretariat on the following project proposals:

Foam:

- Rigid Umbrella project - Phaseout of CFC-11 by conversion to HCFC-141b technology in the manufacture of rigid polyurethane foam at 9 foam manufacturers UNDP
- Phasing out CFC-11 by conversion to HCFC-141b as a blowing agent in the manufacture of rigid P.U. foams (Umbrella II) UNIDO

Refrigeration:

- Replacement of CFC-11 by HCFC-141b in the manufacture of rigid polyurethane foam for domestic refrigerators and sandwich panels at MTH S.R.L. World Bank
- Change of technology: Elimination of CFCs in the manufacturing plant of domestic refrigerators at Lobato San Luis S.A. World Bank

Solvent:

- Change of technology for 3 out of 9 enterprises of the umbrella project for conversion from MCF used as solvent to aqua based cleaning (ARG/SOL/28/INV/91) World Bank

PROJECT EVALUATION SHEET ARGENTINA

SECTOR: Foam ODS use in sector (1999): 1,370 ODP tonnes

Sub-sector cost-effectiveness thresholds: Rigid US \$7.83/kg

Project Titles:

- (a) Rigid Umbrella project – Phaseout of CFC-11 by conversion to HCFC-141b technology in the manufacture of rigid polyurethane foam at 9 foam manufacturers
- (b) Phasing out CFC-11 by conversion to HCFC-141b as a blowing agent in the manufacture of rigid P.U. foams (Umbrella II) (seven companies)

Project Data	Rigid	Rigid
	9 foam manufacturers	Umbrella II
Enterprise consumption (ODP tonnes)	49.60	51.75
Project impact (ODP tonnes)	44.80	46.06
Project duration (months)	36	24
Initial amount requested (US \$)	334,624	340,055
Final project cost (US \$):		
Incremental capital cost (a)	279,000	244,100
Contingency cost (b)	27,900	21,210
Incremental operating cost (c)	143,980	64,185
Total project cost (a+b+c)	450,880	329,495
Local ownership (%)	100%	100%
Export component (%)	0%	0%
Amount requested (US \$)	320,332	329,495
Cost effectiveness (US \$/kg.)	7.15	7.15
Counterpart funding confirmed?	Yes	Yes
National coordinating agency	OPROZ	OPROZ
Implementing agency	UNDP	UNIDO

Secretariat's Recommendations		
Amount recommended (US \$)	320,332	329,495
Project impact (ODP tonnes)	44.80	46.06
Cost effectiveness (US \$/kg)	7.15	7.15
Implementing agency support cost (US \$)	41,643	42,834
Total cost to Multilateral Fund (US \$)	361,975	372,329

PROJECT DESCRIPTION

Sector Background

- Latest available total ODS consumption (1999)	4,964.10	ODP tonnes
- Baseline consumption of Annex A Group I substances (CFCs)	5,061.70	ODP tonnes
- Consumption of Annex A Group I substances for the year 1999	4,316.30	ODP tonnes
- Baseline consumption of CFCs in foam sector	2,100.00	ODP tonnes
- Consumption of CFCs in foam sector in 1999	1,370.00	ODP tonnes
- Funds approved for investment projects in foam sector as of end of 1999	US \$9,462,666.00	
- Quantity of CFC to be phased out in foam sector as of end of 1999	1,631.90	ODP tonnes
- Quantity of CFCs phased out in investment projects in the foam sector as of end of 1999	779.00	ODP tonnes
- Funds approved for investment projects in the foam sector approved in 2000	US \$594,300	
- Quantity of CFC to be phased out in foam projects approved in the year 2000	98.70	ODP tonnes

1. Based on analysis of data reported by Argentina to the Ozone Secretariat and other relevant data, the country appears to be in compliance with the CFC freeze. In order to meet the 50% CFC reduction by 2005, an additional 339.55 ODP tonnes of CFC must be phased out.

Rigid Foam

2. Two umbrella projects are submitted by UNDP and UNIDO in the rigid foam sub-sector for 16 small- and medium- scale foam producers in Argentina. The UNDP project (Umbrella Project I) covers 9 foam producers with a total consumption (in 1999) of 49.6 tonnes, while the UNIDO project covers 7 foam producers with a total consumption (average 1997-1999) of 51.8 tonnes. The companies produce products for a variety of applications including construction, cold stores and display cabinets, truck bodies and insulated tanks. They use high pressure sprayfoam equipment as well as low pressure dispensers of various makes. Profiles of the companies are provided in tables 1 and 2.

3. All the companies will convert their production to HCFC-141b technology as an interim technology. The cost of conversion in the two projects includes the cost of replacement of low pressure dispensers with high pressure at US \$50,000-60,000, replacement of low pressure sprayfoam dispensers with high pressure at US \$15,000 and cost of retrofit of the high pressure sprayfoam machines at US \$5,000. In the Umbrella I project trials, technology transfer and training will be US \$8,000 per project while in the Umbrella II project technology transfer, training and commissioning will be US \$4,000 per project. Incremental operating costs range from about US \$4,500 to US \$53,700 in the Umbrella I project and from US \$6,560 to US \$18,500 in the Umbrella II project.

Justification for the use of HCFC-141b

4. Both UNDP and UNIDO provide justification for the use of HCFC-141b in the technology evaluation. They both stated that during the preparation of the projects the companies were briefed on the available technological options and the related technical, commercial and other issues. UNDP provided annexes of additional justification, projected “techno-economic” impact of zero ODP technologies and the cost of future conversion to non-ODS technology, which are attached as annexes to this evaluation. UNIDO stated that no further investment is foreseen to convert to zero ODP technology. The Government of Argentina has provided letters endorsing the use of HCFC-141b by the companies, copies of which are attached.

Impact of the projects

5. A total of 90.86 ODP tonnes will be phased out by the two umbrella projects. This will eliminate 2.1% of Argentina’s 1999 consumption of Annex A Group I substances. There will be residual CFC-11 ODS consumption of 10.5 ODP tonnes as a result of the use of HCFC-141b.

SECRETARIAT’S COMMENTS AND RECOMMENDATIONS**COMMENTS**

1. The Fund Secretariat has discussed the two umbrella projects with the implementing agencies (UNDP and UNIDO) and agreed on the grants for each project, as follows:

Umbrella I (9 enterprises): US \$320,332
 Umbrella II: US \$329,495

RECOMMENDATIONS

1. The Fund Secretariat recommends blanket approval of the two umbrella projects, Umbrella I project (9 foam manufacturers) and Umbrella II project with the levels of funding and associated support costs indicated below.

	Project Title	Project Funding (US\$)	Support Cost (US\$)	Implementing Agency
(a)	Rigid Umbrella project - Phaseout of CFC-11 by conversion to HCFC-141b technology in the manufacture of rigid polyurethane foam at 9 foam manufacturers	320,332	41,643	UNDP
(b)	Phasing out CFC-11 by conversion to HCFC-141b as a blowing agent in the manufacture of rigid P.U. foams (Umbrella II) (seven companies)	329,495	42,834	UNIDO

Table 1: Profile of Enterprises in the Rigid Foam Sub-sector Umbrella Project I

Enterprise	Founded	ODS Use Tonnes 1999	Foam Product	Baseline Equipment*	Impact ODP Eliminated Tonnes	ICC US \$	IOC US \$	Total Project Cost US \$	Requested Grant US \$	Cost-effectiveness US \$/kg
Produmerc	1984	1.6	Sprayfoam	Gusmer FF-1600	1.4	14,300	4,749	19,049	10,962	7.83
Produnova	1991	2.3	Thermal insulation	Glascraft (mini, maxi)	2.1	19,800	6,981	26,781	16,443	7.83
Carlos Masciotta	1994	6.5	Sprayfoam	2 Glascraft Maxi	5.9	8,800	16,852	25,652	25,652	4.35
Elido Palermo	1981	8.4	Trucks, panels, spray	2Gusmer H-II, Gusmer FF-1600	7.6	77,000	19,897	96,897	59,508	7.83
Carlos Castillo	1993	8.3	Sprayfoam	Tans LPD 6 kg/min	7.5	25,300	23,518	48,818	48,818	6.51
Estanislao Kowcz	1955	2.5	Trucks	2 Hennecke H2 LPD	2.3	22,000	5,204	27,204	18,009	7.83
Constuctora Vimac	1955	1.6	Sprayfoam	Gusmer H-II, Gusmer FF-1600	1.6	36,300	4,519	40,819	12,528	7.83
Gaspar Adragna	1975	4.5	Doors	ICR 12 kg/min	4.1	25,300	8,556	33,856	32,103	7.83
Pacido Sandoval	1984	13.7	Sprayfoam, blocks, tank insulation	2 Gusmer FF-220, Gusmer H-II, Glascraft Maxi, Mecpol	12.3	78,100	53,704	131,804	96,309	7.83
Total					44.8	306,900	143,980	450,880	320,332	7.15

* All the baseline equipment were installed before 25 July 1995 except 2 Glascraft Maxi of Carlos Masciotta installed in 1996 and 1997.

LPD: Low pressure dispenser

Table 1: Profile of Enterprises in the Rigid Foam Sub-sector Umbrella Project II

Enterprise	Founded	ODS Use Tonnes 1999	Foam Product	Baseline Equipment*	Impact ODP Eliminated Tonnes	ICC US \$	IOC US \$	Total Project Cost US \$	Requested Grant US \$	Cost- effectiveness US \$/kg
Aislaciones y servicios Maximo	1990	6.5	Sprayfoam	2 LPD Aistec 8 kg/min	5.8	37,000	7,280	44,280	44,280	7.65
Baduco D & D	1960	7.50	Insulated tanks	2 LPD Rosasco 1 self-made 20 kg/min 1 Rosasco spray	6.7	44,150	7,933	52,083	52,083	7.81
Bolatti	1991	6.70	Panels	LPD ICR 40 kg/min	6.0	39,200	7,089	46,289	46,289	7.76
Hi-Tec Poliuretano Alberto	1994	9.49	Sprayfoam	3 Gusmer FF-1600 (1 in 1997)	8.5	30,000	18,502	37,502	37,502	4.44
Nagera Jose	1961	6.20	Panels	Rosasco 40 kg/min	5.5	36,450	6,561	43,011	43,011	7.79
Stefanelli Vincer	1984	9.13	Cold stores, display cabinets	2 Aistec LPD (40 kg/min and 60 k/min)	8.1	53,060	10226	63,286	63,286	7.79
S.R.L.	1994	6.23	Panels	Viking LPD	5.5	36,450	6,594	43,044	43,044	7.76
Total					46.1	276,310	64,185	329,495	329,495	7.15

All the equipment were installed before 25 July 1995 except 1 Gusmer FF-1600 of Hi-Tec Poliuretano installed in 1997.

***LPD low pressure dispenser**

PROJECT EVALUATION SHEET ARGENTINA

SECTOR: Refrigeration ODS use in sector (199): ODP tonnes
 Sub-sector cost-effectiveness thresholds: Domestic US \$15.21/kg

Project Titles:

- (a) Change of technology: Elimination of CFCs in the manufacturing plant of domestic refrigerators at Lobato San Luis S.A.
- (b) Replacement of CFC-11 by HCFC-141b in the manufacture of rigid polyurethane foam for domestic refrigerators and sandwich panels at MTH S.R.L.

Project Data	Domestic	Domestic
	Lobato San Luis	MTH
Enterprise consumption (ODP tonnes)	19.40	6.25
Project impact (ODP tonnes)	18.53	5.56
Project duration (months)	24	24
Initial amount requested (US \$)	254,956	96,052
Final project cost (US \$):		
Incremental capital cost (a)	319,887	75,000
Contingency cost (b)	31,989	7,500
Incremental operating cost (c)	45,634	84,323
Total project cost (a+b+c)	397,510	166,823
Local ownership (%)	100%	100%
Export component (%)	0%	0%
Amount requested (US \$)	254,956	0
Cost effectiveness (US \$/kg.)	13.76	13.76
Counterpart funding confirmed?	Yes	Yes
National coordinating agency	UEPRO	OPROZ
Implementing agency	IBRD	IBRD

Secretariat's Recommendations		
Amount recommended (US \$)		
Project impact (ODP tonnes)		
Cost effectiveness (US \$/kg)		
Implementing agency support cost (US \$)		
Total cost to Multilateral Fund (US \$)		

PROJECT DESCRIPTION

Sector Background

- Latest available total ODS consumption (1999)	4,964.10 ODP tonnes
- Baseline consumption of Annex A Group I substances (CFCs)	4,855.50 ODP tonnes
- Consumption of Annex A Group I substances for the year 1999	3,550.00 ODP tonnes
- Baseline consumption of CFCs in refrigeration sector	Not available ODP tonnes
- Consumption of CFCs in refrigeration sector in 1992	1,451.00 ODP tonnes
- Funds approved for investment projects in refrigeration sector as of July 2000 (31st Meeting)	US\$23,224,319.00
- Quantity of CFC to be phased out in investment projects in refrigeration sector as of end of 1999	722.00 ODP tonnes

1. The major manufacturers of domestic and commercial refrigeration equipment have been converted to non-ODS technologies. However, a number of small- and medium-sized refrigeration companies are still using CFC-based technologies in Argentina.

MTH S.R.L.

2. The enterprise consumed 9.1 ODP tonnes of CFC-11 in its foam operation in 1999. This consumption is sub-divided into consumption for foam operation in manufacturing of domestic refrigerators and freezers (6.25 ODP tonnes) and rigid foam operation (2.8 ODP tonnes) in the production of insulation sandwich panels. The enterprise operates an in-house foaming machine in the baseline.

3. The refrigeration units are based on absorption technology (ammonia) as a refrigerant, and therefore no CFC-12 is consumed.

4. The current project will phase-out 9.1 ODP tonnes of CFC-11 used by MTH S.R.L by converting from CFC-11 to HCFC-141b as the foam blowing agent. Under the current project, the existing foaming machine will be replaced by a high-pressure foam dispenser (US \$65,000). Other costs include testing, trials (US \$5,000), technical assistance and training (US \$5,000). Incremental operating costs are requested by the enterprise at a level of (US \$13,552) reflecting the higher cost of chemicals and an increase in foam density.

Lobato San Luis S. A.

5. The project for Lobato San Luis , domestic refrigeration company, was approved by the Executive Committee at its 13th Meeting at the cost of US \$410,683. The approved project included the conversion from CFC-11 to cyclopentane in foam blowing operations and from CFC-12 to HFC-134a in refrigerant operations.

6. In the course of implementation of the project, the company realized that based on quotations received from equipment suppliers the cost of conversion turned out to be more expensive than expected. The enterprise has been unable to co-finance the additional costs.

7. In order to implement the project the World Bank is requesting from the Executive Committee the approval of a change in technology for the foaming operation in Lobato. The requested technology is based on HCFC-141b as the blowing agent. The requested grant in the revised proposal is US \$254,956 which is lower than on that in the approved project (US \$410,683). The difference will be returned to the Multilateral Fund.

8. The original project for Lobato was approved after Decision 22/71 on change of technology was adopted. In accordance with this decision, the project is submitted to the Executive Committee for individual consideration together with the Secretariat's review and comments.

Justification for the use of HCFC-141b

9. The two enterprises have selected HCFC-141b technology to replace CFC-11 in their foam blowing operations. It is an interim solution until non-CFC systems (different from hydrocarbons) are commercially available. A letter advising the Government decision to use HCFC technology has been received by the Secretariat in accordance with the Executive Committee Decision 27/13 and is attached to this evaluation together with a justification from the implementing agency.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

MTH

1. The Secretariat has sought clarification from the World Bank on the weight of foam insulation used in the calculation of incremental operating cost for production of refrigerators and freezers. It appears that the weight of foam exceeds by 100% the calculated weight of foam using the reported thickness of insulation and the volume of appliances produced by MTH. The inconsistency in the reported and calculated weight of foam has implications for the determination of CFC-11 consumption, IOC and cost-effectiveness.

2. The World Bank is in the process of obtaining the necessary information from the enterprise. The Sub-Committee on Project Review will be advised accordingly.

Lobato San Luis

3. The Secretariat has discussed with the World Bank the incremental capital costs of the revised proposal for Lobato San Luis. The cost of the high pressure dispenser has been adjusted to reflect the prevailing market price for this equipment. The cost of additional mixing head has been recognized as ineligible for funding. The incremental capital costs have been agreed between the Secretariat and the World Bank at the level of US \$183,085.

4. The data on production and CFC consumption date back to 1996. The Secretariat has requested information on the current production level of the enterprise. This information is required for calculation of the incremental operating costs and cost effectiveness as well as the indication of economic viability of the company. The World Bank reported to the 28th Meeting in its progress report on the Lobato project that the sub-grant agreement was not signed due to the unstable economic conditions of Lobato. The proposal submitted to the 32nd Meeting indicates that the enterprise is currently facing a sharp market reduction and is struggling to survive during the current economic crisis in Argentina.

5. On the issue of economic viability of the enterprise the World Bank advised the Secretariat that according to information provided by the Bank's financial agent in Argentina, the company does not have any kind of financial difficulty and will be able to complete the project.

6. The Secretariat has not received the required production data from the World Bank. The Sub-Committee on Project Review will be advised by the Secretariat accordingly.

PROJECT EVALUATION SHEET ARGENTINA

SECTOR: Solvent ODS use in sector (1998): 90.8 ODP tonnes

Sub-sector cost-effectiveness thresholds: CFC-113 US \$19.73/kg
TCA US \$38.50/kg

Project Titles:

- (a) Change of technology for 3 out of 9 enterprises of the umbrella project for conversion from MCF used as solvent to aqua based cleaning (ARG/SOL/28/INV/91)

Project Data	Combined CFC-113 and TCA	
Enterprise consumption (ODP tonnes)		
Project impact (ODP tonnes)		
Project duration (months)		
Initial amount requested (US \$)		
Final project cost (US \$):		
Incremental capital cost (a)		
Contingency cost (b)		
Incremental operating cost (c)		
Total project cost (a+b+c)		
Local ownership (%)		
Export component (%)		
Amount requested (US \$)		
Cost effectiveness (US \$/kg.)		
Counterpart funding confirmed?		
National coordinating agency		
Implementing agency	IBRD	

<i>Secretariat's Recommendations</i>	
Amount recommended (US \$)	
Project impact (ODP tonnes)	
Cost effectiveness (US \$/kg)	
Implementing agency support cost (US \$)	
Total cost to Multilateral Fund (US \$)	

PROJECT DESCRIPTION

Change of technology for 3 out of 9 enterprises of the umbrella project for conversion from MCF used as solvent to aqua based cleaning (ARG/SOL/28/INV/91) at Trosh S.A., Unisol S.A. and Grimoldi S.A.

1. This is an umbrella project for nine enterprises which was approved by the Executive Committee at its 28th Meeting. It was designed to phase out the consumption of 70.69 tonnes of 1.1.1 TCA used as cleaning solvent through conversion to aqueous technology. Three of the enterprises manufacture shoe soles. The other six enterprises manufacture metal products. The approved grant of US \$272,157, at the threshold limit, was to be used to meet most of the incremental capital costs for cleaning equipment. Incremental operating costs were not requested.

2. The project is being submitted for change of technology at the three shoe sole manufacturers. Decision 22/69 on guidelines for change of technology requires that all projects approved after adoption of the decision are to be implemented as approved, but that exceptions will be considered where the only other option would be cancellation. The revised proposal must be implemented within the approved level of funding. Such proposals are to be submitted for individual consideration.

3. Test on shoe soles using aqueous cleaning technology at the supplier's facility were unsuccessful. It is now proposed to provide to the three shoe sole enterprises cleaning machines of a different design that can use either iso-propyl alcohol or organic solvents as cleaning agents. Tests have been conducted with the proposed new equipment and were successful. The cost of the alternative machines is similar to the cost of the machines originally proposed. No change to the level of grant for the project is proposed. Details of the funding originally approved for the three enterprises are as follows:

<u>Company</u>	<u>TCA Consumption</u>	<u>Grant</u>
	<u>ODP tonnes</u>	<u>US \$</u>
Trosh S.A.	0.75	28,875
Unisol S.A.	1.070	41,195
Grimoldi S.A.	1.224	47,124

SECRETARIAT'S COMMENT AND RECOMMENDATION

COMMENT

1. The World Bank confirmed that phase-out at the three enterprises would not be able to proceed unless the proposed aqueous technology was changed. The Bank also confirmed that costs for the proposed alternative equipment were comparable to the equipment originally specified and that it did not provide any increase in production capacity. Since not all incremental capital costs (e.g. trials and training) and no incremental operating costs were requested, minor differences in equipment cost (e.g. reductions) would not affect the overall project cost.

RECOMMENDATION

1. Consistent with Decision 22/69 the project is submitted for individual consideration. The Secretariat recommends that the technology change be approved.



**United Nations
Environment
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Distr.
Limited

UNEP/OzL.Pro/ExCom/32/30/Benin
8 November 2000

ORIGINAL: ENGLISH

EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Thirty-second Meeting
Ouagadougou, 6-8 December 2000

PROJECT PROPOSAL: BENIN

This document consist of the comments and recommendations of the Fund Secretariat on the following project proposal:

Foam:

- Phaseout of CFC-11 by conversion to methylene chloride in the manufacture of flexible polyurethane foam at Plastique Elastomeres du Benin (P.E.B.)

UNDP

SECTOR:	Foam	ODS use in sector (1998):	25 ODP tonnes
Sub-sector cost-effectiveness thresholds:	Flexible		US \$6.23/kg

Project Titles:

- (a) Phaseout of CFC-11 by conversion to methylene chloride in the manufacture of flexible polyurethane foam at Plastique Elastomeres du Benin (P.E.B.)

Project Data	Flexible slabstock
	P.E.B.
Enterprise consumption (ODP tonnes)	27.30
Project impact (ODP tonnes)	27.30
Project duration (months)	30
Initial amount requested (US \$)	169,000
Final project cost (US \$):	
Incremental capital cost (a)	133,000
Contingency cost (b)	13,300
Incremental operating cost (c)	-3,273
Total project cost (a+b+c)	143,027
Local ownership (%)	100%
Export component (%)	0%
Amount requested (US \$)	143,027
Cost effectiveness (US \$/kg.)	5.24
Counterpart funding confirmed?	Yes
National coordinating agency	Ministry of Environmental Affairs
Implementing agency	UNDP

<i>Secretariat's Recommendations</i>	
Amount recommended (US \$)	143,027
Project impact (ODP tonnes)	27.30
Cost effectiveness (US \$/kg)	5.24
Implementing agency support cost (US \$)	18,594
Total cost to Multilateral Fund (US \$)	161,621

PROJECT DESCRIPTION

Sector Background

- Latest available total ODS consumption (1999)	134.00	ODP tonnes
- Baseline consumption of Annex A Group I substances (CFCs)	27.10	ODP tonnes
- Consumption of Annex A Group I substances for the year 1999	123.00	ODP tonnes
- Baseline consumption of CFCs in foam sector	Not Available	ODP tonnes
- Consumption of CFCs in foam sector in 1998	25.00	ODP tonnes

There has been no investment project in Benin as of now.

Flexible Slabstock

P.E.B.

1. Plastiques Elastomeres du Benin (P.E.B.), founded in 1984, is the only foam producer in Benin. It produces flexible slabstock foam for the furniture industry. At the time that Benin's country programme was adopted the company used relatively small quantity of CFCs as it was trying to change to the use of methylene chloride. However in the past few years the company's consumption of CFC-11 is reported to have grown as it moved away from its trials with methylene chloride. The most recent blowing agent consumption data is reported as follows:

	1996	1997	1998	Last 12 Months
CFC-11 (tonnes)	20	18	25	27.3
Methylene Chloride (tonnes)	10	12	5	3

2. The company operates a 220 kg/min low pressure conventional Tipocvh foam machine commissioned in 1984.

3. P.E.B. will convert the production to the use of methylene chloride. The capital cost of conversion includes the cost of methylene chloride tank (US \$12,000), methylene chloride metering system (US \$13,000), machine enclosure including extractor fans and encasement of relevant sections of the foaming line (US \$63,000), ventilation in the curing room (US \$18,000) and methylene chloride detector systems and safety devices (US \$8,000). Trials, technology transfer and training amount to US \$19,000. The project will realize incremental operational savings of US \$3,273.

Impact of the project

4. When completed the project will eliminate 27.3 tonnes of CFC-11 which is 22.2% of Benin's 1999 consumption of Annex A Group I substances.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS**COMMENTS**

1. The Secretariat and UNDP have discussed the project and agreed on the eligible grant.

RECOMMENDATIONS

1. The Fund Secretariat recommends blanket approval of the P.E.B. project with the funding level and associated support cost indicated below.

	Project Title	Project Funding (US\$)	Support Cost (US\$)	Implementing Agency
(a)	Phaseout of CFC-11 by conversion to methylene chloride in the manufacture of flexible polyurethane foam at Plastique Elastomeres du Benin (P.E.B.)	143,027	18,594	UNDP



**United Nations
Environment
Programme**

Distr.
Limited

UNEP/OzL.Pro/ExCom/32/30/Brazil
10 November 2000

ORIGINAL: ENGLISH

EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Thirty-second Meeting
Ouagadougou, 6-8 December 2000

PROJECT PROPOSALS: BRAZIL

This document consist of the comments and recommendations of the Fund Secretariat on the following project proposals:

Foam:

- | | |
|--|------|
| • Phaseout of CFC-11 by conversion to water-based technology in the manufacture of integral skin foams (shoesoles) at Megaflex | UNDP |
| • Phaseout of CFC-11 by conversion to water-blown technology in the manufacture of rigid integral skin foam and to HCFC-141b for rigid polyurethane foam at Poliumetka | UNDP |
| • Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at Jose Sola | UNDP |
| • Conversion from CFC-12 to isobutane technology in the manufacture of extruded polyethylene foam at Thermo-flex | UNDP |
| • Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at Refri-Leste | UNDP |
| • Phaseout of CFC-11 by conversion to water-blown technology in the manufacture of rigid foam at Plastiron | UNDP |
| • Conversion from CFC-11 to HCFC-141b and water technology in the manufacture of rigid polyurethane foam at Ser Therm | UNDP |

- Phaseout of CFC-11 by conversion to water-blown technology in the manufacture of rigid foam at Rytpak UNDP
- Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at Frigs UNDP
- Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at Termobras UNDP

PROJECT EVALUATION SHEET BRAZIL

SECTOR: Foam ODS use in sector (1998): 2,286 ODP tonnes

Sub-sector cost-effectiveness thresholds: Polystyrene/polyethylene US \$8.22/kg
Rigid US \$7.83/kg

Project Titles:

- (a) Phaseout of CFC-11 by conversion to water-based technology in the manufacture of integral skin foams (shoesoles) at Megaflex
- (b) Phaseout of CFC-11 by conversion to water-blown technology in the manufacture of rigid intergal skin foam and to HCFC-141b for rigid polyurethane foam at Poliumetka
- (c) Conversion from CFC-12 to isobutane technology in the manufacture of extruded polyethylene foam at Thermo-flex
- (d) Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at Frigs
- (e) Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at Jose Sola

Project Data	Integral Skin	Multiple Subsector	Polystyrene/polyethylene	Rigid	Rigid
	Megaflex	Poliumetka	Thermo-flex	Frigs	Jose Sola
Enterprise consumption (ODP tonnes)	41.50	25.50	15.00	90.00	38.70
Project impact (ODP tonnes)	41.50	24.50	15.00	64.90	34.90
Project duration (months)	36	36	36	36	36
Initial amount requested (US \$)	211,068	136,183	123,300	368,332	150,369
Final project cost (US \$):					
Incremental capital cost (a)	77,000	57,500	126,000	270,000	70,000
Contingency cost (b)	7,700	5,750	12,600	27,000	7,000
Incremental operating cost (c)	126,368	72,933	3,400	71,332	73,369
Total project cost (a+b+c)	211,068	136,183	142,000	368,332	150,369
Local ownership (%)	100%	100%	100%	100%	100%
Export component (%)	0%	0%	0%	0%	0%
Amount requested (US \$)	211,068	136,183	123,300	368,332	150,369
Cost effectiveness (US \$/kg.)	5.08	5.61	8.22	5.68	4.31
Counterpart funding confirmed?	Yes				
National coordinating agency	PROZON				
Implementing agency	UNDP				

<i>Secretariat's Recommendations</i>					
Amount recommended (US \$)	211,068	136,183	123,300	335,568	150,369
Project impact (ODP tonnes)	41.50	24.50	15.00	64.90	34.90
Cost effectiveness (US \$/kg)	5.08	5.61	8.22	5.17	4.31
Implementing agency support cost (US \$)	27,439	17,704	16,029	43,624	19,548
Total cost to Multilateral Fund (US \$)	238,507	153,887	139,329	379,192	169,917

PROJECT EVALUATION SHEET BRAZIL

SECTOR: Foam ODS use in sector (1998): 2,286 ODP tonnes

Sub-sector cost-effectiveness thresholds: Rigid US \$7.83/kg

Project Titles:

- (f) Phaseout of CFC-11 by conversion to water-blown technology in the manufacture of rigid foam at Plastiron
- (g) Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at Refri-Leste
- (h) Phaseout of CFC-11 by conversion to water-blown technology in the manufacture of rigid foam at Rytpak
- (i) Conversion from CFC-11 to HCFC-141b and water technology in the manufacture of rigid polyurethane foam at Ser Therm
- (j) Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at Termobras

Project Data	Rigid	Rigid	Rigid	Rigid	Rigid
	Plastiron	Refri-Leste	Rytpak	Ser Therm	Termobras
Enterprise consumption (ODP tonnes)	32.40	30.00	27.00	72.00	77.00
Project impact (ODP tonnes)	32.40	27.00	27.00	57.10	60.90
Project duration (months)	36	36	36	36	36
Initial amount requested (US \$)	131,768	136,840	211,410	377,391	256,845
Final project cost (US \$):					
Incremental capital cost (a)	30,100	70,000	120,000	218,000	156,000
Contingency cost (b)	3,010	7,000	12,000	21,800	15,600
Incremental operating cost (c)	98,658	59,840	82,215	137,591	155,715
Total project cost (a+b+c)	131,768	136,840	214,215	377,391	327,315
Local ownership (%)	100%	100%	100%	100%	100%
Export component (%)	0%	0%	0%	0%	0%
Amount requested (US \$)	131,768	136,840	211,410	377,391	327,315
Cost effectiveness (US \$/kg.)	4.07	5.07	7.83	6.61	5.37
Counterpart funding confirmed?	Yes				
National coordinating agency	PROZON				
Implementing agency	UNDP				

<i>Secretariat's Recommendations</i>					
Amount recommended (US \$)	131,768	136,840	211,410	377,391	327,314
Project impact (ODP tonnes)	32.40	27.00	27.00	57.10	60.90
Cost effectiveness (US \$/kg)	4.07	5.07	7.83	6.61	5.37
Implementing agency support cost (US \$)	17,130	17,789	27,483	49,061	42,551
Total cost to Multilateral Fund (US \$)	148,898	154,629	238,893	426,452	369,866

PROJECT DESCRIPTION

Sector Background

- | | |
|--|----------------------|
| - Latest available total ODS consumption (1999) | 13,166.60 ODP tonnes |
| - Baseline consumption of Annex A Group I substances (CFCs) | 11,050.90 ODP tonnes |
| - Consumption of Annex A Group I substances for the year 1999 | 11,615.00 ODP tonnes |
| - Baseline consumption of CFCs in foam sector | 2,337.00 ODP tonnes |
| - Consumption of CFCs in foam sector in 1999 | 1,780.00 ODP tonnes |
| - Funds approved for investment projects in foam sector as of end of 1999 | US\$18,171,629.00 |
| - Quantity of CFC to be phased out in investment projects in foam sector as of end of 1999 | 2,488.27 ODP tonnes |
| - Quantity of CFC phased out in investment projects in foam sector as of end of 1999 | 946.80 ODP tonnes |
| - Funds approved for investment projects in the foam sector in 2000 | US\$5,951,817.00 |
| - Quantity of CFC to be phased out in investment projects in foam sector approved in 2000 | 488.9 ODP tonnes |
-
- (a) **Phaseout of CFC-11 by conversion to water-based technology in the manufacture of integral skin foams (shoesoles) at Megaflex**
 - (b) **Phaseout of CFC-11 by conversion to water-blown technology in the manufacture of rigid integral skin foam and to HCFC-141b for rigid polyurethane foam at Poliumetka**
 - (c) **Conversion from CFC-12 to isobutane technology in the manufacture of extruded polyethylene foam at Thermo-flex**
 - (d) **Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at Frigs**
 - (e) **Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at Jose Sola**
 - (f) **Phaseout of CFC-11 by conversion to water-blown technology in the manufacture of rigid foam at Plastiron**
 - (g) **Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at Refri-Leste**
 - (h) **Phaseout of CFC-11 by conversion to water-blown technology in the manufacture of rigid foam at Rytpak**
 - (i) **Conversion from CFC-11 to HCFC-141b and water technology in the manufacture of rigid polyurethane foam at Ser Therm**
 - (j) **Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at Termobras**

Integral Skin Foam

Megaflex

1. Megaflex was established in March 1995. It produces polyester-based shoe soles of different colours using polyester polyol and MDI quasi-polymer at 1:1 ratio with 7% CFC-11 in the polyol. It operates three Transtecnica low pressure dispensers made in 1986 and an open-top mixer for blending pigments into the polyol.

2. The production will be converted to fully water-blown technology. The requested incremental capital costs include retrofit of the three Transtecnica low pressure dispensers with refrigerated cooling at US \$30,000 and replacement of the open-top mixer with a closed top one at US \$20,000 (to avoid evaporative losses and maintain the integrity of the water-based system). Trial cost and technology transfer and training cost of US \$7,000 and US \$15,000 respectively are also requested. Incremental operating cost due mainly to increased use of isocyanate amounting to US \$126,368 is also requested.

Multiple Sub-Sector

Poliumetka

3. Poliumetka manufactures polyurethane rigid integral skin foam (ISF) (Density: 400 kg/m³) for display shelves and rigid foam (FPF) for pipe insulation. Poliumetka was established in May 1995. The company operates a Transtecnica low pressure dispenser for the manufacture of the integral skin foam and hand mixing operation for the rigid foam.

4. The integral skin foam production will be converted to water-blown technology, and the rigid foam production to the use of HCFC-141b. The incremental capital cost of conversion includes the cost of mold heating oven (US \$15,000), retrofit of the Transtecnica dispenser with a cooling system (US \$10,000) and procurement of a new 15 kg/min portable high pressure dispenser at US \$25,000 with US \$12,500 deduction for technology upgrade. Other costs include, trials, technology transfer and training costs at US \$20,000. Incremental operating cost amounting to US \$72,933 is requested.

Polyethylene/Polystyrene Foam

Thermo-flex

5. Thermo-flex is a 100% Brazilian owned enterprise founded in 1989. It produced extruded polyethylene foam tubing for pipe insulation in air-conditioning, freezers, etc. In 1998, the enterprise sold its production facilities to Polipex Industria e Comercial Ltda. The company maintained its sales force under the name TTP S.A. (Transformacion Technical Plastiques) and is selling products manufactured by Polipex under the name Termo-flex on the equipment previously owned by Thermo-Flex.

6. A CFC-phase out project for conversion to isobutane which was approved for Polipex at the 22nd Meeting is being implemented by UNDP. This project is proposed as complimentary to the Polipex project and will make use of the infrastructure – tanks, piping, general safety features-already approved for Polipex.

7. The project will phase out the use of 15 tonnes of CFC-12 with the conversion of the manufacturing of the extruded polyethylene tubing to isobutane technology. The project costs include the cost of connection to the Polipex isobutane storage tank at US \$10,000, low and high pressure pump systems at US \$10,000 and US \$20,000 respectively, retrofit of the extruder (US \$30,000), ventilation (US \$10,000), cutting machine US \$10,000 and inkjet printer US \$21,000. Technology transfer, training and trial cost of US \$10,000 is also requested. The incremental operating cost requested is US \$3,400.

Rigid Foam

Frigs, Jose Sola, Plastiron, Refri-Leste, Rytpak, Ser Therm, Termobras

8. All seven companies are 100% Brazilian owned. Six of them were established before 25 July 1995. The Seventh, Jose Sola was established in June 1996 as an independent company to take over the foam production operations of an already existing family-run company Ind. E. Co. De Refrigeracion Elvi Ltda which was founded in 1977.

9. Five of the companies produce rigid insulation foam for various applications including pipe insulation, display cabinets, panels, door frames and doors for cold rooms, sprayfoam for roof, pipes, tanks and cold chambers. Two companies manufacture semi-rigid foam for bumpers (Plastiron) and for packaging (Rytpak). Frigs produces foam of density 42 Kg/ m³ for pipe insulation.

10. All the companies producing insulating foams will convert their production to interim use of HCFC-141b while, those producing non-insulating semi-rigid foams will convert to water-blown technology.

11. The cost of conversion includes the replacement of low pressure machines with high pressure machines and hand-mixing operations with high pressure or low pressure machine depending on whether the company's foam product has critical insulation requirements or not. Where hand-mixing is replaced with a machine a deduction for technology upgrade has been made in the incremental capital cost calculation. Also appropriate deductions have been made for replacement of machines rearing the end of their useful lives. Other incremental capital costs include trials (US \$5,000-US \$10,000) depending on the number of product lines), technology transfer and training (US \$5,000- US \$15,000) depending on the number of machines and product lines. Each project incurs incremental operating cost which in the case of the insulating foams includes, where applicable, the cost associated with increase in foam density following conversion. The summary of the incremental capital and the operating costs is provided in table 1.

Table 1: Profile of the rigid foam-producing enterprises

Name of Enterprise	Date Established	ODS Consumption OPD tonnes	ODS Phase out ODP tonnes	Baseline Equipment ²	Year*	ICC** US \$	IOC*** US \$
Frigs	1983	90.0	64.9	8 12 kg/min self-made LPD spray 6 12 kg/min self-made LPD spray 2 Self-made open-top premixers	1993-94 1998 1993	297,000	71,332
Jose Sola	June 1996 ¹	38.7	34.9	2 15 kg/min self-made LPD	1994	77,000	73,369
Megaflex		41.5	41.5	15 kg/min Transtecnica	1986	79200	126368
Plastiron	1985	2.4	32.4	None (hand mix)	--	33,407	98,658
Refri-Leste	1981	30.0	27.0	None (hand mix)	--	77,000	59,840
Rytpak	1991	27.0	27.0	3 7 kg/min Olin pressure transfer dispensers (PTD) 1 7 kg/min self-made PTD	1991 1991	132,000	82,215
Ser Therm	1974	72.0	571.0	7 kg/min Transtecnica LPD spray-pour 3 self-made 12 kg/min LPD spray/pour Viking LPD Self-made premixer	1993 1993 (2) 1994 (1) 30+ years 1993	222,200	137,591
Termobras	1975	77.0	60.9	2 self-made LPD spray None (for boxfoam operation)	1992	138,875	155,715

*Year – year of purchase and/or installation of equipment

**ICC – incremental capital cost including 10% contingency

***IOC – incremental operating cost

¹ Jose Sola took over the foam production of an already existing Brazilian Company.

² LPD – Low pressure dispenser

PTD – pressure transfer dispenser

Justification for the use of HCFC-141b

12. Justification for the use of HCFC-141b, including projected “techno-economic” impact of zero ODP technology and estimated cost of future conversion to zero ODP technology as well as the Government’s letter of agreement provided in line with Decision 27/13 for the enterprises converting to HCFC-141b have been provided in each project document by UNDP. It is stated that the enterprises were briefed in detail on issues associated with the use of HCFC in Multilateral Fund projects prior to the preparation of the projects, and this informed their choice of technology.

13. Since the texts of the justification are similar in all the projects submitted by UNDP, a sample of the justification together with a copy of the Government letter are attached as annexes to this evaluation.

Impact of the projects

14. When all the projects are implemented, 385.2 ODP tonnes will be phased out. This represents 3.3% of Brazil's 1999 consumption of Annex A Group I substances. There will be residual ODS consumption of 63.9 ODP tonnes due to the conversion to HCFC-141b.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

1. The Fund Secretariat and UNDP discussed various issues relating to the projects, where necessary, including replacement or retrofit of foam equipment and related costs, cost-effectiveness etc. The eligible grants of all the projects have been agreed except that of Frigs. Where necessary, the project documents have been revised to reflect the agreed changes.

2. Frigs produces foam of density 42kg/ m³ which is already higher than the density range for HCFC-141b foam in the relevant application as specified in the recommendations of the technical study on foam density adopted in Decision 31/44, to be used in the calculation of incremental operational costs. On this basis, the density increase in the calculation of incremental operational cost of the project is not eligible for funding.

3. Based on the data provided in the project document, the Secretariat has recalculated the eligible incremental operational cost taking out the cost associated with the density increase, as well as the eligible grant as follows:

- (a) Total incremental operational cost: US\$ 71,332
- (b) Incremental operational cost due to increase in density of foam: US\$29,764
- (c) Eligible incremental operational cost (a) - (b): US\$41,568
- (d) Incremental capital cost (including contingency) : US\$ 297,000
- (e) Eligible project cost (c) + (d): US\$ 335,568

4. The Secretariat has recommends the amount of US\$ 338,568 as the eligible grant of the Frigs project and has included it in the list of Brazil projects recommended for blanket approval.

RECOMMENDATIONS

1. The Fund Secretariat recommends blanket approval of the Frigs, Megaflex, Poliumetka, Thermo-flex, Jose Sola, Plastiron, Refri-Leste, Rytpak, Ser Therm and Termobras projects with the levels of funding and associated support costs as indicated in the table below.

	Project Title	Project Funding (US\$)	Support Cost (US\$)	Implementing Agency
(a)	Phaseout of CFC-11 by conversion to water-based technology in the manufacture of integral skin foams (shoesoles) at Megaflex	211,068	27,439	UNDP
(b)	Phaseout of CFC-11 by conversion to water-blown technology in the manufacture of rigid integral skin foam and to HCFC-141b for rigid polyurethane foam at Poliumetka	136,183	17,704	UNDP
(c)	Conversion from CFC-12 to isobutane technology in the manufacture of extruded polyethylene foam at Thermo-flex	123,300	16,029	UNDP
(d)	Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at Frigs	335,568	43,624	UNDP
(e)	Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at Jose Sola	150,369	19,548	UNDP
(f)	Phaseout of CFC-11 by conversion to water-blown technology in the manufacture of rigid foam at Plastiron	131,768	17,130	UNDP
(g)	Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at Refri-Leste	136,840	17,789	UNDP
(h)	Phaseout of CFC-11 by conversion to water-blown technology in the manufacture of rigid foam at Rytpak	211,410	27,483	UNDP
(i)	Conversion from CFC-11 to HCFC-141b and water technology in the manufacture of rigid polyurethane foam at Ser Therm	377,391	49,061	UNDP
(j)	Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at Termobras	327,315	42,551	UNDP

Annex

Additional Justification for Using HCFC-141b Technology

The UNDP technical expert appraised the enterprise in July 2000, prior to the preparation of this project document, and had discussions with the company's representatives about the choice of technology for replacing the existing CFC-based technology. The enterprise was briefed in detail about the following:

- (a) An overview of the available interim (low ODP) and permanent (zero ODP) replacement technologies.
- (b) The "techno-economic impact" of each technology on the products manufactured, and the processes and practices employed.
- (c) Possible implications of each technology, in terms of its known impact on environment, health and safety, such as ozone depleting potential, global warming potential, occupational health, etc.
- (d) It was emphasized to these enterprises that HCFC technologies are interim technologies due to their residual ODP and therefore may continue to adversely affect the environment, although at a lower rate than CFCs.
- (e) It was further explained that HCFCs may become controlled substances under present or future international conventions and will therefore also need to be phased out at a future date, and any investments required for their phase-out and for conversion to a permanent technology will have to be borne by the enterprises themselves.

The main conclusions reached by the enterprise through discussions with the UNDP technical expert were:

- 1. HCFC-141b will maintain the insulation properties required by the enterprise's customers.
- 2. Water based formulations do not provide sufficient insulation properties for the application. Use of water based formulations could require an increase in foam thickness at higher densities (significant cost increases to the enterprise).
- 3. Hydrocarbon technology was seen as not a feasible option due to the fact that hydrocarbon technology is not recommended for field applications based on the lack of control of the operational conditions (presence of ignition sources, etc).

In view of the above, the technology selected is HCFC-141b based systems in the interim, until permanent technology (either water based or HFC-based systems) is available and can provide the required physical properties.

Estimated Cost of Future Conversion to Zero-ODP Technology

At the present time, there are no zero-ODP technology options, which can be applied cost-effectively for this project (refer to Annex 7).

The following possibilities exist for a future conversion to zero-ODP technology, based on information available presently:

- Water based systems
- HFC based systems

The equipment installed under this option would allow future conversion with no additional capital investments. Other future costs are expected to be in the area of incremental operating costs, related to higher isocyanate usage (in the case of water based) or higher costs of the HFCs.

Before: 64.8 t HCFC-141b	@ US\$ 3.00	=	194,400
After: 108 t MDI	@ US\$ 2.50	=	270,000
IOC/y		=	75,600

It is unknown what the price would be of the HFCs in the future; therefore, IOCs related to a potential conversion to HFC technology are not quantifiable at this point.

FAX**MINISTRY OF ENVIRONMENT
BRAZIL**

TO: Mr. Frank J. Pinto – Principal Technical Advisor and Chief Montreal Protocol Unit
Organization: UNDP
FAX Number 001 212 906 6947 **DATE:** 05/10/2000
FROM: Mr. Fernando Vasconcelos de Araújo
Brazilian Ozone Unit
PHONE: 55-61-317-1225 **FAX:** 55-61-226 8050
N° of PAGES: 01
(including this one)

MESSAGE

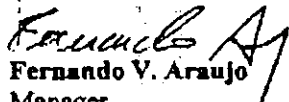
Dear Mr. Pinto,

In reference to the project submissions to the 32nd ExCom Meeting, I authorize you to submit for approval the investment projects of the following enterprises: FRIGS, TRANSEN, TERMOBRAS, JUNTA FACIL, JOSE SOLA, SER THERM, MEGAFLEX, PLASTIRON, POLIUMETKA, RÉFRI-LESTE, RYT PAK, and THERMO-FLEX.

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

1. Verifies that it has reviewed the specific situation involved at the enterprise presented above as well as its commitments under the Article 2F;
2. States that, based on prevailing circumstances at the said enterprises, at present time the conversion of these enterprises requires the use of HCFC-141b for the interim period as stipulated in the Montreal Protocol;
3. Confirms that the Government and the recipient enterprises understood that no funding would be available from Multilateral Fund for the conversion from HCFCs for the said enterprises whenever such conversion to other alternatives will be required.

Best regards,


Fernando V. Araújo
Manager
Brazilian Ozone Unit
Ministry of Environment



**United Nations
Environment
Programme**

Distr.
Limited

UNEP/OzL.Pro/ExCom/32/30/Burkina Faso
9 November 2000

ORIGINAL: ENGLISH

EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Thirty-second Meeting
Ouagadougou, 6-8 December 2000

PROJECT PROPOSAL: BURKINA FASO

This document consist of the comments and recommendations of the Fund Secretariat on the following project proposal:

Refrigeration:

- Implementation of the RMP: incentive programme for the commercial and industrial refrigeration end-user sector

UNDP

PROJECT EVALUATION SHEET BURKINA FASO

SECTOR: Refrigeration ODS use in sector (1999): 37.1 ODP tonnes

Sub-sector cost-effectiveness thresholds: n/a

Project Titles:

- (a) Implementation of the RMP: incentive programme for the commercial and industrial refrigeration end-user sector

Project Data	RMP	
Enterprise consumption (ODP tonnes)		
Project impact (ODP tonnes)		3.00
Project duration (months)		72
Initial amount requested (US \$)		132,250
Final project cost (US \$):		
Incremental capital cost (a)		132,250
Contingency cost (b)		
Incremental operating cost (c)		
Total project cost (a+b+c)		132,250
Local ownership (%)		100%
Export component (%)		0%
Amount requested (US \$)		132,250
Cost effectiveness (US \$/kg.)		44.08
Counterpart funding confirmed?		
National coordinating agency	Ministere de l'Environnement et de l'Eau	
Implementing agency	UNDP	

<i>Secretariat's Recommendations</i>	
Amount recommended (US \$)	
Project impact (ODP tonnes)	
Cost effectiveness (US \$/kg)	
Implementing agency support cost (US \$)	
Total cost to Multilateral Fund (US \$)	

PROJECT DESCRIPTION

(a) Implementation of the RMP: incentive programme for the commercial and industrial refrigeration end-user sector

1. The Burkina Faso RMP project was approved by the Executive Committee at the 29th Meeting as bilateral co-operation by the Government of Canada (UNEP/OzL/Pro/29/19).

2. The RMP reported that the annual consumption of CFCs in the domestic refrigeration subsector is estimated at 22 tonnes. About 99 per cent of the imports is made by over 200 small traders who travel overland to Nigeria and smuggle refrigerant into the country.

3. Legislation has been enacted whereby the imports of ODS and products using and containing ODS is now strictly controlled. A customs coding method based on the Brussels system has been adopted which allows this range of products to be separately identified and recorded. A decree was issued in March 1997 whereby prior approval from the Ozone Office is required for the import of CFC and CFC-based equipment. It is intended to use this to prevent the imports of second-hand refrigerators and MACs from 1999 onwards. The import of these will be affected by further legislation.

4. Insufficient training in good practices for the majority of the refrigeration technicians is the major cause for inadequate and inappropriate maintenance of refrigeration equipment and thus the high consumption of CFCs. To address this issue, the RMP included a training programme for refrigeration service technicians.

5. A recent survey of cold stores was conducted in Burkina Faso with assistance from the Institut de Génie Thermique of Switzerland. In total, 24 cold stores were surveyed. According to the survey, it was found that:

- (a) while some installations are well maintained, and conversion to zero-/low-ODP refrigerants would require minor changes, other installations would need to be completely re-built or replaced;
- (b) retrofit of newer facilities (installed after 1995) to zero/low-ODP refrigerants will be relatively easy to perform, since they were designed for either CFC or HFC refrigerants;
- (c) in general, the design and electrical installations of the facilities preclude simple retrofit to a flammable hydrocarbon refrigerant (which would involve major equipment re-design, and upgrading of the electrical installation).

6. Based on the results of the survey, the Government of Burkina Faso has submitted a project to be implemented over a period of 5 years for establishing an incentive programme to encourage refrigeration end-users to replace, or permanently retrofit their existing ODS based equipment (fisheries, meat-processing plants, breweries, hospitals, hotels, restaurants,

supermarkets), to zero/low-ODP refrigerants (the total ODS consumption in this sub-sector is 14 ODP tonnes). During the period 2001-2006, any end-user (established prior to 25 July 1995) can apply to receive an incentive payment towards the cost of replacement/retrofit of their CFC-based equipment. Incentive payments (between US \$500 and US \$15,000) will be based on CFC consumption when equipment is replaced, or the cost for a permanent retrofit.

7. The project also includes a component for information dissemination and monitoring (advertisements in newspapers, information brochures for end-users and relevant industry associations, and workshops and annual meetings to report on progress of the programme).

8. The project cost is US \$132,250, equivalent to the total additional funding that could be made available to Burkina Faso for implementation of its RMP (decision 31/48).

9. Following completion of the conversion, the end-user enterprise must provide invoices to confirm the total costs incurred during the conversion.. The level of payment will be reviewed by the Ozone Office and UNDP (40 per cent of the incentive amount will be paid upon receipt of an application and the balance after conversion has been completed and a certification that the replaced equipment has been destroyed/rendered unusable has been issued).

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

1. The Government of Burkina Faso submitted the project proposal with an official letter of transmittal stating its commitment and financial implications associated with decision 31/48. The Government considers that the proposed incentive programme is an important step to assist the country in the refrigeration sector.

2. The Secretariat pointed out to UNDP that it has not been clearly demonstrated how the proposed incentive programme will assist Burkina Faso to reduce its CFC consumption from 37.1 tonnes in 1999 to 18.1 tonnes by 2005. If the project is successfully implemented, only 3 tonnes of CFCs will be phased out (as reported in the project cover sheet). UNDP informed the Secretariat that the project aims, through the innovative mechanism, to apply the limited funding available (less than US \$150,000) as widely as possible amongst end-users in the commercial and industrial refrigeration sector. UNDP also felt that most requests for an incentive would come from end-users who must change their refrigeration system (i.e., age, innovation of business), and would be willing to select a non-CFC technology. Even if the number of end-users coming forward for an incentive is low at the beginning (i.e., during the first one or two years), it will increase as CFC prices continue to evolve. The incentive programme must start now so that the direct impact of at least 3 tonnes/year can be achieved in 2003-2004.

3. The Secretariat also raised issues related to the high leakage rate of installed commercial refrigeration equipment surveyed (from 10 per cent to over 400 per cent); and the low price of CFC-12 (US \$6.50/kg) as compared to the price of HFC-134a (US \$12.10/kg). UNDP informed the Secretariat that the annual CFC used by the surveyed enterprises is a realistic figure; not all

of the consumption is for topping-up the systems due to leaks. Whilst there may be potential to reduce this by improvements in servicing techniques this is no more certain than the potential to reduce overall consumption by the proposed incentive programme. In Burkina Faso, the price of CFC-12 is already US \$6.7/kg, which can be considered as relatively high for the region (the current HFC-134a/CFC-12 price ratio is 1.86:1). The price of R-502 is also very high (US \$40.40).

4. UNDP considered that all requirements under decisions 28/44 and 31/48 have been met. Regarding the issue of utilizing all the funds available without meeting the phase-out objectives of the RMP, UNDP is convinced that neither service technician training nor recovery and recycling projects will give any better guarantee. The incentive programme has the potential to start the process of elimination by conversion. Remaining consumption will be decreased through legislative measures, quota systems and market forces.

RECOMMENDATIONS

1. The Executive Committee may wish to consider the project proposal in light of the above comments and observations, and specifically in the context of paragraph (a) of Section A of decision 31/48.



**United Nations
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Distr.
Limited

UNEP/OzL.Pro/ExCom/32/30/Chile
9 November 2000

ORIGINAL: ENGLISH

EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Thirty-second Meeting
Ouagadougou, 6-8 December 2000

PROJECT PROPOSAL: CHILE

This document consist of the comments and recommendations of the Fund Secretariat on the following project proposal:

Fumigant:

- Demonstration and phase-out project for methyl bromide soil fumigation for fruit tree production and replant

UNDP

PROJECT EVALUATION SHEET CHILE

SECTOR: Fumigant ODS use in sector (1998): 204 ODP tonnes
76.2 ODP in replants and nurseries

Sub-sector cost-effectiveness thresholds: n/a

Project Titles:

(a) Demonstration and phase-out project for methyl bromide soil fumigation for fruit tree production and replant

Project Data	Methyl bromide	
Enterprise consumption (ODP tonnes)		76.20
Project impact (ODP tonnes)		76.20
Project duration (months)		66
Initial amount requested (US \$)		1,251,747
Final project cost (US \$):		
Incremental capital cost (a)		1,137,952
Contingency cost (b)		113,795
Incremental operating cost (c)		
Total project cost (a+b+c)		1,251,747
Local ownership (%)		100%
Export component (%)		5%
Amount requested (US \$)		0
Cost effectiveness (US \$/kg.)		
Counterpart funding confirmed?		
National coordinating agency	CONAMA	
Implementing agency	UNDP	

<i>Secretariat's Recommendations</i>	
Amount recommended (US \$)	
Project impact (ODP tonnes)	
Cost effectiveness (US \$/kg)	
Implementing agency support cost (US \$)	
Total cost to Multilateral Fund (US \$)	

PROJECT DESCRIPTION

Background

1. The Government of Chile is submitting a project to phase out 76.2 ODP tonnes of methyl bromide (MB) mainly used for replanting fruit trees and vines, and to a lesser extent for tree nurseries.
2. Chile produces a wide variety of tree fruit (plums, peaches, nectarines, apricots, cherries, citrus, kiwifruit, apples, pears, table grapes, avocados, olives, walnuts, almonds). The total surface area planted with fruit trees and nurseries, where MB use is important, is 108,731 ha and 1,127 ha, respectively. The fruit industry is the third largest economic sector in the country.
3. Many of the products are exported (fresh or processed) mainly to Japan, European countries and the United States; however, most growers sell their fruit to other companies who supply and export fresh or processed products (about 5 per cent of growers export fruit themselves). Plants from tree nurseries (mainly grape vines and walnut trees) are exported only to Article 5 countries (almost all farms and nurseries in the sector are owned by local enterprises). Growers' associations are separate institutions from the exporters' associations and have different economic and technical interests.

Consumption of MB

4. The MB baseline for compliance calculated by the Ozone Secretariat is 212.5 ODP tonnes. Between 1990 and 1998 MB imports increased by an average of 15 ODP tonnes per year; in the last four years, however, the rate increased to 36.6 ODP tonnes per year. In 1998, 298 ODP tonnes of MB were imported (as reported to the ozone Secretariat), almost 160 ODP tonnes more than the previous year. Of this amount, 76.2 ODP tonnes is used for tree replanting and production of small trees (mainly peaches, plums, citrus, avocado and vines for table grapes) and in nurseries.
5. MB is used only at the time a tree/vine is replanted. A typical MB application rate for replant is 400 kg/ha, which equates to an annual area of 245 ha. Trees have crop cycles of about 10 to 30 years, and therefore, the total area treated with MB for replant is 2,450 ha in any 10 year period (calculated as the factor of the replant area treated with MB in one year (245 ha) by the frequency of replant applications (conservatively 10 years)). There are also 145 ha of nurseries treated with MB of which about 72.5 ha are treated with MB annually. Most nurseries use MB every two years, therefore about 145 ha of nurseries rely on MB at present.
6. There are at about 4,400 farmers who use MB for tree/vine replants and 725 individual nurseries.

Alternatives selected

7. The project will be implemented in two phases. In Phase I, alternative technologies to MB will be adapted and their technical and economic feasibility in key agricultural regions will be assessed during two agricultural seasons. Conditional on identifying effective and economically viable alternatives for this sector, Phase II will develop training and extension programmes to ensure that the alternative technologies are adopted by MB users. Phase II will proceed only if effective and economically viable alternatives are identified; however, Phase I has been designed to ensure successful adaptation of viable alternative technologies.

8. The following alternatives are proposed to be tested in the field: chemical controls; integrated pest management (IPM) system and cultural practices; solarization in combination with IPM system (in selected regions); and substrates and steam in nurseries.

Implementation modalities

9. The project proposes, as the first activity, to hold workshops (one in each demonstration region) to assist in the design of the project and establish stakeholders' consultative groups for growers to be informed and consulted with during project implementation. This activity will help to ensure that the project continues to be supported by stakeholders (growers, growers' associations, investigators, extension agents).

10. The project also includes an overseas trip for three national experts to visit MB alternatives at farms and institutes, and to learn about the relevant techniques from researchers, extension personnel and farmers.

11. Using the results from Phase I, the project proposes a 'train the trainers' programme for extension staff, technicians and farmers; and training programmes for farmers on how to use the best alternatives. It will include field days (key stakeholders will be brought to demonstration sites to see alternative results in each region); and preparation of brochures, technical manuals and a video.

12. The training programme will commence as soon as viable alternative technologies to MB are identified by the trials. A detailed training package will be prepared, including technical manuals and teaching material. One 10-day training workshop will train 17 leading trainers in practical and theoretical aspects of alternatives to MB and effective training methods. In addition, 40 extension personnel and technicians (who can act as leading extension and diffusion agents) will be trained in similar workshops.

13. Subsequently, the leading trainers will train 1,000 technicians, extension personnel and farmers, to be selected on the basis that they are able to extend the alternatives effectively to others in the sector (farmers will be selected on the basis of respect by other farmers who tend to copy their production methods, and willingness to allow other farmers to visit their farms to see alternatives and related extension activities). Leading trainers will hold one-day meetings for 10 people on farms, and will make 5 follow-up visits to trainees during the active season. The project will provide funds for the leading trainers, transportation and related costs.

Policy measures

14. With assistance from the consultative groups, the project also proposes to hold several workshops to enable stakeholders to discuss and develop a package of measures and an action plan that will assist MB phase-out in a practical manner in all the regions, as well as activities to prevent the reintroduction of MB. These discussions will lead to the production of a policy package and action plans for the sector in the third year.

15. The national agency responsible for the implementation of the project is the Agricultural Research Institute (INIA). They will provide facilities (including cultivation fields which can be used for some trials) and technical personnel to carry out laboratory analyses and other activities. The Agricultural Development Institute (INDAP) will also participate in activities related to technology transfer, distribution of information, training and technical assistance. The Ozone Unit will be in charge of co-ordinating and monitoring all the activities related to the Montreal Protocol.

Project cost

16. The total project cost has been estimated at US \$1,251,747 with the following distribution: US \$708,080 for personnel; US \$23,060 for laboratory analysis; US \$137,479 for equipment and materials; US \$82,160 for events and workshops; US \$187,173 travel costs; and US \$113,795 as contingency. Incremental operating costs/savings have not been claimed. The cost effectiveness of the project is US \$16.42/kg.

17. The estimated time for the implementation of the project is 5.5 years.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

Consumption of MB

1. The Secretariat was informed by UNDP that the significant increase in MB consumption between 1997 and 1998 was due partly to increased demand in specific agricultural sectors, such as replanting trees/vines. A Chilean expert panel which evaluated MB consumption figures for 1998 believed that some of the additional imports were carry-over stocks.

Implementation modalities

2. The Secretariat pointed out that the project appears to be more of a demonstration project than an investment project; the second phase being conditional on identifying viable alternative technologies to MB.

3. UNDP informed the Secretariat that the project is a phase-out (investment) project with a small demonstration component. Demonstration trials are absolutely essential in the case of replant and propagation (nursery) materials, because alternatives have to be adapted and tested in order to identify technically and economically viable alternatives for Chile's pests and conditions. To gain the farmers' full support it was necessary to state in the project proposal that the extension/training phase can only proceed if viable alternatives are identified. Experts who were consulted are confident that alternatives will be adaptable to local conditions.

Incremental costs

4. The Secretariat pointed out that detailed specification for equipment and material requested (US \$137,479) and a breakdown of the request for laboratory analysis (US \$23,060) was not provided in the project proposal; some of the items requested (video production, data loggers, training packs) are not justifiable. Subsequently, UNDP provided specification of equipment and laboratory analysis and informed the Secretariat that training packs (materials for the training courses) are essential; the proposed video will be a cost-effective part of the technology transfer; and data loggers are necessary for the adaptive trials.

5. The Secretariat considers that some of the costs associated with the training programme and extension services (US \$708,080 for personnel, US \$82,160 for workshops and US \$187,173 for travel) are not incremental, and others are high. UNDP indicated that the training and extension programmes are essential for implementing alternatives at farm level and therefore phasing-out MB. Most of the cost of the technology transfer lies in personnel (essential for technology adaptation, training, extension), workshops/events (necessary for training and field days) and travel (necessary for technology adaptation, training and extension). The travel costs are justified and necessary in a country with Chile's geography (the country spans half the length of South America, and MB is used in 10 of the 13 Regions of Chile). Travel costs are subsidised by INIA.

6. The Secretariat also discussed with UNDP inclusion of operating costs/savings in the calculation of the total project costs. UNDP indicated that when calculating the project budget, estimates on incremental operating costs/savings were made. UNDP could not use actual costs on alternatives because there have not been demonstrations for this sector in Chile; therefore UNDP estimated costs based on the technologies that are most likely to be successful for this sector. The resulting operating costs have not been claimed.

Policy measures

7. UNDP informed the Secretariat that an action plan and policy package to ensure that MB will be phased out permanently in this sector will be prepared during project implementation. In submitting this project the Government of Chile is committed to phasing out MB in soil fumigation in the fruit tree and tree nursery sectors. The transmittal letter from the Government stresses the importance of this project and notes that it will lead to the phase-out of 34 per cent of the baseline MB consumption.

RECOMMENDATION

1. The Fund Secretariat and UNDP are still discussing cost issues. The results of the discussion will be conveyed to the Executive Committee.



**United Nations
Environment
Programme**

Distr.
Limited

UNEP/OzL.Pro/ExCom/32/30/China
15 September 2000

ORIGINAL: ENGLISH

EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Thirty-second Meeting
Ouagadougou, 6-8 December 2000

PROJECT PROPOSALS: CHINA

This document consist of the comments and recommendations of the Fund Secretariat on the following project proposals:

Foam:

- | | |
|---|------------|
| • Conversion of PU slabstock manufacture from CFC-11 to liquid carbon dioxide technology at eight enterprises in Henan Province | World Bank |
| • Conversion of PU slabstock manufacture from CFC-11 to liquid carbon dioxide technology at eleven enterprises in Chengdu | World Bank |
| • Replacement of CFC-11 with HCFC-141b in manufacturing of PU rigid spray foam for insulation at 26 enterprises | UNIDO |

Halon:

- | | |
|--|------------|
| • 2001 Annual Programme - Halon Sector | World Bank |
|--|------------|

Production:

- | | |
|---|------------|
| • 2001 annual program - CFC production sector | World Bank |
|---|------------|

Refrigeration:

- | | | |
|---|--|-------|
| • | Phaseout of CFC-11 by conversion to cyclopentane technology and CFC-12 by conversion to isobutane (600a) technology in the manufacture of domestic freezers at Qingdao Haier No. 2 Freezer Plant | UNDP |
| • | Replacement of CFC-11 and CFC-12 with cyclopentane and isobutane in the production of refrigerators at Little Swan Electric (Jingzhou) Co. Ltd. | UNIDO |

Solvent:

- | | | |
|---|---|------|
| • | Interim report and request for second payment on the implementation of the 2000-2001 annual programme under the China Solvent Sector Plan | UNDP |
|---|---|------|

PROJECT EVALUATION SHEET CHINA

SECTOR: Foam ODS use in sector (1999): 23,145 ODP tonnes

Sub-sector cost-effectiveness thresholds: Flexible slabstock US \$6.23/kg
Rigid US \$7.83/kg

Project Titles:

- (a) Conversion of PU slabstock manufacture from CFC-11 to liquid carbon dioxide technology at eleven enterprises in Chengdu
- (b) Conversion of PU slabstock manufacture from CFC-11 to liquid carbon dioxide technology at eight enterprises in Henan Province
- (c) Replacement of CFC-11 with HCFC-141b in manufacturing of PU rigid spray foam for insulation at 26 enterprises

Project Data	Flexible slabstock	Flexible slabstock	Rigid
	Chengdu 11 enterpris	Henan 8 enterprises	26 enterprises
Enterprise consumption (ODP tonnes)	890.00	636.70	978.80
Project impact (ODP tonnes)	890.00	636.70	891.40
Project duration (months)	48	48	30
Initial amount requested (US \$)	4,990,000	3,966,330	6,979,859
Final project cost (US \$):			
Incremental capital cost (a)	6,050,000	4,400,000	2,996,000
Contingency cost (b)	550,000	400,000	299,600
Incremental operating cost (c)	-964,740	-430,226	5,681,498
Total project cost (a+b+c)	5,635,260	4,369,774	8,977,098
Local ownership (%)	100%	100%	100%
Export component (%)	0%	0%	0%
Amount requested (US \$)	4,990,000	3,929,874	6,956,762
Cost effectiveness (US \$/kg.)	5.61	6.23	7.80
Counterpart funding confirmed?	Yes	Yes	Yes
National coordinating agency			SEPA
Implementing agency	IBRD	IBRD	UNDP

Secretariat's Recommendations			
Amount recommended (US \$)			
Project impact (ODP tonnes)			
Cost effectiveness (US \$/kg)			
Implementing agency support cost (US \$)			
Total cost to Multilateral Fund (US \$)			

PROJECT DESCRIPTION

Sector Background

- Latest available total ODS consumption (1999)	159,452.90	ODP tonnes
- Baseline consumption (average 1995-1997) of Annex A Group I substances (CFCs)	57,818.70	ODP tonnes
- Consumption of Annex A Group I substances for the year 1999	42,983.40	ODP tonnes
- Baseline consumption of CFCs in foam sector	Not available	ODP tonnes
- Consumption of CFCs in foam sector in 1999 ¹	23,145	ODP tonnes
- Funds approved for investment projects in foam sector as of end of 1999	US \$74,695,424.00	
- Quantity of CFC to be phased out in foam sector as of end of 1999	6,946.10	ODP tonnes
- Quantity of CFCs phased out in investment projects in the foam sector as of end of 1999	4,413.59	ODP tonnes
- Funds approved for investment projects in the foam sector in the year 2000	US \$2,559,851	
- Quantity of CFC to be phased out in foam projects approved in the year 2000	328.50	ODP tonnes

¹ 1999 foam sector consumption data based on information from the project documents.

1. Three umbrella projects, two in the flexible slabstock (19 enterprises) and one in the rigid foam (26 enterprises) sub-sectors are being submitted to the 32nd Meeting. The three umbrella projects are expected to phase out 2,418 ODP tonnes within a period of 30 months and four years for the rigid foam and flexible slabstock foam projects, respectively. The flexible slabstock foam projects are submitted by the World Bank while the rigid foam is from UNIDO. Both UNIDO and the World Bank indicated that the consumption of the foam sector which is the largest in China was 23,145 tonnes of CFC in 1999, of which 19,164 tonnes was CFC-11 and 3,981 tonnes was CFC-12. They also stated that there are currently 67 ongoing projects for the phase out of 5,414 tonnes CFC-11. When the three projects and the projects being submitted to the 32nd Meeting are completed the 1999 consumption will be reduced from 19,164 tonnes to 11,332 tonnes.

2. Resources (US \$300,000) were approved for the World Bank at the 30th Meeting to prepare a foam sector strategy which was to be completed by December 2000. The World Bank in a status report has indicated that due to difficulties in data collection the strategy will be completed by March 2001 and submitted to the 34th Meeting in July 2001. The World Bank also indicated that prior to submission of the foam sector plan to the 34th Meeting China is submitting the two flexible PU and one rigid PU umbrella projects as pilot projects for the sector plan through which it hopes to gain experience for implementation of umbrella projects under the sector plan. The three umbrella projects will be accounted for in the foam sector plan when approved, and will be managed under the 2001 annual programme.

3. The scope of the rigid foam sub-sector will be ascertained only after completion of ongoing in-depth survey of the sub-sector. The flexible slabstock foam enterprises that still remain to be converted are estimated to be about 106 operating 131 production lines, with about 40% of the enterprises consuming over 50 tonnes per year of CFC-11 each while 30% consume 40-50 tonnes per year. All the enterprises consuming over 40 tonnes CFC per year (about 74 enterprises) are expected to request funding for LCD technology.

Flexible Slabstock Foam

- (a) Conversion of PU slabstock manufacture from CFC-11 to liquid carbon dioxide technology at eleven enterprises in Chengdu**
- (b) Conversion of PU slabstock manufacture from CFC-11 to liquid carbon dioxide technology at eight enterprises in Henan Province**

Chengdu umbrella project and Henan Province umbrella project

4. Two umbrella projects for 19 enterprises producing flexible slabstock polyurethane foam in Chengdu (in Sichuan Province) and Henan Province have been submitted for China by the World Bank. The total CFC-11 consumption of the two projects is 1,527 ODP tonnes. The Chengdu umbrella project includes 11 enterprises with a total CFC-11 consumption of 890 ODP tonnes while the Henan project includes 8 enterprises with CFC-11 consumption of 637 ODP tonnes. The CFC-11 consumption of the individual enterprises in the Chengdu project ranges from 76-86 tonnes with average of 80.9 tonnes, while in the Henan project it is 65-87 tonnes with an average of 79.6 tonnes. All the enterprises except two operate Maxfoam units with outputs between 120 and 320 kg/min. The remaining two Yanshi and Yiyang Juijui in the Henan group operate 120 kg/min Vertifoam machines. The annual foam production of the enterprises range from 800 to 1,960 tonnes.

5. All the enterprises will phase out 100% of the CFC consumption through the use of LCD technology. The total project cost was calculated based on calculation of the cost of each individual production line. Each project includes the cost of replacement of the CFC storage, metering and mixing systems with LCD system at a total cost of US \$550,000. This includes LCD system (US \$360,000), high pressure pump system (US \$60,000), bulk storage tank refrigeration system (US \$45,000), trials (US \$15,000) and technical assistance (US \$10,000). Each project also includes technology license fee of US \$50,000. The total incremental operating savings of the Chengdu and Henan projects are US \$964,740 and US \$430,226 respectively. The operational savings of the individual enterprises as well as their other characteristics are provided in Tables 1 and 2.

Implementation of the projects

6. The Government of China and the World Bank propose to use the two umbrella projects as pilot projects for the phase out of CFC in the remaining flexible slabstock foam producing enterprises. A merger of the 11 enterprises in the Chengdu umbrella project into one group company with industrial restructuring is foreseen. Similarly, the eight enterprises in the Henan

umbrella project are considering merging into one group company and conduct industrial restructuring as well. Both the Government and the enterprises believe that industrial restructuring could be a better phase out instrument. Consequently, the World Bank's project monitoring milestones indicate that prior to signing grant agreements with enterprises in the two groups, establishment of the group companies will be carried out as indicated below:

Chengdu Group Company

Establishment of Chengdu Group Company	May 2001
Grant agreement submitted to beneficiary	July 2001
Grant agreement signature	October 2001

Henan Group Company

Establishment of Henan Group Company	December 2001
Grant agreement submitted to beneficiary	April 2002
Grant agreement signature	May 2002

7. The World Bank states that as the enterprises will have to finance 24% and 17% of the total capital cost of the Chengdu and Henan projects, respectively, China requests maximum flexibility in implementing the umbrella projects in the most efficient way to ensure that the phase out target (in terms of ODP) are met, all baseline ODS equipment listed in the project summary are rendered unusable or destroyed and not transferred to other foam plants, and CFC foam will no longer be produced at project completion. This flexibility will allow the Chengdu and Henan enterprises to conduct industrial re-structuring which both the Government and the enterprises believe could be a better phase out instrument.

8. The two umbrella projects are scheduled for completion in December 2004 although commissioning and trials are expected to be completed in October 2003 and September 2003 at Chengdu and Henan respectively.

Rigid Foam

(c) Replacement of CFC-11 with HCFC-141b in manufacturing of PU rigid spray foam for insulation at 26 enterprises

26 enterprises (umbrella project)

9. The 26 enterprises in the umbrella project consumed a total of 978.8 ODP tonnes (average 1996-1996). The project will phase out 891.1 ODP tonnes. The factories included in the project were preselected by SEPA through an ongoing inventory of the sub-sector. They produce rigid polyurethane foam for various applications mainly spray insulation foam, sandwich panels and pre-formed pipe sections. The enterprises use predominantly locally made low pressure spray or pouring foam machines. A total of 111 machines are used by the 26 enterprises including 61 sprayfoam machines of 4-13 kg/min capacity and 50 pouring machines of 10-150 kg/min capacity. 26 of the 111 machines used by the enterprises were installed between February and 15 July 1995 and the rest between 1990 and 1994.

10. All the enterprises will convert to the use of HCFC-141b. The main item of the incremental capital costs of the projects is the cost of replacement of 61 locally made low pressure sprayfoam and low output pouring machines with high pressure sprayfoam machines at the cost of US \$18,000 each, replacement of the high output low pressure machines at US \$80,000-US \$85,000 each and replacement of one open-top batch premixer at US \$20,000. Other capital costs include retrofit cost of two Chinese-made high pressure machines at US \$8,000 and US \$10,000 and retrofit of two Glascraft sprayfoam dispensers at US \$7,500, trial costs of US \$2,000-US \$10,000 per enterprise depending on the number of equipment and product lines, technology transfer and training of US \$5,000-US \$8,000 per enterprise.

11. UNIDO also stated that the umbrella project when approved, will be used as a pilot project for the implementation of future projects in the rigid foam sub-sector. The profile of the enterprises in the umbrella project is provided in Table 3.

Justification for the use of HCFC-141b

12. UNIDO indicated that its technical experts visited the enterprises prior to preparation of the project documents in June/July 2000 and had discussions with them about the choice of technology for replacing CFC-based technology. The enterprises were briefed in detail about the available technological options. On the basis of the briefings HCFC-141b was chosen as interim technology until new developments in water-based or HFC-based technologies allow the use of zero ODP technology. A summary of the briefings entitled "Technology Selection Statement" is attached as an annex to this evaluation, together with the letter of the Government endorsing the use of HCFC-141b by the enterprises.

Impact of the projects

13. A total of 2,418.1 ODP tonnes will be phased out when the projects are completed. This will phase out 4.4% of its 1998 consumption of Annex A Group I substances or 10.4% of its 1999 foam sector consumption of these substances. There will be residual consumption of 87.4 ODP tonnes.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

Flexible slabstock

1. The Fund Secretariat discussed various aspects of the projects with the World Bank bearing in mind China's intention to use the umbrella projects as pilot projects; these included the cost structure, the implementation time frame of four years, and the proposed amalgamation of the companies into two single entities, the request of the Government of China for maximum flexibility in the implementation of the projects and the licensing fees.

Implementation time frame

2. With regard to the time frame it was observed from the project monitoring milestones that the length of time of four years for completing the projects is partly due to the time it would take for the proposed mergers and restructuring of the enterprises to take place. This is about 6 months in the case of the Chengdu group and 1 ¼ years for the Henan group. This also confirms that the mergers and the restructuring indicated in the project documents will actually take place.

Amalgamation of the enterprises and restructuring of their production

3. Analysis of the production output of the individual enterprises shows that as capacity utilization of the enterprises is low (about 10-15%) there exists in every plant excess capacity which would call for industrial rationalization after the mergers of the enterprises into group companies. In the flexible slabstock foam sub-sector due to intrinsically low equipment usage relative to installed capacity industrial restructuring should result in closure of some production capacity (lines). The Secretariat therefore advised the World Bank that it might be appropriate to submit the project after the expected restructuring of the companies had been completed and the actual numbers of production lines to be converted by each group company are known. This is relevant since the capital cost of conversion for flexible slabstock foam production lines is independent of the CFC consumption or foam output and as the project costs are calculated on production line by production line basis. The World Bank responded by expressing uncertainty about the implementation of the projects, whether by industrial restructuring as described earlier or by each enterprise on its own, although the implementation concept remained unchanged in the projects. Although the World Bank indicated that existing capacity will be maintained, it is not the capacity but the number of production lines that determines the extent of the costs of the project.

Request to the Executive Committee by China for maximum flexibility in the implementation of the projects

4. The Secretariat could not recommend this request of the Government of China to the Executive Committee for the following reasons:

- (a) The cost of each umbrella project was calculated on the basis of the number of individual production lines.
- (b) Industrial rationalization which could result in reduction of production lines will take place only after the approval of the projects and their funding levels, and so the Committee may not be in a position to determine whether the approved grant represented the eligible cost of phase out.

Technology License Fees

5. The Secretariat advised the World Bank, consistent with Decision 17/4 regarding rationalization of technology transfer fee of groups of projects using similar technology, to negotiate the best possible terms for the license fee (US \$50,000 per enterprise) for the projects. The total amount of licensing fee for the two projects is US \$950,000 and will increase as projects are prepared for most of the remaining 106 enterprises. The World Bank gave assurance that this will be done. However, it added that unused funding for license fee for Henan should be returned, while only savings exceeding US \$645,260 for Chengdu should be returned. Analysis of the project costs (see table 1) shows should this may not be the case. The World Bank should be requested to report to the Executive Committee whatever agreement it reaches with the technology suppliers on the reduction of the license fee.

Project costs

6. The project costs as calculated based on the individual enterprises or production lines is consistent with the applicable rules and have been agreed as calculated.

Conclusion

7. The projects are being submitted for individual consideration on account of the issues discussed above.

8. The Executive Committee may wish to consider requesting the Government of China to encourage the enterprises concerned to expedite the restructuring process and subsequently negotiate funding for the conversions based on the results of the industrial rationalization as well as negotiations of the license fees. This would require withdrawal of the two projects and resubmission at a later date. This approach may not affect the eventual project completion date as the industrial rationalization foreseen in the current project proposals would in itself delay the projects' implementation even if they were approved as they are.

Rigid foam

9. The Secretariat and UNIDO have agreed on the incremental capital costs. However the incremental operating costs are still under discussion, particularly with regard to the chemical prices used in their calculation. The outcomes of the discussion will be communicated to the Sub-Committee on Project Review.

Table 1: Profile of Enterprises in the Chengdu Umbrella Project (Flexible Slabstock Foam)

Enterprise	ODS Use Tonnes Av. 1997- 1999	Equipment	Date Installed	Output kg/min	Installed Capacity* Tonnes	Foam Produced Av. 97-99 Tonnes	ICC** US \$	IOC/(IOS)*** US \$	Total Cost US \$	Requested Grant US \$	Cost- effectiveness US \$/kg
Chengdu Duocai	76	Maxfoam	Apr 93	225	16,200	848	600,000	(75,593)	524,407	475,536	6.23
Huiyu Co.	86	Maxfoam	Apr 94	220	15,840	957	600,000	(100,228)	499,772	499,772	5.83
Hongyang	76	Maxfoam	Apr 95	220	15,840	835	600,000	(69,384)	530,616	471,424	6.23
Luili	80	Maxfoam	Mar 93	150	10,800	891	600,000	(84,349)	515,651	500,456	6.23
Wantjiang	82	Maxfoam	Mar 95	225	16,200	906	600,000	(95,201)	504,799	504,799	6.18
Yongsheng	84	Maxfoam	15 Jul 95	225	16,200	930	600,000	(91,781)	508,219	508,219	6.07
Yunde	89	Maxfoam	Apr 95	200	14,400	985	600,000	(108,356)	491,644	491,644	5.54
Quianjin	79	Maxfoam	Mar 95	220	15,840	876	600,000	(76,041)	523,959	492,170	6.23
Dongzikou	79	Maxfoam	Jan 94	150	10,800	878	600,000	(97,710)	502,590	494,226	6.23
Xindu	84	Maxfoam	May 95	150	10,800	936	600,000	(94,387)	505,613	505,613	6.02
Jinjiang	76	Maxfoam	May 94	220	15,840	797	600,000	(71,710)	528,290	471,424	6.23
Total	890				158,760	9837	6,600,000	(964,740)	5,635,560	5,415,283	5.61

Table 2: Profile of Enterprises in the Henan Umbrella Project (Flexible Slabstock Foam)

Enterprise	CFC Consumption Av. 1997- 1999	Equipment	Date Installed	Output kg/min	Installed Capacity* Tonnes	Foam Produced Tonnes Av. 1997- 1999	ICC** US \$	IOC/(IOS)*** US \$	Total Cost US \$	Requested Grant US \$	Cost- effectiveness US \$/kg
Yanshi Foam Plant	86.0	Vertifoam	Nov 93	120	8,640	1,691	600,000	(53,180)	546,820	535,780	6.23
Zhengshou Dev. Zone	79.3	Maxfoam	Jan 94	300	21,600	1,786	600,000	30,793	630,793	494,226	6.23
Huizian Zijinshan	84.3	Maxfoam	Feb 94	250	18,000	1,461	600,000	(98,992)	501,008	501,008	5.94
Yiyang Juijui	85.3	Vertifoam	Mar 93	120	8,640	1,592	600,000	(80,481)	519,519	519,519	6.09
Luoyang Jinling	87.3	Maxfoam	Mar 94	320	23,040	1,957	600,000	(5,457)	594,543	544,066	6.23
Wazhi Fuli	73.7	Maxfoam	Nov 91	250	18,000	1,114	600,000	(58,584)	541,416	458,964	6.23
Shangqiu	75.3	Maxfoam	Jun 93	200	14,400	1,158	600,000	(97,070)	502,930	469,306	6.23
Shangqiu Yongfeng	65.3	Maxfoam	Mar 95	250	18,000	1,144	600,000	(67,255)	532,745	407,006	6.23
Total	636.7				130,320	11,903	4,800,000	(430,226)	4,369,774	3,929,874	6.17

* Installed capacity calculated on the basis of 6 hour working day for 200 days.

** ICC – incremental capital cost, including 10% contingency and US \$50,000 licensing fee.

*** IOC/(IOS) incremental capital cost/savings

Table 3: Profile of the 26 Rigid Foam Enterprises

	Enterprise	CFC-11 use ODP tonnes	Project impact ODP tonnes	ICC US\$	IOC US\$	Total Project Cost * US\$	Baseline Equipment***	Requested Grant US\$	Total cost to MLF US\$ **	Cost effect.
1	Jiangsu Jieda Chemical New Technology Developing Company	63.52	57.88	181,000	381,490	580,590	5 SPD, 1 LPD	453,210	512,127	7,830
2	Zhoushan Putuo Huayuan Chemical Co. Ltd.	43.96	39.98	62,000	272,730	340,930	3 SPD	313,057	353,754	7,830
3	Puyang Zhongbai Chemical Co. Ltd.	46.33	42.06	106,000	292,939	409,539	1 SPD, 1 LPD	329,368	372,186	7,830
4	Puyang Shiqu PU Material Plant	26.66	24.25	128,000	163,052	303,852	2 SPD, 1 LPD (H)	189,892	214,578	7,830
5	Puyang Changfa Anti-corrosion & Insulation Engineering Co. Ltd.	12.52	11.41	62,000	73,579	141,779	3 LPD (L)	89,353	100,969	7,830
6	Hejian Zhongke Anti-corroton & Insulation Engineering Co.Ltd.	58.96	53.31	139,000	382,138	535,038	2 SPD, 2 LPD (H)	417,434	471,701	7,830
7	Dacheng Youlian Chemical & Building Material Company	20.19	18.33	128,000	125,818	266,618	2 SPD, 2 LPD (H)	143,544	162,204	7,830
8	Qingdao Jinbeiyang Engineering Co. Ltd	61.54	56.35	84,000	351,238	443,638	4 SPD	441,221	498,580	7,830
9	Haicheng Antisepsis and Insulating Engineering Co. Ltd.	40.00	37.30	148,000	203,533	366,333	6 SPD, 1 LPD (L)	292,067	330,036	7,830
10	Shenyang Liaowu Antisepsis and Insulating Engineering Department	36.89	33.70	62,000	172,559	240,759	3 SPD	240,759	272,057	7,145
11	Shenyang PU Technology-Industry-Trade Co. Ltd.	23.37	20.81	64,000	138,046	208,446	4 SPD	162,946	184,129	7,830
12	PU Development Co. Ltd.	15.13	14.05	44,000	73,655	122,055	3 SPD	110,027	124,331	7,830
13	Shenyang Yixing PU Trial Plant	11.52	10.44	62,000	58,347	126,547	5 SPD	81,709	92,331	7,830
14	Liaohu Oil Exploration Bureau	112.73	103.18	362,000	655,160	1,053,360	25 LPD (L)	807,876	906,742	7,830
15	Bejin Huiyuan Tech. Development Company	55.08	50.34	177,000	341,860	536,560	4 SPD, 1 LPD (H), 1 HPD	394,178	445,422	7,830
16	Beijing Zhonghao Trade Company	38.50	35.34	131,000	215,979	360,079	2 SPD, 1 LPD (H)	276,720	312,694	7,830
17	Jizhoushi Xinxing Insulating Material Factory	43.33	39.27	177,000	253,225	447,925	2 SPD (HP), 4 SPD, 1 LPD (H)	307,499	347,474	7,830
18	Dachengxian Zhenhua Polyurethane Plant	32.50	29.46	124,000	188,499	324,899	1 SPD, 1 LPD (H)	230,672	260,659	7,830
19	Hejian Dongfeng Polyurethanes Plant	35.61	32.28	103,000	206,538	319,838	1 SPD, 1 LPD (H)	252,752	285,610	7,830
20	Hebei Hejian Jinwei Rubber & Plastics Co. Ltd.	31.25	28.33	144,000	181,251	339,651	1 SPD, 1 LPD (H)	221,824	250,661	7,830
21	Hejian Shuntong Polyurethanes Plant	27.90	25.29	134,000	161,804	309,204	2 SPD, 2 LPD (H)	198,021	223,763	7,830
22	Jinan Beijiao Thermal Power Plant	13.12	11.89	93,000	57,056	159,356	3 LPD (H)	93,099	105,202	7,830
23	Jinan Taiya Polyurethanes Co. Ltd.	44.67	40.49	115,000	259,260	385,760	3 SPD	317,037	358,251	7,830
24	Shandong Dongda Chemical Industries Co. Ltd.	40.64	36.84	64,000	220,997	291,397	1 SPD, 1 LPD (H)	288,457	325,957	7,830
25	Shandong Huangming Solar Energy Co. Ltd.	30.69	27.82	38,000	177,965	219,765	1 SPD	217,831	246,149	7,830
26	Zhaoyuan Polyurethanes Co. Ltd.	12.15	11.01	64,000	72,782	143,182	6 SPD, 1 LPD (H)	86,208	97,415	7,830
	Total 26 Enterprises	978.78	891.43	2,996,000	5,681,498	8,977,098		6,956,762	7,854,983	7,804

* Includes 10% contingency

** Includes support cost

*** SPD - low pressure sprayfoam dispenser (mostly China Lequing dispenser)

SPD (HP) -high pressure sprayfoam dispenser (mostly Glascraft)

LPD (L) - low pressure dispenser, low output (10kg/min)

LPD (H) - low pressure dispenser, high output (60-150kg/min)

HPD - high pressure dispenser

Annex

Technology Selection Statement

UNIDO technical experts have visited the enterprises of this project prior to preparation of the project documents in June/July 2000 and had discussion with the companies about the choice of technology for replacing CFC-based technology. The enterprises were briefed in detail about the following:

- An overview of available interim (low ODP) and permanent (zero ODP) replacement technologies;
- The “techno-economic impact” of each technology on the products manufactured and the process and practices employed;
- Possible implications of each technology in terms of its impact on environment, health and safety, ozone depleting potential, global warming potential, etc;
- It was emphasized to the companies that HCFC technologies are interim technologies due to their residual ODP and therefore may continue to adversely affect the environment, although at a lower rate than CFC’s.

The main conclusions reached by the enterprises through the discussions with UNIDO’s technical experts were as follows:

- The use of HCFC-141b is the only currently feasible option for the rigid spray PU foam production;
- Water blown technology at this point results in a product that could not be sold commercially, its density increases by 20-30% with a reduction in insulation value of 35-40%;
- The companies are not prepared, as per today, to operate with inflammable and explosive materials;
- Many types of mechanical works, including welding are carried out in the production buildings as well as “on site” services at the customers premises restricting application of flammable blowing chemicals.

In view of the above among the available HCFC-141b based systems is selected as the interim technology until new developments (water or HFC-based systems) allows the use of zero ODP technologies.

中 国 国 家 环 境 保 护 总 局
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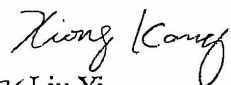
FACSIMILE COVER SHEET AND MESSAGE

Date: 2000/10/8	No. of Pages: 1 (Including this cover sheet)
To:	From:
Name: Mr. Yalchidag Acting Director	Name: Mr. Liu Yi Deputy Director-general
Organization: UNIDO	Dept.: FECO, SEPA, China
Fax No.: 43(1)26026-3939/6804	Fax No.: 86-10-66151776

Subject: GOVERNMENT REVIEW AND ENDORSEMENT OF
USING HCFC-141B

According to the ExCom Decision 27/13, on behalf of the
Government of China, I hereby endorse as following:

1. SEPA has reviewed the specific situations involved with the
projects as well as its HCFCs commitments under Article
2F;
2. It has nonetheless determined that, at the present time, the
projects need to use HCFCs for an interim period;
3. It understands that no funding would be available for the
future conversion from HCFCs for these companies.


for Liu Yi
Deputy Director General
FECO/SEPA
People's Republic of China

PROJECT EVALUATION SHEET CHINA

SECTOR: Halon ODS use in sector (2000): 3,980ODP tonnes (production)

Sub-sector cost-effectiveness thresholds: N/A

Project Titles:

(a) 2001 Annual Programme - Halon Sector

Project Data	Halon Sector
Enterprise consumption (ODP tonnes)	
Project impact (ODP tonnes)	
Project duration (months)	
Initial amount requested (US \$)	4,500,000
Final project cost (US \$):	
Incremental capital cost (a)	
Contingency cost (b)	
Incremental operating cost (c)	
Total project cost (a+b+c)	
Local ownership (%)	100%
Export component (%)	0%
Amount requested (US \$)	0
Cost effectiveness (US \$/kg.)	
Counterpart funding confirmed?	
National coordinating agency	
Implementing agency	IBRD

<i>Secretariat's Recommendations</i>	
Amount recommended (US \$)	
Project impact (ODP tonnes)	
Cost effectiveness (US \$/kg)	
Implementing agency support cost (US \$)	
Total cost to Multilateral Fund (US \$)	

PROJECT DESCRIPTION

(a) The Halon Sector 2000 Annual Program

1. In accordance with the Executive Committee's approval of the Sector Plan for Halon Phase out in China (Decision 23/11), China is requesting release of the fourth tranche of US\$4.5 million for the implementation of the year 2001 Annual Programme. With this funding, China halon 1211 production will be reduced to a maximum of 3,317 MT and its consumption to a maximum of 3,117 MT in 2001. The halon 1301 production will be maintained at the agreed maximum level of 618 MT and consumption will be 300 MT. Details of the annual programme are provided in the request submitted by the World Bank as annexed to this document. The 2001 Annual Program includes the following activities:

- a) US\$1.6 million to be used for buying back quotas and as a result closing 2-3 halon agent producers;
- b) US\$2.1 million to be used for closing and converting 7-10 fire extinguisher manufacturers;
- c) US\$0.4 million to be used for converting 2-3 fire extinguishing system manufacturers; and
- d) US\$0.4 million to be used for technical assistance activities in order to support the halon phase out programme and ensure that existing fire protection requirements can be met.

2. The Government of China will continue to implement bidding for closure/conversion contracts for halon phase out activities and the tradable production quotas, and to strengthen the ban on new installation of halon extinguishers for non-essential uses through, inter alia, a gradual tightening of the definition of essential uses. The ban on non-essential uses will also be implemented through: the dissemination of the details of the ban to prospective consumers through the news media, bulletins, etc.; the inspection by fire bureaux and environmental protection bureaux; requiring regular reports from local bureaux to the Ministry of Public Security (MPS) and the National Environmental Protection Agency (NEPA); and strict control of the sale of halons.

3. Technical assistance activities planned for the year 2001 include: Design Code for Water Mist Fire Extinguishing Systems, Revision of Design Code for Installation of Fire Extinguishers in Buildings, Feasibility Study on Substitutes for Halon Fixed Fire Extinguishing Systems; Studies of Market Prospect for Closure Enterprises; Training of Personnel Involved in Phase out Activities.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

4. Decision 23/11 established a schedule of production and consumption reductions for the duration of the China Halon Phase-out project through the year 2010. The reductions indicated in the 2001 Annual Programme correspond to the established schedule.

Technical audit

5. Paragraph C of Decision 23/11 requires that the payments in respect of each annual programme are conditional from 2000 onwards on the Executive Committee receiving satisfactory confirmation that reductions have been made in accordance with the schedule in Paragraph A and the requirements of paragraph (F) for the year two years prior to the year to which the annual programme relates (e.g. confirmation of the 1998 level to determine funding for the year 2000).

Late Submission of Audit Results

6. Due to the Bank's late initiation of the audit of the 1999 reductions, the Secretariat extended the due date for the submission of the results by two weeks. On 27 October, the Bank informed the Secretariat that the audit might not be available until 15 November, one week after the due date for the dispatch of documents to the Executive Committee. As in last year, the results of the audit were submitted too late to enable either a review by the Secretariat in advance of the dispatch of documents or a review by the Committee based on information in the meeting documents.

First Annual Independent Technical Audit under Paragraph D of Decision 23/11

7. Unlike last year, this year is the first year that an independent technical audit was commissioned since the approval of the China Halon Plan in October 1997. The Executive Committee approved the technical audit as part of the World Bank's support costs for the 2000 annual work programme (Decision 29/58). Paragraph D of Decision 23/11 states that "China also agrees to allow for annual independent technical audits administered as directed by the Executive Committee to verify that annual halon production and consumption levels agreed in paragraphs (a), (e) and (f) are actually being met".

Confirmation of Reductions Required by Decision 23/11 under Paragraph C

8. The Secretariat informed the Bank that without the confirmation of that reductions have been made through the required independent technical audit, the Secretariat was not in a position to provide a positive recommendation for the release of funds. The Bank indicated that requiring the results of a technical audit for the release of funds at this meeting changes the agreement with China which is not allowed under Paragraph M of Decision 23/11 that states that "the funding

components of this decision shall not be modified on the basis of future Executive Committee decision that may affect the funding of the halon sector”.

9. The Bank indicated that since it provided a desk review conducted by the firm conducting the independent technical audit that the obligations required as a condition to the release of funds as specified in paragraph C of Decision 23/11 had been fulfilled.

Desk Study

10. A desk study was provided with the submission of the 2001 Annual Plan. It concluded that within the limitations of the scope of work of the desk study, it did not identify information that contradicted that the required reductions in production and consumption in 1999 were achieved. The purpose of the desk review was to provide the World Bank “with a certain level of assurance regarding the level of production and domestic consumption of halon in China in 1999”. The study and its conclusions were based on audit reports from China’s National Audit Office, the Zhejiang Provincial Audit Office, the halon sector annual programmes, and memos/faxes to the World Bank personnel.

11. The desk study raised the following issues: the need for a different monitoring and audit approach for the Zhejiang plant due to its specific business circumstances; the need for improvement of monitoring and controlling consumption data due to the inherent risk that the level of accuracy of data for domestic consumption is low; and that the production and sales of the by-product halon 1202 should be included in the audit and reporting because at least 3 plants had sold halon 1202 in 1995 and that it was more profitable to sell it than to recycle it for the production process for conversion to halon 1211.

12. The special audit for Zhejiang is due to the fact that it produces both halon 1211 and halon 1301 on the same production line, consequently halon 1211 is produced about four months per year and the company has large stocks of halon 1211. Despite the stocks, the company also buys and resells halon 1211 from other producers.

13. This issue is related to the issue about the accuracy of consumption data. In the light of the fact that consumption for the purpose of the agreement is based on the formula: consumption = production plus imports minus exports, it is essential to have good records of the level of exports, imports, and internal transfers of halon from one producer to another or from producer to exporter. The World Bank indicated that since the desk review, the necessary documentation was provided and only documented export was included in the export figures.

14. The technical audit that is currently underway in China will audit and report, once completed, on the production and sales of halon 1202.

Halon fire extinguisher closure/conversion targets and achievements

15. The annual programmes of the China Halon Plan indicate the targeted number of fire extinguisher manufacturers that are expected to receive contracts. The following table provides

the World Bank's targets and achievements based on the targets in the plans and the achievements reported in the 2001 Plan.

Annual Programme	Targeted Companies to Receive Contracts	Number Receiving Contracts for Closure or Conversion	Number of Companies Left to Receive Contracts	Actual Completion*	Actual Number of Companies Left to be Converted or Closed as of the end of the Plan
1997 Sector Plan			72		72
1998 Annual Plan	20-25	16	56		72
1999 Annual Plan	10-14	11	45	10	62
2000 Annual Plan	33-37	13	32	8	54
2001 Annual Plan	7-10	N/A	N/A	22	32

* The number of companies whose planned closure or conversion in the year 2001 is based on contracts approved through 2000.

16. The World Bank indicated that the target for a previous year (it appears the year 2000) was in error.

RECOMMENDATIONS

1. The Executive Committee may wish to take the above into consideration in its determination of the approval of the 2001 work programme of the China Halon Plan and when to release the funds for its implementation.

CHINA

THE HALON SECTOR

2001 ANNUAL PROGRAM

October 8, 2000

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The Halon Sector 2001 Annual Program

Background

1. In accordance with the Executive Committee's approval of the Sector Plan for Halon Phaseout in China (UNEP/OzL.Pro/ExCom/23/68), China is hereby requesting release of the fourth tranche of US\$4.5 million for implementation of the year 2001 Annual Program. With this funding, China halon 1211 production will be reduced to a maximum of 3,317 MT and its national consumption to a maximum of 3,117 MT in 2001. The halon 1301 production will be maintained at the agreed maximum level of 618MT and the national consumption will not exceed a maximum level of 300MT. Details of the annual program are in Part B.

2. Since the approval of the China Halon Sector Strategy at the 23rd meeting of the ExCom and release of funding for the first (1998) Annual Program, China has started implementation of the Halon Sector Phaseout Strategy. From the start of the program, China has developed supporting policies and regulations. From an initial total of 14 halon plants, 8 halon 1211 production plants have been closed and dismantled completely and production and capacity has been reduced at the six remaining halon 1211 production plants. Out of a total of the 72 halon fire extinguisher manufacturers, 7 enterprises have signed contracts to close their extinguisher production, and 30 enterprises have signed contracts to convert their production fire extinguishers from halon to non-ODS extinguishers. 17 of the 37 enterprises have completed closures/conversions, and the rest are implementing their conversions. At the end of 1999, the total impact of the contracts for completed conversion or closure projects for extinguishers and systems was 2,731 MT of halon 1211. Out of a total of the 22 halon fire fighting systems manufacturers, three enterprises have signed contracts to convert their systems from halon to non-ODS extinguishers; one has been completed, and two are implementing their conversions. In 1999, the national consumption of halon 1211 was 5248 MT. There are 35 other fire extinguisher manufacturing enterprises and 19 fire extinguishing systems manufacturing enterprises which have not yet started conversion. A total of 20 technical assistance activities have started implementation, including activities for strengthening implementation capacity, and preparation of standards to ensure quality and reliability of halon substitute fire extinguishers and fire extinguishing systems.

3. The national production level of halon 1211 allowed for 2000 is 3,980 MT, a reduction of 1,990 MT from the allowable production level of 5,970 MT in 1999. As compared to the actual production level in 1997, the total production reduction of halon 1211 will be 7,664 MT from 1997 to the end of 2000. Production of halon 1301 has been capped at 618 MT, equal to halon 1301 production level in 1997. Detailed implementation status is provided in Part A.

4. As far as the other halons are concerned, halon 1202 is generated as a by-product during the production of halon 1211. According to information provided by the four largest halon 1211 producers, the amount of halon 1202 generated averages between 20 and 30 kg per ton of halon 1211 produced. This amount is captured in closed tanks, and is fed back into the production process of 1211 in a closed system. Halon 1202 is neither vented, nor sold. The Ministry of Public Security (MPS) has also promulgated a regulation to ban the sales of halon 1202 in the market. The halon sector team set up by SEPA is confident that, based on their investigations, there is no halon 1202 sold in the market. China has never produced halon 2402, and has never had plans to do so. In accordance with national regulations, a new halon 2402 production facility would require a new production license, and such a license can no longer be obtained because of a ban on setting up new halon production facilities or expanding existing halon production facilities.

5. These phaseout results have been achieved through the close cooperation between State

Environmental Protection Administration (SEPA), the Ministry of Public Security (MPS), China National Chemical Construction Corporation (CNCCC) and the fire fighting enterprises. The experience of implementation has confirmed the necessity of strong policy enforcement and monitoring of the halon phaseout program. Because of the number and geographical distribution of the enterprises involved, the success of the program depends to a large extent on the cooperation and support from provincial and local Environmental Protection Bureaus and Fire Fighting Bureaus. For this reason, training and public awareness continue to be key elements in the halon sector plan implementation.

6. While halon phaseout is important for meeting China's commitments to the Montreal Protocol, an assured and adequate supply of alternative fire extinguishing agents and fire fighting equipment is essential for ensuring that the national fire protection and fire fighting capacity are maintained. With the rapid reduction of halon 1211 supply, special initiatives have been taken to strengthen the supply of ABC powder, foam and CO₂ cylinders. Contracts have been signed for setting up an ABC dry powder plant, and a feasibility study has been undertaken to assess the financial and technical parameters of setting up the production of light weight CO₂ cylinders. In addition, a special initiative is being taken up to provide testing equipment to test plant protein foam, a new fire-fighting alternative to halons developed indigenously in China.

Halon Production and Consumption

7. The production and consumption of halons in China after the start of the halon sector plan has been as follows:

Table I: Annual Production and consumption of Halons under the Sector plan

	Halon 1211				Halon 1301			
	Production		consumption		Production		consumption	
	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual
1997	9,950	11,644	NA	10,849	NA	618	NA	NA
1998	7,960	7,842	7,160	7,218	618	450	300	-152*
1999	5,970	5,965	5,370	5,248	618	484	300	299
2000	3,980		3,580		618		300	
2001	3,317		3,117		618		300	
2002	2,654		2,654		600		150	
2003	1,990		1,890		600		150	
2004	1,990		1,890		600		150	
2005	1,990		1,990		600		150	
2006	0	0	0		150		100	
2007	0	0	0		150		100	
2008	0	0	0		150		100	
2009	0	0	0		150		100	
2010	0	0	0		0			

*: The consumption of -152MT of Halon 1301 reflects the export of 602MT, which includes part of the stock (328MT) from the previous year's production. Therefore, the total consumption in 1998 (Consumption = Production + Import - Export) is negative.

Consumption on this table was determined in accordance with the ExCom approval conditions as total annual production plus imports, minus exports. China has reported that no other halons were produced in China, including halon 1202 and halon 2402.

Part A

Implementation Status Of Previous Annual Programs

Status of 1998 Annual program

8. **Phaseout targets and objectives.** The phaseout target for the 1998 Annual Program was (a) to reduce halon 1211 production from the level of 9,950 MT to a maximum of 7,960 MT and consumption to a maximum of 7,160 MT and (b) to maintain halon 1301 production at a maximum of 618 MT and consumption at a maximum of 300 MT. 1998 actual production of halon 1211 was 7,842 MT and actual consumption was 7218 MT. The halon 1211 domestic consumption exceeded the agreed level, as exports of halon 1211 turned out to be lower than expected, and this was discovered only when the export figures became available in the beginning of 1999. The halon 1301 production was reported to be 450 MT and consumption to be -152 MT. It reflects the export of 602MT, which includes the part of the stock from the previous year's production. As the consumption is defined as: production+import-export, the consumption figure becomes negative. The China National Auditing Office (CNAO) had audited the 1999 production and consumption data and found them accurate.

9. **Implementation of policy instruments.** The production quota regulation became effective in December, 1997. The national 1998 halon quota was issued and each producer was assigned a halon 1211 1998 production quota and one producer was assigned the halon 1301 production quota. The data reported by the producers was verified by SEPA and MPS.

Enterprise-level phaseout activities

10. **Closure halon production facilities.** All contracts were signed with bid winners who had stopped halon production by January 1, 1998. Their production facilities were dismantled and equipment was completely destroyed by March 1998. Details are in Annex I.

11. **Closure & conversion of halon fire extinguisher & system manufacturers.** Contracts were signed with 15 extinguisher and one system manufacturers for a reduction halon 1211 consumption of 2,617 MT. Two extinguisher manufacturers had selected closure and the other selected conversion. All had completed their closure and conversion activities in early 2000 and were commissioned by SEPA and MPS. Details are in Annex II.

Technical Assistance (TA) Activities

12. All TA projects have been completed. The Chinese project team has completed the draft code on the design code of gaseous fire extinguishing system at the end of 1999, but the National Standard Bureau has not yet confirmed the draft code yet. The "halon management plan - provincial demonstration center" undertaken by Guangdong fire fighting bureau has been commissioned, while the other TA activities will be commissioned by the end of 2000. Details are in Annex III.

Status of 1999 Annual Program

13. **Phaseout targets and objectives.** The phaseout target for the 1999 Annual Program was (a) to reduce halon 1211 production from the actual production level of 7,842 MT to a maximum of 5,970 MT and consumption to a maximum of 5,370 MT and, (b) to maintain halon 1301 production at a maximum of 618 MT and consumption remain at 300 MT. Halon 1211 production was reported to be 5,965 MT and consumption to be 5248 MT. Halon 1301 production was reported to be 484 MT and consumption to be 299 MT. All were below the level allowed in the approval conditions of the Sector Plan. The CNAO had

audited the production and consumption data and verified their accuracy.

14. Another main objective of the Halon Sector Plan is to ensure that the level of fire protection capability in China is not compromised through halon phaseout activities, and that suitable quality substitutes are available in sufficient quantities.

15. **Implementation of policy instruments.** The quota system is the main tool for the implementation of the halon phaseout. It is supported and enforced fully by MPS. MPS has simultaneously strengthened its enforcement of the regulation on use of halon 1211 fire extinguishers, which has further reduced the demand for halon 1211. The halon 1211 quotas for halon exporting enterprises are now administratively split up into production quotas for domestic consumption and for export. Three halon producers who are allowed to export halon directly, (Zhejiang Chemical Industry Research Institute Plant, Zhejiang Dongyang Chemical plant and Shangdong Shouguang Fire-Extinguishing Agent Plant), have all received their annual halon 1211 production quotas divided into separate quota allocations for domestic consumption and for export. Utilization of the export component requires proof of export orders.

Enterprise-level phaseout activities

16. **Closure of halon production facilities.** Contracts were signed with 4 bid winners. The total halon 1211 quota reduction effected was 1,942 MT, thereby staying within the 1999 national halon 1211 allowable production level of 5,970 MT. One producer stopped its halon production before January 1, 1999, and its production facilities were dismantled and equipment was completely destroyed by March 1999. The three other producers signed quota reduction contracts and their production stayed within their production limit. Details are in Annex I.

17. **Closure and conversion of halon fire extinguisher & system manufacturers.** Contracts were signed with 10 halon extinguisher and one system manufacturers selected through a bidding process for a reduction of halon 1211 consumption of 1,317 MT. In this program, 2 extinguisher manufacturers selected closure and the other 9 selected conversion. The 2 closure projects have been completed and passed the acceptance requirements of China. Most of the conversion activities have also been carried out. Details are in Annex II.

Special initiatives

18. **ABC dry chemical powder.** The shortage of suitable quality ABC powder is posing a problem. The implementation of the first two years of the Halon Sector Phaseout Plan has resulted in the phaseout of production of about 6,000 MT of halon 1211, greatly increasing the market demand for halon substitutes. ABC dry powder has been identified as one of the main substitutes. Steps have been taken to address the low production levels of ABC dry powder at the Beijing Fire Fighting Agent Factory, which was experiencing low output because of a combination of technical problems, enterprise management issues, and market penetration constraints of the costlier higher quality ABC dry powder when compared to the lower prices of existing Chinese ABC and BC dry powder. SEPA and MPS are trying to address these issues.

19. To maintain the required level of fire fighting capacity in China, it also became necessary to establish an additional ABC dry powder production line with an annual capacity of 3,000 MT. The Foshan Electro-chemical General Plant was selected for installing this capacity, and has already received all the required equipment for the ABC production line at the plant site by May 2000. Foshan is presently carrying out trial production on the production line and it is expected that the commercial production of ABC powder will start by October 2000.

20. **Light weight high pressure CO₂ cylinders.** The need for light weight high pressure CO₂ cylinders is another concern which was addressed in the 1999 Annual Program. Domestically manufactured

CO₂ fire extinguishers do not meet international standards in terms of production technology and the quality of steel used. Weifang Dongming Fire-fighting Equipment Co.Ltd was selected to set up such a production line, and a feasibility study has been undertaken to examine the financial and technical parameters of establishing the production line of light weight CO₂ cylinders.

Technical Assistance Activities

21. Consulting companies for all TA activities have been selected. All TA projects are proceeding in accordance with the agreed implementation plans. The standard of HFC227 has been drafted and circulated for technical review. The other 6 TA projects on standards revision and test method as well as related rules on halon 1211 and CO₂ extinguishers have been carried out smoothly. For the halon management plan, one additional provincial demonstration center for halon management activities has been started. The project has been undertaken by the Beijing Fire Fighting Bureau. As part of the Beijing halon management demonstration project, several related policies on halon phaseout have been promulgated and a survey on halon in the Beijing area has been carried out. Details on the status for TA activities are in Annex III.

Status of 2000 Annual Program

22. **Phaseout targets and objectives.** The phaseout target for the 2000 Annual Program is to (a) reduce halon 1211 production from the actual production level of 5,965 MT to a maximum of 3,980 MT and limit consumption to a maximum of 3,580 MT, and (b) to maintain halon 1301 production at 618 MT and consumption remain at 300 MT. The annual plan is currently under implementation.

23. **Implementation of policy instruments.** The quota system is the main tool for the implementing the halon phaseout and is supported fully by MPS. MPS has simultaneously strengthened its enforcement of the regulation on use of halon 1211 fire extinguishers, which has further reduced the demand for halon 1211.

Enterprise-level phaseout activities

24. **Closure of halon production facilities.** Contracts were signed with all 6 remaining halon producers through proportional reduction of quotas. The total halon 1211 quota reduction through these contracts was 1,990 MT from the 5,965 MT production level, and will thereby stay within the annual halon 1211 target in 2000. All the 6 partial closure projects are now producing halons based on their reduced quotas. Details are in Annex I.

25. **Closure & Conversion of halon fire extinguisher manufacturers.** Contracts were signed with 12 halon extinguisher and one system manufacturers selected through the bidding process with a reduction of halon 1211 consumption of 1,138 MT. In this program, 3 halon fire extinguisher manufacturers selected closure and the other 10 selected conversion. The 3 extinguisher closure projects have been completed and certified. Most of the conversion activities have also been carried out. Details are in Annex II.

Special initiatives

26. **Halon Banking.** With the rapid phaseout of Halon 1211 in the past three years, it is necessary to start to planning the construction of a Halon Bank in order to meet the demand for essential uses after the complete phaseout of Halon 1211 in 2005. To gain experience and better understanding of halon banking, China has decided to establish halon banking and recycling centers in certain provinces. Guangdong province has been chosen to set up a branch of the China National Halon Bank. A company has been chosen to operate the facility and recycle and store Halon 1211 in the province.

27. **Plant-Protein based foam.** In the Halon Phaseout Sector Plan, foam agent is one of the major substitution agents. At present China mainly produces and consumes two kinds of foam agent:

animal-protein-based agent and AFFF. Both these agents have the common disadvantages of not being environmentally benign, and being corrosive to extinguisher cylinders which impacts on the extinguishing capacity. The production of AFFF has recently been discontinued in the USA because of environmental concerns. A new plant-protein-based foam agent has been invented by the Hongsen Fire-fighting Hi-tech. Co., Ltd., and has undergone some tests. In order to guarantee the quality of the product, China considers it necessary to set up a test laboratory with adequate testing equipment in this agent's production plant. This contract was signed in early September.

28. **MIS.** The Halon Management Information System was the first one in PMO to manage implementation of the Sector Plan, and was developed using the FoxPro database software. With the development of ODS phaseout program in China, additional Management Information Systems have been developed for various ODS sectors. However, as these were developed using later generation Access database software, the Halon Management Information System has become incompatible with the newer systems. In order to provide a complete picture on ODS program to SEPA management and project teams, it became necessary to convert the MIS to Access. This has been completed.

29. **Compilation of standards.** The government has promulgated several policies and technical standards related to Halon phaseout in China. Substitute production is also under way. China therefore considers this the appropriate time to compile a book to comprehensively introduce all these activities and substitution technologies. Such a publication will guide the phaseout of Halon in future years. It is expected that the book will be published in October, 2000.

30. **National Conference.** The Halon Sector Plan has been implemented successfully in the past three years. To guarantee the complete phaseout of Halon as scheduled and to maintain the required levels of fire fighting capacity in China, SEPA and MPS plan to hold a national meeting on Halon phaseout. The purpose of the meeting is to review the past experience and look forward to future tasks, as also to promote the experiences of the provincial demonstration centers. The meeting is planned to be held in the middle of November, 2000.

Technical Assistance Activities

31. The terms of reference of all TA projects have been prepared and the short lists for bidding have been reviewed by the World Bank. All contracts are expected to be signed by the end of 2000. The TA on "design code for water-mist fire extinguishing systems" has been deferred to the 2001 Annual Program.

PART B

2001 ANNUAL PROGRAM

Objectives

32. The phaseout target for the 2001 Annual Program is (a) to reduce halon 1211 production from the level of 3,980 MT to a maximum of 3,317 MT and consumption to a maximum of 3,117 MT and, (b) to maintain halon 1301 production at 618 MT and consumption remain at 300 MT. The 2001 program will also continue actions to ensure that the fire fighting capacity is not undermined as the result of an insufficient supply of substitutes of satisfactory quality.

33. China is requesting the release of the approved amount of US\$ 4.5 million for the 2001 Annual Program as agreed in the overall Halon Sector Phaseout Plan. To achieve these goals, the following activities are envisioned:

- a) US\$1.6 million to be used for buying back quotas and as a result closing 2-3 halon agent producers;
- b) US\$2.1 million to be used for closing and converting 8-10 fire extinguisher manufacturers;
- c) US\$0.4 million to be used for converting 2-3 fire extinguishing system manufacturers; and
- d) US\$0.4 million to be used for technical assistance activities in order to support the halon phaseout program and ensure that existing fire protection requirements can be met..

Policy instruments during the Year

34. ***Policies to be continued.*** In 2001, the following policies and measures will continue to be implemented by the Government. These policies are considered necessary for the success of a total halon phaseout in China.

- a) Bidding -- The bidding system will continue to be improved based on the experiences gained from the 1998, 1999 and 2000 Annual Programs. Preparatory work will be finished in the second half of 2000. Bidders with the highest scores will be awarded grant funds after bid evaluation. The Government will sign closure/conversion contracts with the winning enterprises.
- b) Tradable production quota – The regulation will be implemented as in 1998, 1999 and 2000.
- c) Strengthening of the ban on new installations of halon extinguishers for non-essential uses and a gradual tightening of the definition of essential uses.

35. In order to support local enforcement of the ban on non-essential uses of halons in the most effective manner, the Government will ensure that:

- a) SEPA/MPS will disseminate details of the ban to all prospective consumers through various channels (news media, bulletin, propaganda, etc.);
- b) Local fire bureaus and environmental protection bureaus will jointly inspect consumers on a regular basis. If any consumer is found to be using the newly-installed halon fire extinguishers in non-essential areas, the consumer will be required to change within a definite time.
- c) Joint inspection teams of the local fire bureaus and environmental protection bureaus will be required to submit regular reports to MPS and NEPA about the situation and measures in implementation of the ban.
- d) Strictly control the sales of halon by implementing the project of two demonstration centers and spreading the experience to other provinces in order to reach phaseout goals.

Enterprise-level activities

36. Through the production quota and bidding systems, bid winners will be granted funds for closure and conversion activities. All contracts for closures are expected to be signed by the end of 2000. Closure projects (for halon agent producers) are expected to take effect from January 1, 2001 and all the closure projects to be completed within the program year. All contracts for conversion projects are expected to be signed in the first three months of 2001 and implementation will start afterwards. Implementation may take one year.

Technical assistance (TA) activities

37. TA activities envisioned under the Sector Phaseout Plan concentrate on strengthening: (i) the overall institutional framework, (ii) management, monitoring & evaluating capabilities of participating institutions, (iii) technical personnel involved in halon phaseout activities, and (iv) support development and facilitate use of alternative technology. These are essential to the success of the phaseout objectives. The main TA activities in 2001 include:

38. ***Design Code for Water Mist Fire Extinguishing Systems:*** As an alternative technology for halon fire extinguishing systems, water mist systems provide a good performance and cost effective alternative to halon systems. Water mist systems have been gaining acceptance in many industrial and commercial fire protection applications in other countries. Earlier work in China consisted of developing a fire test which can now serve as the basis for a design code. The development of the design code for water mist systems is necessary to provide this attractive, cost- and performance-effective alternative to halon systems.

39. ***Revision of Design Code for Installation of Fire Extinguishers in Buildings:*** The existing "Design Code for Installation of Fire Extinguishers in Buildings" was issued on September 1, 1991. It was used as a guideline for checking and reviewing the location of fire extinguishers in building, it specified the appropriate type of extinguishers and fire fighting capacity. It was carried out and implemented widely and usefully by local fire monitor departments and construction design institutes. With the implementation of halon sector approach in China, a lot of areas defined in the code in which halon extinguishers are available have to be redefined and restrained. Therefore, it is necessary to revise the Design Code to reflect the current situation.

40. ***Feasibility Study on Substitutes for Halon Fixed Fire Extinguishing Systems:*** With halon phasing out in China, some substitutes for halon fire extinguishing system have been developed and applied in China. In the Meantime, a lot of new halon alternative systems developed by international fire companies are introduced into China in recent years. However, it is rather difficult for fire-fighting departments, designing institutes and customs to evaluate and select suitable fire extinguishing system for different kind of uses and applications. In order to guide the application and monitor the application, a study to evaluate the quality and performance of these systems is necessary and will support the implementation of the halon sector approach.

41. ***Studies of Market Prospect for Closure Enterprises:*** With the implementation of the Halon sector approach, more and more enterprises have been closed down. For enterprises whose sole activity was the production of Halon, it is very important that they study the market and convert their production activities to other products. As the capacity of small enterprises in such aspects is rather limited, it is necessary to provide assistance from consultant firms to help in their investigation and market evaluation.

42. ***Training of Personnel Involved in Phaseout Activities:*** In order to implement the phaseout plan effectively, it is necessary to train staff of local environmental protection bureaus, local fire bureaus and halon enterprises. Training is needed to prepare enterprises to bid in the following year, to supervise halon production and consumption, to manage the tradable production quota system, and to learn operating procedures in the halon sector phaseout approach. In addition, as the halon sector approach requires

financial and performance audits it is necessary to provide training for audit agencies on the sector approach and the annual plan. This type of training will need to be repeated every year in the first few years of implementation.

43. The above policy initiatives, enterprise-level and technical assistance activities are summarized in Table II below.

Table II. 2001 Annual Program

Halon phaseout targets & policy instruments					
	Start of program (MT)	Phaseout Target (MT)	End of program (MT)	Key Actions Required	Key Dates
Halon 1211 Production	3,980	663	3,317	1. Closures of halon agent producers 2. TA activities to help phaseout	1. Jan-Dec. 2001
o.w. export	400		200		
Consumption	3,580	463	3,117	1. Closures of extinguishers manufacturers 2. Conversion of halon fire extinguishers to non-halon extinguishers 3. Policies and awareness to limit demand for halons	1. Jan.-Dec. 2001 2. 1 quarter of 2001 to start conversion
Halon 1301 Production	618	0	618	1. Activities to help phaseout.	1. Jan. – Dec.
Consumption	300	0	300	1.Appropriate TA to help future phaseout. 2. Policies and TA activities to direct users toward substitute fire extinguishing systems	1. Jan. – Dec.
Continuation of policy instruments					
Policy Instruments	Actions Required			Key Dates	
1. Bidding system	1. Training for the 2001 bidding 2. Bidding started 3. Bidding completed 4. Bid winners awarded for 2001 5. Contracts signing with winners 6. Implement closure/ conversion contracts.			1. Sept./Oct. 2000 2. Oct. 2000 3. Dec.2000 4. Dec. 2000 5. Dec. 2000 6. Closure -- Jan. To Dec. 2001 Conversion—starting Jan. for 12 month period	
2. Tradable production quota for halon producers	1. Establish 2001 halon production quota ; 2. Issue 2001 production quota to halon producers for 2001			1. Dec. 2000 2. Dec. 2000	
3. The ban on halon extinguisher uses in non-essential areas	1. Promotional campaign on the ban, through various channels; 2. Joint supervision of ban by local Fire Fighting Bureaus and Envir. Protection Bureaus.			1. Through 2001 2. Through 2001	

Table II: 2001 Annual Program (Contd.)

Enterprise-level Activities						
	Funding Requested (US\$ mill)	Existing Enterprises	# of enterprise targeted	# of enterprises at end of 1999	Key Actions Required	Key Dates
1. Closure of halon agent producers	1.6	6	2-3	3-4	Selection through bidding process or administrative action	1. Bid winners announced in Dec. 2000 2. Contracts signed Dec. 2000 3. Completed within 12 months
2. Closure & conversion of halon extinguisher manufacturer	2.1	35	7-10	25-28	Selection through bidding process	1. Bid winners announced Dec. 2000. 2. Contracts signed no later than May 2001 3. Completed within 12 months after signing contracts
3. Conversion of halon fire extinguishing system manufacturers	0.4	18	2-3	15-16	Selection through bidding process	1. Bid winners and contracts signed no later than May 2001 2. Completed within 12 months after signing contracts
Subtotal	4.1					
TECHNICAL ASSISTANCE ACTIVITIES						
Activities	MLF funding requested (US\$'000)		Actions Required		Key Dates	
1. Formulating Design Code for Mist Water Fire Extinguishing System"	55		Selection of qualified institutions to formulate the code		1. Contract signed no later than 2Q 2001. 2. Finish work within 12-24 months after signing contracts.	
2. Revision of Design Code for Installation of Fire Extinguishers for Buildings	25		Selection of qualified institutions to formulate design code		1. Contract signed no later than 2Q 2001. 2. Finish work within 12-24 months after signing contracts.	
3. Feasibility Study on Substitutes for Halon Fixed Fire Extinguishing Systems	90		Selection of qualified institutions to carry out the study		1. Contract signed no later than 2Q 2001. 2. Finish work within 12-24 months after signing contracts.	
4. Studies of Market Prospect for Closure Enterprises	60					
5. Training	60				Training will be carried out through the 2001.	
6. Audit	70					
7. International consultants	40		International consultants will be recruited by SEPA to help local consultant firms to study, design and revise standards, codes, etc. Appointments dates will be throughout 2001.			
Subtotal	400					
TOTAL for phaseout activities	4,500					

Table III: 2001 Annual Program - Proposed Performance Indicators

Halon Phaseout Targets				
Halon sector	Start of program (MT)	Phaseout Target (MT)	End of program (MT)	Performance Indicators
Halon 1211 Production	3,980	663	3,317	• Production levels (national aggregate halon 1211production)
o.w. exports	400		200	
Consumption	3,580	463	3,117	• Consumption levels (national halon production plus import minus export)
Halon 1301 Production phase-Out target	618	0	618	• Production levels (national aggregate halon 1301 production)
Consumption Phaseout target	300	0	300	• Consumption levels (production plus imports minus exports)
Continuation of Policy Instruments				
Initiatives	Performance Indicators			
Bidding system	• bidding for 2001 annual plan • Winning enterprises for 2001 selected • Enterprises trained for bid preparation for 2001 bidding			
Tradable production quota for halon producers	• Annual production quota to halon producers for 2001 issued • Production reports from enterprises received			
The ban on halon extinguisher uses in non-essential areas	• Promotional campaigns on the ban undertaken; • Local Fire Fighting Bureaus and Envir. Protection Bureaus engaged in overseeing ban enforcement.			
Enterprise-level activities				
Activities	Funding requested (US\$ mil.)	Existing Enterprises	# of enterprises at end of 2001	Performance Indicators
Closure of halon agent producers	1.6	6	3-4	• Number of ODS reduction contracts signed for closure • Number of closures completed
Closure & conversion of halon extinguisher manufacturer	2.1	35	28-32	• Number of ODS reduction contracts signed for closure or conversion • Number of closures completed • Number of conversions completed and Implementation progress
Conversion of halon fire extinguishing system manufacturers	0.4	18	16-17	• Number of ODS reduction contracts signed for conversion • Number of conversions completed and/or implementation progress
Subtotal	4.1			• Total disbursement to enterprises

Table III: 2001 Annual Program - Proposed Performance Indicators (contd.)

Technical assistance activities		
Activities	Amount in US\$'000	Performance Indicators
1) Formulating Design Code for Mist Water Fire Extinguishing System"	55	Date of invitation sent
2) Revision of Design Code for Installation of Fire Extinguishers for Buildings	25	Date of bidding Date of bid awards
3) Feasibility Study on Substitutes for Halon Fixed Fire Extinguishing Systems	90	Starting date of Contract Implementation schedule
4) Studies of Market Prospect for Closure Enterprises	60	
5) Training	60	Training dates Training participants
6) Audit	70	
7) International consultants	40	Date of invitation sent Date of contracts Contracts dates and amounts Date of completion of works
Subtotal	400	
TOTAL for Phaseout Activities	\$4.5million	

Closures of halon production facilities and lines

I. 1998 Annual Program

Table 1: Closure of Halon 1211 Plants with 1998 Production Quotas

Name of the plant	Halon phaseout (MT)	Closure date	Implementation status	Remarks
1.Zhedong No.1 Chemical Plant	347	January 1, 1998	Project completed	Plant closure
2.Zhejiang Dongyang No.2 Chemical Plant	1,004	January 1, 1998	Project completed	Plant closure
3.Zhejiang Xiaoshan Fire-fighting Chemical Plant	387	January 1, 1998	Project completed	Partial closure. One out of two production plant closed.
4.Foshan Electro-Chemical General Plant	300	January 1, 1998	Project completed	Partial closure. Reactor pipes dismantled.
Total (Quotas sold back to Govt.):	2,038			

Table 2: Closure of Halon 1211 plants not assigned 1998 production quotas

Name of the plant	Halon phaseout (MT)	Year of stop production	Implementation status	Remarks
1.Dalian Fire-extinguishing Agent Plant	165.9	1997	Equipment dismantled completely	Dismantling and destruction of equipment verified
2.Zigong Fujian Chemical Plant	54.0	1997	Equipment dismantled completely	Dismantling and destruction of equipment verified
3.Guangdong Dongguan Fire-fighting Equipment Plant	320.0	1997	Equipment dismantled completely	Dismantling and destruction of equipment verified
4.Guangxi Beihai Ocean Chemical Plant	40.0	1997	Equipment dismantled completely	Dismantling and destruction of equipment verified
5.Wenling Salt Farm Chemical Plant	70.5	1997	Equipment dismantled completely	Dismantling and destruction of equipment verified
Total	650.4			

II. 1999 Annual Program

Name of the plant	Halon phaseout (MT)	Closure date	Implementation status	Remarks
1. Zhejiang Xiaoshan Fire-fighting Chemical Plant	400	January 1, 1999	Project completed Plant closed	Plant closure
2. Shandong Haihua Group Shouguang Fire-fighting Chemical Plant	500	January 1, 1999	Project completed Reactor pipes dismantled	Partial closure.
3. Wuxian Chemical Plant	388	January 1, 1999	Project completed Reactor pipes dismantled	Partial closure.
4. Zhejiang Dongyang Chemical Plant	654	January 1, 1999	Project completed Reactor pipes dismantled	Partial closure.
Total (Quotas sold back to Govt.):	1,942			

III. 2000 Annual Program

Name of the plant	Halon phaseout (MT)	Closure date	Implementation status	Remarks
1. Zhejiang Dongyang Chemical Plant	779	January 1, 2000	Producing basing on reduced quota	Partial closure.
2. Shandong Haihua Group Shouguang Fire-fighting Chemical Plant	451	January 1, 2000	Producing basing on reduced quota	Partial closure.
3. Wuxian Chemical Plant	170	January 1, 2000	Producing basing on reduced quota	Partial closure.
4. Zhejiang fire-fighting Chemical Plant	130	January 1, 2000	Producing basing on reduced quota	Partial closure.
5. Foshan electro-chem general plant	381	January 1, 2000	Producing basing on reduced quota	Partial closure.
6. Zhejiang chemical research institute	79	January 1, 2000	Producing basing on reduced quota	Partial closure.
Total (Quotas sold back to Govt.):	1,990			

ANNEX II

List of beneficiary fire extinguisher and system manufacturers

I. 1998 Annual Program

Name of the manufacturer	Project starting date	Phaseout amount (MT)	Implementation Status	Completion date	Remarks
1.Zhejiang Xiangshan No.1 Fire-fighting Equipment Plant	1998.03.14	223.0	Complete/ equipment dismantled.	1999.12.22	Plant closure
2.Zhejiang Yiwu Fire-fighting Extinguisher Plant	1998.03.14	162.2	Complete/ equipment dismantled.	1999.06.23	Plant closure
3.Changzhou Fire-fighting Equipment Plant	1998.03.14	47.5	Complete/PCR finalized	1999.12.27	Conversion
4.Dalian Jinzhou Fire-fighting Equipment Plant	1998.03.14	105.7	Complete/PCR finalized	2000.01.05	Conversion
5.Guangxi Wuzhou Fire-fighting Equipment Plant	1998.03.14	52.4	Complete/PCR finalized	2000.01.06	Conversion
6.Guangzhou Zhujiang Fire-fighting Equipment Plant	1998.03.14	138.4	Complete/PCR finalized	2000.01.05	Conversion
7.Jiangxi No.1 Fire-fighting Equipment Plant	1998.03.14	220.8	Complete/PCR finalized	2000.01.08	Conversion
8.Nanjing Heli Fire-fighting Equipment Plant	1998.03.14	146.4	Complete/PCR finalized	1999.12.27	Conversion
9.Ningxia Yongning Fire-fighting Equipment Plant	1998.03.14	23.0	Complete/PCR finalized	2000.01.09	Conversion
10.Panyu Shengjie Fire-fighting Equipment Plant	1998.03.14	435.1	Complete/PCR finalized	2000.01.04	Conversion
11.Shanghai Haishen Fire-fighting Equipment Plant	1998.03.14	149.6	Complete/PCR finalized	1999.12.23	Conversion
12.Shanghai Punan Fire-fighting Equipment Plant	1998.03.14	268.4	Complete/PCR finalized	1999.12.24	Conversion
13.Shanghai Qingpu Fire-fighting Equipment Plant	1998.03.14	169.9	Complete/PCR finalized	1999.12.25	Conversion
14.Shenyang Fire-fighting Equipment Plant	1998.03.14	153.7	Complete/PCR finalized	2000.01.06	Conversion
15.Xiangshan Fire-fighting Equipment Plant	1998.03.14	270.6	Complete/PCR finalized	1999.12.21	Conversion
16.Ningbo Sanyou Fire-fighting Equipment Ltd.	1998.03.14	50.0	Complete/PCR finalized	2000.03.14	System conversion
Total (Average halon 1211 consumption 1995 to1997):		2,616.7			

II. 1999 Annual Program

Name of the manufacturer	Project starting date	Phaseout amount (MT)	Implementation Status	Planned/ Actual Completion date	Remarks
1.Zhejiang Dongyang Fire-fighting Equipment Plant	1999.03.16	131.88	Complete/ equipment dismantled.	1999.12.24	Plant closure
2.Shanghai Global Fire-fighting Extinguisher Plant	1999.03.16	32.66	Complete/ equipment dismantled.	1999.12.22	Plant closure
3.Helongjiang Fire-fighting Equipment Plant	1999.03.16	23.4	Most of conversion activities have been done.	2001.03.16	Conversion
4.Guangzhou Fire-fighting Equipment Plant	1999.03.16	83.431	Most of conversion activities have been done.	2001.03.16	Conversion
5.Jiangsu Taixin Fire-fighting Equipment Plant	1999.03.16	336.6	Most of conversion activities have been done.	2001.03.16	Conversion
6.Chongqing Zhendan Fire-fighting Equipment Plant	1999.03.16	60.77	Most of conversion activities have been done.	2001.03.16	Conversion
7.Heilongjiang Shangzhi Fire-fighting Equipment Plant	1999.03.16	78.4	Most of conversion activities have been done.	2001.03.16	Conversion
8.Hubei Jiangling Fire-fighting Equipment Plant	1999.03.16	194.78	Most of conversion activities have been done.	2001.03.16	Conversion
9.Shandong Weifang Fire-fighting Equipment Plant	1999.03.16	153.116	Most of conversion activities have been done.	2001.03.16	Conversion
10.Shunde Fire-fighting Equipment Plant	1999.03.16	192.72	Most of conversion activities have been done.	2001.03.16	Conversion
11.Guangzhou Fire-fighting Equipment Plant	1999.03.16	29.697	Most of conversion activities have been done.	2001.03.16	System Conversion
Total (Average halon 1211 consumption 1995 to1997):		1,317.431			

Note: From the experience of the 1998 annual program, SEPA had decided that all contracts for fire extinguishers and systems had to be completed within two years from the date of signing.

III. 2000 Annual Program

Name of the manufacturer	Project starting date	Phaseout amount (MT)	Implementation Status	Planned completion date	Remarks
1.Guangzhou Baiyun Luoyang Fire-fighting Equipment Plant	2000.02.24	183.608	Project complete/ equipment dismantled.	2001.02.24	Plant closure
2.Zhejiang Linhai Fire-fighting Equipment Plant	2000.02.24	57.5	Project complete/ equipment dismantled.	2001.02.24	Plant closure
3.Anhui Bengbu Fire-fighting Equipment Plant	2000.02.24	142.124	Project complete/ equipment dismantled.	2001.02.24	Plant closure
4.Suzhou Fire-fighting Equipment Plant	2000.02.24	14.2677	Conversion activities in processing	2001.02.24	Conversion
5.Shanghai No. 4 Fire-fighting Equipment Plant	2000.02.24	74.762	Conversion activities in processing	2001.02.24	Conversion
6.Lianyungang Tianyi Fire-fighting Equipment Plant	2000.02.24	52.35	Conversion activities in processing	2001.02.24	Conversion
7.Tianjin Tanggu Fire-fighting Equipment Plant	2000.02.24	45.64	Conversion activities in processing	2001.02.24	Conversion
8.Zhejiang Wananda Fire-fighting Equipment Plant	2000.02.24	56.5	Conversion activities in processing	2001.02.24	Conversion
9.Zhenzhou Huanghe Fire-fighting Equipment Plant	2000.02.24	25.153	Conversion activities in processing	2001.02.24	Conversion
10.Nanjing Honghu Fire-fighting Equipment Plant	2000.02.24	81.818	Conversion activities in processing	2001.02.24	Conversion
11.Zhuhai Zhuzhou Fire-fighting Equipment Plant	2000.02.24	80	Conversion activities in processing	2001.02.24	Conversion
12.Fujian Changle Fire-fighting Equipment Plant	2000.02.24	284.2	Conversion activities in processing	2001.02.24	Conversion
13. Zhuhai Zhuzhou Fire-fighting Equipment Plant	2000.02.24	40.5	Conversion activities in processing	2001.02.24	System Conversion
Total (Average halon 1211 consumption 1995 to1997):		1138.423			

Note: In early 2000, MPS issued a regulation that all enterprises which won the bidding would have to complete conversion projects within a year. This include the fire extinguisher and systems manufacturers.

ANNEX III

A. Implementation of Technical Assistance Activities in the 1998 Annual Program

Name of TA Projects	Implementing Agency	Contract Date	Implementation Status	Planned/actual Completion Date	Remarks
1.Revision of Standards for ABC Powder	Tianjin Fire Research Institute	1998.04.28	Completed, not yet commissioned	1999.12.31	
2.Design Codes for Gaseous Fire Extinguishing Systems	Tianjin Fire Research Institute	1998.04.28	Completed draft code, delayed because of not getting confirmation from National Standard Bureau	2000.01.31	
3.Standards for Components of Gaseous Fire Extinguishing Systems	Tianjin Fire Research Institute	1998.04.28	Completed , not yet commissioned.	2000.02.28	
4.Halon Management Plan-Overall Management	Shanghai Fire Research Institute	1998.04.28	Completed, not yet commissioned	1999.12.31	
5.Halon Management Plan-Training Courses and Propaganda Materials	Shanghai Fire Research Institute	1998.04.28	Completed, not yet commissioned	2000.06.30	
6.a)Halon Management Plan-Provincial Promotions and Demonstration Centers	Shanghai Fire Fighting Bureau	1998.04.28	Completed, not yet commissioned	1999.10.31	
6.b)Halon Management Plan-Provincial Promotions and Demonstration Centers	Guangdong Fire Fighting Bureau	1998.04.28	Completed and Commissioned	1999.08.31	
7.Development of halon Management Database and Data collection System	Qinghua University	1998.04.28	Completed, not yet commissioned	1998.09.28	
8.Management Information System	Qinghua University	1998.04.28	Completed, not yet commissioned	1998.04.02	
9.Training	SEPA		four training workshops have been conducted	1998.12.10	
10. Export/Import	Beijing University	1998.08	Completed, not yet commissioned	1999.11.30	

B. Implementation of Technical Assistance Activities and Special Initiatives, 1999 Annual Program

Name of TA Projects	Implementing Agency	Contract Date	Implementation Status	Planned Completion Date	Remarks
TA					
1. Halon management plan---establishment of demonstration centers	Beijing Fire Fighting Bureau	1999.11.10	1)The demonstration center has been established and are now in operation; 2)A series of local policies have been formulated and issued. 3)Halon consumption survey has been carried out. 4)Propaganda has been launched on newspaper, magazines and TV.	2001.7.10	
2. Demonstration halon bank	Guangdong Fire Fighting Bureau	1999.11.10	1) International Information on halon bank policies have been collected and reviewed; 2) The framework of Guangdong demonstrative halon bank has been formulated. 3) Recycle and reclaim procedure has been studying and testing.	2001.7.10	
3. Revision of national standard for CO ₂ fire extinguishing agent	Tianjin Fire Research Institute	1999.11.10	1)Test equipment has been installed; 2)Information on similar international standards collected & reviewed.	2001.7.10	
4. Study on test method and test equipment for CO ₂ fire extinguishing agent	Tianjin Fire Research Institute	1999.11.10	1)Test equipment has been installed; 2)Information on similar international standards collected & reviewed.	2001.7.10	
5. Revision of the design code of CO ₂ fire extinguishing systems	Tianjin Fire Research Institute	1999.11.10	1)Test equipment has been installed; 2)Information on similar international standards collected & reviewed.	2001.7.10	
6. Study on the scope of use of CO ₂ extinguishers	Shanghai Fire Research Institute	1999.11.10	1)Information on similar international standards collected & reviewed. 2)The study and test procedure has been set up.	2001.7.10	
7. Study on the standard and test method of CO ₂ extinguishers with light cylinders	Shanghai Fire Research Institute	1999.11.10	1)Test equipment has been installed; 2)Information on similar international standards collected & reviewed.	2001.7.10	
8. Formulation of national standard for HFC227 agent	Tianjin Fire Research Institute	1999.11.10	1)Completed 1 st draft standard for review by the fire protection industry	2001.7.10	

9. Study on the disposal standard for Halon 1211 extinguishers	Shanghai Fire Research Institute	1999.11.10	1) Completed the collection of test samples; 2) Formulated the test plan and procedure; 3) Launched sample test.	2001.7.10	
10. Training	SEPA		four training workshops have been conducted		
Special Initiatives					
1. ABC Dry Powder Production Line	Foshan Electro-Chem General Plant	1999.05.12	All equipment has arrived in plant. The production line is being commissioned.	2001.05.12	
2. Light Weight CO2 Cylinders	Weifang Dongming Fire-fighting Equipment Co., Ltd.		Feasibility study carried out and expected to be completed in the second half of year 2000	Three years after contract signed	

C. Implementation of Technical Assistance Activities and Special Initiatives, 2000 Annual Program

Name of TA Projects	Implementing Agencies	Contract Date	Implementation Status	Planned Completion Date	Remarks
1.Design code for Water Mist Fire extinguishing System					Defer to 2001 annual program
2. National standards for performance requirements and test methods of Components of Water Mist fire extinguishing systems				18 months after the contract signed	
3. Propaganda for halon sector approach and halon alternative technology				18 months after the contract signed	
4. Design Code for Dry Powder Fire Extinguishing System				18 months after the contract signed	
5. National standards for inert gas agents				18 months after the contract signed	
6. Review and Revise Chinese Halon Essential Uses Criteria and List				18 months after the contract signed	
7. Study on test equipment for portable light weight CO ₂ Cylinders				18 months after the contract signed	
8. Revision of national standards for portable Mechanical foam extinguishers				18 months after the contract signed	
9. Revision of national standards for portable dry powder extinguishers				18 months after the contract signed	
10 Study on the use of bulk nitrogen supply for the pressurization of fire extinguishers					Deferred.
11. Training of personnel involved in phaseout activities.	SEPA		Two training workshops were conducted in March, 2000.	December, 2000	
12. Performance audit training	China National Audit Office		Training workshop for provincial auditors conducted in April, 2000.	Completed June , 2000.	
Special Initiatives:					
Halon MIS Update	Qinghua University		The update of Halon MIS has finished.	Three months after contract signed.	
National Halon Phaseout Conference	SEPA		Conference is in preparation	2000.11.30	
Book on China Halon Phaseout Action	SEPA		First draft of the book has been finished	2000.09.30	
Plant Protein Foam p-roject	Hongsen Fire-fighting Hi-tech Co.Ltd.		Contract was signed in early September.	2001.09.31	

Halon Bank Guangdong Branch	Guangdong Fire Fighting Bureau		Company selected to run facility.		
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CHINA Halon Sector Phaseout Action Plan, January 1,1998 to January 1,2010															
		First Stage			Second Stage					Third Stage					Total Funding Request
Year	Base line production	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	
Halon 1211 (MT)															
Production target	9,950	7,960	5,970	3,980	3,317	2,654	1,990	1,990	1,990	0	0	0	0	0	
o.w. Export		800	600	400	200	100	100	100	0	0	0	0	0	0	
Import		0	0	0	0	0	0	0	0	0	0	0	0	0	
Domestic Consumption		7,160	5,370	3,580	3,117	2,654	1,890	1,890	1,990	0	0	0	0	0	
Production phaseout target		1,990	1,990	1,990	663	664	664	0	0	1,990	0	0	0	0	
Consumption phaseout target		1,790	1,790	1790	463	564	764	0	0	1,990	0	0	0	0	
Halon 1301 (MT)															
Production target ^{3/}	618	618	618	618	618	600	600	600	600	150	150	150	150	0	
o.w. Export		318	318	318	318	450	450	450	450	50	50	50	50	0	
Import		0	0	0	0	0	0	0	0	0	0	0	0	0	
Domestic Consumption		300	300	300	300	150	150	150	150	100	100	100	100	0	
Production phaseout target		0	0	0	0	150	0	0	0	450	0	0	0	150	
Consumption phaseout target		0	0	0	0	150	0	0	0	50	0	0	0	100	
Required funding from MLF (\$'000)		1240	970	1060	450	370	590	120	180	1140	40	30	10		6200

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THE CFC PRODUCTION SECTOR OF CHINA 2001 ANNUAL PROGRAMME

PROJECT DESCRIPTION

1. In accordance with the Agreement for the China Production Sector, which requests that annual programmes be submitted for review at the last meeting of the year preceding the year of the programme, the World Bank submitted the year 2001 annual programme for the implementation of the Agreement, with the understanding that funding for the 2001 programme will be approved at the first meeting in that year based on satisfactory performance, as per the Agreement.

2. The submission included 2 parts:

(a) Part I is a progress report on the implementation by China of the 2000 programme as of August 2000.

(i) Implementation of the 1999 annual programme has reduced the CFC production from 50,351 tonnes/ODP to 44,853 tonnes/ODP in compliance with the Agreement approved in March 1999. This was partially accomplished by closing 21 plants whose closures was verified in 1999. Therefore, the total number of CFC plants were reduced from 37 to 16 in 1999. Implementation of the 2000 annual programme would further reduce the CFC production from 44,853 tonnes/ODP to 40,000 tonnes/ODP according to the target set in the sector plan. This would be achieved by closing additional 6 plants, leaving 10 plants still producing by the end of 2000. The first six months of CFC production was reported at 20,978 tonnes/ODP, which was achieved through implementation of tradable production quotas. The report provided a list of plants with names, CFC product, capacity and the 2000 production quota both of the plants that would be shut down and the plants that would be producing. The result of implementing this component of the 2000 programme would be verified by the World Bank and reported to the first meeting of the Executive Committee in 2001.

(ii) The progress report on the 2000 annual programme also includes a list of policy controls that have been enacted by the Government of China which includes "Circular on Control Mechanism of Import and Export of ODS" promulgated in December 1999 and "Export/Import Control List of ODS in China" under which carbon tetrachloride is banned and CFCs are regulated by license.

- (iii) There is an update on the implementation of the biennial technical assistance programme (1999-2000) which includes training of custom officers, personnel to conduct performance audit, feasibility study for a HFC-134a production facility, survey on the ODS applications as chemical process agents in China and other activities.
 - (b) Part II of the World Bank's submission is a description of the components of the 2001 programme, which includes policy actions, production reduction quota, and technical assistance activities. The key component, the production reduction quota would require a reduction of 3,800 tonnes/ODP in 2001 to meet the Agreement target that the national CFC production should be no more than 36,200 tonnes/ODP in 2001. China will continue to implement the tradable production quota combined with the bidding, as well as the implementation of the export/import control mechanism which has been enacted.
3. The submission of the World Bank includes a list of 19 HCFC producers in China as per the Agreement.
4. The World Bank's submission requested disbursement of US \$13 million for implementation of the year 2001 programme and the support cost.

COMMENTS FROM THE SECRETARIAT

Unverified plant closures

1. The plants reported as closed by the World Bank in 1999 includes two plants (Liaoning Chemical Group Chlor-Alkali Plant and the Fujian Shaowu Fluorochemical Plant) which have not been verified. The two verification reports that were submitted by the World Bank to date covered plant closures verified up till January 2000 but not the verification of these two plants which was scheduled for "March 5-8, 2000" in the submission.

Information concerning the implementation of the tradable quota system in China

2. China has been using a tradable quota system to implement the CFC production reductions and it has also been observed from the submission that at the national level the total production of CFC-11 and CFC-12 exceeds the national quota in each case. At the plant level there is also variance between the quota allocated to them and the actual production. However it would be useful to elaborate how the system operates, including such parameters, among other things, like the institution that is administrating the trading and the agency that is supervising its implementation.

RECOMMENDATIONS

1. The World Bank should include the two plants, Liaoning Chemical Group Chlor-Alkali Plant and the Fujian Shaowu Fluorochemical Plant in the verification report to be submitted to the first meeting in 2001.
2. The tradable quota system is the vehicle by which the Government of China is using to implement its CFC reductions. It is important to understand how it is being managed to provide confidence in its effectiveness. Therefore China should provide to the Secretariat information on the operation of the tradable quota system, including such parameters like the institution that is administering the trading, the agency that is supervising its implementation and other detail.

THE CFC PRODUCTION SECTOR

CHINA

2001 ANNUAL PROGRAM

SEPTEMBER 12, 2000

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TABLE B.1: 2001 ANNUAL PROGRAM

Introduction

1. In accordance with the Executive Committee's approval of "The Sector Plan for CFC Production Phaseout in China (Closure Part)" (UNEP/OzL.Pro/ExCom/27/45/Corr.2), China is hereby requesting release of the **third tranche** of **US\$13 million** for the implementation of the 2001 Annual Program. With this funding, China's CFC production will be reduced to a **maximum of 36,200 MT** by the end of 2001, and China will need to phase out an additional 3,798 MT in ODP terms during the year compared to the 2000 quota. Details of the 2001 annual program are provided in Section B.
2. Following the approval of the China CFC Production Sector Plan at the 27th Meeting of the ExCom in March 1999 and the release of funds for the first (1999) Annual Program, China has implemented the phaseout project according to the agreed phaseout plan. Since the start of the program, China has developed supporting policies and regulations. At the beginning of the program, there were 37 CFC production plants in China; the number has been reduced to 10 producers in 2000, CFC production has been reduced from 50,351 MT in 1997 to 44,768 MT in 1999 in terms of ODP, which is lower than the annual requirement, and will not exceed 39,998 MT in 2000.
3. Fourteen technical assistance activities have been started, including activities to strengthen the implementation capacity and conversion capacity of closure enterprises, and preparation of standards to ensure quality and reliability of CFC substitutes.
4. The detailed implementation status of the 1999 and 2000 Annual Programs is described in Section A.
5. **China's CFC phaseout obligations.** Within the Sector Plan, China agreed to the following phaseout schedule for CFCs in Annex A and Annex B in Group I.

CFC Production Phaseout Schedule and Annual Grant

	Agreed schedule ^{1/}		Planned		Actual Produc- tion ^{3/}	Annual grant funding
Year	Phaseout Amount in the year	Maximum production in the year	Phaseout Amount in the year	Maximum planned production ^{2/}		
	<i>(Metric Tons, ODP)</i>					<i>(US\$ million)</i>
1999	5,420	44,931	5,498	44,853	44,768	20
2000	4,931	40,000	4,855	39,998		13
2001	3,800	36,200				13
2002	3,300	32,900				13
2003	2,900	30,000				13
2004	4,700	25,300				13
2005	6,550	18,750				13
2006	5,250	13,500				13
2007	3,900	9,600				13
2008	2,200	7,400				13
2009	4,200	3,200				13
2010	3,200	0				0 ^{4/}
						150

Note: The baseline year for CFC production phaseout is 1997. Baseline year production of CFCs (comprising CFC-11, CFC-12, CFC-113, CFC-114, CFC-115, CFC-13) was 50,351 MT (ODP).

1/ As provided in the agreement.

2/ The sum of quotas issued in the year to the enterprises remaining in production.

3/ Actual total production by the remaining enterprises.

4/ Savings from earlier years would be used for funding the 2010 phaseout.

PART A**IMPLEMENTATION STATUS OF PREVIOUS YEARS' ANNUAL PROGRAMS****As of August, 2000****Phaseout Target**

6. Starting with a baseline production of 50,351 MT in 1997, the phaseout target for 1999 was to reduce CFC production to **44,931 MT**, measured in ODP; following the completion of the bidding process, quotas for only **44,853 MT** were issued to the remaining CFC plants. Actual audited production for 1999, according to an audit carried out by the China National Audit office in June 1999, was verified as **44,768 MT** (See Table A.2). The phaseout target for 2000 was to further reduce CFC production to **40,000 ODP MT**. Following the completion of the bidding process, quotas were only issued for **39,998 MT** to the remaining 10 CFC plants. Actual targeted production phaseout for the year 2000 was therefore **4,855 MT** compared to 1999 quota.

Enterprise Phaseout Activities

7. Details regarding the enterprise phaseout activities in the 1999 and 2000 Annual Programs are provided in Table A1. The impact of closures is summarized as follows:

Date of contracts	No. of lines closed	Enterprises closed	Capacity closed (MT)	Enterprises remaining
No. of enterprises at start of program (36 in Sector Plan, 1 identified later):				37
Plant closures in the 1999 Annual Program				
1. April & May 1999	17	14 (all complete closures)	22,630	23
2. April & May 1999	3	1 (2 enterprises closed one line each, and the 3 rd enterprise was completely closed)	4,000	22
		Total	26,630	
3. June 99	8	7 (all complete closures)	23,800	15
Closures under 2000 Annual Program				
December 1999 to March 2000	5	5 (complete closures); a sixth enterprise has accepted a reduction of quota.	15,500	10

8. Three sets of closures were carried out under the 1999 Annual Program.

- a) Under the production sector agreement, China committed to close and dismantle production facilities at 14 enterprises that had not been in production in 1997 (one of these lines did, however, produce some CFCs in the early part of 1999, prior to the agreement). Between April 22 and May 12, SEPA signed closure contracts with these 14 enterprises listed in the approval conditions for the CFC Production Sector Phaseout Plan. The reduction of production capacity resulting from the closure of these 14 enterprises totaled 22,630 MT (Table A1, Part 1).

- b) Contracts were also signed with 3 other enterprises for closing down production lines that had no production in 1997. The reduction of production capacity resulting from the closures of these three lines totaled 4,000 MT (Table A1, Part 2). The total production capacity dismantled through these permanent closures was 26,630 MT. In accordance with the Agreement for the CFC Production Sector, all production lines and plant facilities had been dismantled and their primary CFC production equipment destroyed by the end of June 1999.
- c) As a result of the quota regulation and bidding for 1999 quotas (see below), contracts were signed in June 1999 with 7 enterprises to phase out production capacity of 23,800 MT (Table A1, Part 3). All the enterprises have completed dismantling of their facilities; the production lines at each location have been verified by a World Bank team that visited the sites and confirmed that these facilities are no longer capable of producing CFCs and their primary production equipment has been fully dismantled.

9. Under the 2000 Annual Program, as a result of the quota regulation and bidding, contracts were signed in December 1999 with 6 enterprises, of which 5 enterprises were to close and dismantle production facilities and one enterprise was to accept a reduction in quota, so as to enable a phase out of production capacity totaling 15,550 MT in 2000 (Table A1, Part 4). By the end of March, 2000, all the closing production lines and plant facilities had been dismantled and their primary CFC production equipment had been destroyed in accordance with the Agreement for the CFC Production Sector. These production lines were visited by a World Bank team in early September, 2000 to confirm that they are no longer capable of producing CFCs and their primary production equipment has been fully dismantled. The enterprise accepting a reduction in quota will be verified in 2001.

10. CFC production for 1999 was audited by the China National Audit office, and has been verified at 44,768.12 MT in ODP terms; details are at Table A.2. In year 2000, production recorded up to June 30, 2000 totalled 20,978 MT of ODP. Details are provided in Table A.3.

Implementation of Policy Instruments

11. *Key instrument.* The key policy instrument of the program is the regulation promulgated for the introduction and implementation of an annual tradable quota system, entitled "Circular on Implementing the Quota System for CFC Production", by the State Environmental Protection Administration (SEPA) and the State Administration of Petroleum and Chemical Industry (SAPCI) on May 31, 1999. A bidding system was also introduced together with the promulgation of the tradable production quota. Under this regulation, seven CFC producers were awarded grants through bidding in 1999 to reduce production of 5,498 ODP MT, and a national CFC production quota of 44,853 MT was issued to the 15 remaining CFC producers in order to ensure that the national production for the year did not exceed the agreed target. Similarly, for 2000, five CFC producers were awarded grants to stop production, and one CFC producer accepted a reduction in production quota, for a total phaseout of 4,855 ODP MT; overall, a national CFC production quota of 39,998 MT was issued in February to the 10 remaining CFC producers in order to ensure that the national production for the year does not exceed the agreed target.

12. *Other instruments relate to trade in CFCs.* A study on options for export/import management for halons and CFCs, which would help China to monitor trade in CFCs and prevent illegal CFC trade, was completed in July 1999. A “Circular on Control Mechanism of Import and Export of ODS” was promulgated on December 3, 1999. The mechanism is implemented by Management Office of ODS Import-Export Control jointly administered by SEPA, the General Administration of Customs (GAC), and the Ministry of Foreign Trade and Economic Cooperation (MFTEC), and helps China to monitor trade in ODS and eliminate illegal ODS trade. An *Export/Import Control List of ODS in China* was promulgated in January 2000. Imports of Carbon Tetrachloride, a key feedstock for CFCs production, were banned on April 1, 2000, and imports of CFCs are regulated by a permit system administered by the MFTEC.

Technical Assistance Activities

13. Sixteen technical assistance activities have so far been identified under the first two annual programs, and fourteen have either been completed or are underway.

14. The 1999 Annual program originally had ten technical assistance activities. One TA project, *ODS export/import management and monitoring study* that was originally included in the 1999 annual program was cancelled because its objectives were covered under a similar study conducted under the Halon Sector Phaseout Program. Instead, another project, a *survey on the ODS application as chemical process agents in China*, was added to the 1999 annual program. Some activities have already been completed and the rest are being conducted. All are expected to be completed within two calendar years. Similarly, there were five technical assistance activities taken up in the original and approved 2000 Annual Program, and a new workshop for customs staff is being added. All the TA activities have started and all are expected to be completed within two calendar years.

15. The status of the 1999 technical assistance activities as of July 2000:

- a) Production of an ODS phaseout video. An ODS Phaseout video was prepared and broadcast for public information during the 11th meeting of the Parties in Beijing in November 1999. The video, as well as six TV advertisements prepared under the activity, have been broadcast on national TV to raise awareness of the general public and authorities in China concerning the necessity for ODS phaseout and the urgency of phaseout activities. All activities have been completed.
- b) Development of a Management Information System (MIS). An MIS has been established and is now in place, and has been used to generate the final 1999 production data and program progress reports. Modifications will be made to the MIS continuously over the implementation of the program to reflect the changing requirements of the program.
- c) Development of a substitute strategy. TORs were agreed with the World Bank in January 2000. After a bidding process, a contract was signed in June 2000, and the study is under way. It is expected to be completed in June 2001.
- d) Formulation of Standards for Cyclopentane, HCFC 141b, and HFC 134a. A TOR was agreed with the World Bank and a contract was signed in April, 2000;

preliminary sampling of HCFC-141b and HFC-134a has been completed for testing, and preliminary content and parameters of the standards have been confirmed with the Government's administrative unit for standards. This TA is expected to be completed by the end of 2001.

- e) Evaluation of bids for a feasibility study for setting up of a HFC 134a production facility. Funding was provided to an evaluation of four proposals bidding to win the opportunity to undertake a feasibility study for the construction of a HFC 134a production facility. Bid evaluation was finalized and a winner was selected. The feasibility study and evaluation of the feasibility study are expected to be completed within 2000.
 - f) Training of personnel involved in phaseout activities. Two training workshops were conducted in 1999 for CFC producers, local Environmental Protection Bureaus and local Chemical Industry Bureaus. Moreover, an audit training workshop was conducted in April 2000. All activities under this TA have been completed.
 - g) Initial desk review of the consumption of ODS in the Chemical Process Agents Application sector in China. This review was carried out in January, 2000 and the Report of Preliminary Survey on the ODS Application as Chemical Process Agents in China has been used as the basis for preparations on the project preparation request for the Process Agent Sector Phaseout Plan in China.
 - h) Market prospects for closure enterprises. This TA activity has been completed. Nine enterprises submitted applications and eight were funded. The first disbursement was made to enterprises in February 2000, and all enterprises submitted their completion reports to the sector team by May 2000. A report of the project activities was submitted to the World Bank on June 5, 2000, reporting on the generally useful results of this experience.
 - i) National Workshop on substitute development. This workshop was conducted on June 7, 8 and 9, 2000. 35 representatives from 30 CFC enterprises attended the workshop, and 11 experts from four domestic famous research institutes and universities made presentations at the conference. The experts introduced research topics relating to nine categories of CFC substitutes, fine fluorine chemicals, electrical fluorinated chemicals, electronic pure chemical reagents, special fluorine-containing drugs and agrochemicals (herbicide, insecticide etc.); production of these chemicals, and their potential market prospects. Many enterprises expressed an interest in seeking assistance and collaboration from these institutes and universities.
 - j) Recruitment of International Technical Consultants. No technical consultants were recruited internationally for TA activities in 1999.
16. The status of the 2000 technical assistance activities as of July 2000:
- a) Formulation for standards for HFC-152a, and isobutane. Draft TORs were agreed with the World Bank in August 2000.

- b) Training of personnel involved in implementation of phaseout activities (including performance audit training). A TOR was submitted to the World Bank on April 25, 2000, and agreement was reached in early August 2000. Training activities for production quota bidding, for local Environmental Protection Bureaus, Petroleum Chemical Industrial Bureaus or relevant institution and auditors, are scheduled to be conducted in September, November and December 2000. A workshop for Customs staff will be added. Training activities will be conducted in Dec. 2000.
- c) Studies of market prospects for closure enterprises. Based on the generally successful experience of this activity in 1999, a similar TOR enabling such studies for both closure and production enterprises, has been reviewed with the World Bank and agreed in early August 2000. All activities are expected to be completed by the middle of 2001.
- d) Performance Audit. A Performance audit is required under the CFC sector plan. The China National Audit Office (CNAO) has informed SEPA that, as the content of this audit is more substantive than the conventional financial audits, additional expenditures are necessary to finance this activity annually. A TOR has been agreed between the Bank and SEPA for this purpose. The 1999 Performance Audit has been completed.
- e) Verification of HCFC-22 Producers. The list of producers of HCFC-22 in China has been provided along with the annual program. A survey will be conducted to validate the list and verify whether there have been any changes.
- f) Recruitment of international technical consultants. No technical consultants are expected to be recruited in 2000. This activity will be activated when necessary.

Plants producing HCFC-22 in China

17. As required by the agreement on the production sector, China has provided a list of the plants producing HCFC-22 in China, attached in Table A.4. The list will be verified in the second half of 2000 as indicated above.

Table A.1: Status of All CFC Producing Plants under the Production Sector

SRI No.	Name of CFC producers	CFC produced	Capacity (MT /Y)	Status/Date Dismantling verified ¹	Production Data ² (MT/ODP)	
PART 1: PRODUCTION LINES CLOSED AS PART OF APPROVAL CONDITIONS (CONTRACTS 4&5/ 1999)					"Assigned" Quota	1999 production
A3	Shangdong Dongyue Chemical Co. Ltd. (1 CFC-12 production line only)	CFC-12	5,000	Aug 16-20, 1999	1,042	1,042
C2	Hunan Yiyang Chlor-Alkali Chemical Co. Ltd. 1 CFC 12 production line.	CFC-12	1,000	SRI report + Aug 16-20, 1999		
C5	Inner Mongolia Baotou Chemical Plant #1. 1 CFC-12 production line.	CFC-12	700	Aug 23-27, 1999		
C1	Jiansu Jianhu Phosphate Fertilizer Plant 1 CFC-12 production line.	CFC-12	500	August 8-13, 1999		
B4	Sichuan Zigong Fujiang Chemical Plant 1 CFC-11 production line and 1 CFC-12 production line.	CFC-11 CFC-12	1,500 1,000	August 8-13, 1999		
B9	Zhejiang Linhai Jianxin Chemical Plant 1 CFC-12 production line.	CFC-12	800	SRI report + August 16, 1999		
A14	Guangdong Huiyang Chemical Plant 1 CFC-11 production line and 1 CFC-12 production line.	CFC-11 CFC-12	1,000 3,000	August 8-13, 1999		
A1	Henan Hebi Chemical Plant #1. 1 CFC-12 production line.	CFC-12	1,500	Aug 16-20, 1999		
C3	Hebei Longwei Fluorochemical Plant #1 2 CFC-12 production lines.	CFC-12	1,080	SRI report + Aug 16-20, 1999		
C4	Guizhou Wuling Chemical Plant. 1 CFC-12 production line and 1 CFC-13 production line.	CFC-12 CFC-13	1,500 50	SRI report + August 8-13, 1999	18	0
A15	Guangdong Zhaoqing Chemical Plant. 1 CFC-12 production line.	CFC-12	500	August 8-13, 1999		

¹ Exact date of verification visit to plant by the Bank team. References to the SRI report in this column indicate that, according to the technical audit report, the plant had already been dismantled.

² All numbers rounded off.

SRI No.	Name of CFC producers	CFC produced	Capacity (MT /Y)	Status/Date Dismantling verified	Production Data ³ (MT/ODP)	
	(PART 1 CONTD.)				"Assigned" Quota	1999 production
C6	Shanxi Shangzhou Chemical Plant1 CFC-12 production line	CFC-12	2,000	Aug 16-20, 1999		
A12	Shanghai Shuguang Chemical Plant 2 CFC-113 production lines.	CFC-113	1,000	August 8-13, 1999		
B10	Zhejiang Linhai Shuiyang Chemical Plant 1 CFC-12 production line.	CFC-12	500 MT	SRI report + August 8-13, 1999		
1	Total Production capacity dismantled through these closures	CFC-11	2,500		0	0
		CFC-12	19,080		1,060	1,042
		CFC-13	50		0	0
		<u>CFC-113</u>	<u>1,000</u>		<u>0</u>	<u>0</u>
		Total	22,630		1,060	1,042
PART 2: ADDITIONAL PRODUCTION LINES CLOSED IN 1999 (CONTRACTS 4&5/99)						
SRI No.	Name of CFC producers	CFC produced	Capacity (MT /Y)	Status/Date Dismantling verified	Production Data (MT/ODP)	
A2	Shangdong Jinan 3F Chemical Co. Ltd. 1 CFC-11 production line	CFC-11	1,500	Aug 16-20, 1999	0	0
Not audited by SRI	Liaoning Chemical Group Chlor-Alkali Plant. 1 CFC-12 production line.	CFC-12	1,000	March 5-8, 2000	0	0
B15	Fujian Shaowu Fluorochemical Plant. (one CFC-11 production line only; CFC12 line remained in production.)	CFC-11	1,500	March 5-8, 2000	0	0
	Total Production capacity dismantled through these closures	CFC-11	3,000		0	0
		<u>CFC-12</u>	<u>1,000</u>			
		Total	4,000			

³ Quotas are tradable between enterprises after allocation, and consequently may not match production levels.

Table A.1: Status of All CFC Producing Plants under the Production Sector (con't)

PART 3: PLANTS CLOSED IN 1999 AT APPROVAL IN ACCORDANCE WITH QUOTA REGULATION (CONTRACTS 6/ 99)						
SRI No.	Name of CFC producers	CFC produced	Capacity (MT /Y)	Status / Date Dismantling verified	Production Data (MT/ODP)	
					1999⁴ Quota	1999 production
B2	Chongqing Tianyuan Chemical Plant. CFC-11 and CFC-12 on the same production line	CFC-11 CFC-12	500 *	January 16, 2000	0	14 0
B5	Hubei Wuhan Changjiang Chemical Plant 1 CFC-11 production line, 1 CFC-12 production line	CFC-11 CFC-12	1,500 4,500	January 15, 2000	0	0 0
A5	Jiangsu Wuxian Juxing Chemical Plant 1 CFC-11 production line	CFC-11	2,000	January 14, 2000	0	0
A6	Jiangsu Wuxian Union (City Link) Chemical Plant. 1 CFC-11 production line	CFC-11	1,800	January 14, 2000	0	0
B1	Jiangxi De'an Refrigeration Plant 1 CFC-12 production line	CFC-12	3,000	January 12, 2000	0	0
A2	Shandong Jinan 3F Chemical Co. Ltd. 1 CFC-12 production line	CFC-12	3,500	August 17, 1999	0	0
B6	Shanghai Chlor-Alkali Chemical Plant Co. Ltd. 1 CFC-12 production line	CFC-12	7,000	January 13, 2000	687	687
	Total Production capacity dismantled through these closures, production 'quota' (derived from baseline) and actual production	CFC-11 <u>CFC-12</u> Total	5,800 <u>18,000</u> 23,800		0 <u>687</u> 687	14 <u>687</u> 701

⁴: Quotas are tradable between enterprises after allocation, and consequently may not match production levels.

Table A.1: Status of All CFC Producing Plants under the Production Sector (con't)

PART 4. PERMANENT PLANT CLOSURES AND QUOTA REDUCTIONS AFTER 2000 ANNUAL QUOTA BIDS (CONTRACTS 12/99)						
SRI No.	Name of CFC producers	CFC produced	Capacity (MT /Y)	Status/Date Dismantling verified	Production Data (MT/ODP)	
					1999 Quota⁴	1999 production
A9	Jiangsu Wuxi Hushan Refrigeration Plant 1 CFC-11 production line	CFC-11	4,000	<i>For 9/2000</i>	1,003	560
B3	Sichuan Zigong Refrigerant Plant 1 CFC-11 production line, 1 CFC-12 production line	CFC-11 CFC-12	1,500 1,500	<i>For 9/2000</i>	409 54	198
B13	Zhejiang Lanxi Refrigeration Plant 1 CFC-11 production line	CFC-11	2,500	<i>For 9/2000</i>	1,670	785
B7	Zhejiang Rui'an Haitian Chem. Co. Ltd. 1 CFC-11 production line	CFC-11	5,000	<i>For 9/2000</i>	1,122	617
A4	Shandong Xuecheng Xinxing Chemical Plant 1 CFC-12 production line	CFC-12	1,000	<i>For 9/2000</i>	110	0
A10	Jiangsu Changshu Ref. Plant (Changshu 3F) reduction – quota reduced by 50 MT	CFC-113	50 (quota reduction only)	<i>For 9/2000</i>	See Part 5	
	Total impact on national capacity, production quota, and actual production	CFC-11 CFC-12 <u>CFC113</u> Total	13,000 2,500 <u>50</u> 15,550		4,204 164 <u>0</u> 4,368	2,160 0 <u>0</u> 2,160

⁴: Quotas are tradable between enterprises after allocation, and consequently may not match production levels.

Table A.1: Status of All CFC Producing Plants under the Production Sector (contd.)

PART 5. PLANTS REMAINING IN 2000						
SRI No.	Name of CFC producers	CFC produced	Capacity (MT /Y)		Production Data (MT/ODP)	
					1999 Quota⁴	1999 production
A8	Jiangsu Meilan Electric Chem. Plant 1 CFC-11 line and 1 CFC-12 line	CFC-11 CFC-12	3000 3000		1,337 1,866	1765 1866
B14	Zhejiang Juhua Florochem. Com. Ltd. Produce CFC-11 and CFC-12 in 1 production line	CFC-11 CFC-12	4000 8000		3,375 6,325	3374 6324
A10	Jiangsu Changsu Refrig. Plant (Changsu 3F) 1 CFC-11 production line, 1 CFC-12 production line, 1 CFC-113 production line and 1CFC-115 production line	CFC-11 CFC-12 CFC-113 CFC-115	10,000 5,000 4,000 200		7,960 2,597 3,086 20	7960 2780 2834 90
A7	Suzhou Xinye Chemical Co. Ltd. 2 CFC-11 production line	CFC-11	7,000		5,809	7408
B8	Zhejiang Linhai Limin Chem. Plant 2 CFC-12 production line and 1 CFC-13 production line	CFC-12 CFC-13	3,000 50		1,189 27	1189 27
B15	Fujian Shaowu Floro-chem. Plant 1 CFC-12 production line	CFC-12	3,500		979	980
B12	Zhejiang Dongyang Chem. Plant 1 CFC-12 production line	CFC-12	5,000		2,053	2051
A13	Guangdong Xiangsheng Chem. Co. Ltd. 1 CFC-12 production line	CFC-12	3,000		1,487	1601
A11	Jiangsu Changsu Yudong Chem. Plant 2 CFC-113 production line	CFC-113	1,000		544	544
B11	Zhejiang Chemical Research Institute 1 production line to produce CFC-114 and CFC-115	CFC-114 CFC-115	100 100		11 72	0 72
		CFC-11 CFC-12 CFC_13 CFC-113 CFC-114 CFC-115 Total	24,000 30,500 50 5,000 100 300 59,950		18,481 16,496 27 3,630 11 92 38,737	20,507 16,791 27 3378 0 162 40,865
			Grand Total of Parts 1 through 5		44,852	44,768

⁴: Quotas are tradable between enterprises after allocation, and consequently may not match production levels.

Table A.2: CFC Production in 1999 verified by CNAO Audit (Figures in MT ODP)

SRI no.	CFC producers	CFC 11	CFC 12	CFC 113	CFC 114	CFC 115	CFC13	Total
A8	Jiangsu Meilan Electric Chemical Plant	1,765	1,866					3,631
B14	Zhejiang Juhua Florochemical Company, Ltd.	3,374	6,324					9,698
B6	Shanghai Chlor-Alkail Chemical Co. Ltd.		687					687
A10	Jiangsu Changsu Refrigerant Plant (Changsu 3F)	7,960	2,779	2,834		90		13,664
B12	Zhejiang Dongyang Chemical Plant		2,052					2,051
B13	Zhejiang Lanxi Refrigerant Plant	786						785
A3	Shandong Dongyue Chemical Co. Ltd. ***		1,042					1,042
B11	Zhejiang Chemical Research Institute					72		72
A9	Jiangsu Wuxi Hushan Refrigerant Plant	560						560
B3	Sicuan Zigong Refrigerant Plant	198						198
B2	Chongqing Tianyuan Huagong Chemical Plant General	14						14
B8	Zhejiang Linhai Limin Chemical Plant		1,188				26	1,215
A11	Jiangsu Changsu Yudong Chemical Plant			545				545
B15	Fujian Shaowu Floro-Chemical Plant		979					979
B7	Zhejiang Rui'an Haitian Chemical Co. Ltd.	617						617
A7	Suzhou Xinye Chemical Co. Ltd.	7,408	1,602					9,009
	Total	22,682	18,519	3,379	0	162	26	44,768

***: Shandong Dongue was targeted for closure in 1999 because it had no production in 1997; however, it produced some CFCs in early 1999 before the agreement. There were fifteen other producers in the first year of the program.

Table A.3: CFC Production in 2000 (Figures in MT ODP) (Data up to June 30, 2000; to be updated at end-year)

SRI No.	CFC producers	CFC 11		CFC 12		CFC 113		CFC 114		CFC 115		CFC 13		Total	
		Quota	Actual Production	Quota	Actual Production	Quota	Actual Production	Quota	Actual Production	Quota	Actual Production	Quota	Actual Production	Quota	Actual Production
A8	Jiangsu Meilan Electric Chem. Plant	1,050	362	1,793	734									2,843	1,096
B14	Zhejiang Juhua Florochem. Com. Ltd.	4,339	2,485	7,760	4,420									12,099	6,905
A10	Jiangsu Changsu Refrig. Plant	10,232	4,731	2,739	2,117	3,036	1,469			20	33			16,027	8,350
A7	Suzhou Xinye Chemical Co. Ltd.	2,532	1,600											2,532	1,600
B8	Zhejiang Linhai Limin Chem. Plant			1,365	584							27	11	1,392	595
B15	Fujian Shaowu Floro-chem. Plant			1,159	549									1,159	549
B12	Zhejiang Dongyang Chem. Plant			2,219	871									2,219	871
A13	Guangdong Xiangsheng Chem. Co. Ltd.			1,100	683									1,100	683
A11	Jiangsu Changsu Yudong Chem. Plant					544	288							544	288
B11	Zhejiang Chemical Research Institute							11	0	72	41			83	41
	Total	18,153	9,178	18,135	9,958	3,580	1,757	11	0	92	74	27	11	39,998	20,978

There will be no trade in quotas between enterprises in 2000.

Table A.4 List of HCFC-22 producing plants in China

Name	Status
Fujian Shaowu Fluoro-Chemical Plant	<i>Also reported in 1999</i>
Guangdong Huiyang Chemical Plant	-do-
Hunan Zhuzhou Chemical Corporation (Group)	-do-
Jiangsu Changshu Refrigeration Plant	-do-
Jiangsu Changshu Elf Atochem 3F Co., Ltd.	-do-
Jiangsu Meilan Electric Chemical Plant	-do-
Liaoning Fuxin Fluoro-chemical Plant	-do-
Shanghai Chlor-Alkali Chemical Co. Ltd.	-do-
Sichuan Chenguang Chemical Research Institute Plant No.2	-do-
Sichuan Zigong Refrigeration Plant	-do-
Shandong Jinan 3F Chemical Co. Ltd.	-do-
Shandong Dongyue Chemical Co. Ltd.	-do-
Shandong Fire Extinguishing Agent Plant Shouguang Division	-do-
Sichuan Zigong Fujiang Chemical Plant	-do-
Wuhan Changjiang Chemical Plant	-do-
Zhejiang Juhua Fluoro-chemical Co. Ltd.	-do-
Zhejiang Dongyang Chemical Plant	-do-
Zhejiang Linhai Limin Chemical Plant	-do-
Zhejiang Yingpeng Chemical Co. Ltd.	-do-

PART B

2001 ANNUAL PROGRAM

Phaseout Objectives

1. The phaseout objective of the 2001 Annual Program is to ensure that CFC production in the year does not exceed 36,200 MT. China is requesting the release of the **third annual tranche of US\$ 13 million** as agreed in the overall CFC Production Sector Phaseout Plan to achieve this objective. It is envisaged that the US\$ 13 million will be allocated for closing CFC production lines or reducing production levels in some CFC enterprises which received production quota in 2001, for technical assistance activities, and for activities relating to substitute development.

Program Activities During the Year

2. **Policy actions.** In 2001, the following policies and measures will continue to be implemented by the Government. These policies are considered necessary for the success of a total CFC production phaseout in China.

- a) Tradable production quota – The regulation has been under implementation since 1999, and will continue.
- b) Export and import control mechanism – The Management Regulation on Export/Import Control of ODS, promulgated in December 1999 by SEPA in collaboration with Ministry of Foreign Trade and Economic Cooperation (MFTEC) and General Administration of Customs (GAC), covers all ODS as well as related equipment and facilities that produce or consume ODS. ODS Export/Import quota and permit systems have been adopted, and all enterprises wishing to export or import ODS must hold both a quota issued by SEPA and MFTEC, as well as specific export/import permits. GAC supervises exports and imports of ODS. China has also promulgated the Export/Import Control List of ODS in China (The First Group) in January, 2000. Under this regulation, China has banned exports and imports of CTC, and introduced quota and permit requirements exports and imports of CFC 11, 12, 113, 114 & 115, CFC 13, halon 1211 and halon 1301.

3. **Enterprise activities.** Through the interaction of production quota and bidding systems, bid winners would be granted funds for closure. All CFC reduction or closure contracts are expected to be signed by the end of 2000, but in any case will be signed no later than the end of the first quarter of 2001. Closure projects are expected to take effect from January 1, 2001 and to be completed by the end of June 2001.

4. **Technical assistance(TA) activities.** TA activities envisaged under the Sector Plan concentrate on strengthening: (a) the overall institutional framework for phaseout; (b) substitute chemical development; (c) management, monitoring & evaluation capabilities of participating institutions; (d) skills of enterprise managers involved in CFC production phaseout activities; and (e) information exchange. These are all essential to the success of the phaseout. All terms of reference and detailed work programs will be agreed with the World Bank before implementation. Most of

these activities are expected to be completed within two years. Proposed 2001 TA activities include:

- a) A feasibility study of industrialized technology for CTC conversion to chloro-hydrocarbons other than CTC. There are currently more than 20 plants producing CTC with an annual production of 35,000 MT and total capacity of 70,000 MT in China. Because 90% of CTC production is used as specialized raw materials for CFCs, market prospects and profitability will deteriorate as CFC production is phased out. Two kinds of technical processes dominate CTC production, and it is intended to examine whether one or both are suitable technically and economically for conversion to production of chloro-hydrocarbons other than CTC. For this purpose, laboratory and pilot experiments must be conducted to determine technical and economic feasibility. Since the experiments under this TA are expected to take almost two years, the 2001 Annual Program will finance the laboratory experiments, and pilot experiment at selected enterprises will be financed by another TA in the 2002 annual program.
- b) Training of personnel involved in implementation of phaseout activities. To implement the phaseout plan effectively, it is necessary to train staff in: (i) local environmental protection bureaus; (ii) local bureaus of Petroleum and Chemical Industry or relevant agencies; (iii) CFC producers; (iv) Customs; and (v) audit agencies. Training is needed to prepare enterprises to bid in the following year, to train government officials to properly supervise CFC production, and to learn operating procedures of the CFC production sector phaseout approach. This type of training will need to be repeated every year in the first few years of implementation. For the 2001 Annual Program, a workshop to evaluate progress in the phaseout program, including ODS production phaseout, consumption demand and substitutes supply, is included.
- c) Market prospects for closure and production enterprises. Based on the generally successful experience of this activity in previous years, a similar technical assistance package enabling both closure and production enterprises to carry out analysis and study of alternative commercial options, will be put into operation
- d) Recruitment of international technical consultants. Consultants will be recruited, where and when necessary, especially in the field of CTC conversion, to provide technical guidance to CTC conversion activities.
- e) Risk Assessment Study: This study was originally part of the UNEP Business plan for 2000, and has been transferred to the Bank after discussions during the July 2000 meeting of the ExCom. China and the Bank have been discussing the methodology and coverage of this study, and it will be included in the 2001 Annual Program activities after the TOR is agreed.
- f) SNAP – To guide the production and consumption of ODS substitutes in the years ahead, SEPA intends to issue a List for ODS Substitutes in China. For this purpose, it will carry out a comprehensive study, including a proposed collaborative study with the USEPA on its experience, a survey on production and application of substitutes in

the domestic market, and tests to identify the character of substitutes. TORs will be developed

- g) **Performance Audit.** A Performance audit is required under the CFC sector plan. The China National Audit Office (CNAO) has informed SEPA that, as the content of this audit is more substantive than the conventional financial audits, additional expenditures are necessary to finance this activity annually. A TOR for the 2000 performance audit will be agreed between the Bank and SEPA for this purpose by November 2000, and the audit is expected to be completed by June 30, 2001.
- h) Other TA activities that are necessary for effective phaseout may be developed during the year.

5. **Special Initiatives:** As the phaseout of ODS production proceeds, the demand for substitutes in the consumption sector has increased rapidly. The impact of the first two years of implementation of CFC sector plan equals a phaseout of more than 10,351 tons of CFC 11 and 12. The phaseout of CFC-11, which is the major foaming agent, has impacted on production in the foam sector, and there is an urgent need to move into production of substitutes such as Cyclopentane and HCFC-141b. The use of CFC-12 as refrigerant in air-conditioners installed in all newly produced cars will be forbidden from January 1, 2002. It is estimated that the demand for HFC-134a, presently the only substitute of CFC-12 in the MAC sector in China, will exceed 7,500 tons in 2005 in this sector alone, and could reach 19,000 tons by 2010. China therefore envisages an urgent need to initiate special initiatives to produce such substitutes to ensure that there is no shortfall in their supply. China therefore intends to review the scope of adequate domestic production of HFC134a. In the 1999 annual program, a TA activity was included to evaluate the bidding proposals on establishing a HFC 134a production facility. A bid winner was selected in June 2000 and a feasibility study for HFC-134a production has been initiated; the study is expected to be completed and evaluated in 2000. The study will be reviewed by the Chinese authorities, and if it is considered acceptable, China intends to support the establishment of a production facility for HFC-134a, and may provide financial support from grant proceeds, as provided under the provisions of maximum flexibility in section (d) of the Agreement for the China Production Sector.

6. The above policy initiatives, enterprise-level and technical assistance activities are summarized in Table B.1 below.

TABLE B.1: 2001 ANNUAL PROGRAM
(AMOUNT IN US\$ MILLION)

CFC production phaseout targets						
	Funding (US\$ mill.)	2000 Quota ⁴ (MT)	Phaseout in 2001 (MT)	Allowed Production in 2001 ⁵ (MT)	Performance Indicators	Key Dates
CFC in terms of ODP	13	39,998	3,798	36,200	1. Closures of current producers and reduction in production in remaining producers 2. Implementation of TA activities to help phaseout. 3. Production level not more than 36,200 MT	1. Dec. 2000-June 2001 2. Dec. 2000-Dec. 2001 3. Dec.31, 2001
Policy Initiatives						
Initiatives	Funding	Performance Indicators				Key Dates
1. Bidding system	incl.in TA n.a. n.a. n.a.	1. Training enterprises for bid preparation in the 2001 bidding 2. Determine winning enterprises for 2001 3. Sign closure contracts with bid winners 4. Implement closure contracts				1. Oct. 2000 2. by Dec. 2000 3. Dec. 2000 4. Dec. 2000-June 2001
	incl. in TA	5. Train enterprises for bid preparation for 2002 bidding				5. Oct. 2001
2. Tradable production quota for CFC producers	n.a.	1. Establish 2001 annual CFC production quota 2. Issue annual production quota to CFC producers for 2001				1. Feb. 2001 2. Feb. 2001
3. Import/export trade management	n.a.	1. implement the import/export trade management mechanism.				1. January 2001-December 2001
Enterprise activities						
	Funding (US\$ million)	Existing lines	# of lines targeted	# of lines at end of 2001	Performance Indicators	Key Dates
Closure of CFC11/12/113 production lines	12.00	17	t.b.d.	t.b.d.	1. Training of bidders 2. Bidding for grant funds 3. Selection of bid winners 4. Contracts signed 5. Facilities dismantled, and reports completed	1. Oct. 2000 2. Oct. 2000 3. by Dec.. 2000 4. end-Dec. 2000 5. no later than June 2001
Special Initiatives						
	Funding (US\$ million)					Key dates
HFC 134a Production	t.b.d.	Establishment of HFC-134a production facilities of up to 10,000 MT				t.b.d.

⁴ Total quota issued for 2000, compared with the amount allowed under the Phaseout Plan of 40,000 MT.

⁵ Maximum production quota that can be allocated for calendar 2001.

TABLE B.I: 2001 ANNUAL PROGRAM (CONT.)
(AMOUNT IN US\$ MILLION)

Technical assistance activities			
Activities	Funding ^{1/} (US\$ Million)	Performance Indicators	Key Dates
1. A feasibility study of industrialized technology for CTC conversion to chloro-hydrocarbon other than CTC	0.15	1. TOR to be agreed with the Bank 2. Select Contractor 3. Contract signing 4. Basic information gathering in China 5. Investigation abroad 6. Laboratory experiments 7. Seminar to discuss technology conversion 8. Final report	1. December 2000 2. Mid Feb. 2001 3. End March 2001 4. no later than May. 2001 5. no later than May. 2001 6. June 2001-Oct. 2002 7. no later than Nov. 2002 8. no later than Dec. 2002
2. Training	0.10	1. TOR to be agreed with World Bank 2. Training on supervision and evaluation of CFC production, bidding system, management of CFC production quota system, and CFC Project Implementation Manual 3. Seminar on review of ODS production phaseout	1. Oct. 2000 2. Start in Jan. 2001. Specific schedules to be detailed in TORs 3. Sept. 2001
3. Recruitment of international consultants	0.10	1. Finalization of TORs for consultant assignments 2. Signing of contracts 3. Completion of work and submission of reports by consultants	1. Throughout 2001 2. Throughout 2001 3. Throughout 2001
4.Risk Analysis	0.20	TOR to be agreed with the Bank	By June 2001
5.SNAP	0.25	1 TOR to be agreed with the Bank 2 Select Contractor 3 Contract signing 4 Basic information gathering in China 5 Investigation abroad 6 Laboratory experiments 7 Seminar to discuss substitute list 8 Final report 9 Issue substitute list (first group)	1 December 2000 2 Mid Feb. 2001 3 End March 2001 4 no later than May. 2001 5 no later than May. 2001 6 June 2001-Oct. 2002 7 no later than Nov. 2002 8 no later than Dec. 2002 9 first half of year 2003
6.Market prospects for closure etc.	0.10	1. TOR to be agreed with the bank and Invitation of applications 2. Bid evaluation 3. Bid award 4. Contract signing 5. Contracts signing between bid winners and their contractors 6. SEPA receipt of progress reports from bid winners 7. Completion of projects by individual bid winners 8. SEPA completion report for the project	1 No later than Feb.2001 2.June 2001 3. June 2001 4. July 2001 5. July-August 2001 6. Sept. 2002 7. Nov. 2002 8. End of 2002
Recruitment of international technical consultants	0.10		1. Throughout 2001-2002
Subtotal	1.00		
TOTAL for phaseout activities	13.00		

^{1/} These are estimated costs. After bidding for TA contractors, these costs will be adjusted to reflect contractual amounts for each TA. All TA activities are to be completed in two years from January 2001.

PROJECT EVALUATION SHEET CHINA

SECTOR: Refrigeration ODS use in sector (1999): 16,065 ODP tonnes

Sub-sector cost-effectiveness thresholds: Domestic US \$13.76/kg

Project Titles:

- (a) Phaseout of CFC-11 by conversion to cyclopentane technology and CFC-12 by conversion to isobutane (600a) technology in the manufacture of domestic freezers at Qingdao Haier No. 2 Freezer Plant
- (b) Replacement of CFC-11 and CFC-12 with cyclopentane and isobutane in the production of refrigerators at Little Swan Electric (Jingzhou) Co. Ltd.

Project Data	Domestic	
	Qingdao Haier No. 2	Little Swan
Enterprise consumption (ODP tonnes)	180.83	211.95
Project impact (ODP tonnes)	180.83	211.95
Project duration (months)	36	36
Initial amount requested (US \$)	1,138,687	3,204,521
Final project cost (US \$):		
Incremental capital cost (a)	830,580	2,609,243
Contingency cost (b)	83,058	255,624
Incremental operating cost (c)	225,049	339,654
Total project cost (a+b+c)	1,138,687	3,204,521
Local ownership (%)	100%	100%
Export component (%)	0%	0%
Amount requested (US \$)	0	3,204,521
Cost effectiveness (US \$/kg.)	4.53	15.12
Counterpart funding confirmed?	Yes	Yes
National coordinating agency	SEPA	
Implementing agency	UNDP	UNIDO

Secretariat's Recommendations		
Amount recommended (US \$)		3,204,521
Project impact (ODP tonnes)		211.95
Cost effectiveness (US \$/kg)		15.12
Implementing agency support cost (US \$)		362,497
Total cost to Multilateral Fund (US \$)		3,567,018

PROJECT DESCRIPTION

Sector Background

- Latest available total ODS consumption (1998)	166,265.90 ODP tonnes
- Baseline consumption of Annex A Group I substances (CFCs)	57,818.00 ODP tonnes
- Consumption of Annex A Group I substances for the year 1998	55,414.00 ODP tonnes
- Baseline consumption of CFCs in refrigeration sector	Not available ODP tonnes
- Consumption of CFCs in refrigeration sector in 1998	23,178.00 ODP tonnes
- Funds approved for investment projects in refrigeration sector as of July 2000 (31st Meeting)	US\$147,713,196.00
- Quantity of CFC to be phased out in investment projects in refrigeration sector as of end of 1999	12,033.00 ODP tonnes

1. The production of refrigerators and freezers has increased from 8.1 million units in 1993 to 14.2 million units in 1997, an increase of 75.3%. The target for the complete phase out of CFC consumption in the domestic refrigeration sub-sector in China is 2005. Based on data reported by China to the Multilateral Fund Secretariat, the country is in compliance with the CFC freeze. In order to meet the 50% CFC reduction by 2005, an additional 302.45 ODP tonnes of CFC must be phased out.

2. According to information from the Government of China three projects for individual enterprises in the domestic refrigeration sector remain to be funded by the Multilateral Fund. Two projects have been submitted to the 32nd Meeting, one from UNDP and another UNIDO. The third one will be submitted to the 33rd Meeting of the Executive Committee. The remaining enterprises in the sector are small- and medium-sized. A terminal umbrella project covering about 20 such enterprises will be prepared and submitted at a later stage.

3. The Executive Committee has approved about US \$147,713,196 for 81 projects to phase out 12,033 ODP tonnes of CFC for enterprises manufacturing refrigeration equipment in the refrigeration sector in China.

Qingdao Haier

4. Haier Group is one of the largest manufacturers of domestic refrigerators and freezers in China whose market shares account for 33.44% of the refrigerators and 41.28% of the freezer markets in China. There are several factories and production lines for manufacturing refrigerators and freezers in different locations. All the refrigerator production lines have been converted to ODS-free production.

5. Three of the four freezer production lines were converted by UNDP with grants provided from the Multilateral Fund. One remaining production line at No. 2 Freezer Plant still uses CFC technology. The line was established in 1994-1995 and started production in June 1995.

6. The production line consumed 154.97 ODP tonnes of CFC-11 and 25.86 ODP tonnes of CFC-12 in the manufacture of domestic refrigeration equipment in 1999. Existing production equipment consist of one high pressure foaming machine which serves foaming jigs installed in the cabinet and door production lines. The factory is also equipped with assembly and refrigerant charging equipment.

7. Phase-out will be achieved by converting from CFC-11 to cyclopentane technology and from CFC-12 to isobutane (R600a) technology. The existing high pressure foam dispenser will be retrofitted for use with cyclopentane. The enterprise will require an additional mixing head, wagon system, pre-mixer station with intermediate tank, gas detection system, safety plant modifications, and a power generator. Other costs include commissioning, transportation, testing, trials, technical assistance and training. Incremental operating costs are requested by the enterprise for a period of six months reflecting the higher cost of chemicals and an increase in foam density.

Little Swan Electric Co.

8. The company was established in 1980. The production was 100,000 units in 1988. In 1994, the company expanded its production facilities by installing new CFC-based foaming and refrigerant charging equipment. In 1999, production reached 177,000 units. The enterprise consumed 177.3 ODP tonnes of CFC-11 and 35.8 ODP tonnes of CFC-12 in the manufacture of domestic refrigerators and freezers in 1999.

9. The project will to phase out consumption of 35.8 tonnes of CFC-12 and 177.3 tonnes of CFC-11 used in the production of refrigerators and freezers at Little Swan Electric Co. in China. The selected ODS substitutes are cyclopentane as a blowing agent and isobutane as a refrigerant. During the conversion process the present five high pressure foaming machines, the foaming fixtures and curing ovens installed in four cabinet plants and two door lines will be modified for cyclopentane. Two cyclopentane/polyol mixing stations will be installed. The cyclopentane storage, premixing and foaming areas will be equipped with the required safety ventilation, gas detector and fire extinguishing systems. The assembly lines will be equipped with 4 charging boards, five leak detectors, helium leak detection systems, and ultrasonic welding. Isobutane storage and safety system will be installed. The cost of engineering, commissioning, technology transfer, testing consultancy and training costs are included in the budget, while the company will upgrade its testing facilities on its own. Safety inspections and certification cost of the sites, and a 10% contingency are also requested in the proposal. Incremental operating costs are requested by the enterprise for a period of six months reflecting the higher cost of chemicals and an increase in foam density.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

Qingdao Haier

1. The Executive Committee has approved the following technical assistance and investment projects for Haier, with a total value of US \$6,531,213.

- (i) Qingdao freezer conversion to a 50% reduction of CFC foam in freezer cabinets for the World Bank at a cost of US \$606,000 (approved at the 10th Meeting)
- (ii) Staged project on model prototype development and testing at the cost of US \$396,140 (stage 1a) (approved at the 10th Meeting as USA-China bilateral project)
- (iii) Staged project to produce CFC-free refrigerators: stage 1b: Field testing, stage 2: changeover of foam blowing agent to cyclopentane and refrigerant to isobutane in Haier at the cost of US \$2,980,793 (approved at the 16th Meeting as a USA-Germany-China bilateral project).
- (iv) A project for conversion of Haier freezer production capacity to cyclopentane and HFC-134a technologies at US \$2,548,280 (approved at the 19th Meeting for UNDP). The enterprise background information indicated that the production capacity had consisted of three production lines. One line was installed in Factory No. 1 and two lines in Factory No2. No other production equipment was identified at that time. The project document implied also that the total CFC consumption in the twelve months of August 1994 – July 1995 of 278.5 tonnes would be eliminated as a result of the proposed conversion.

2. Information in this, and previous project indicates that, in the period 1993-1995, while moving the earlier projects forward, the company was in the process of simultaneously installing new CFC-based production capacity, which might be eligible for assistance for conversion from the Multilateral Fund at a later stage. Non-ODS technology was readily available at that time but was evidently not selected by Haier for the new production line.

3. The project approved for UNDP in May 1996 for conversion of three freezer production lines had made no reference to the additional production line, which had been in operation for about one year by that time.

4. The Secretariat sought from UNDP confirmation on the date of installation of production capacity and reasons why the Executive Committee had not been informed of the existence of this line during consideration of previous projects.

5. UNDP explained that no information was provided to UNDP by Haier management regarding the newly installed CFC-based production line because of decentralized management and lack of coordination. The Secretariat noted that the subsequent relocation of the new line to the factory converted by UNDP under the project approved in May 1996 suggests that there was, indeed, close coordination between the factories. UNDP provided additional information indicating that equipment was installed in 1994 and production on the line commenced in June 1995.

6. The Secretariat has reviewed the incremental capital and operating costs and is currently discussing cost issues with UNDP. The results will be reported to the Sub-Committee on Project Review.

7. Noting the level of assistance provided to Haier from the Multilateral Fund (more than US \$6.5 million), Haier's situation as a multinational company exporting to more than 80 countries, with a U.S. subsidiary, American Haier, and that Haier installed the CFC-based production line while it was progressing projects to phase out CFC-based production elsewhere in its operations, the Executive Committee may wish to consider both the eligibility of this project and the priority which should be accorded to provision of funds for it.

8. The project is submitted for individual consideration.

Little Swan

9. The Secretariat has requested clarification from UNIDO regarding the dates of purchase and installation of various production equipment at Little Swan Company. UNIDO provided copies of relevant purchase contracts justifying that the installation of new production equipment took place in 1994 and production started in early 1995.

10. The Secretariat discussed with UNIDO incremental capital and operating costs. The number of new charging boards has been reduced taking into account the capacity of the new equipment to maintain the equivalent replacement. Helium leak detection systems were recognized as not essential for conversion. The cost of gas detection system has been reduced given the layout of the production and repair areas. The cost of retrofitting high pressure foaming machines has been adjusted to reflect the difference in retrofitting approaches of original suppliers of this equipment. One nitrogen generator of required capacity will be provided instead of the two units requested. The pre-mixing operations will be rationalized reflecting the existing layout of the production area. The incremental operating costs have been adjusted using more recent prices of chemicals in China.

11. All the incremental capital and operating costs have been agreed between the Secretariat and UNIDO.

RECOMMENDATIONS

1. The Fund Secretariat recommends blanket approval of the Little Swan project with the level of funding and associated support costs as indicated in the table below.

	Project Title	Project Funding (US\$)	Support Cost (US\$)	Implementing Agency
(b)	Replacement of CFC-11 and CFC-12 with cyclopentane and isobutane in the production of refrigerators at Little Swan Electric (Jingzhou) Co. Ltd.	3,204,521	362,497	UNIDO

PROJECT EVALUATION SHEET CHINA

SECTOR: Solvent ODS use in sector (1999): 4,286 ODP tonnes

Sub-sector cost-effectiveness thresholds: CFC-113 US \$19.73/kg
TCA US \$38.50/kg

Project Titles:

- (a) Interim report and request for second payment on the implementation of the 2000-2001 annual programme under the China Solvent Sector Plan

Project Data	Multiple solvents
Enterprise consumption (ODP tonnes)	
Project impact (ODP tonnes)	
Project duration (months)	
Initial amount requested (US \$)	6,955,000
Final project cost (US \$):	
Incremental capital cost (a)	
Contingency cost (b)	
Incremental operating cost (c)	
Total project cost (a+b+c)	
Local ownership (%)	100%
Export component (%)	0%
Amount requested (US \$)	0
Cost effectiveness (US \$/kg.)	
Counterpart funding confirmed?	
National coordinating agency	
Implementing agency	UNDP

Secretariat's Recommendations	
Amount recommended (US \$)	
Project impact (ODP tonnes)	
Cost effectiveness (US \$/kg)	
Implementing agency support cost (US \$)	
Total cost to Multilateral Fund (US \$)	

Interim Report and Request for Second Payment on the Implementation of the 2000-2001
Annual Programme under the China Solvent Sector Plan

**PART A:
SECRETARIAT'S COMMENTS AND RECOMMENDATIONS**

1. UNDP has submitted for the consideration of the Executive Committee:
 - (a) an interim report on Implementation of the Solvent Sector Plan for ODS Phase-out in China, in support of a request for approval of the balance of the funding for the first implementation programme, 2000-2001, namely US \$6.955 million plus support costs of US \$695,500.
 - (b) a proposed amended first implementation programme for 2000 – 2001.

Interim Report

2. The interim report advises that the activities foreshadowed in the 2000-2001 implementation programme considered at the 30th Meeting are proceeding, but with a delay of about two months due to the need to complete essential promotional work with enterprises and industrial associations and workshops training, seminars and exchanges on alternative technologies. UNDP has advised that this delay will not affect achievement of the 2001 reduction targets because an import and export ban on CFC-113 will commence on 1 January 2001 (an advance of six months on the date originally proposed) and production of CFC-113 in China will be reduced to the level required, that is 2700 ODP tonnes.
3. The 2-month delay means that the target date for signature of the first round of ODS reduction contracts has slipped from September to November 2000. The interim report indicates that bidding has been initiated. UNDP plans to provide an oral report at the 32nd Meeting to confirm that the contracts were completed as currently indicated.
4. The agreement between the Executive Committee and the Government of China concluded at the 30th Meeting indicated that “an additional US \$6.955 million will be made available in January 2001 for the period January 2001 through December 2001, upon satisfactory verification that China has finished the bidding process for phase-out in 2001, to be reported at the 32nd meeting of the Executive Committee.

Revised implementation programme

5. The Government of China has prepared a revision to the first implementation programme on the advice of UNDP, arising from China's wish to undertake a significant reallocation of funds within the 2000-2001 programme. China proposes to reduce the funding allocated to reduction contracts by US \$2 million and redirect this amount to a new activity, namely development and production of alternative solvents. This and all other proposed revisions are

indicated in Table 1 below. All other activities remain as proposed in the original implementation programme.

Table 1

Component	Original	Revised
Change in Schedule		
Sign 2000 ODS Reduction Contract	September 2000	November 2000
Sign 2001 ODS Reduction Contract	January 2001	June 2001
Controlling Import and Export of ODS solvent	July 1, 2001	Control: July 1, 2000 Ban: January 1, 2001 TCA export ban: January 1, 2000
Public Awareness	Start no later than April 2000	Start no later than July 2000
Preparation for the development of a ODS solvent management plan	Start no later than July 2000	Start no later than September 2000
Establishment of Standards and Technical Norms	Contract signed no later than July 2000	Contract to be signed in October 2000
Cost Reallocation		
CFC-113 Reduction Contract	\$4.8 million in 2000; \$4.8 million in 2001	\$4.5 million in 2000 \$5.0 million in 2001
TCA Reduction Contract	\$1.45 million in 2000 \$1.455 million in 2001	\$0.5 million in 2000 \$0.505 million in 2001
Development and Production of Alternative Solvents	None	\$1.25 million in 2000 \$0.75 million in 2001
Public Awareness	\$100,000	\$70,000
Training	\$120,000	\$90,000
Strengthening ATSS	\$180,000	\$170,000
Consultants	None	\$70,000
Total cost reallocation	\$12,905,000	\$12,905,000

6. UNDP has indicated that while the ODS Reduction Contracts and Voucher Systems for CFC-113 and TCA will be reduced in 2000 and 2001 by US \$2 million; China strongly believes that it will still be able to phaseout the level of consumption required to meet the 2001 and 2002 control targets, as stipulated in the Agreement. China anticipates that the bidding will result in a lower phase-out cost per ODP tonne than previously budgeted for, therefore the reduced allocation will still be sufficient to cover the cost of the 2000 and 2001 ODS Reduction Contracts.

7. In regard to the new provision of US \$70,000 for consultants, UNDP has advised that there is no change to proposed activities but the reallocation of funds aligns better with UNDP's budget classifications.

8. The revised plan includes a proposal to allocate US \$2.0 million from the first implementation programme for “selection and development of new solvents”, including consideration of the use and production of n-propyl bromide (nPB), which has a small ODP and is currently under investigation by the Scientific Assessment Panel (SAP) and the TEAP at the request of the Parties. The Secretariat sought additional information on: why a major proposed expenditure of this nature had not been foreshadowed in the original strategy approved only this year; what was actually proposed to be funded, and; an explanation of the proposal to use nPB in the light of Decision X/8 which encourages Parties, in the light of reports from the SAP and the TEAP, to take measures actively as appropriate to discourage the production and marketing of new ozone depleting substances.

9. UNDP advised that a cleaning solvent called HEP-2 containing about 70 percent nPB is currently being imported from the USA, where it is in use, at 1.5 to 2 times the current local price of CFC-113. Realising the importance and necessity of developing local alternative solvents to provide sufficient good quality products at a reasonable price, China will support the development and production of this solvent. It has been provided by SEPA to enterprises as one of the alternatives to be used in preparing for the bidding for first year phase-out contracts. If a winning enterprise chooses to use this product as an alternative solvent, China will approve its usage in appropriate applications. However China will also ensure that the decisions of the Parties and the Executive Committee regarding the usage of these alternative solvents will be strictly followed.

10. UNDP advised that nPB-based solvents have similar physical properties to CFC-113 and TCA and can be used in many applications, for example in production of liquid crystal displays and for metal cleaning. The Secretariat understands that these solvents can often be used in existing equipment – obviating the need to change to aqueous-based machinery, and thus reducing the cost of phaseout.

11. The second solvent referred to for local development and production has the title HT-1 and is said to contain “hydrate-carbon”. This is presumed to mean that it is a hydrocarbon, but at the time of preparation of this report, UNDP has not been able to provide clarification as to the substance used. It is said to be zero-ODP, non-toxic and to have been used in the aviation industry in China for several years.

RECOMMENDATION

1. The Executive Committee might wish to consider the funding requested for 2001 on the basis of the above comments, the oral report on progress with ODS reduction contracts to be presented by UNDP at the meeting, and taking into account the Committee’s views on the proposed reallocation of funds for development and production of alternative solvents, including nPB.

PART B

INTERIM REPORT AND REQUEST FOR SECOND PAYMENT ON THE IMPLEMENTATION OF THE 2000-2001 ANNUAL PROGRAMME UNDER THE CHINA SOLVENT SECTOR PLAN

Prepared by
State Environmental Protection Administration (SEPA), China
and
United Nations Development Programme (UNDP)

BACKGROUND

At its 30th Meeting held in Montreal 29-31 March 2000, the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol (ExCom), by Decision 30/56, approved the 29 March 2000 “Agreement for ODS Phaseout in China’s Solvent Sector” on the phaseout of ozone-depleting substances (ODS) in China’s solvent sector at a total cost of \$52 million to the Multilateral Fund (MLF).

The Agreement is for the phased reduction and complete phaseout of the consumption of trichlorotrifluoroethane (CFC-113) and 1,1,1 trichloroethane (TCA), as well as the consumption of carbon tetrachloride (CTC) used as cleaning solvents in China.

The \$52 million would be paid out in installments over an eleven-year period in the exact amount of US dollars as specified in the Agreement, starting in the year 2000 and ending in 2010. By the approval of the Agreement, China committed that in exchange for the funding level specified, it will eliminate its total non-exempt CFC-113 and TCA consumption, as well as its total CTC consumption for solvent use in accordance with an agreed schedule. China further agreed that total non-exempt CFC-113 and TCA consumption in China, as well as the total consumption of CTC in the solvent sector in China will not exceed the levels agreed for specific chemicals in each of the year up to 2010.

China will phase out its CFC-113 consumption by 1 January 2006 and its CTC consumption by 1 January 2004, save for consumption of these two ODS for feedstock and process agent uses, and for CFC-113 consumption and CTC solvent consumption that may be agreed by the Parties to be essential for China after 2010. TCA will be totally phased out by 1 January 2010, save for any TCA solvent consumption that may be agreed by the Parties to be essential for China after 2015.

The United Nations Development Programme (UNDP) has agreed to be the implementing agency for this project for the first three years at a fee of 10% of funds allocated during that period. The fees for future years will be agreed between the Executive Committee and the implementing agency for the project.

ACTIVITIES UNDERTAKEN

Immediately after the approval of the Agreement, SEPA and UNDP held many discussions on implementation arrangements and preparation of workplans. The project document was signed by SEPA and UNDP in June 2000. The draft Project Implementation Manual (PIM) was reviewed, finalized and agreed by SEPA and UNDP in June 2000.

A Domestic Implementing Agency (DIA) was to be selected to assist SEPA in undertaking the day-to-day operational activities to facilitate enterprise level phaseout. Shortlisting of qualified bidders for the selection of DIA started in April 2000. Bidding for the DIA was initiated by the end of June 2000. Bid evaluation took place late August 2000 and the selection of DIA was approved by UNDP headquarters in September 2000. A contractual agreement is now being finalized by UNDP.

In June 2000, SEPA conducted a seminar for the industrial associations and national experts to introduce the Solvent Sector Plan, to initiate action to organize the Alternative Technology Support System (ATSS), to discuss the operational mechanism, to obtain updated information on current cleaning technologies and trends in each industrial sector, and to identify and assess alternative solvents and conversion technologies for different ODS solvent consuming sub-sectors. In addition, development of alternative solvent technologies was discussed.

In July, international and national experts met together to further develop the sector phaseout plan in defining the phaseout priorities, set time schedules, identify technical options and funding level for phaseout in each sub-sector. National experts gained experience through exchanges with international experts. Phaseout schedules were refined and preparation for the first bidding of ODS Reduction Contracts were carried out.

In early August 2000, SEPA and Ministry of Information Industry (MII) convened a National Conference for the Implementation of Solvent Sector Plan to publicize the Solvent Sector Plan and to mobilize related industrial associations, enterprises and research institutes to participate and facilitate in the phaseout activities. 42 enterprises, most of them large CFC-113 consumers, participated in the conference and would be candidates of phaseout in the First Annual Programme. Industrial associations, research institutes and technical committees also made presentations on alternative solvents currently under development and on substitution technologies available in different sub-sectors.

Bidding documents for ODS Reduction Contracts to phase out the amount of ODP required to meet the 2001 targets were sent out in September 2000 to 30 large liquid crystal display (LCD) manufacturers and other solvent consuming enterprises. All these enterprises have pre-registered their interest in converting to non-ODS cleaning technologies. The consumption of these enterprises is more than 640 MT CFC-113. It is expected that ODS Reduction Contracts in excess of the required 2000 reduction of 466 MT CFC-113 will be signed. Closing date for submission of bid is 6 November 2000 and it will be followed by two weeks of bid evaluation. ODS Reduction Contracts will be signed with the selected successful bidding enterprises by 24 November 2000.

Due to the time required to complete some of preparatory works that are critical to the successful initiation of enterprise level phaseout activities, the initiation of the first year bidding process was delayed and subsequently the signing of the ODS Reduction Contracts will be delayed for about two months, from September 2000 to November 2000. This two-month delay will not affect China's achieving its 2001 CFC-113 and TCA reduction target levels. China will reduce CFC-113 production level to 2,700 tons in 2001 and import and export ban of CFC-113 will be in effect January 1, 2001, therefore the consumption of CFC-113 at the national level will be less than 2,700 ODP tonnes, ensuring China will meet the 2001 control target.

While all key components of the technical assistance activities were initiated, the initiation of two activities were delayed for about three months in order to allow staff to concentrate on the preparation and kick-off of the first bidding process.

To better align with UNDP's budget classification, the cost allocations among some of the technical assistance components have been rearranged with part of the allocation moved to the "consultants" category, however the purpose of the usage of these funds has not been changed.

2001 FUNDING

In approving the Agreement, the ExCom approved the release of the 2000 funding level of \$6.75 million to facilitate China's initiation of activities to meet the 2001 reduction target levels as well as work towards achieving future years' reduction targets. The ExCom also decided that an additional amount of \$6.955 for the year 2001 would be made available to China, for the period January 2001 through December 2001, upon satisfactory verification that China has finished the bidding process for phaseout in 2001. China and UNDP are to provide such report at the 32nd Meeting of the ExCom.

Bidding process for ODS phaseout for 2001 is currently in progress with a bid closing deadline of 6 November 2000. As the ODS Reduction Contracts can only be signed at the conclusion of a careful bid evaluation to be completed towards the end of November 2000, SEPA and UNDP can only report at the time of submitting this report (11 October 2000) that the bidding has been initiated and that the entire process will be completed by the time the 32nd ExCom Meeting is in session. SEPA and UNDP will present an oral report during the 32nd ExCom Meeting on the final result of the bidding process, in order for the Executive Committee to approve the release of the 2001 funding in the amount of \$6.955 million in January 2001.

DEVELOPMENT AND INVESTMENT OF ALTERNATIVE SOLVENT PRODUCTION

During the preparation for the implementation of the Solvent Sector Plan, China realizes that the most important challenge for a successful and smooth phaseout in the solvent sector is the sufficient availability of good quality alternatives at reasonable low price. At present, China imports most of the alternative solvents at very high price which is a major obstacle to getting the interest of enterprises to participate in phaseout activities. Some local enterprises have embarked on the development and production of alternative solvents and equipment. SEPA strongly

believes that one important activity in the successful implementation of the Solvent Sector Plan is to assist these local enterprises in the development of these alternative solvents that are identified to be of good potential substitutes and to provide investment in building up their production capacity in order to provide sufficient supply to current ODS solvent consumers. The matter was discussed in many occasions between SEPA and UNDP.

Two locally developed alternative solvents, HEP-2 (including nPB) and HT-1 have been evaluated by Chinese industries and found to be economically and technically acceptable alternative solvents. Testing and pilot production in some sub-sectors have proven to be effective and their use being accepted by those enterprises.

HEP-2 is a chemical mixture, its main component is nPB (60-70%) and 3 other non-ODS, non-toxic chemicals. Its physical property is quite similar to TCA and can be used for cleaning instead of CFC-113 and TCA in many applications, such as LCD and metal cleaning. At present, HEP-2 is imported from USA at 1.5 to 2 times the price of CFC-113. As HEP-2 is produced and used in America and its cleaning property has been proven by testing and pilot production in China, SEPA has provided to the enterprises as one of the alternative solvents to be used in preparing for the first year bidding.

HT-1 is a locally produced co-solvent. Its main component is hydrate-carbon. It has zero ODP and has no toxicity. HT-1 was used safely for several years in aviation industry in China. It cannot be used widely as CFC-113 and TCA, but it can be used as one alternative option for ODS phaseout in some sub-sectors and enterprises.

While China understands that nPB is a low ODP substance and that the Scientific Assessment Panel and the TEAP are evaluating nPB and will draft new report regarding its ODP value and toxicity, China will abide by the decisions made by the Parties and the Executive Committee regarding its usage.

Realizing the importance and necessity of developing local alternative solvents to provide sufficient good quality at reasonable price to enterprises that will undertake ODS phaseout activities, China will support the development and production of HEP-2 and HT-1. If a winning enterprise in the bidding process chooses to use HEP-2 as an alternative solvent, China will approve its usage in the appropriate applications. China will ensure that the decision of the Parties and the Executive Committee regarding the usage of these alternative solvents will be strictly followed.

To meet the requirement of the development and production of alternative solvents, a total of \$2 million was reduced from the ODS Reduction Contracts and Voucher System in 2000 and 2001, to be reallocated to the development and production of alternative solvents. SEPA has revised the 2000 – 2001 Annual Programme to include this support.

While \$2 million will be deployed from the ODS Reduction Contracts and Voucher Systems of CFC-113 and TCA in 2000 and 2001 to provide for the development cost and investment capital for alternative solvents, China strongly believe that even with the \$2 million reduction, it will still

be able to sign sufficient ODS Reduction Contracts to phaseout the level of consumption required to meet the 2001 and 2002 control targets, as stipulated in the Agreement. This will be achieved through the bidding system which China anticipates that the bidding will result in a lower phaseout cost per ODP tonne, therefore the reduced allocation will still be sufficient to cover the cost of the 2000 and 2001 ODS Reduction Contracts.

ACTION REQUESTED

The amended 2000 – 2001 Annual Programme is attached herewith for the review and approval of the Executive Committee.

At the 32nd Executive Committee Meeting to be held 6-8 December 200, SEPA and UNDP will present an oral addendum to this report on the result of the 2000 bidding for the ExCom to approve the release of the 2001 funding of \$6.955 million in January 2001.

SOLVENT SECTOR PLAN FOR ODS PHASEOUT IN CHINA

**Amendment of
FIRST IMPLEMENTATION PROGRAMME**

(July 1, 2000 – December 31, 2001)

Date of Amendment: 10 October, 2000

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Solvent Sector Plan for ODS Phaseout in China

First Implementation Programme

A. Background

Solvent Sector Plan for ODS Phaseout in China was approved at the 30th Executive Committee (ExCom) Meeting in March 2000. The ExCom, by Decision 30/56 approved the 29 March 2000 "Agreement for ODS Phaseout in China's Solvent Sector" with total funding of US\$52 million. United Nation Development Programme (UNDP) agreed to be the international implementing agency of this programme for the first three years at a fee of 10% of funds allocated during that period. The execution duration of First Implementation Programme of China's Solvent Sector Plan is from July 1, 2000 to December 31, 2001. Before the end of June 2000, UNDP and SEPA signed the Project Document of Solvent Sector Plan for ODS Phaseout in China and the draft Project Implementation Manual (PIM) for this sector plan was finalized and agreed upon. Based on the Project Document and the PIM, Request for Proposal for the selection of a Domestic Implementing Agency (DIA) was issued to 9 selected potential bidders on 28 June 2000. The bid evaluation of the DIA was completed before the end of August 2000 and a Chinese enterprise based in Beijing was selected to be the DIA. The selection was approved by the UNDP headquarter in September 2000.

On 9-11 August 2000, SEPA and the Ministry of Information Industry (MII) organized a Nation Conference for the Implementation of Solvent Sector Plan. 42 enterprises participated in the meeting, most of them are large CFC-113 consumers and will be candidates of ODS solvent phaseout project for the First Annual Programme. The Alternative Technology Support System (ATSS) was developed during the pre-session on 8 August 2000. The ATSS consists of national expert group (12 candidates), 6 industrial associations, 3 alternative technology support centers (research institutes) and more than 20 alternative solvent and equipment suppliers.

To meet the requirement in the Agreement for ODS Phaseout in China's Solvent Sector, the DIA, in cooperation with the Special Working Group for Solvent (SWG) under the Foreign Economic Cooperation Office (FECO) of SEPA, prepared the Bidding Document that was issued to 30 large CFC-113 consumers and invited these enterprises to participate in the bidding for the 2001 ODS Reduction Contracts. All these enterprises have been pre-registered and have expressed their interest on non-ODS cleaning technology conversion. Total consumption of these consumers is more than 640 MT CFC-113 in last year, and 466 MT CFC-113 reduction contracts are expected to be signed before 24 November 2000 through this bidding process.

In preparation for the implementation of the Solvent Sector Plan, China realizes that the most important challenge is to provide sufficient alternative solvents and equipment at reasonable price in good quality to the market. At present in China, the imported alternatives are all at very high price and most Chinese enterprises can not afford it. Some local enterprises can provide some alternative solvents and equipment but the supply is still at low quantities. Therefore, FECO/SEPA and MII plan to support and expand the local alternative production capacity in the Solvent Sector Plan so as to meet the requirements of the ODS solvents phaseout. China believes that this is the best way to reach the ODS solvents phaseout target and will make project implementation more smoothly and successfully.

On the basis of half year preparation for the implementation of Solvent Sector Plan, China amends the First Implementation Programme (2000-2001) with addition of support to local alternatives development and production, reallocation of budget for some of the technical assistance activities, reschedule of the 2000 and 2001 bidding process but with no changes on the phaseout target.

B. Phaseout Scope and Approach

The Solvent Sector Plan uses a phased, performance-based approach as described in detail in the final version of "Solvent Sector Plan For ODS Phaseout in China" (March 30, 2000) to phaseout consumption of CFC-113, TCA and CTC in cleaning applications and development and implementation of an Alternative Technology Support (and delivery) System (ATSS). The scope of the First Implementation Programme is now amended to include the development and investment of alternative solvents indicated in vi):

- i.) Develop and begin implementation of the ATSS for all solvents and technologies;
- ii.) Develop and begin implementation of the Voucher System for small solvent users;
- iii.) Undertake and complete ODS Reduction Contracts with about 20-40 large and medium user enterprises and redeem vouchers with about 100 small users in the second year to eliminate consumption of 466 MT tons CFC-113 and 100 MT tons TCA by the end of 2001; (the contracts will give a total reduction of 1,121 MT tons for CFC-113 and 200 MT tons for TCA, with the balance resulting in reductions in 2002)
- iv.) Undertake technical assistance activities described in Table 3;
- v.) Undertake policy action described in Table 3; and
- vi.) Develop of alternative solvents and initiate investment to increase capacity of local production, Table 4.

C. Actions and Proposed Funding

Solvent consumption phaseout requires implementation of investment projects at the enterprise level, with, on the average, about one year lag between local funding approval at the enterprise level and commissioning of non-ODS technology system. Thus, this First Implementation Programme covers funding for 18 months, with the first ODS phaseout results being achieved in 2001 and additional results achieved in 2002. Activities and proposed funding for the Implementation Programme are summarized in Table 1 and shown, respectively, for 2000 (six months) and for 2001 (for 12 months). The funding allocation for ODS Consumption Reduction Contracts and for Development and Investment on Alternative Solvents Production may be slightly adjusted based on phaseout cost requirement at enterprises level. Details are given in Table 2 to Table 4. Performance indicators are shown in Table 5.

At its 30th Meeting, the Executive Committee approved the payment of US\$ 6.75 million for China to implement the First Implementation Programme, to cover the period from July 1, 2000 through December 31, 2000. The ExCom also decided that an additional US \$6.955 million will be made available in January 2001, for the period January 2001 through December 2001, upon satisfactory verification that China has finished the bidding process for phaseout in 2001, to be reported at the 32nd Meeting of the Executive Committee.

At the conclusion of the First Implementation Programme, China will have reduced CFC-113 consumption to 3,375 MT tons (ODS) during calendar year 2001, and 2,750 MT tons (ODS) CFC-113 in 2002, including phaseout results from ongoing projects.

Table 1 Activities and Proposed Funding (US\$ 1,000)

Enterprise Level Actions		2000	2001
ODS Consumption Reduction Contracts (or vouchers redeemed)			
2000/2001	1,121 tons CFC-113*		
	estimated 20-40 larger and medium users of CFC-113	4,500	5,000
2001	estimated 100 small users of CFC-113 under voucher system		
2000/2001	200 tons TCA under above ODS Reduction Contracts	500	505
Development and Investment on Alternative Solvents Production		1,250	750
Technical Assistance, including policy actions and development of ATSS		500	700
Proposed Funding		6,750	6,955

* The contracted phaseout target will be properly higher than 1,121 tons CFC-113 to safely meet the agreed phaseout target.

D. Enterprise Level Actions

Enterprise level activities focus on identifying, funding and implementing about 20-40 large and medium sized projects during 2000-2001, identifying and completing about 100 small sized projects through redeemed vouchers in 2001, plus identifying projects that would be funded in the Second Annual Implementation Programme (2002). Project identification will be carried out in several ways. UNDP will take an active role in identification/development of phaseout projects, but the principal focus will be on use of local resources including PMO, DIA, MII, ATSS agencies, technical institutions and local consultants. Promotional work will include dealers, equipment manufacturers, provincial level industrial bureaus and use of media outlets.

Projects to be implemented in the first year will require that ODS Reduction Contracts be signed by November 2000. PMO has undertaken an accelerated action plan to identify, bid and negotiate these contracts starting in September 2000. The focus will be on the larger enterprises in sub-sectors such as LCD. These sub-sector enterprises have already initiated action on early ODS phaseout and are well positioned to have contracts signed by November 2000. This expedited action has been done in parallel with the development of the formal bidding system and selection of DIA. The bidding for the second group of projects will proceed in early 2001 under the normal operational procedures as described in Chapter VI of the Solvent Sector Plan.

Table 2 Implementation Programme - Phaseout Targets and Enterprise Activities (July 1, 2000 – December 31, 2001)

SOLVENT CONSUMPTION PHASEOUT TARGETS & ACTIVITIES (CFC-113 and TCA)							
	MLF \$ million Requested	Start of programme (MT)	Reduction Target (MT)	Reduction Contract (MT)	End of programme (MT)	Key Actions Required	Key Dates
CFC-113 Domestic consumption	4.5(2000) 5.0(2001) Total 9.5		466	1,121		Conversion of ODS solvent enterprises to non-ODS cleaning technology	July 1, 2000 – Dec 31, 2001
CFC-113 Import		149	149		0	Ban on import and management on export	
Ongoing project			600				
Consumption Phaseout target		4,441	1066		3,375		By December 31, 2001

TCA	0.5(2000) 0.505 (2001)	6,230	100	100	6,130	Require all ODS reduction contracts to include 100% of all solvent use by enterprise bidding	
ENTERPRISE-LEVEL ACTIVITIES (For CFC-113 and TCA)							
	Estimated MLF \$ million requested		# of enterprises targeted		Key Actions Required	Key Dates	
1. Conversion of ODS consumers	CFC-113	4.5 (2000)	1. L/M: 20-40 (2000 and 2001)		1 Sign ODS reduction Contracts (20-40)	1. 2000 Bid winners and contracts signed by November 2000; 2001 Bid winners and contracts signed by June 2001 2. During 2001	
	CFC-113	5.0 (2001)					
	TCA	0.5	2. Small: 100 (2001)		2. Redeem vouchers with 100 small users		
	TCA	0.505	Included in L/M contracts				

E. Development of Alternative Technology Support System

The ATSS consists of national solvent expert group, three technology institutes, industrial associations, a small number (about 5 to begin with) of equipment suppliers, several solvent producers and selected solvent dealers that will supply technology and technical assistance to ODS solvent users. The ATSS will have the technical ability and experience to supply alternative cleaning technologies and equipment, and will develop technical support capability to assist small solvent users/customers regarding their selection of the most appropriate option for moving to a non-ODS operating design. The ATSS will be developed during 2000 and begin delivering its technical services and equipment during 2001.

F. Policy Actions

The following policies will be promulgated to support implementation of the First Implementation Programme and the overall Solvent Sector Plan:

- Bidding* -- A bidding system for consumption phaseout will be implemented following approval of this Implementation Programme. Recipient enterprises will be determined through a bidding procedure administrated by DIA/PMO. The lowest bidders will be awarded grant funds after bid evaluation. PMO will sign ODS Reduction Contracts with the winning enterprises.
- Production quota* -- A regulation on a production quota for CFC-113 is being implemented under the CFC Production Sector Plan. The production quota of CFC-113 for 2000 is 4,125 tons ODS (3,300 tons ODP) and for 2001, 3,375 tons ODS (2,700 tons ODP). This is the key policy instrument for accomplishing the phaseout objective.
- Banning newly-built equipment which produces or uses ODS* -- On Nov. 11, 1997, SEPA together with other ministries promulgated "The notice on banning newly-built enterprises which produce or use ODS". It is very important to continue to implement

the Notice and to achieve sustainable phaseout results. SEPA will disseminate details of the notice to all prospective consumers through various channels (news media, bulletin, propaganda.)

- (d) Phaseout for enterprise ineligible under MLF guidelines with respect to foreign ownership or export share of output should phaseout ODS solvents by their own resources and on a schedule consistent with the overall solvent phaseout schedule.
- (e) *Controlling supply and consumption of ODS solvent* -- The following regulation will be implemented to control supply and consumption of solvent:
 - (i) Imports and exports: CFC-113 imports and exports will be controlled in 2000 and banned after January 1, 2001; import and export of TCA will be controlled after July 1, 2000 and export ban on TCA will be added after January 1, 2001.
 - (ii) Local production of CFC-113 will be controlled under the CFC Production Sector Plan and production of TCA is expected to be controlled under the CTC/TCA Production Sector Plan now being prepared by SEPA and the World Bank;
 - (iii) Enterprises that implement projects under the Solvent Sector Plan will not be permitted to use any ODS solvent after their respective projects are completed.
 - (iv) Ban on use of new solvent with higher ODP: after January 1, 2001, solvent users will not be permitted to switch to different solvent with higher ODP.
- (f) *Establishment of standards and technical norms* -- These standards will be developed in TA activities as described below.

G. Technical assistance (TA) activities

TA activities concentrate on:

- (i) strengthening the overall institutional framework;
- (ii) management, monitoring and evaluation capabilities of participating institutions;
- (iii) training enterprise managers, technical personnel and decision makers at various levels,
- (iv) development of the Alternative Technology Support System.

All terms of references and work schedule will be agreed with UNDP prior to signing contracts and initiating work.

Main TA activities include:

- (a) *Development of a Management Information System (MIS) for ODS solvent phaseout in the solvent sector* - The MIS is an important tool in management and supervision of all phaseout activities. It is used to monitor performance in the solvent phaseout and to generate progress reports on implementation of the Solvent Sector Plan required by ExCom and UNDP. An information management center will be established in PMO and two sub-stations in MII and DIA.
- (b) *Public Awareness Campaigns* -- Introduce and publicize Solvent Sector Plan and ODS solvent phaseout schedule in newspaper and other media to make people, especially the ODS solvent users to understand the phaseout plan. Provide information and guidance to the related enterprises to make them aware of how to prepare and take part in the phaseout actions.
- (c) *Training of personnel involved in implementation of phaseout activities* -- It is necessary to provide training for: 1) environmental staff and decision makers to increase their

recognition and management capacity, 2) industrial managers and technicians to enhance their understanding of alternative technology and to master how to use it, 3) ODS and substitute solvent dealers to deliver information on update alternative non-ODS solvent technology to their users, especially for SME. Training is needed to prepare enterprises to bid in the following year, to supervise solvent production and consumption, to manage and monitor ODS import and export, and to learn operating procedures in the solvent sector phaseout approach. This type of training will need to be repeated every year in the first few years of implementation.

- (d) *Developing Alternative Technology Support System* -- The ATSS will include three technical support centers (including No. 46 Institute funded by MLF, one institute in Shanghai funded by Swedish Government and a third center in Guangdong being developed), national solvent expert group, plus dealers, procurement agent(s) and local equipment suppliers. The support system will provide services such as technical consulting and support and includes development of a promotion and delivery system to reach the many small solvent users, as well as development and promotion of low cost alternate solvents and development and promotion of low cost local equipment and low cost conversion processes.
- (e) *Establishment of a Third Technical Center*: Proposed in Guangdong to be developed in 2000/2001. The scope and objectives of the third technical support center will be substantially the same as for the first two centers.
- (f) *Establishment of standards and technical norms*:
 - 1) Production safety regulations on using flammable substances as solvent;
 - 2) Environmental regulations on using toxic substances as solvents;
 - 3) Related environmental regulations on solvents without ODS;
 - 4) Technology identification of solvent without ODS;
 - 5) Standards for quality identification of solvents without ODS.
 - 6) Standards for non-ODS alternative cleaning technologies.
- (g) *Preparation for the development of a solvent management plan* -- The Solvent Sector Phaseout Plan lays out principles for establishment of a solvent management plan. This represents only the first stage of development to initiate all preparatory work. Issues and activities are highlighted below:
 - (i) Rapid phaseout of ODS solvent production in China will cause demand after 2010 to be covered increasingly by substitutes. This makes it imperative that preparation work for the development of ODS substitutes to start in 2000. Preparation of the plan will draw on experiences from developed countries.
 - (ii) Determine essential and necessary usage in the solvent sector.
 - (iii) Conduct survey and study on the alternative solvents, and assist in the selection of alternatives, testing, tryout and spreading of ODS substitute activities in selected enterprises through demonstration.
- (h) *National and International Consultants* -- Recruit national and international consultants to provide alternative technical services for training and technical conversion guidance to ODS solvent users.

The above policy initiatives, enterprise-level and technical assistance activities are summarized in Table 3 below.

Table 3 Implementation Programme - Policies and TA Activities

(July 1, 2000 – December 31, 2001)

POLICY INITIATIVES			
ACTIVITIES		Actions Required	Key Dates
1. Bidding system		1. Establish operating procedures; 2. Train enterprises for bid preparation 3. Determine winning enterprises 4. Sign ODS Reduction Contracts; 5. Implement ODS Reduction Contracts.	1. System in place by July, 2000 2. July-August 2000 for 2000 activities & March-April 2001 for 2001 activities 3. By November 2000 and June 2001 4. By November 2000 and June 2001 5. After November 2000, for 12-18 month implementation period
2. Production Quota		1. The production quota of CFC-113 for 2000 will not exceed 4,125 tons ODS (3,300 tons ODP) 2. For 2001 will not exceed 3,375 tons ODS (2,700 tons ODP).	1. By the end of 2000 2. By the end of 2001
3. Notice on banning newly-built enterprises which produce or use ODS		1. Promotional campaign, through various channels; 2. Joint supervision of Notice by local Electronic Bureaus and EPBs.	
4. Notice: Foreign enterprises should phaseout ODS solvent by own resources.		Promotion campaign and monitoring	From July 2000
5. Controlling import and export of ODS solvent		1. Import and export of CFC-113, TCA and CTC will be controlled in 2000; 2. Import and Export of CFC-113 and CTC will be banned in 2001; 3. Export of TCA will be banned in 2001.	1. By July 1, 2000 2. By January 1, 2001 3. By January 1, 2001
TECHNICAL ASSISTANCE ACTIVITIES			
ACTIVITIES	MLF funding requested (US\$'000)	Actions Required	Key Dates

a. MIS development	50	MIS center will be located in PMO, with substations in MII and DIA	1. Start preparation in June 2000. 2. Operational at end 2000.
b. Public Awareness	70	Promote public awareness of enterprises on ODS solvent sector phaseout activities	Start no later than July 2000
c. Training	90	Training on supervision of ODS solvent consumption and operating manual.	Start no later than July 2000
d. Strengthening ATSS	170		Start in June 2000
e. Establishment of third technology center	200		Start in September 2000
f. Preparation for the development of a non-ODS solvent management plan	300	1. Preparation of a report on experiences from developed countries. 2. Determine essential and necessary usage in the solvent sector	Start no later than September 2000
g. Establishment of standards and technical norms	250	By qualified institution	Start no later than October 2000
h. National and International Consultants	70		Start no later than July 2000
Total for TA Activities in 2000 - 2001	1,200		

H. Development and Investment of Alternative Solvents Production

The potential candidates of alternatives to be developed include n-propyl bromide (nPB), hydrate-carbon, HFCs, etc. Based on cleaning test and market analysis conducted in China so far, there are several non-ODS solvents produced locally that could be used to replace CFC-113 and TCA in industrial production as alternative solvent, such as HEP-2 (including nPB) and HT-1 (including hydrate-carbon), but the supply of these alternative solvents is still at low quantity and higher price. It is therefore important to support the development and local production of these alternative solvents so as to have sufficient supply at lower price to reduce the cost of phaseout actions and make the implementation of Solvent Sector Plan more successfully and smoothly. All ODS consumers will be encouraged to take part in the phaseout actions more actively and can therefore benefit from this support. The implementation of development of alternative solvents will follow the Guideline for management of investment on ODS substitute production which is being developed.

Two locally developed alternative solvents, HEP-2 (including nPB) and HT-1 have been evaluated by Chinese industries and found to be economically and technically acceptable alternative solvents. Testing and pilot production in some sub-sectors have proven to be effective and their use being accepted by those enterprises. HEP-2 is a chemical mixture, its main component is nPB (60-70%) and 3

other non-ODS, non-toxic chemicals. Its physical property is quite similar to TCA and can be used for cleaning instead of CFC-113 and TCA in many applications, such as LCD and metal cleaning. At present, HEP-2 is imported from USA at 1.5 to 2 times the price of CFC-113. As HEP-2 is produced and used in America and its cleaning property has been proven by testing and pilot production in China, SEPA has provided to the enterprises as one of the alternative solvents to be used in preparing for the first year bidding.

HT-1 is a locally produced co-solvent. Its main component is hydrate-carbon. Its has zero ODP and has no toxicity. HT-1 was used safely for several years in aviation industry in China. It cannot be used widely as CFC-113 and TCA, but it can be used as one alternative option for ODS phaseout in some sub-sectors and enterprises.

While China understands that nPB is a low ODP substance and that the Scientific Assessment Panel and the TEAP are evaluating nPB and will draft new report regarding its ODP value and toxicity, China will abide by the decisions made by the Parties and the Executive Committee regarding its usage.

Realizing the importance and necessity of developing local alternative solvents to provide sufficient good quality at reasonable price to enterprises that will undertake ODS phaseout activities, China will support the local development and production of HEP-2 and HT-1. If a winning enterprise chooses to use HEP-2 as an alternative solvent, China will approve its usage in the appropriate applications. China will ensure that the decision of the Parties and the Executive Committee regarding the usage of these alternative solvents will be strictly followed.

Table 4 Implementation Programme – Development and Production of Alternatives

ACTIVITIES	MLF requested (US\$'000)	funding	Actions Required	
Development and Investment on Alternative solvents production	1,250 (2000) 750 (2001)		1. Selected alternative(s) to be developed; 2. Selected enterprise(s) through bidding process to develop alternative production.	1. By June 30, 2001 2. By December 31, 2001

Table 5 Implementation Programme (2000 - 2001)

Performance Indicators

Solvent Phaseout Targets				
Solvent sub-sector	Start of programme (MT)	Reduction Target (MT)	End of programme (MT)	Indicators to be reported on in semi-annual progress reports. Verified in annual performance audits
CFC-113 Imports/exports	149	149	0	Ban on exports and imports effective January 1, 2001
Domestic consumption and phaseout target	4,441	466 (plus 600 from on-going MLF projects)	3,375 (in 2001) 2750 (in 2002)	Consumption levels (production plus imports minus exports)
TCA	-	>100	-	Included in ODS Reduction Contracts
Number of ODS Reduction Contracts (inclusive of TCA supplement) Voucher Redeem		L/M 20-40 S 100 (2001)		- Number of contract signed (sum of ODS reduction in the contracts) - Progress under contracts - Number of voucher redeemed
Development and Investment on alternative solvents production				- Strategy developed and potential alternatives to be developed selected by June 30, 2001 - Enterprises selected for investment through bidding process.
Policy and TA Initiatives				
Initiatives	Indicators to be reported on in semi-annual progress reports			
1. Bidding system	- Bidding system's operating procedures finalized - Winning enterprises for 2000 – 2001 selected - Enterprises trained for bid preparation for 2000 and 2001 bidding			
2. Public Awareness	- Introduce Solvent Sector Plan and phaseout schedule on two newspapers - Invite ODS solvent users to take part in the reduction bidding and promote the enterprises to participate in the phaseout actions			
3. Training	Provide personal training courses to ODS users, EPBs and local line ministries			
4. Notice on banning newly-built enterprise which produces or uses ODS solvent	- Promotional campaigns on the ban; - Local Electronic Bureaus and EPBs engaged in overseeing ban enforcement.			
5. Developing ATSS	Contracts issued, progress reports			
6. Establishment of standards and technical norms	Contracts issued, progress reports			



**United Nations
Environment
Programme**

Distr.
Limited

UNEP/OzL.Pro/ExCom/32/30/Colombia
10 November 2000

ORIGINAL: ENGLISH

EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Thirty-second Meeting
Ouagadougou, 6-8 December 2000

PROJECT PROPOSALS: COLOMBIA

This document consist of the comments and recommendations of the Fund Secretariat on the following project proposals:

Foam:

- Conversion from CFC-11 to HCFC-141b and water based technology in the manufacture of various polyurethane foam applications at Olaflex with a technical assistance programme covering 10 small customers UNDP
- Conversion rom CFC-11 to HCFC-141b and water based technology in the manufacture of various polyurethane foam applications at 25 small enterprises centered around their systems house, Espumlatex, with a technical assistance program convering distributors UNDP
- Retroactive funding for the conversion from CFC-11 to water-based technology in the manufacture of flexible molded and integral skin foam at Espumlatex-Promicolda UNDP

PROJECT EVALUATION SHEET COLOMBIA

SECTOR: Foam ODS use in sector (1999): 352.7 ODP tonnes

Sub-sector cost-effectiveness thresholds: Integral skin US \$16.86/kg
Multiple US \$13.85/kg*

Project Titles:

- (a) Retroactive funding for the conversion from CFC-11 to water-based technology in the manufacture of flexible molded and integral skin foam at Espumlatex-Promicolda
- (b) Conversion from CFC-11 to HCFC-141b and water based technology in the manufacture of various polyurethane foam applications at 25 small enterprises centered around their systems house, Espumlatex, with a technical assistance program covering distributors
- (c) Conversion from CFC-11 to HCFC-141b and water based technology in the manufacture of various polyurethane foam applications at Olaflex with a technical assistance programme covering 10 small customers

Project Data	Integral skin	Multiple-subsectors	
	Promicolda	Espumlatex	Olaflex
Enterprise consumption (ODP tonnes)	11.50	110.30	15.70
Project impact (ODP tonnes)	11.50	100.70	15.00
Project duration (months)		36	36
Initial amount requested (US \$)	193,890	620,748	191,833
Final project cost (US \$):			
Incremental capital cost (a)	217,936	846,550	212,000
Contingency cost (b)		84,655	21,200
Incremental operating cost (c)	150,284	138,503	123,647
Total project cost (a+b+c)	368,220	1,069,708	356,847
Local ownership (%)	100%	100%	100%
Export component (%)	0%	0%	0%
Amount requested (US \$)	0	0	191,833
Cost effectiveness (US \$/kg.)	16.86	10.46	11.76
Counterpart funding confirmed?		Yes	
National coordinating agency	Unidad Tecnica de Ozono - UTO		
Implementing agency	UNDP	UNDP	UNDP

<i>Secretariat's Recommendations</i>			
Amount recommended (US \$)			191,833
Project impact (ODP tonnes)			15.00
Cost effectiveness (US \$/kg)			11.76
Implementing agency support cost (US \$)			24,938
Total cost to Multilateral Fund (US \$)	Pending	Pending	216,771

* Both projects have three components each, 2 integral skin and one rigid foam components with composite cost-effectiveness threshold of US \$13.85/kg. All three components in each project are within the applicable sub-sector cost-effectiveness threshold.

PROJECT DESCRIPTION

Sector Background

- Latest available total ODS consumption (1999)	997.13	ODP tonnes
- Baseline consumption of Annex A Group I substances (CFCs)	2,208.20	ODP tonnes
- Consumption of Annex A Group I substances for the year 1999	986.16	ODP tonnes
- Baseline consumption of CFCs in foam sector	414.20	ODP tonnes
- Consumption of CFCs in foam sector in 1999	352.73	ODP tonnes
- Funds approved for investment projects in foam sector as of end of 1999	US \$2,391,808.00	
- Quantity of CFC to be phased out in investment projects in foam sector as of end of 1999	474.70	ODP tonnes
- Quantity of CFC to be phased out in foam sector as of end of 1999	190.00	ODP tonnes
- Funds approved for investment projects in the foam sector in the year 2000	US \$0	
- Quantity of CFC to be phased out in investment projects in foam sector approved in the year 2000	0	ODP tonnes

Background information

1. The two projects Espumlatex Systems House Group project and Espumlatex Promicolda were both submitted for consideration at the 31st Meeting. The Fund Secretariat reviewed and discussed the two projects with UNDP and on the basis of the discussion submitted them in documents UNEP/OzL.Pro/ExCom/31/31 to the 31st Meeting of the Executive Committee with recommendations for their approval. UNDP subsequently withdrew the projects before their consideration by the Sub-Committee on Project Review. Copies of document UNEP/OzL.Pro/ExCom/31/31 are available on request.

Espumlatex Systems House Group

2. As reported by the Secretariat in document UNEP/OzL.Pro/ExCom/31/31 (page 6) the original project of the systems house group included a request for an amount of US \$292,400 to be paid to seven distributors, two of which were Espumlatex and Espumlatex Promicolda, to assure supply of new systems to very small customers at competitive pricing. The amount requested was based on incremental operating cost calculated on the basis of CFC consumption of 68.1 tonnes of which 57.1 tonnes or 83% was accounted for by Espumlatex and its subsidiary company (Espumlatex Promicolda). No actual users of the systems were identified. During the discussion of this component of the project it was agreed that it was ineligible for funding. Consequently, UNDP revised the project document excluding the distributor component and submitted it for consideration of the 31st Meeting.

3. In the project document submitted for consideration at this 32nd Meeting for the Systems House Group UNDP has proposed a technical assistance component of US \$287,980 for the distributors who cover the very small and “spot” buyers. Since their usage of foam is very small, the very small and “spot” buyer enterprises do not have foam processing equipment. The document indicates that the distributors and the small customers have been identified and quantified locally, but no information on the identities of the beneficiaries is provided in the document. The technical assistance comprises:

10 distributor workshops at US \$5,000 per workshop	US \$50,000
274 trials at US \$500 each	US \$137,000
274 trial visits at US \$100 each	US \$27,400
274 verification visits at US \$100 each	US \$27,400
International supervision and technical support	US \$20,000

4. The two other components of the project, i.e. Espumlatex Systems House component and the component of the 25 downstream enterprises remain essentially the same as submitted to the 31st Meeting and will not require any change in the Secretariat’s recommendations on these two components of the project.

Espumlatex Promicolda (retroactive)

5. UNDP submitted the project to the 31st Meeting for retroactive funding of costs incurred when the company converted its flexible molded foam operation from CFC-11 based to water-blown technology in June 1994. The amount of US \$179,500 was requested. This included incremental capital cost and incremental operating cost of US \$40,000 and US \$139,500 respectively, with the following breakdown:

Alterations to premixing system	US \$15,000
Trials	US \$20,000
Verification testing	US \$5,000
Total	US \$40,000

6. The amount of US \$139,000 represented two-year NPV of incremental operating cost calculated based on the use of 11.5 tonnes of CFC-11 reported to have been phased out in 1994 and 10% foam density increase.

7. The Secretariat advised UNDP to request from the company the actual cost difference in the operational costs instead of a theoretical calculation of 2 years NPV based on consumption which was difficult to verify in view of the apparent inconsistencies in the consumption data reported by the company and those reported in the country programme for the sub-sector. Following discussion of the issues involved UNDP decided to request US \$40,000 capital costs and the project was recommended for approval as such.

8. UNDP has resubmitted the project to the 32nd Meeting in which the retroactive payment of US \$368,220 made up of US \$217,936 incremental capital cost and US \$150,284 incremental operational cost are being claimed. The breakdown is as follows:

Cost of 1 high pressure foam dispenser purchased to replace a low pressure dispenser US \$217,936
Two-year NPV incremental operating cost calculated based on use of 11.5 tonnes CFC-11 and 13.6% density increase US \$150,284

9. In its justification for requesting retroactive payment of US \$217,936 for the high pressure dispenser, UNDP maintained that at the time that the company converted its operation the cost of replacement of low pressure dispenser with high pressure dispenser was an eligible incremental cost.

10. It also indicated that not only the flexible molded foam production was converted as indicated in the first project document (submitted to the 31st Meeting), but also the integral skin production and that the information in the earlier project document was an error. Therefore the consumption of CFC-11 of 11.5 tonnes was for both flexible molded and integral skin foam. However the foam system usage remains the same as in the first document when the phase out was attributed to the production of molded foam alone.

11. Prior to submission of the project document the Secretariat received communication from the Government of Colombia which in effect validated the consumption data in the country programme.

Integral Skin Foam

Olaflex

12. Olaflex is a 100% Colombian company established in 1991. It is an importer and distributor of polyurethane chemicals, a manufacturer of systems for its own customers and manufacturer of polyurethane foam products, including flexible molded foam chair cushions, integral skin chair components, and rigid polyurethane sprayfoam and foam panels.

13. Olaflex consumed average (1997-1999) of 7.4 tonnes and 5.2 tonnes of CFC-11 in rigid and integral skin foam production respectively.

14. This project proposal deals with the phase out of the consumption of CFC-11 in the production activities of Olaflex as well as technical assistance for its downstream customers. The rigid foam production will be converted to HCFC-141b while the flexible molded and integral skin foam production will be converted to water-blown technology.

15. Olaflex operates an OMS C-60 low pressure dispenser for panel production and three self-made 6 kg/min low pressure sprayfoam dispensers. The integral skin and flexible molded foam are produced by hand mix.

16. The incremental capital cost includes the cost of replacement of the low pressure dispensers (US \$80,000) and the two low pressure sprayfoam dispensers at US \$15,000 each. Trials, technology transfer and training amount to US \$45,000. Incremental operating cost of US \$24,279 for the rigid foam conversion and US \$123,647 for the integral skin and flexible molded foam production are expected.

Technical assistance

17. The technical assistance programme covers 10 small-scale enterprises with CFC-11 consumption from 0.05–1.2 tonnes and a total of 3.2 tonnes. The characteristics of the enterprises are provided in the profile in table 1 below.

18. The total cost of the technical assistance programme is US \$47,000. This is made up of 2 workshops for US \$10,000, trials (US \$15,000), trial visits by the distributors (US \$1,000), verification visits (US \$1,000) and international supervision and technical support US \$20,000.

Table 1: Profile of the Small-scale Enterprises (Olaflex Group)

ENTERPRISE	SYSTEMS CONSUMPTION (t/y)	CFC USE (t/y)	EQUIPMENT	APPLICATION
Ind. DRANT	10	0.6	Canon LP	Automotive
INTERFILL	4	0.2	Handmix	Automotive
DONSOON	5	0.3	Handmix	Automotive
SUPERFILT	1.5	0.1	Handmix	Automotive
A&Z	1	0.05	Handmix	Automotive
SERIES	20	1.2	OMS LP	Furniture
PLASFIVI	5	0.3	Handmix	Automotive
EXICROM	3	0.2	Handmix	Furniture
MAGRU	1	0.05	Handmix	Furniture
UNICOR	2	0.1	Handmix	Several
TOTAL	52.5	3.1		

Justification for the use of HCFC-141b

19. UNDP indicated that the companies were briefed during appraisal prior to project preparation about available conversion technologies and their “techno-economic”, health and environmental impacts, and that the enterprises will be responsible for conversion to zero ODP technology. The companies selected the HCFC-141b option against the background of these discussions.

20. UNDP has also provided a letter from the Government of Colombia supporting the company’s choice of the HCFC-141b technology. The justification from UNDP and the Government’s letter are attached to this document.

Impact of the projects

21. A total of 115.7 ODP tonnes will be phased out when the Espumlatex and Olaflex projects are implemented. This will eliminate about 33% of Colombia's 1999 consumption of Annex A Group I substances. There will be residual ODS consumption of 10.3 ODP tonnes as a result of the use of HCFC-141b. Espumlatex Promicolda (retroactive funding) project does not impact Colombia's baseline consumption of Annex A CFCs since it was implemented in 1994

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

Espumlatex Systems House

1. Agreement has been reached between the Secretariat and UNDP on the eligible grants of the Espumlatex component and the customers component of the project for a total grant of US \$332,768. The breakdown is as follows:

Espumlatex	US \$16,500
Customer group	US \$316,268

2. The technical assistance component relating to the distributors are still under discussion and the results will be communicated to the Sub-Committee on Project Review.

Espumlatex Promicolda

3. No agreement was reached on the eligible cost of the retroactive funding.

Incremental capital cost

4. The replacement of low pressure dispensers with high pressure dispensers is not essential to the conversion from CFC to the substitute blowing agent. This has been confirmed by industry experts and has been applied to all similar projects.

5. UNDP was informed that, the fact that projects that included such costs were earlier approved based on technical information available to the Committee at that time does not make the cost eligible as the company did not have to replace its low pressure machine in order to effect its conversion.

6. Furthermore the project was not submitted at the time when the cost was approved (by default) as an eligible incremental cost. Therefore the amount of US \$217,936 is not an eligible incremental cost.

Incremental operational cost

7. UNDP has not provided actual incremental operational cost incurred by the company which has already been in its post-conversion operation for about 6 years. The theoretical calculation is based on data which are not supported by the technological information on the foam production in the document.

8. Since the project has been completed for longer than two years it was expected that the company would provide actual differences in operational cost. This would have provided a basis for comparison with the theoretical calculation and thus provided the Committee the basis for determining the eligible incremental operating cost to the company.

9. Based on the above, the Secretariat could not recommend the amount of US \$150,284 as eligible incremental operational cost.

Olaflex

10. The Secretariat and UNDP discussed the project and agreed on the eligible grant.

RECOMMENDATIONS

1. The Fund Secretariat recommends blanket approval of the Olaflex project with the funding level and associated support cost indicated below.

	Project Title	Project Funding (US\$)	Support Cost (US\$)	Implementing Agency
(a)	Retroactive funding for the conversion from CFC-11 to water-based technology in the manufacture of flexible molded and integral skin foam at Espumlatex-Promicolda		Pending	UNDP
(b)	Conversion from CFC-11 to HCFC-141b and water based technology in the manufacture of various polyurethane foam applications at 25 small enterprises centered around their systems house, Espumlatex, with a technical assistance program covering distributors		Pending	UNDP
(c)	Conversion from CFC-11 to HCFC-141b and water based technology in the manufacture of various polyurethane foam applications at Olaflex with a technical assistance programme covering 10 small customers	191,833	24,938	UNDP



**United Nations
Environment
Programme**



Distr.
Limited

UNEP/OzL.Pro/ExCom/32/30/Egypt
8 November 2000

ORIGINAL: ENGLISH

EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Thirty-second Meeting
Ouagadougou, 6-8 December 2000

PROJECT PROPOSAL: EGYPT

This document consist of the comments and recommendations of the Fund Secretariat on the following project proposal:

Halon:

- Halon management bank programme

UNDP

PROJECT EVALUATION SHEET EGYPT

SECTOR: Halon ODS use in sector (1999): 810 ODP tonnes

Sub-sector cost-effectiveness thresholds: n/a

Project Titles:

(a) Halon management bank programme

Project Data	Banking	
Enterprise consumption (ODP tonnes)		
Project impact (ODP tonnes)		754.00
Project duration (months)		36
Initial amount requested (US \$)		500,000
Final project cost (US \$):		
Incremental capital cost (a)		182,500
Contingency cost (b)		
Incremental operating cost (c)		222,500
Total project cost (a+b+c)		405,000
Local ownership (%)		100%
Export component (%)		0%
Amount requested (US \$)		405,000
Cost effectiveness (US \$/kg.)		
Counterpart funding confirmed?		
National coordinating agency	EEAA	
Implementing agency	UNDP	

<i>Secretariat's Recommendations</i>	
Amount recommended (US \$)	405,000
Project impact (ODP tonnes)	754.00
Cost effectiveness (US \$/kg)	
Implementing agency support cost (US \$)	52,650
Total cost to Multilateral Fund (US \$)	457,650

PROJECT DESCRIPTION

(a) Halon Management Bank Programme in Egypt

1. The project includes several activities to achieve its objectives and goals. Through establishing a halon management bank, the project will provide for the following:

- Identification of current halons users.
- Implementation of the Halon Phase-out Programme.
- Establishment a database for existing halons systems.
- Conduct fire protection & engineering courses and training workshops
- Conduct environmental awareness seminars and workshops.
- Provision of information and documentation as to Halon alternatives and the suitability for different applications.
- Provision of enough halon for refill to serve essential users.
- Development and operation of the halon bank, set up of the reclamation center and collection of used halon from throughout the country for recycling.

2. It is expected that not all halon users in the commercial sectors will go into the halon alternatives replacement scheme at one time unless a ministerial decree is enforced. The Egyptian Environment Affairs Authority (EEAA) has begun the process for the decree. The ministerial decree is ready to be issued with the establishment of the Halon Bank to avoid the creation of a black market for halons. A similar decree has already been issued and is being implemented for other ODSs.

3. The plan for achieving indicated activities is based on a voluntary halon decommissioning programme, which will follow two parallel routes:

- (i) The establishment of a halon storage and recycling facility
- (ii) The development of a complete database of halon technology users in Egypt and including halon users as members of the halon bank.
- (iii) Members of the halon bank would be expected to commit to a replacement date, phase-out plan, or schedule for servicing needs for their systems using halons in return for a commitment from the Halon Bank to provide halon for refill in the case of discharges due to fires.

4. A non-governmental implementing organization under the supervision and monitoring of the Egyptian Environmental Affairs Authority (EEAA) will carry out the project. An example of such an organization is the Egyptian Fire Protection Association (EFPA) which has been active since 1995 and represents a suitable, potential implementing entity with good representation of the fire protection industry. The board of directors of this not-for-profit organization consists of representatives from all different categories of the industry, i.e. civil defense, petroleum sector, consultants and others.

5. The implementation of this project would be completed in 36 months. During this time, the physical bank would be established, the equipment would be set up, an awareness campaign would be initiated, a database would be established and potential Halon Bank group members would be contacted.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

1. UNDP indicated that the Government of Egypt informed it that since 1998, all fire extinguisher manufacturers have converted to other fire fighting techniques.

2. The costs and components of the halon banking project for Egypt are consistent with previous approvals and the guidelines for halon banking (Decision 18/11).

3. The Government of Egypt has regulations that require compliance with the control measures for halon with a total phase out and ban by 1 January 2010. The project document indicates that the Government is now preparing modified regulations to enable the Ozone Unit to control the import of all ODSs including halon. The Minister of State for Environmental Affairs issued a decree stating that customs clearance of imported ODSs, including halon, should be subject to EEAA approval.

4. To comply with the guidelines for halon banking, Egypt has indicated that it will modify its regulations so that the importation of halons will be banned at the time of the establishment of a reclamation centre for halons.

RECOMMENDATIONS

1. The Sub-Committee on Project Review may wish to recommend to the Executive Committee to approve this project in the amounts indicated in the following table with the understanding that the importation of halons will be banned at the time of the establishment of a reclamation centre for halons and that no more fire extinguisher manufacturers are consuming halon in Egypt.

	Project Title	Project Funding (US\$)	Support Cost (US\$)	Implementing Agency
(a)	Halon management bank programme	405,000	52,650	UNDP



**United Nations
Environment
Programme**

Distr.
Limited

UNEP/OzL.Pro/ExCom/32/30/Ghana
15 September 2000

ORIGINAL: ENGLISH

EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Thirty-second Meeting
Ouagadougou, 6-8 December 2000

PROJECT PROPOSAL: GHANA

This document consist of the comments and recommendations of the Fund Secretariat on the following project proposal:

Refrigeration

- Implementation of the RMP: mobile air conditioning (MAC) recovery and UNDP recycling of CFC-12
- Implementation of the RMP: Monitoring of the activities UNDP
- Incentive programme for the commercial/industrial refrigeration end-user sector UNDP
- Implementation of the RMP: customs training programme UNEP

PROJECT EVALUATION SHEET GHANA

SECTOR: Refrigeration ODS use in sector (1999): 43.60 ODP tonnes

Sub-sector cost-effectiveness thresholds: Commercial US \$ 15.21/kg

Project Titles:

- (a) Implementation of the RMP: mobile air conditioning (MAC) recovery and recycling of CFC-12
- (b) Implementation of the RMP: Monitoring of the activities
- (c) Incentive programme for the commercial/industrial refrigeration end-user sector
- (d) Implementation of the RMP: customs training programme

Project Data	RMP	RMP	RMP	RMP
	(a)	(b)	(c)	(d)
Enterprise consumption (ODP tonnes)				
Project impact (ODP tonnes)	11.70		4.00	
Project duration (months)	36	24	72	24
Initial amount requested (US \$)	98,902	15,455	198,000	97,000
Final project cost (US \$):				
Incremental capital cost (a)	91,184	14,050	198,000	
Contingency cost (b)	7,718	1,405		
Incremental operating cost (c)				
Total project cost (a+b+c)	98,902	15,455	198,000	
Local ownership (%)	100%	100%	100%	100%
Export component (%)	0%	0%	0%	0%
Amount requested (US \$)	98,902	15,455	198,000	81,000
Cost effectiveness (US \$/kg.)	8.50			
Counterpart funding confirmed?				
National coordinating agency		Ozone Office		
Implementing agency		UNDP		UNEP

<i>Secretariat's Recommendations</i>				
Amount recommended (US \$)	98,902	15,455	Issue	81,000
Project impact (ODP tonnes)	11.70			
Cost effectiveness (US \$/kg)	8.50			
Implementing agency support cost (US \$)	12,857	2,009		10,530
Total cost to Multilateral Fund (US \$)	111,759	17,464		91,530

PROJECT DESCRIPTION

- (a) Incentive programme for the commercial/industrial refrigeration end-user sector
- (b) Implementation of the RMP: mobile air conditioning (MAC) recovery and recycling of CFC-12
- (c) Implementation of the RMP: Monitoring of the activities
- (d) Implementation of the RMP: customs training programme

Background

1. In 1991, total CFC consumption in the refrigeration sector in the country was estimated at 73 tonnes used for servicing domestic, commercial and industrial refrigeration equipment and MAC units. In 1999, CFC consumption was estimated at 43.6 tonnes. CFC reduction has been supported by introduction of a licensing system to control imports of ODS and implementation of investment projects and training programmes in the refrigeration sector. However, additional activities are needed in order to achieve the 2005 and 2007 reduction measures stipulated in the Montreal Protocol.

Policy and legislation

2. The Government of Ghana has already developed legislative measures to control import of ODS and ODS-based equipment. Since 1994, an ODS import permit is in place which requires that importers must obtain a clearance from the Environmental Protection Agency before importing ODS-based equipment into the country. While no controls on quotas are applied, the Ozone Office uses moral judgement to reduce the amounts of ODS imported.

3. Under the Environmental Assessment Regulation LI-1652 of 1999, an Environmental Impact Assessment of new cold stores is required prior to their instalment. The Ozone Office plays a key role in the review process, ensuring that only ozone-friendly refrigerants are used.

4. The Government of Ghana has identified the need for development of new legislation to control the amounts of ODS and used CFC-12-based refrigeration equipment that can be imported into the country (about one million second-hand refrigerators are in operation in Ghana).

Projects already approved in the refrigeration sector

5. The Government of Ghana has implemented the following projects in the refrigeration servicing sector:

- (a) Improved servicing and maintenance practices in the refrigeration sector (US \$328,000, under UNDP implementation);
- (b) Implementation of a train the trainers programme for refrigeration technicians

(US \$99,000, under UNEP implementation); and

- (c) Technical assistance in air conditioning (US \$31,500 as bilateral cooperation by the Government of France).

6. Through these projects, maintenance and servicing procedures and refrigerant recovery/recycling operations of service technicians have been improved; and 37 recovery/recycling machines have been distributed. While these projects were successfully implemented, they were not sufficient to assist all service technicians in the country, specially those in the informal sector. With the eventual phase out of CFC-12 and the increased imports of refrigeration equipment based on non-ODS refrigerants, additional training is required.

Sub-projects contained in the RMP

7. The RMP project aims to reduce the consumption of CFCs in the country in order to achieve Montreal Protocol obligations. The RMP includes a training programmes for customs officers and other government staff involved in the monitoring of ODS and ODS-based equipment. This project aims at training customs officers to increase their knowledge on ozone depletion issues; get acquainted with ODS import/export licensing system and other regulations related to the phase-out of ODS; identify ODS and ODS-based refrigeration (CFC-detection equipment will be provided in all major customs entry points in the country); and development of a database on ODS imports at the Department of Customs, Excise and Preventive Services.

8. Through a survey carried out in 2000, it was found that of the total 30,000 vehicles with a CFC-12 MAC unit in the country, 18,500 units are serviced every year (by more than 300 technicians in 100 workshops) using more than 18.5 tonnes of CFC-12. To address the management of CFCs used in this sub-sector, the RMP includes a request for the establishment of a recovery and recycling network for 16 recovery/recycling machines for servicing MAC units, at a total cost of US \$98,902. This sub-project also provides for training workshops for service technicians on practical demonstrations for recovery and recycling operations.

9. A recent survey of cold stores and fishing vessels was conducted in Ghana with assistance from the Institut de Génie Thermique of Switzerland. In total, 67 cold stores (of a total 900 identified in the country) and 76 fishing vessel companies were surveyed. According to the survey, it was found that:

- (a) while some installations are well maintained, and conversion to zero-/low-ODP refrigerants would require minor changes, other installations would need to be completely re-built or replaced;
- (b) retrofit of newer facilities (installed after 1995) to zero/low-ODP refrigerants will be relatively easy to perform, since they were designed for either CFC or HFC refrigerants;
- (c) in general, the design and electrical installations of the facilities preclude simple retrofit to a flammable hydrocarbon refrigerant (which would involve major

equipment re-design, and upgrading of the electrical installation).

10. Based on the results of the survey, the RMP includes a project to, be implemented over a period of 5 years for establishing an incentive programme to encourage refrigeration end-users to replace, or permanently retrofit their existing ODS based equipment (fisheries, meat-processing plants, breweries, hospitals, hotels, restaurants, supermarkets), to zero/low-ODP refrigerants (the total ODS consumption in this sub-sector is 7.1 ODP tonnes). During the period 2001-2006, any end-user (established prior to 25 July 1995) can apply to receive an incentive payment towards the cost of replacement/retrofit of their CFC-based equipment. Incentive payments (between US \$500 and US \$15,000) will be based on CFC consumption when equipment is replaced, or the cost for a permanent retrofit. The incentive project also includes a component for information dissemination and monitoring (advertisements in newspapers, information brochures for end-users and relevant industry associations, and workshops and annual meetings to report on progress of the programme). Following completion of the conversion, the end-user enterprise must provide invoices to confirm the total costs incurred during the conversion. The level of payment will be reviewed by the Ozone Office and UNDP (40 per cent of the incentive amount will be paid upon receipt of an application and the balance after conversion has been completed and a certification that the replaced equipment has been destroyed/rendered unusable has been issued).

11. The RMP project also includes a request for engaging a local consultant to collect data on CFCs recovered and recycled from the service workshops that are included in the recovery and recycling project (at US \$15,455); and a request for US \$137,000 for other projects related to the refrigeration servicing sector (possibly additional training programmes) which will be submitted at a later meeting of the Executive Committee.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

1. The Government of Ghana submitted the RMP to the Fund Secretariat with an official letter of transmittal stating its commitment, responsibilities and the financial implications associated with decision 31/48 (i.e., 50 per cent reduction of CFC baseline by 2005 and 85 per cent reduction by 2007; that all refrigeration sub-sectors have been carefully assessed; and a system for monitoring and reporting on progress for delivering the phase out targets has been established).

2. During the preparation of the RMP, the current and future forecast consumption of CFCs in relation to the 50 per cent reduction by 2005 and 85 per cent by 2007 were taken into account. The activities proposed in the RMP including legislative measures, would reduce CFC consumption to negligible levels from the year 2006 onwards.

3. The Secretariat and UNEP also discussed cost issues related to logistical arrangements and training material for the custom training programme. Subsequently, it was agreed to adjust the costs for the programme accordingly (as indicated in Table 1 above).

4. The Fund Secretariat also requested an explanation for the request for assessment and co-ordination of technical and policy issues (US \$10,000) included in the training programme. UNEP informed the Secretariat that the request for assistance and coordination of policy and technical issues represents UNEP's substantive management work (which is not covered under the agency's support cost), which includes: detailed definition of responsibilities of each stakeholder; definition of characteristics of the products and deliverables; guidance to local governments and experts on the work carried out at national level; review and comments on products and deliverables; preparation and delivery of targeted presentations at the workshops; follow-up and assistance on activities to be implemented after the workshop.

5. Regarding the incentive programme for commercial and industrial end-user refrigeration, the Secretariat pointed out that this activity appeared premature at the present time for the following reasons:

- (a) The leakage rate of installed commercial refrigeration equipment is high (ranging from 10 per cent to over 300 per cent in the equipment surveyed);
- (b) While the price of CFC-12 has increased in the last 10 months (from US \$3.00 to US \$5.50 per kg) it is still cheaper than HCF-134a (US \$6.60/kg);
- (c) The total amount of CFCs estimated to be phased out from this programme is 4 tonnes over the period 2001 – 2006. Even if the end-user project was successful in phasing out all 7 tonnes and through the proposed MAC recovery and recycling project additional 11.7 ODP tonnes were recovered and recycled, Ghana will still not be able to achieve the 50% reduction by 2005 (calculated at 17.8 tonnes);

6. UNDP informed the Secretariat that the project aims, through the innovative mechanism, to apply the limited funding available as widely as possible amongst end-users in the commercial and industrial refrigeration sector. UNDP also felt that most requests for an incentive would come from end-users who must change their refrigeration system (i.e., age, innovation of business), and would be willing to select a non-CFC technology. Even if the number of end-users coming forward for an incentive is low at the beginning (i.e., during the first one or two years), it will increase as CFC prices continue to evolve. The incentive programme must start now so that the direct impact of at least 3 tonnes/year can be achieved in 2003-2004.

7. UNDP also pointed out that the annual CFC used by the surveyed enterprises is a realistic figure; not all of the consumption is for topping-up the systems due to leaks. Whilst there may be potential to reduce this by improvements in servicing techniques this is no more certain than the potential to reduce overall consumption by the proposed incentive programme. In Ghana, the difference in price between CFC 12 and HFC 134a is negligible (a difference of US \$0.80/kg). The commercial and industrial refrigeration end-user sector needs to be addressed now

8. UNDP considered that all requirements under decisions 28/44 and 31/48 have been met. Regarding the issue of utilizing all the funds available without meeting the phase-out objectives of the RMP, UNDP is convinced that neither service technician training nor recovery and recycling projects will give any better guarantee (it is to be noted that UNDP is including a MAC recovery and recycling project within the RMP). The incentive programme has the potential to start the process of elimination by conversion. Remaining consumption will be decreased through legislative measures, quota systems and market forces.

9. Upon a request by the Secretariat regarding the responsibilities of the implementing agencies in the overall implementation of the RMP, UNDP indicated that, as bound by its agreement with the Committee, it will facilitate compliance with the provisos of the Montreal Protocol by Article 5 countries through execution of the individual projects within the RMP project. UNDP considers that ODS phaseout resulting from legislative measures and through implementation of activities stipulated in the RMP, are the final responsibility of the country for which the implementing agency could not be held responsible.

RECOMMENDATION

1. The Fund Secretariat recommends approval of MAC recovery and recycling, RMP monitoring, and customs training programme components with associated support costs at the funding level shown in the table below (items (a), (b), (d)).

2. The Executive Committee may wish to consider the incentive programme for the commercial/industrial refrigeration end-user sector in light of the above comments and observations.

3. The Executive Committee may wish to consider the RMP as a whole in the light of its conclusion on the incentive programme.

	Project Title	Project Funding (US\$)	Support Cost (US\$)	Implementing Agency
(a)	Implementation of the RMP: mobile air conditioning (MAC) recovery and recycling of CFC-12	98,902	12,857	UNDP
(b)	Implementation of the RMP: Monitoring of the activities	14,455	2,009	UNDP
(c)	Incentive programme for the commercial/industrial refrigeration end-user sector	Issue		UNDP
(d)	Implementation of the RMP: customs training programme	81,000	10,530	UNEP



**United Nations
Environment
Programme**

Distr.
Limited

UNEP/OzL.Pro/ExCom/32/30/India
10 November 2000

ORIGINAL: ENGLISH

EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Thirty-second Meeting
Ouagadougou, 6-8 December 2000

PROJECT PROPOSALS: INDIA

This document consist of the comments and recommendations of the Fund Secretariat on the following project proposals:

Foam:

- | | |
|---|------|
| • Conversion from CFC-11 to water-blown technology in the manufacture of flexible molded polyurethane foam at Netplast Ltd. | UNDP |
| • Conversion from CFC-11 to water-blown technology in the manufacture of flexible molded polyurethane foam and from CFC-11 to HCFC-141b technology in the manufacture of integral skin polyurethane foam at Sawhney Seating Systems | UNDP |
| • Conversion from CFC-11 to HCFC-141b technology in the manufacture of integral skin polyurethane foam at Sun Steering Wheels Ltd. | UNDP |

Process agent:

- | | |
|--|-------|
| • Conversion of carbon tetrachloride (CTC) as process solvent to ethylene dichloride at Doctors Organic Chemicals Ltd., Tanuku | UNIDO |
| • Conversion of carbon tetrachloride (CTC) as process solvent to ethylene dichloride at Svis Labs Ltd., Ranipet | UNIDO |

- | | |
|---|------------|
| • Conversion of carbon tetrachloride (CTC) as process solvent to trichloromethane at M/S Alpha Drugs India Ltd., Patiala | UNIDO |
| • Conversion of chlorinated rubber manufacture from carbon tetra chloride to non-ODS process at Rishiroop Organics Pvt. Ltd. And Rishiroop Polymers Pvt. Ltd. | World Bank |
| • Conversion of carbon tetrachloride (CTC) as process solvent to ethylene dichloride at Satya Deeptha Pharmaceuticals Ltd., Hummabad | UNIDO |

Refrigeration:

- | | |
|--|-------|
| • Conversion from CFC-11 to HCFC-141b and from CFC-12 to HFC-134a technology in the manufacture of commercial refrigeration equipment at Nine Enterprises | UNDP |
| • Conversion from CFC-11 to HCFC-141b and from CFC-12 to HFC-134a technology in the manufacture of commercial refrigeration equipment at Sandlas Air-Con Systems P. Ltd. | UNDP |
| • Umbrella project for the conversion of three commercial refrigeration enterprises in New Delhi | UNIDO |

PROJECT EVALUATION SHEET INDIA

SECTOR: Foam ODS use in sector (1998): 6,400 ODP tonnes

Sub-sector cost-effectiveness thresholds: Integral Skin US \$16.86/kg

Project Titles:

- (a) Conversion from CFC-11 to water-blown technology in the manufacture of flexible molded polyurethane foam at Netplast Ltd.
- (b) Conversion from CFC-11 to water-blown technology in the manufacture of flexible molded polyurethane foam and from CFC-11 to HCFC-141b technology in the manufacture of integral skin polyurethane foam at Sawhney Seating Systems
- (c) Conversion from CFC-11 to HCFC-141b technology in the manufacture of integral skin polyurethane foam at Sun Steering Wheels Ltd.

Project Data	Flexible moulded	Flexible moulded	Integral skin
	Netplast	Sawhney	Sun Steering
Enterprise consumption (ODP tonnes)	18.00	28.90	17.00
Project impact (ODP tonnes)	18.00	27.99	15.65
Project duration (months)	36	36	36
Initial amount requested (US \$)	177,224	241,619	144,379
Final project cost (US \$):			
Incremental capital cost (a)	70,000	100,000	85,000
Contingency cost (b)	7,000	10,000	8,500
Incremental operating cost (c)	100,224	131,619	50,879
Total project cost (a+b+c)	177,224	241,619	144,379
Local ownership (%)	100%	100%	100%
Export component (%)	0%	0%	0%
Amount requested (US \$)	177,224	241,619	144,379
Cost effectiveness (US \$/kg.)	9.85	8.63	9.23
Counterpart funding confirmed?			
National coordinating agency	Ministry of Environment & Forests		
Implementing agency	UNDP	UNDP	UNDP

<i>Secretariat's Recommendations</i>			
Amount recommended (US \$)	177,224	241,619	144,379
Project impact (ODP tonnes)	18.00	27.99	15.65
Cost effectiveness (US \$/kg)	9.85	8.63	9.23
Implementing agency support cost (US \$)	23,039	31,410	18,769
Total cost to Multilateral Fund (US \$)	200,263	273,029	163,148

PROJECT DESCRIPTION

Sector Background

- Latest available total ODS consumption (1998)	11,736.70	ODP tonnes
- Baseline consumption (average 1995-1997) of Annex A Group I substances (CFCs)	6,681.00	ODP tonnes
- Consumption of Annex A Group I substances for the year 1998	5,264.60	ODP tonnes
- Baseline consumption of CFCs in foam sector	2,391.00	ODP tonnes
- Consumption of CFCs in foam sector in 1998	2,403.00	ODP tonnes
- Funds approved for investment projects in foam sector as of end of 1999	US \$23,389,349.00	
- Quantity of CFC to be phased out in investment project in the foam sector as of end of 1999	2,753.60	ODP tonnes
- Quantity of CFCs phase out from investment projects in the foam sector as of end of 1999	2,459.40	ODP tonnes
- Funds approved for investment projects in the foam sector in the year 2000	US \$3,105,884	
- Quantity of CFC to be phased out in foam projects approved in the year 2000	443.60	ODP tonnes

As at the time of preparation of this evaluation India had not reported its ODS consumption for 1999 to the Ozone Secretariat.

- (a) **Conversion from CFC-11 to water-blown technology in the manufacture of flexible molded polyurethane foam at Netplast Ltd.**
- (b) **Conversion from CFC-11 to water-blown technology in the manufacture of flexible molded polyurethane foam and from CFC-11 to HCFC-141b technology in the manufacture of integral skin polyurethane foam at Sawhney Seating Systems**
- (c) **Conversion from CFC-11 to HCFC-141b technology in the manufacture of integral skin polyurethane foam at Sun Steering Wheels Ltd.**

Flexible Molded and Integral Skin Polyurethane Foams

1. Three companies (listed below) manufacture flexible molded and integral skin polyurethane foam. Netplast manufactures flexible molded polyurethane foam for the automotive industry while Sawhney manufactures flexible molded and integral skin foams for the automotive and furniture industries and Sun Steering Wheels manufactures integral skin foam steering wheels, head rests and others also for the automotive industry. The equipment used by the enterprises are indicated in table 1 below. The density of the molded foam is stated to be 42 kg/m³.

2. Netplast and Sawhney purchase CFC-11 premixed in the polyol at a CFC-11 proportion of 13% by weight in the blend, while Sun uses premixed polyol with 20% CFC in the blend. The companies will convert the production of flexible molded foam to fully water-based systems and integral skin foam to HCFC-141b. The costs of these conversions include the retrofit of low and high pressure dispensers at US \$15,000 and US \$10,000 per machine respectively, replacement of fiberglass molds at US \$1,000 per mold, mold heating at US \$10,000, technical assistance at US \$10,000 per project, and training at US \$5,000 per project. Incremental operating cost for each project consistent with the amount of CFC-11 to be phased out is requested as indicated in the table below.

3. The table below (Table 1) provides a profile of the enterprises.

Table 1: Profile of the flexible molded/integral skin foam producing enterprises

Name of enterprise	Date Established	CFC Phase out	Baseline dispensers*	No. of molds	I.C.C.** (US\$)	I.O.C.*** (US\$)
Netplast	1980	18.0	H.P.D. 30 kg/min Elastogran	30	77,000	100,224
Sawhney	1993	28.9	2 H.P.D. 14 kg/min Polycraft 1 L.P.D. 30 kg/min OMS	40	110,000	131,619
Sun Steering	1994	17.0	2 H.P.D. 30 kg/min Elastogran	22	93,500	50,879

*L.P.D.: low-pressure dispenser, H.P.D. high-pressure dispenser

**I.C.C.: Incremental capital cost, including 10% contingency.

***I.O.C.: Incremental operating cost.

Justification for the use of HCFC-141b

4. Justification for the use of HCFC-141b by Sawhney and Sun in the conversion of the integral skin foam production has been provided in each project document and as annexes to the document, including projected “techno-economic” impact. It is stated that detailed discussions on issues associated with the use of HCFC in Multilateral Fund projects were held with the enterprises prior to the preparation of the projects, and this informed their choice of the technology. The Government of India has also provided a letter supporting the use of HCFC-141b by the companies consistent with Decision 27/13.

5. A sample of the justification (additional justification) annexed to the projects (from Sawhney project document) and the letter of the Government of India supporting the choice of HCFC-141b are attached to this evaluation.

Impact of the projects

6. A total of 61.64 ODP tonnes will be phased out from the three foam projects. This will eliminate 0.9% of India's baseline consumption of Annex A Group I substances. As India's 1999 ODS consumption data is not available to the Fund Secretariat, the impact of the projects on India's 1999 consumption of Annex A Group I substances could not be assessed. There will be residual ODS consumption of 2.26 ODP tonnes as a result of the use of HCFC-141b conversion technology.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS**COMMENTS**

1. The three projects and their associated costs have been agreed between the Secretariat and UNDP.

RECOMMENDATIONS

1. The Fund Secretariat recommends blanket approval of the Netplast, Sawhney and Sun Steering Wheels projects with the levels of funding and associated support costs as indicated below.

	Project Title	Project Funding (US\$)	Support Cost (US\$)	Implementing Agency
(a)	Conversion from CFC-11 to water-blown technology in the manufacture of flexible molded polyurethane foam at Netplast Ltd.	177,224	23,039	UNDP
(b)	Conversion from CFC-11 to water-blown technology in the manufacture of flexible molded polyurethane foam and from CFC-11 to HCFC-141b technology in the manufacture of integral skin polyurethane foam at Sawhney Seating Systems	241,619	31,410	UNDP
(c)	Conversion from CFC-11 to HCFC-141b technology in the manufacture of integral skin polyurethane foam at Sun Steering Wheels Ltd.	144,379	18,769	UNDP

Additional Justification for Use of HCFC Technology

The implementing agency expert appraised the prospective recipient enterprise, Sawhney Seating Systems, prior to the preparation of this project document, during February 2000 and had detailed discussions with the technical and managerial personnel of the enterprise, regarding the choice of technology for replacing the existing CFC-based technology, under the project. The enterprise was briefed in detail about the following:

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

The justifications offered by Sawhney Seating Systems for the selection of HCFC-141b based systems in their manufacture of integral skin polyurethane foam are summarized as below:

1. Hydrocarbon (pentanes) technology involves fire and explosion hazards. The local laws governing the use of hydrocarbons cannot be complied with, in the existing manufacturing premises of Sawhney Seating Systems, as they are located in a crowded industrial area. They may need to relocate, which they do not consider feasible. Furthermore the technology is not considered mature or locally available, for this application.
2. Water based systems are not available locally in India.
3. Sawhney Seating Systems considers that the HCFC-141b technology is proven in India and technically satisfactory systems are locally available.

Sawhney Seating Systems believe that the changeover to HCFC technology is relatively quick, safe and cost-effective. They therefore prefer HCFC technology after considering the pros and cons of various available alternatives for their integral skin foam production.



भारत सरकार
पर्यावरण एवं वन मन्त्रालय
ओज़ोन सेल
Government of India
Ministry of Environment and Forests
Ozone Cell

C. Viswanath
Director (O)

F. No. 5/1/2000-OC
September 29, 2000

RECEIVED

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Dear Mr Van Engel

We are pleased to convey the recommendation of the Ministry of Environment and Forests for submitting the following foam and commercial refrigeration project for consideration of the XXXII Meeting of the Executive Committee in December 2000.

Foam Sector:

S. No.	Name of the Company	Amount Recommended	ODP MT
1.	M/s. Sawhney Seating System (Revised Project)	241,619	27.99
2.	M/s. Sun Steering Wheels Ltd.	144,379	15.65

Commercial Refrigeration Sector

1.	M/s. Sandlas Aircon System (Revised Project)	200,531	22.37
2.	Group Project of 9 commercial enterprises comprising the following :- a. M/s. Anand Aircon b. M/s. Comments Aircon System c. M/s. Freezeland d. M/s. Kay Ess Industries e. M/s. Kool Pack Industries f. M/s. Mongia and Co. g. M/s. RR Industries h. M/s. Sheetal Refrigeration i. M/s. Verma Frost	797,923	53.52

Contd..2..

जोन चार बी, द्वितीय मंजिल, इंडिया हैबिटाट सेंटर, लोदी रोड, नई दिल्ली- ११० ००३
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PHONE : 4642176, 4607601, 4601533 FAX: 91-11-4642173 E-mail : ozone@del3.vsnl.net.in

..2..

2. Reference Foams Projects of India submitted for consideration of the 32nd Executive Committee Meeting in December 2000. It is stated in accordance with the Decision 27/13 of the Executive Committee that the specific situations involved with Foam projects in Sr. No. 1 to 8 and HCFC commitments under Article-2F, has been reviewed and determined that, at the present time, the following projects need to use HCFCs for an interim period. The companies are aware that no funding would be available for the future conversion for their projects.

With regards,

Yours sincerely,

C. Viswanath
(C. Viswanath)

Mr. Jacques Van Engel,
Regional Programme Coordinator,
Montreal Protocol Unit,
1 UN Plaza, Room No. FF-9918
New York NY 1007, USA
Fax : 001-212-906-6947

email sent
Swite

PROJECT EVALUATION SHEET INDIA

SECTOR: Process agent ODS use in sector (1998): 3,689 ODP tonnes

Sub-sector cost-effectiveness thresholds:

Project Titles:

- (a) Conversion of chlorinated rubber manufacture from carbon tetra chloride to non-ODS process at Rishiroop Organics Pvt. Ltd. And Rishiroop Polymers Pvt. Ltd.
- (b) Conversion of carbon tetrachloride (CTC) as process solvent to trichloromethane at M/S Alpha Drugs India Ltd., Patiala
- (c) Conversion of carbon tetrachloride (CTC) as process solvent to ethylene dichloride at Doctors Organic Chemicals Ltd., Tanuku
- (d) Conversion of carbon tetrachloride (CTC) as process solvent to ethylene dichloride at Satya Deeptha Pharmaceuticals Ltd., Hummabad
- (e) Conversion of carbon tetrachloride (CTC) as process solvent to ethylene dichloride at Svis Labs Ltd., Ranipet

Project Data	Process conversion	Process conversion	Process conversion	Process conversion	Process conversion
	Rishiroop	Alpha Drugs	Doctors Organic	Satya Deeptha	Svis Labs
Enterprise consumption (ODP tonnes)		69.70	94.60	27.92	54.17
Project impact (ODP tonnes)	452.00	69.70	94.60	27.92	54.17
Project duration (months)	36	18	18	18	12
Initial amount requested (US \$)	4,957,246	197,194	451,469	342,337	317,971
Final project cost (US \$):					
Incremental capital cost (a)	4,066,100	236,043	387,648	202,046	207,402
Contingency cost (b)	406,610	13,372	38,765	20,205	10,613
Incremental operating cost (c)	484,536	153,022	75,219	120,086	99,956
Total project cost (a+b+c)	4,957,246	402,437	501,632	342,337	317,971
Local ownership (%)	100%	100%	100%	100%	100%
Export component (%)	0%	0%	0%	0%	0%
Amount requested (US \$)	3,319,990	163,370	325,768	288,166	272,881
Cost effectiveness (US \$/kg.)		2.34	3.10	10.32	5.04
Counterpart funding confirmed?		Yes		Yes	Yes
National coordinating agency	Ministry of Environment and Forest IBRD	Ministry of Environment and Forest UNIDO	Ministry of Environment and Forest UNIDO	Ministry of Environment and Forest UNIDO	Ministry of Environment and Forest UNIDO
Implementing agency					

<i>Secretariat's Recommendations</i>					
Amount recommended (US \$)					
Project impact (ODP tonnes)					
Cost effectiveness (US \$/kg)					
Implementing agency support cost (US \$)					
Total cost to Multilateral Fund (US \$)					

PROJECT DESCRIPTION

- (a) Conversion of chlorinated rubber manufacture from carbon tetra chloride to non-ODS process at Rishiroop Organics Pvt. Ltd. And Rishiroop Polymers Pvt. Ltd.
- (b) Conversion of carbon tetrachloride (CTC) as process solvent to trichloromethane at M/S Alpha Drugs India Ltd., Patiala
- (c) Conversion of carbon tetrachloride (CTC) as process solvent to ethylene dichloride at Doctors Organic Chemicals Ltd., Tanuku
- (d) Conversion of carbon tetrachloride (CTC) as process solvent to ethylene dichloride at Satya Deeptha Pharmaceuticals Ltd., Hummabad
- (e) Conversion of carbon tetrachloride (CTC) as process solvent to ethylene dichloride at Svis Labs Ltd., Ranipet

Sub-Sector Backgrounds

The sub sector background for each process for which projects have been submitted is included with the description of the relevant projects.

PRODUCTION OF CHLORINATED RUBBER

- (a) Conversion of carbon tetrachloride as process solvent to a non-ODS process at Rishiroop Organics, Rishiroop Polymers Pvt. Ltd., India

1. The objective of this project is to eliminate the use of carbon tetra-chloride (CTC) as a process agent in the production of chlorinated rubber (CR) by Rishiroop Organics Pvt. Ltd. (ROL) at its plant in Vapi, India and by Rishiroop Polymers Pvt. Ltd. (RPL) at its plant at Nasik, India. As part of an industrial restructuring the two units are proposed to be amalgamated into a single production unit at ROL, Vapi. The production capacity of the converted non ODS CR production facility proposed for funding is equal to the combined production capacity of ROL and RPL, that is, 1100 tonnes per annum

2. Rishiroop Organics and Rishiroop Polymers are wholly Indian-owned companies which manufacture chlorinated rubber as part of the Rishiroop Group. In the last three years of operation, Rishiroop Organics consumed an average of 226.2 ODP tonnes of CTC as a process agent in the production of 344.3 tonnes of chlorinated rubber annually. In the period from 1992-1995, Rishiroop Polymers consumed an average of 225.6 ODP tonnes of CTC as a process agent in the production of 371.5 tonnes of chlorinated rubber. Production at Rishiroop Polymers was suspended in September 1995 due to a labour dispute, which was finally resolved in October 1999. The enterprise has yet to restart production of chlorinated rubber and so the consumption of CTC for the last three years has been zero.

3. There are five CR manufacturers in India, including three in the Rishiroop Group, who use CTC as a process solvent. Details of these enterprises are as follows :

CR Manufacturers in India

Serial No.	Enterprise	Start of commercial production	Installed capacity (MT/yr.)	Process agent (CTC, Metric Tons) inventory in plant equipment when inspected (Dec. 1999)
1.	Rishiroop Polymers Pvt. Ltd. (RPL)	1973	550	65.0
2.	Pauraj Chemicals Pvt. Ltd.	1980	150	26.0
3.	Rishiroop Organics Pvt. Ltd. (ROL)	1991	550	65.0
4.	Rishiroop Rubber International Ltd. (RRIL)	1993	4500	400.0
5.	Tarak Chemicals Ltd.	1998	300	Not visited.

4. The cumulative consumption and emission of CTC by these enterprises is estimated to be 1,800 MT (or 1,980 ODP tons) in the year 2000, at levels slightly above the estimates in the country programme.

5. Conversion of RIL and ROL will make use of an aqueous process developed by the third Rishiroop Group company, Rishiroop Rubber International (RRIL). The conversion of production of CR at RRIL (capacity 4,500 tonnes per annum) is not included in the current proposal. The project document states that “the conversion at RRIL will be taken up at a subsequent stage”. It is indicated that RRIL is a publicly owned company and any proposal for amalgamation of a publicly owned company with a privately owned enterprise requires legal clearances from various institutions. It is also stated that apart from these processes, RRIL would also need to take approvals for the merger from its shareholders which would take additional time. It is indicated on the Rishiroop web-site that the RRIL plant is a 100 per cent export-oriented facility.

6. Of the other two remaining companies involved in the manufacture of CR, **Tarak Chemicals** is ineligible for MP assistance, as it was established after the funding cut-off date of July 31, 1995. The other, **Pauraj Chemicals**, has an installed capacity of 150 MT/year, and was established in 1979-80. It has been consuming between 34-38 MT of CTC per year in the last two years. The project document indicates that conversion of technology at Pauraj Chemicals will require a complete overhaul, particularly because of the plant's age and capacity. The company has no plans at present about the next steps for conversion.

7. The non-ODS technology developed by RRIL involves the chlorination of rubber in an aqueous medium using ultra-violet light as a catalyst. RRIL applied for a domestic patent for its process in December 1998, and registered a provisional patent under Indian law on January 8, 1999. Details regarding the Indian patent process are included in Annex 8 of the project document.

8. The technical requirements of the new process require that much of the existing equipment be replaced. The main capital cost items requested are six glass-lined reactors (US\$

512,000), a photochemical system (US\$ 184,000), glass-lined stirred tanks (US\$ 240,000), FRP belt filter (US\$ 370,000), two-stage fluidized bed dryer system (US\$ 334,000), effluent treatment facility (US\$ 55,700), process utility and piping (US\$ 310,400). Incremental operating costs arising mainly from increased power consumption and additional quantities of chemicals are requested for four years at a level of US\$ 484,536.

9. A technology transfer fee of US\$ 238,000 is requested, to be paid to RRIL as the developer of the technology. "Pre-operative" costs are also sought for insurance, travel, training and project team salaries (US \$141,000) fixed overheads for a six month changeover period (US \$71,500) and costs of amalgamations of ROL and VAPI (US \$199,000) as well as start up and commissioning costs (US \$71,500)

10. The project document contains an explanation of the rationale for the choice of the aqueous process. It also includes a detailed discussion of emission control options and an analysis which concludes that capital costs for emission control would be similar to the proposed costs for process conversion, but that operating problems provide "strong argument against opting for an emission abatement system in Indian conditions".

11. A technical review of the project has been provided.

Secretariat's Comments

Sub-sector profile and guidelines for process agent projects (Decision 27/78)

12. The project document provides details of the entire chlorinated rubber sub-sector in India and thus appears to meet the requirements of Decision 27/78 (a).

13. The project proposal may not conform fully to paragraph (c) of the decision which states "to permit adequate consideration of the industrial rationalisation option, a project proposal should cover all the production facilities in the country for the particular application under consideration." The proposal includes closure of the RPL plant not now in production and a doubling of production capacity at the ROL plant, but does not include a discussion of conversion of RRIL other than to indicate that it will be taken up at a subsequent stage. In this regard it is noted that the World Bank has included a possible project for conversion of RRIL in its draft 2001 business plan. It is also noted that the current total level of CR production of all plants in the Rishiroop Group including RRIL, is less than 1100 tonnes per annum (TPA) which is equal to the capacity requested in the present project proposal. RRIL has a nominal capacity of an additional 4500 TPA.

14. The Secretariat raised with the World Bank the issue of industrial consolidation involving RRIL. The Bank advised that in its view the proposal provides a complete description of the sub-sector and is fully consistent with Decision 27/78. The Bank believed that the guidelines did not require all plants to be converted at the same time.

Eligibility of the Rishiroop Polymers Limited (RPL) plant

15. At the sixteenth Meeting the Executive Committee decided that consumption should be calculated on the basis of either the year or an average of three years immediately preceding preparation of a project. The Secretariat advised the World Bank that since the RPL plant has had no consumption since 1995, it appeared that conversion of the RPL plant was not eligible for funding. The Secretariat also noted that in these circumstances the proposal to convert the ROL plant at a capacity of 1100 TPA amounted to a capacity upgrade. The Secretariat therefore has reviewed the project on the basis of conversion of the ROL plant only, and at its current capacity of 550 TPA.

16. The World Bank subsequently responded to the Secretariat's comments on the basis of a 550 TPA plant, but indicated its view that the plant had been closed because of a "legal strike" which was resolved early in 2000, that the plant was able to resume production and therefore should be eligible for compensation. The Bank also advised that the Government of India is requesting that the project should be considered as submitted.

Technology development and intellectual property

17. The proposal indicates that the technology has been developed in-house by RRIL and that a patent application has been filed with the Indian authorities. A number of international patents exist for aqueous processes for production of CTC, mainly originating in Japan where one company, Asahi-Denka, is producing CR commercially using an aqueous process. It is understood that this process is patented in a number of countries but not in India. Because the RRIL patent application process has not yet been completed, the patent information relating to the RRIL process has not been published. It is not possible therefore to use published information to compare the RRIL aqueous process with others. The World Bank has advised the Secretariat that the RRIL process is different from other aqueous processes, but the extent of the difference cannot be established from information so far available. The Bank also provided advice from the Government of India which stated, inter-alia, that "The process of Rishiroop does not infringe on any Patent rights of any company within the territorial jurisdiction of India."

18. The RRIL technology has not yet been put into commercial production. The Secretariat notes that MLF funds have been used to date to fund the transfer of mature technology. Production development has not been funded. The World Bank was invited to provide clarification on this issue, in particular by providing information on the laboratory tests, trials and pilot production undertaken by RRIL which might assist in demonstrating that the technology is mature and the level of technical risk is low. At the time of preparation of this evaluation, no additional information on this matter was available.

Technology transfer fee

19. The Secretariat queried the request for a technology transfer fee when the companies involved were all in the same group and RRIL, the technology provider, was partly owned (30 percent) by the owners of ROL. The Bank pointed out that technology transfer fees had

previously been funded by the Multilateral Fund in cases where the beneficiary enterprise was a subsidiary company of a multinational technology provider. The Bank also considered that since it was a public company, RRIL was obliged to seek a return on the costs incurred for technology development, which exceeded the fee requested.

Emissions

20. The April 1997 TEAP Process Agent Task Force report indicated that “the aqueous process for the manufacture of chlorinated rubber produces inadvertent, trace quantities of CTC.” The Secretariat also understands that the Japanese aqueous process produces chlorinated rubber with a CTC content of between 250 and 500 parts per million. These CTC emissions occur even though no CTC is used, because it is generated inadvertently by the chemicals in the process. Consistent with the Parties’ decision on process agents (Decision X/14), the Secretariat asked the World Bank to provide advice on the emissions of CTC from the RRIL process as these appeared not to be zero. The Bank reiterated that the RRIL process is different from the Japanese aqueous technology and the enterprise considers that in its aqueous process there will be “no emission of CTC”.

Technical issues

21. The project is based on replacement of most of the production equipment because of differing technical requirements in the new process. The project document provides only a broad technical overview. The Secretariat therefore raised with the Bank a wide range of issues related to the design of the new process and the ensuing equipment requirements for a plant equal to the current capacity at ROL, that is 550 TPA. The Secretariat wished to be able to advise the Executive Committee about the technical risk associated with the new process, the extent to which the equipment design was the most cost-effective in the circumstances, the maximisation of opportunities to make use of existing equipment and infrastructure, and the eligibility of incremental operating costs, claimed for four years.

22. In response to the Secretariat’s initial comments, the World Bank provided a detailed reply in which substantial additional technical information was included. The Secretariat examined this information and raised further technical comments and enquiries. The Bank’s response to these enquiries, and the outcome of the likely further technical discussions on equipment eligibility and cost will be advised to the Sub-Committee on Project Review.

PRODUCTION OF PHENYL GLYCINE

(b) Conversion of carbon tetrachloride (CTC) as process solvent to trichloromethane at M/S Alpha Drugs India Ltd., Patiala

23. Alpha Drugs consumed an average of 69.74 ODP tonnes of carbon tetrachloride annually during the period from 1997 to 1999 in the manufacture of D(-) phenyl glycine chloride hydrochloride. Phenyl glycine is included in the list of applications in Table A of Decision X/14. Approximately 0.366 tonnes of CTC is used in the manufacture of 1 tonne of phenyl glycine.

24. The project proposes the replacement of carbon tetrachloride with trichloromethane. The reaction rate with trichloromethane is 25% slower than the rate achieved with a combination of CTC and EDC used in the current process (30 hours versus 24 hours). In addition, a larger amount of the new solvent is required. Therefore, some process equipment needs to be enlarged accordingly.

25. The major cost item is US\$ 201,043 (for one new glass-lined reactor, one dryer with solvent recovery system (retroactively), reactor modifications and one glass-lined tank). Annual incremental operating costs are US \$48,272.

Secretariat's Comments

26. Noting the sharp decrease in the level of production in 1999, the Secretariat inquired about the economic circumstances of the enterprise. UNIDO said that the drop in production was due to lower demand and competitive pricing and that the financial viability of the enterprise was not in question.

27. The Secretariat obtained expert advice that costs for major equipment items were consistent with norms for the industry.

28. Proposed incremental operating costs for additional maintenance arising from new or additional equipment were withdrawn.

29. The Secretariat discussed with the implementing agency, UNIDO, the proposed retroactive payment for the drying system installed in late 1998. UNIDO advised that the dryer was used to reduce emissions of CTC, in which case it could be eligible for funding (taking offsetting incremental operating savings into account). However consumption figures indicate that the major decrease in consumption of around 50 percent was realised in 1997/98 before the dryer was installed.

30. In further discussions it was found that the process agent losses before and after conversion used in IOC calculations has not taken into account the installation of the new dryer in 1998. IOCs were recalculated accordingly. Equipment eligibility and the levels of incremental capital costs and annual incremental operating costs have been agreed between the Secretariat and UNIDO as follows:

Incremental capital costs:	
(plus 10% contingency, 49% local ownership)	US \$122,213
<u>Annual</u> IOC (at 49% local ownership)	US \$ 23,653

PRODUCTION OF IBUPRUFEN

31. In response to decision 31/40 of the Executive Committee, the Government of India submitted a report on India's ibuprofen and bromohexine sub-sectors to the Secretariat on 4 October 2000. The section of the report on the ibuprofen sub-sector is reproduced below:

"Ibuprofen Sub-Sector Profile

- (a) In the course of a 1999 project to review knowledge on the Ibuprofen sub sector and to prepare project documents for the sub-sector phase out the existing database has been expanded and revised.
- (b) It was stated that there are at least 15 producers of Ibuprofen in India. Majority of these producers have phased out CTC and have converted to EDC, a non-ODS solvent. Five of these producers have stopped production of Ibuprofen and are no longer using CTC in their works (Table-2). A comprehensive list with production data is given below in Table 1.

Table 1
Companies still producing Ibuprofen with CTC or EDC

S. No	Name of the company	Ibuprofen Production Mt	CTC used currently Mt	Year of conversion to EDC	CTC consumption at the time of Phase out Mt
1	Shasun chemicals & Drugs Ltd.	1015	NIL	93-94	210
2	Chemisor Drugs Ltd	500	----	93-94	150
3	Sekhsari Chemicals Ltd.	75	----	96-97	25
4	Global Bulk Drug Ltd. (Nicolas Piramal Ltd)	60	----	96-97	20
5	Satwik Drug Ltd.	300	NIL	97-98	100
6	Global Drugs Ltd.	260	NIL	97-98	100
7	Svis Labs Ltd.	290	----	99-2000	51
8	Satya Deeptha Pharmaceuticals Ltd.	170	42	----	----
9	Doctors Organic Chemicals Ltd.	110	86	----	----
10	Chiplun Fine Chemicals Ltd.	Production being restarted in the old plant			
Total		2780	128		656

- (c) It will be seen from Table 1 that most of the companies (Ser. No. 1 to 7) have phased out CTC (≈ 656 Mt) before of ExCom. decision on submission of 'Process Agent' projects for funding by MPMF. The major part of CTC used in Ibuprofen production will have been phased out by 2000. Only 128 Mt projected to be phased by Satya Deeptha, (Ser.No. 8) and Doctors Organic Chemicals (Ser.No. 9) needs to be phased out by the end of year 2000. Svis Laboratory (Ser.No. 7) changed over from CTC to EDC in 1999 and could be considered for retroactive funding. Chiplun fine chemicals have just restarted production of Ibuprofen with CTC and will come up later on with a phase out project. The total budget required for phasing out CTC for these four companies would be

approximately US\$ 1,500,000.

- (d) Five other companies listed earlier (Table 2) have stopped production of Ibuprofen for business reasons.

Table 2
Companies which have stopped production of Ibuprofen

1. C.Well Drugs Ltd.
2. EMGI Pharmaceuticals and Chemicals Ltd.
3. Herren Drugs & Pharmaceuticals Ltd.
4. Karnataka Chemicals Ltd.
5. Kekule Chemicals Ltd.

- (e) Thus total production of Ibuprofen in India is now 2780 Mt/year and total CTC emitted/still used annually is 128 Mt. Total CTC phased out in this sector so far is 656 Mt.

Ibuprofen Industry Analysis

- (f) Ibuprofen prices fell in 1995, causing the smaller producers to review their production plans. Prices have recovered in 1999. Ibuprofen production seems to have stabilised at about 2800 Mt in 1998-99 and to be set to increase in the year 2000. Shasun has had the leading position with nearly 1500 Mt of production and it has worked hard to achieve quality standards with global acceptance and concentrates on the higher prices export markets (Shasun is at present the only producer with the direct export licence). The smaller producers sell to the indigenous market with some exports possibly going indirectly through traders. Chiplun had suspended Ibuprofen production in Dec. 1995 and has resumed in Sept. 1999 using CTC in the old plant. The projected consumption of CTC for year 2001 is 75 Mt.”

(c) Conversion of carbon tetrachloride (CTC) as process solvent to ethylene dichloride at Doctors Organic Chemicals Ltd., Tanuku

32. Doctors Organic Chemicals is a wholly Indian-owned company which manufactures the pharmaceutical drug Ibuprofen. In the period from 1997 to 1999, the enterprise consumed an average of 94.60 ODP tonnes of CTC as a process agent in the production of 238 tonnes of Ibuprofen annually. The enterprise reports an export component of 20% during the last three years.

33. It is proposed that CTC be replaced as process agent by ethylene dichloride (EDC), a non-ODS substance. The chemical process with the new process agent is similar to the baseline process. However, the rate of reaction is slower. In addition, a larger amount of EDC is required

in each batch of chemicals processed. Therefore, to maintain the same level of production capacity, costs are sought to enlarge certain items of the process equipment. Modifications to heating and cooling systems are also required to cater for the different physical and chemical properties of EDC.

34. The main capital cost items requested are two new reactors (US \$83,720), single pass condensers (US \$41,860), a high vacuum distillation system (US \$34,885), effluent treatment plant (US \$33,488), trials and training (US \$14,802). Annual incremental operating costs are US \$6,580.

35. The project document contains an explanation of the rationale for the choice of a new process agent. It also includes a discussion of emission control options to achieve a level of emissions 1-2% or less, and a brief financial analysis which concludes that costs for emission control would be higher than the proposed costs for process conversion.

(d) Conversion of carbon tetrachloride (CTC) as process solvent to ethylene dichloride at Satya Deeptha Pharmaceuticals Ltd., Hummabad

36. Satya Deeptha Pharmaceuticals consumed an average of 27.92 ODP tonnes of carbon tetrachloride annually in the production of ibuprofen in the period 1997 to 1999. Approximately 0.25 MT of CTC is used in the manufacture of 1 tonne of ibuprofen.

37. The project proposes the replacement of carbon tetrachloride with ethylene dichloride (EDC), a non-ODS solvent. With EDC, the solvent requirement is higher and the reaction rate is slower. For these reasons, some additional process equipment is needed. Furthermore, modifications to heating and cooling systems are required to cater for the different characteristics of EDC as opposed to CTC.

38. The main capital cost items requested are four new reactors (US\$ 53,203), high vacuum distillation system (US\$ 35,700), refrigeration plant (US\$ 17,440), civil construction (US\$ 20,652), effluent treatment plant (US\$ 46,512), training (US\$ 10,000) and trials (US\$ 6,000). Annual incremental operating costs are US \$37,882.

(e) Conversion of carbon tetrachloride (CTC) as process solvent to ethylene dichloride at Svis Labs Ltd., Ranipet

39. Svis Labs consumed an average of 54.17 ODP tonnes of carbon tetrachloride annually in the manufacture of ibuprofen and IBAP intermediate in the period 1997 to 1999. Approximately 0.245 MT of CTC is used in the manufacture of each 1 tonne batch of Ibuprofen, while 0.219 MT of CTC is used in the manufacture of each 1 tonne batch of IBAP.

40. The project proposes the replacement of carbon tetrachloride with ethylene dichloride (EDC), a non-ODS solvent. The project document indicates that a larger quantity of the new

solvent is required to process each batch. New equipment is needed to permit the conversion to EDC without sacrificing production capacity.

41. The main capital cost items requested are three glass-lined reactors, ranging in size from 2000 to 4000 litres (US\$ 47,212), a high vacuum distillation system (US\$ 29,605), an EDC storage tank (US\$ 3,488), effluent treatment, settling ponds, sludge filtration, solar evaporation (US\$ 52,950), piping and flame-proof motors (US\$ 21,465). Other costs include civil construction (US\$ 22,930), trials (US\$ 21,560), training (US\$ 10,230) and safety equipment (US\$ 3,700). Annual incremental operating costs are US \$31,352.

42. The grant of US \$ 316,158 is to be provided as retroactive payment except US \$ 64,489 (two glass-lined reactors and high vacuum distillation system) and US \$ 22,930 covering construction expenditures for housing additional facilities.

SECRETARIAT'S COMMENTS

Conversion of carbon tetrachloride (CTC) as process solvent to ethylene dichloride at Doctors Organic Chemicals Ltd., Tanuku

43. The Secretariat discussed with UNIDO the basis for the size of replacement reactor vessels and the quality of the baseline equipment, both of which led to higher costs for these items that were requested in similar projects. The operating conditions of the chemical processes carried out by the enterprises appear less efficient than those of other comparable enterprises, resulting in a longer processing time and consequently larger baseline equipment relative to the capacity now installed at DOCL. However on the basis of the operating parameters of the baseline process, the major equipment requirements and their costs are justified. UNIDO re-examined certain parts of the proposed production process and agreed that when the process was optimised, a number of auxiliary items initially requested, such as storage tanks, would not be required. Cost for these items were deleted. It was also agreed that proposed new condensers were eligible at 60 percent of the cost initially requested since condensers were already present in the baseline. Adjustment were also made to proposed costs for effluent treatment, site preparation, electrical and other installation work. Incremental costs were agreed between the Secretariat and UNIDO as follows:

Incremental capital costs (including 10% contingency)	US \$314,319
IOC for one year	US \$6,580

Conversion of carbon tetrachloride (CTC) as process solvent to ethylene dichloride at Satya Deeptha Pharmaceuticals Ltd., Humnabad

44. Initial scrutiny of potential costs for emission control indicated that the option might have been similar in cost to process change. At the request of the Secretariat UNIDO presented additional analysis which confirmed that process change is the more cost-effective option.

45. In response to queries on the apparently high quantities of EDC required for make-up after conversion (which are reflected in IOC calculations), UNIDO re-examined and revised the

quantities downwards. The Secretariat also sought and received additional assurances regarding electricity costs and chemicals prices. Proposed incremental operating costs for additional maintenance arising from new or additional equipment were withdrawn. Eligible capital costs for effluent treatment were adjusted downwards by 50 percent as there are no effluent treatment facilities in the baseline, and incremental costs for civil works were also revised.

46. Further discussions with UNIDO confirmed equipment eligibility and the levels of costs as previously described and as indicated hereunder:

Incremental capital costs (including 10% contingency)	US \$222,251
<u>Annual</u> IOC	US \$ 37,882

Conversion of carbon tetrachloride (CTC) as process solvent to ethylene dichloride at Svis Labs Ltd., Ranipet

47. The enterprise converted its production process in October 1999 to use EDC as a process agent instead of CTC. At the request of the Secretariat, UNIDO is revising its presentation of the project to split up the costs into those incurred by the enterprise before conversion (for which retroactive funding is sought) and those now proposed for funding to restore the baseline capacity and replace equipment which is currently functioning but which is inadequate for the new process (because it cannot withstand the corrosiveness of the new chemicals). The retroactive portion appears eligible for funding. The additional costs now proposed for funding may not be eligible as explained below.

48. In Decisions 19/8 and 20/25 the Executive Committee made it clear that projects similar to those in which an enterprise had already phased out on its own, without the equipment changes usually included in MLF-funded projects, but subsequently sought funding to provide this equipment, would not be considered as eligible in the future. The situation with Svis Labs is not identical because in the projects which gave rise to these decisions the enterprises had converted their production more than three years before the project was prepared, whereas Svis Labs phased out only last October. However the principle is similar and accordingly the additional costs may not be eligible. On this basis the project is being referred for individual consideration.

49. Proposed incremental operating costs for additional maintenance arising from new or additional equipment were withdrawn. Eligible capital costs for effluent treatment were adjusted downwards by 50 percent as there are no effluent treatment facilities in the baseline, and incremental costs for civil works were also revised.

50. Additional clarifications were obtained on the separation between equipment which was installed prior to phase-out in October 1999, and equipment which is proposed to be installed in the future to replace current equipment of insufficient size to maintain baseline capacity or which is corroding after conversion. Incremental costs were agreed between the Secretariat and UNIDO as follows:

Costs pre-conversion:

Incremental capital costs (with no contingency)	US \$101,273
<u>Annual</u> IOC (which commenced with the conversion)	US \$ 31,352

Costs for proposed new equipment:

Incremental capital costs (including 10% contingency)	US \$116,742
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51. The Executive Committee is invited to consider whether the proposed new equipment is eligible for funding.

Duration of incremental operating costs (all four UNIDO projects)

52. The Secretariat discussed with UNIDO the duration of the “transitional period” for which incremental operating costs should be calculated. UNIDO has proposed a 2-year period based on the time considered to be needed to master the new technology. In this regard, for the single process agent project so far approved in this sector, conversion of production of an agricultural chemical by Excel in India, IOC were requested by the World Bank and subsequently approved for a period of one year. The Secretariat noted in these discussions that most enterprises in the pharmaceuticals sub-sector in India have already converted to non-ODS process agents and are thus operating successfully on the cost structure of the converted process. It was also noted that the production process remains largely the same. New equipment is provided to maintain baseline capacity and to cater for different operating parameters (temperature, pressure etc). It appears that the transfer of technology in this sub-sector is well advanced and that the transitional period is short. This being the case the Secretariat is recommending that in these projects IOC should be funded for a transitional period of one year.

RECOMMENDATION

1. Each project is recommended for individual consideration.

PROJECT EVALUATION SHEET INDIA

SECTOR: Refrigeration ODS use in sector (1998): 2,202 ODP tonnes

Sub-sector cost-effectiveness thresholds: Commercial US \$15.21/kg
Multiple US \$14.75/kg* (composite)

Project Titles:

- (a) Conversion from CFC-11 to HCFC-141b and from CFC-12 to HFC-134a technology in the manufacture of commercial refrigeration equipment at Sandlas Air-Con Systems P. Ltd.
- (b) Umbrella project for the conversion of three commercial refrigeration enterprises in New Delhi
- (c) Conversion from CFC-11 to HCFC-141b and from CFC-12 to HFC-134a technology in the manufacture of commercial refrigeration equipment at Nine Enterprises

Project Data	Commercial		Commercial	Multiple-subsectors
	Sandlas Air-Con	3 enterprises	Nine Enterprises	
Enterprise consumption (ODP tonnes)	24.65	28.79	56.70	
Project impact (ODP tonnes)	23.31	27.32	53.52	
Project duration (months)	36	26	36	
Initial amount requested (US \$)	233,473	379,645	797,923	
Final project cost (US \$):				
Incremental capital cost (a)	150,500	257,124	542,250	
Contingency cost (b)	15,050	19,320	54,225	
Incremental operating cost (c)	62,967	52,450	293,207	
Total project cost (a+b+c)	228,517	328,894	889,682	
Local ownership (%)	100%	100%	100%	
Export component (%)	0%	0%	0%	
Amount requested (US \$)	228,517	328,894	789,425	
Cost effectiveness (US \$/kg.)	9.80	12.04	14.75	
Counterpart funding confirmed?	Yes	Yes	Yes	
National coordinating agency	Ministry of Environment & Forests			
Implementing agency	UNDP	UNIDO	UNDP	

Secretariat's Recommendations			
Amount recommended (US \$)	228,517	328,894	789,425
Project impact (ODP tonnes)	23.31	27.32	53.52
Cost effectiveness (US \$/kg)	9.80	12.04	14.75
Implementing agency support cost (US \$)	29,707	42,756	96,837
Total cost to Multilateral Fund (US \$)	258,224	371,650	886,262

PROJECT DESCRIPTION

Sector Background

- Latest available total ODS consumption (1998)	12,036.00 ODP tonnes
- Baseline consumption of Annex A Group I substances (CFCs)	6,681.00 ODP tonnes
- Consumption of Annex A Group I substances for the year 1998	5,265.00 ODP tonnes
- Baseline consumption of CFCs in refrigeration sector	2,770.00 ODP tonnes
- Consumption of CFCs in refrigeration sector in 1998	2,202.00 ODP tonnes
- Funds approved for investment projects in refrigeration sector as of July 2000 (31st Meeting)	US\$21,838,987.00
- Quantity of CFC to be phased out in investment projects in refrigeration sector as of end of 1999	2,121.00 ODP tonnes

1. The total consumption of CFCs in the refrigeration sector in 1999, according to information from the government of India, was 2,202 ODP tonnes. This figure is sub-divided into consumption in the manufacturing of new refrigeration equipment (662 ODP tonnes) and consumption for servicing (1,540 ODP tonnes).

2. The Executive Committee has approved about US \$21,838,987 for 39 projects to phase out 2,121 ODP tonnes of CFC for enterprises manufacturing refrigeration equipment in the

Commercial refrigeration

Three enterprises

3. The three enterprises (Gaurav Controls, Thermoking and Western Engineering) consumed 18.84 ODP tonnes of CFC-11, 9.95 ODP tonnes of CFC-12 in manufacture of commercial refrigeration equipment (average 1997-1999). The enterprises are manufacturing various models of air-conditioners, walk-in coolers, cold storage units, water coolers, water dispensers and display cabinets. Only one company (Western Engineering) is involved in foam operations, Gaurav and Thermoking are involved in assembly and refrigerant charging operations, using fiberglass or pre-fabricated panels for installation of their refrigeration equipment.

4. The current project will phase-out 18.84 ODP tonnes of CFC-11, 9.95 ODP tonnes of CFC-12 by converting from CFC-11 to HCFC-141b as the foam blowing agent, and from CFC-12 to HFC-134a as the refrigerant. The project includes incremental capital costs covering three low-pressure foam dispensers at Western Engineering (US \$120,000) and the necessary provisional evacuation, portable charging and testing equipment for refrigeration operations (US \$52,400). Other costs include re-design (US \$50,000), testing and trials (US\$ 31,000). Incremental operating costs are requested for a period of two years by Western at a level of

(US \$37,791), and for one year by Thermoking (US \$56,400). Due to the cost-effectiveness threshold figure limitation, incremental operating cost in the Gaurav sub-project is not claimed.

Nine enterprises

5. The nine small to medium-sized enterprises (Anand Aircon, Coments Aircon Systems, Freezeland, Kay Ess Industries, Kool Pack Industries, Mongia and Co., RR Industries, Sheetal Refrigeration and Verma Frost) consumed 43.36 ODP tonnes of CFC-11 and 13.34 ODP tonnes of CFC-12 in the manufacture of commercial refrigeration equipment in 1999. The enterprises are involved in the manufacture of various models of commercial bottle coolers, chest freezers and display cabinets. The enterprises employ hand-mixing techniques for foaming operations in the baseline.

6. The current project will phase-out 43.36 ODP tonnes of CFC-11 and 13.34 ODP tonnes of CFC-12 in the manufacture of domestic refrigeration equipment at three medium-sized enterprises in India. This will be achieved by converting from CFC-11 to HCFC-141b as the foam blowing agent and from CFC-12 to HFC-134a as the refrigerant. The project includes incremental capital costs for the nine enterprises, covering the partial cost of high-pressure foam dispensers (US \$360,000), refrigerant charging units (US \$54,000 each) and vacuum pumps (US \$45,000). Other costs include re-design, testing, trials (US\$ 90,000), technical assistance (US \$135,000) and training (US \$45,000). Incremental operating costs are requested by the enterprises for a period of two years for compressors higher than 250 watts, and for six months for compressors of 250 watts and lower. The incremental operating costs reflect the higher cost of chemicals and an increase in foam density.

Sandlas Air-Con

7. Sandlas Air-Con consumed 18.2 ODP tonnes of CFC-11 and 6.45 ODP tonnes of CFC-12 in the manufacture of commercial refrigeration equipment (average 1997-1999). The enterprise manufactures polyurethane sandwich panels for walk-in coolers and freezers, cold stores, freezing chambers and refrigerated truck bodies. In addition, the enterprise manufactures custom designed refrigeration units equipped with hermetic and semi-hermetic compressor for various applications. The enterprise operates one low-pressure foam dispenser in the baseline, which will be replaced.

8. The current project will phase-out 18.2 ODP tonnes of CFC-11 and 6.45 ODP tonnes of CFC-12 in the manufacture of commercial refrigeration equipment at Sandlas by converting from CFC-11 to HCFC-141b as the foam blowing agent and from CFC-12 to HFC-134a as the refrigerant. The project includes incremental capital costs covering one high-pressure foam dispenser (US \$80,000), refrigerant charging units (US \$24,000), vacuum pumps (US \$4,000) and leak detectors (US \$2,000). Other costs include re-design, testing, trials (US \$10,000), technical assistance (US \$20,000) and training (US \$10,000). Incremental operating costs are requested by the enterprises for a period of two years at a level of (US \$67,923). The incremental operating costs reflect the higher cost of chemicals and an increase in foam density.

Justification for the use of HCFC-141b

9. All the three enterprises have selected HCFC-141b technology to replace CFC-11 in their foam blowing operations. It is an interim solution until non-CFC systems (different from hydrocarbons) are commercially available. A letter advising the Government decision to use HCFC technology has been received by the Secretariat in accordance with the Executive Committee Decision 27/13 and is attached to this evaluation together with a justification from the implementing agency.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

Three enterprises

1. The Secretariat discussed with UNIDO the issue related to the determination of ODS consumption. Additional information has been provided clarifying the specifics of operations in each enterprise. Carbon tetrachloride consumption used by Western Engineering has been taken out from the calculation of ODS consumption with the understanding that a separate solvent project might be developed in the future.

2. Some of equipment is manufactured by Western Engineering Co. on individual contracts according to custom design to be installed outside the premises of the company. In accordance with Decision 31/45 on the new sector for installation assembly and servicing, part of incremental operating costs associated with this project is not eligible.

3. UNIDO has been advised by the Secretariat that the eligible incremental cost for compressors higher than 250 Wt (which are used by the three enterprises) has to be calculated by applying the discounting factor 0.63 which reflects the funding of conversion of compressor manufacturing facilities in India. IOC have been calculated accordingly.

Nine enterprises

4. The Secretariat has discussed with UNDP costs requested for technical assistance and training. Umbrella projects are supposed to reduce these categories of cost. The Secretariat advised UNDP to minimize costs by providing training and technical assistance to groups of enterprises at one time. This proposal has been accepted by UNDP and the budget has been adjusted accordingly.

Sandlas

5. The Secretariat has discussed with UNDP the incremental operating costs and the requirements of Decision 31/45 on the new sub-sector for assembly, installation and servicing. Part of the production of Sandlas has been identified to be under the new sub-sector. Subsequently, part of the incremental operating costs have been recognized as ineligible. IOC has been adjusted accordingly.

RECOMMENDATIONS

1. The Fund Secretariat recommends blanket approval of the commercial refrigeration projects from UNIDO with the level of funding and associated support costs as indicated below.

	Project Title	Project Funding (US\$)	Support Cost (US\$)	Implementing Agency
(a)	Conversion from CFC-11 to HCFC-141b and from CFC-12 to HFC-134a technology in the manufacture of commercial refrigeration equipment at Sandlas Air-Con Systems P. Ltd.	228,517	29,707	UNDP
(b)	Umbrella project for the conversion of three commercial refrigeration enterprises in New Delhi	328,894	42,756	UNIDO
(c)	Conversion from CFC-11 to HCFC-141b and from CFC-12 to HFC-134a technology in the manufacture of commercial refrigeration equipment at Nine Enterprises	789,425	96,837	UNDP



**United Nations
Environment
Programme**

Distr.
Limited

UNEP/OzL.Pro/ExCom/32/30/Iran
10 November 2000

ORIGINAL: ENGLISH

EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Thirty-second Meeting
Ouagadougou, 6-8 December 2000

PROJECT PROPOSALS: IRAN

This document consist of the comments and recommendations of the Fund Secretariat on the following project proposals:

Foam:

- Conversion from CFC-11 to n-pentane technology in the manufacture of integral skin polyurethane foam products at Iran Polyurethane Manufacturing Co. UNDP
- Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at Nobough Industrial Co. UNDP

Refrigeration:

- Conversion from CFC-11 to HCFC-141b technology and from CFC-12 to HFC-134a technology in the manufacture of domestic refrigerators at Ghaynar Khazar Co. UNDP
- Conversion from CFC-11 to HCFC-141b technology and from CFC-12 to HFC-134a technology in the manufacture of domestic refrigerators and freezers at General Industries UNDP

- Conversion from CFC-11 to HCFC-141b technology and from CFC-12 to HFC-134a technology in the manufacture of domestic refrigerators and freezers at Boloorin Yazd Refrigerator Co. UNDP
- Conversion from CFC-11 to HCFC-141b technology and from CFC-12 to HFC-134a technology in the manufacture of domestic refrigerators at Electro Ara Co. UNDP
- Conversion from CFC-11 to HCFC-141b and CFC-12 to HFC-134a technology in the manufacture of domestic and commercial refrigeration at the Arjah Boroudat Co UNIDO
- Conversion from CFC-11 to HCFC-141b and CFC-12 to HFC-134a technology in the manufacture of domestic and commercial refrigeration at the Tehran Shirak Co. UNIDO
- Conversion from CFC-11 to HCFC-141b and CFC-12 to HFC-134a technology in the manufacture of domestic and commercial refrigeration at the Roshan Ind. Group UNIDO
- Conversion from CFC-11 to HCFC-141b technology and from CFC-12 to HFC-134a technology in the manufacture of domestic refrigerators at Sana Commercial Co. UNDP
- Conversion from CFC-11 to HCFC-141b technology and from CFC-12 to HFC-134a technology in the manufacture of domestic refrigerators at Zenoz Sanaat Co. UNDP
- Conversion from CFC-11 to HCFC-141b technology and from CFC-12 to HFC-134a technology in the manufacture of domestic refrigerators and freezers at Yakhchalsazi Yazd Co. UNDP
- Conversion from CFC-11 to HCFC-141b technology and from CFC-12 to HFC-134a technology in the manufacture of domestic refrigerators and freezers at Shagayegh Boroudat Co. UNDP
- Conversion from CFC-11 to HCFC-141b technology and from CFC-12 to HFC-134a technology in the manufacture of domestic refrigerators at Hanzad Co. UNDP
- Conversion from CFC-11 to HCFC-141b technology and from CFC-12 to HFC-134a technology in the manufacture of domestic refrigerators and freezers at Sarmaye Sepahan Co. UNDP
- Conversion from CFC-11 to HCFC-141b technology and from CFC-12 to HFC-134a technology in the manufacture of domestic refrigerators and freezers at Golsarma Co. UNDP

PROJECT EVALUATION SHEET IRAN

SECTOR: Foam ODS use in sector (1999): 2,100 ODP tonnes

Sub-sector cost-effectiveness thresholds: Integral skin US \$16.86/kg
Rigid US \$7.83/kg

Project Titles:

- (a) Conversion from CFC-11 to n-pentane technology in the manufacture of integral skin polyurethane foam products at Iran Polyurethane Manufacturing Co.
- (b) Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at Nobough Industrial Co.

Project Data	Integral skin	Rigid
	Iran Polyurethane	Nobough
Enterprise consumption (ODP tonnes)	51.79	34.23
Project impact (ODP tonnes)	51.79	31.77
Project duration (months)	36	36
Initial amount requested (US \$)	964,876	248,736
Final project cost (US \$):		
Incremental capital cost (a)	683,182	245,000
Contingency cost (b)	68,318	24,500
Incremental operating cost (c)	44,730	57,277
Total project cost (a+b+c)	796,230	326,777
Local ownership (%)	100%	100%
Export component (%)	0%	0%
Amount requested (US \$)	796,230	248,736
Cost effectiveness (US \$/kg.)	15.38	7.83
Counterpart funding confirmed?	Yes	Yes
National coordinating agency	Department of Environment	Ozone Layer Protection Center, DOE
Implementing agency	UNDP	UNDP

Secretariat's Recommendations		
Amount recommended (US \$)	796,230	248,736
Project impact (ODP tonnes)	51.79	31.77
Cost effectiveness (US \$/kg)	15.38	7.83
Implementing agency support cost (US \$)	97,585	32,336
Total cost to Multilateral Fund (US \$)	893,815	281,072

PROJECT DESCRIPTION

Sector Background

- Latest available total ODS consumption (1999)	5,926.80	ODP tonnes
- Baseline consumption (average 1995-1997) of Annex A Group I substances (CFCs)	4,635.00	ODP tonnes
- Consumption of Annex A Group I substances for the year 1999	4,399.00	ODP tonnes
- Baseline consumption of CFCs in foam sector	2,400.00	ODP tonnes
- Consumption of CFCs in foam sector in 1999	2,100.00	ODP tonnes
- Funds approved for investment projects in foam sector as of end of 1999	US \$5,099,884.00	
- Quantity of CFC to be phased out in foam sector as of end of 1999	1,723.00	ODP tonnes
- Funds approved for investment projects in the foam sector in the year 2000	539,882	
- Quantity of CFC to be phased out in foam projects approved in the year 2000	70.00	ODP tonnes

1. Based on data reported by Iran to the Ozone Secretariat in 1998, the country needed 936 ODP tonnes of CFC to be phased out in order to meet the freeze. As of August 2000, the phase out of 1,168.3 ODP tonnes of CFC has been approved but not yet implemented. In order to meet the 50% reduction of CFC by 2005, an additional 2,085.2 ODP tonnes of CFC must be phased out.

Integral Skin Foam

(a) Conversion from CFC-11 to n-pentane technology in the manufacture of integral skin polyurethane foam products at Iran Polyurethane Manufacturing Co.

Iran Polyurethane

2. This project for Iran Polyurethane Manufacturing (IPM) was first submitted by UNDP to the 31st Meeting and was reviewed by the Secretariat. Following a letter from the government of Iran in which it complained that the baseline data presented in the project document was inaccurate UNDP withdrew the project for resubmission at a later date. This project proposal is a result of a revisit of IPM's plant by UNDP and resulting in a revision of the company's baseline data. The Secretariat's review below is, therefore, based on the revised baseline data and revised project proposal.

3. Iran Polyurethane Manufacturing Co. was established in 1976. It produces a range of integral skin foam products including steering wheels, arm rests, furniture parts with CFC-11 and

flexible molded seat cushions by water-blown technology. The three-year total consumption (1997-1999) of CFC-11 and production of the integral skin foam parts are shown below. The steering wheels are produced for Iranian automobile manufacturers, predominantly Iran Khodro. One new steering wheel product line and five others were started in 1998 and in 1999 respectively for car, bus and truck manufacturers. These new production lines accounted for CFC-11 consumption of 7.75 tonnes in 1999. This consumption was not taken into account in the project cost calculation.

	1997	1998	1999
CFC-11 used (ODP tonnes)	32.1	54.7	59.6
Units of foam parts produced	371,000	567,000	668,000

4. The company operates four low pressure and two high pressure machines. The low pressure machines include two 23 year old Martin Sweets, one 22 year old Elastogran and one 16 year old Cannon. The high pressure machines are two 15 year old Cannon of 40 kg/min capacity. The company will convert its production to the use of n-pentane. The cost of the project includes the cost of replacement of five of the six existing dispensers with five high pressure dispensers for use with pentane at US \$100,000 each, a pentafoam premixer and buffer tank (US \$90,000) and interconnecting piping (US \$10,000). Other costs include a storage tank (US \$35,000), ventilation and fire safety system (US \$50,000), safety detection and control system (US \$40,000), miscellaneous civil and electrical works (US \$10,000), trials (US \$25,000), technical assistance for process safety (US \$10,000), safety training (US \$5,000) and external safety audit (US \$20,000). Appropriate deductions have been made to account for the old age of the baseline machines. Incremental operating cost for two years of US \$44,730 is requested.

Rigid Foam

(b) Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at Nobough Industrial Co.

Nobough Industrial Co.

5. Nobough Industrial Co. established in 1964 manufactures rigid polyurethane foam sandwich panels for cold stores, insulated doors and construction application. It consumed 34.23 tonnes CFC-11 in 1999 producing 63,380 m² (228 tonnes) of polyurethane foam sandwich panels of average foam thickness of about 9 cm and density 37-40 kg/m³. The company currently operates a 90 kg/min Electromecanica and 54 kg/min Accrington low pressure machines installed in 1970. The foam production will be converted to the use of HCFC-141b.

6. The conversion costs include capital cost of US \$245,000 which includes the cost of 2 high pressure dispensers (US \$180,000) rail mechanism for mixing head movement (US \$20,000), temperature conditioning system for premixing station (US \$10,000), trials

(US \$10,000) and technical assistance (US \$10,000). There is incremental operational cost of US \$57,277.

Justification for the use of HCFC-141b

7. Justification for the use of HCFC-141b by Nobough has been provided in the project document and as an annex to the document, including projected “techno-economic” impact of zero ODP technologies as well as estimated cost of conversion to zero ODP technology. The Government of Iran has also provided a letter endorsing the use of HCFC-141b by the company.

8. A copy of the justification (additional justification) annexed to the project and the letter of the Government of Iran endorsing the choice of HCFC-141b are attached to this evaluation.

Impact of the projects

9. The total CFC-11 consumption to be phased out in the two projects is 93.78ODP tonnes, which constitutes 2.1% of Iran’s 1999 consumption of Annex A Group I substances. There will be residual consumption of 2.46 ODP tonnes as a result of the use of HCFC-141b for the rigid foam conversion.

SECRETARIAT’S COMMENTS AND RECOMMENDATIONS

COMMENTS

1. The Fund Secretariat and UNDP discussed the two projects and agreed on their eligible grants.

RECOMMENDATIONS

1. The Fund Secretariat recommends blanket approval of the Iran Polyurethane Manufacturing Co. and Nobough Co. projects with the funding levels and associated support costs indicated below.

	Project Title	Project Funding (US\$)	Support Cost (US\$)	Implementing Agency
(a)	Conversion from CFC-11 to n-pentane technology in the manufacture of integral skin polyurethane foam products at Iran Polyurethane Manufacturing Co.	796,230	97,585	UNDP
(b)	Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at Nobough Industrial Co.	248,736	32,336	UNDP

Annex

Additional Justification for use of HCFC technology

The implementing agency expert appraised the prospective recipient enterprise, Nobough Industrial Co. during April 2000, prior to the preparation of this project document, and had detailed discussions with the technical and managerial personnel of the enterprise, regarding the choice of technology for replacing the existing CFC-based technology, under the project. The enterprise was briefed in detail about the following:

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

Nobough Industrial Co. preferred selection of HCFC-141b based technology, in their manufacture of commercial refrigeration equipment offering the following reasons:

- a) To cost-effectively implement hydrocarbon technologies which are characterized by high investment costs, the level of production needs to be higher than what Nobough Industrial Co., has presently or will have in the foreseeable future. Thus, hydrocarbon technologies are not economically viable for them.
- b) Hydrocarbons are flammable and constitute a fire, explosion, safety and security risk. Their factory workers are not familiar with use of flammable chemicals and it would be extremely expensive to re-train them and change their mindset.
- c) The product specifications would change and lot of investments would be needed for this changeover.

Nobough Industrial Co. thus prefer HCFC-141b technology, which would be relatively much cheaper, easier and quicker to implement without making major changes in their manufacturing activities.



Islamic Republic of Iran
Department of Environment

Ref: 02/1491
Date: 4 Oct. 2000

In the name of God

Dr. Omar El-Arini
Chief Officer
Multilateral Fund Secretariat
Montreal, Canada

4 October 2000

Dear Dr. El-Arini,

Reference is made to the commercial refrigeration/Foam sector projects prepared for the submission to the 32nd ExCom as follows:

- | | | |
|------------------------|------------------------|---------------------|
| 1 - General Industries | 2 - Electro Ara | 3 - Nobough |
| 4 - Parsa Sazan | 5 - Ideal Sardair | 6 - Rezvan Co |
| 7 - Sepand Afroz | 8 - Sarmaye Sepahan | 9 - Shagayegh |
| 10 - Hanzad | 11 - Sana Commercial | 12 - Ghaymar Khazar |
| 13 - Zeno Sanaat | 14 - Yakhchalsazi Yazd | 15 - Golsarna |
| 16 - Boloorin | 17 - Ojan cooling Ind | 18 - Anzabi |
| 19 - Part | 20 - Mersun. | |

Please be advised that we recognize that the technology choice is HCFC-141B even though this alternative is considered to be and interim one. Indeed at the time being we have no other choice due to the many national and global factors prevailing the technology selection, and because of commercial availability of HCFC-141B. The counterparts have acknowledged that they would convert to ODS free technology if regulations request them to do so and this is understood and endorsed by us as well.

Thank you and best regards,

for S. Ferdousi
Yousef Mojjat
Deputy Head of Department for
Human Environment Affairs

PROJECT EVALUATION SHEET IRAN

SECTOR: Refrigeration ODS use in sector (1999): 1,945 ODP tonnes

Sub-sector cost-effectiveness thresholds: Domestic US \$13.76/kg

Project Titles:

- (a) Conversion from CFC-11 to HCFC-141b technology and from CFC-12 to HFC-134a technology in the manufacture of domestic refrigerators and freezers at Boloorin Yazd Refrigerator Co.
- (b) Conversion from CFC-11 to HCFC-141b technology and from CFC-12 to HFC-134a technology in the manufacture of domestic refrigerators at Electro Ara Co.
- (c) Conversion from CFC-11 to HCFC-141b technology and from CFC-12 to HFC-134a technology in the manufacture of domestic refrigerators and freezers at General Industries
- (d) Conversion from CFC-11 to HCFC-141b technology and from CFC-12 to HFC-134a technology in the manufacture of domestic refrigerators at Ghaynar Khazar Co.
- (e) Conversion from CFC-11 to HCFC-141b technology and from CFC-12 to HFC-134a technology in the manufacture of domestic refrigerators and freezers at Golsarma Co.
- (f) Conversion from CFC-11 to HCFC-141b technology and from CFC-12 to HFC-134a technology in the manufacture of domestic refrigerators at Hanzad Co.

Project Data	Domestic					
	Boloorin Yazd	Electro Ara	General Industries	Ghaynar Khazar	Golsarma	Hanzad
Enterprise consumption (ODP tonnes)	21.83	13.82	33.16	17.88	30.09	21.05
Project impact (ODP tonnes)	20.53	12.99	31.12	16.80	28.33	19.83
Project duration (months)	36	36	36	36	36	36
Initial amount requested (US \$)	212,320	178,784	428,197	191,092	230,066	199,627
Final project cost (US \$):						
Incremental capital cost (a)	156,000	140,500	411,000	144,000	156,000	144,000
Contingency cost (b)	15,600	14,050	41,100	14,400	15,600	14,400
Incremental operating cost (c)	40,720	26,549	63,828	32,692	58,466	41,227
Total project cost (a+b+c)	212,320	181,099	515,928	191,092	230,066	199,627
Local ownership (%)	100%	100%	100%	100%	100%	100%
Export component (%)	0%	0%	0%	0%	0%	0%
Amount requested (US \$)	212,320	178,784	428,197	191,092	230,066	199,627
Cost effectiveness (US \$/kg.)	10.34	13.94	13.76	11.37	8.12	10.07
Counterpart funding confirmed?	Yes					
National coordinating agency	Ozone Layer Protection Center, DOE				Department of Environment	
Implementing agency	UNDP					

Secretariat's Recommendations						
Amount recommended (US \$)						
Project impact (ODP tonnes)						
Cost effectiveness (US \$/kg)						
Implementing agency support cost (US \$)						
Total cost to Multilateral Fund (US \$)						

PROJECT EVALUATION SHEET IRAN

SECTOR: Refrigeration ODS use in sector (1999): 1,945 ODP tonnes

Sub-sector cost-effectiveness thresholds: Domestic US \$13.76/kg

Project Titles:

- (g) Conversion from CFC-11 to HCFC-141b technology and from CFC-12 to HFC-134a technology in the manufacture of domestic refrigerators at Sana Commercial Co.
- (h) Conversion from CFC-11 to HCFC-141b technology and from CFC-12 to HFC-134a technology in the manufacture of domestic refrigerators and freezers at Sarmaye Sepahan Co.
- (i) Conversion from CFC-11 to HCFC-141b technology and from CFC-12 to HFC-134a technology in the manufacture of domestic refrigerators and freezers at Shagayegh Boroudat Co.
- (j) Conversion from CFC-11 to HCFC-141b technology and from CFC-12 to HFC-134a technology in the manufacture of domestic refrigerators and freezers at Yakhchalsazi Yazd Co.
- (k) Conversion from CFC-11 to HCFC-141b technology and from CFC-12 to HFC-134a technology in the manufacture of domestic refrigerators at Zenoz Sanaat Co.

Project Data	Domestic	Domestic	Domestic	Domestic	Domestic
	Sana Commercial	Sarmaye Sepahan	Shagayegh Boroudat	Yakhchalsazi Yazd	Zenoz Sanaat
Enterprise consumption (ODP tonnes)	12.04	11.47	10.65	31.88	10.81
Project impact (ODP tonnes)	11.36	10.79	10.03	29.96	10.18
Project duration (months)	36	36	36	36	36
Initial amount requested (US \$)	156,286	148,525	137,985	248,646	140,036
Final project cost (US \$):					
Incremental capital cost (a)	141,000	139,500	139,500	172,000	139,500
Contingency cost (b)	14,100	13,950	13,950	17,200	13,950
Incremental operating cost (c)	23,702	22,232	20,561	5,446	21,809
Total project cost (a+b+c)	178,802	175,682	174,011	194,646	175,259
Local ownership (%)	100%	100%	100%	100%	100%
Export component (%)	0%	0%	0%	0%	0%
Amount requested (US \$)	156,286	148,525	137,985	248,646	140,036
Cost effectiveness (US \$/kg.)	13.76	13.76	13.76	8.30	13.76
Counterpart funding confirmed?	Yes				
National coordinating agency	Ozone Layer Protection Center, DOE				
Implementing agency	UNDP				

<i>Secretariat's Recommendations</i>					
Amount recommended (US \$)					
Project impact (ODP tonnes)					
Cost effectiveness (US \$/kg)					
Implementing agency support cost (US \$)					
Total cost to Multilateral Fund (US \$)					

PROJECT EVALUATION SHEET IRAN

SECTOR: Refrigeration ODS use in sector (1999): 1,945 ODP tonnes

Sub-sector cost-effectiveness thresholds: Domestic US \$13.76/kg

Project Titles:

- (a) Conversion from CFC-11 to HCFC-141b and CFC-12 to HFC-134a technology in the manufacture of domestic and commercial refrigeration at the Arjah Boroudat Co
- (b) Conversion from CFC-11 to HCFC-141b and CFC-12 to HFC-134a technology in the manufacture of domestic and commercial refrigeration at the Roshan Ind. Group
- (c) Conversion from CFC-11 to HCFC-141b and CFC-12 to HFC-134a technology in the manufacture of domestic and commercial refrigeration at the Tehran Shirak Co.

Project Data	Multiple-subsectors	Multiple-subsectors	Multiple-subsectors
	Arjah Boroudat	Roshan	Tehran Shirak
Enterprise consumption (ODP tonnes)	28.62	19.37	21.42
Project impact (ODP tonnes)	27.40	18.56	20.50
Project duration (months)	28	28	28
Initial amount requested (US \$)	231,925	226,460	225,336
Final project cost (US \$):			
Incremental capital cost (a)	170,000	173,500	170,000
Contingency cost (b)	14,500	14,850	14,500
Incremental operating cost (c)	24,925	15,610	18,336
Total project cost (a+b+c)	209,425	203,960	202,836
Local ownership (%)	100%	100%	100%
Export component (%)	0%	0%	0%
Amount requested (US \$)	209,425	203,960	202,836
Cost effectiveness (US \$/kg.)	7.64	11.00	9.90
Counterpart funding confirmed?	Yes		
National coordinating agency	Department of Environment		
Implementing agency	UNIDO		

Secretariat's Recommendations			
Amount recommended (US \$)			
Project impact (ODP tonnes)			
Cost effectiveness (US \$/kg)			
Implementing agency support cost (US \$)			
Total cost to Multilateral Fund (US \$)			

PROJECT DESCRIPTION

Sector Background

- Latest available total ODS consumption (1999)	4,990.00 ODP tonnes
- Baseline consumption of Annex A Group I substances (CFCs)	4,571.00 ODP tonnes
- Consumption of Annex A Group I substances for the year 1999	4,405.00 ODP tonnes
- Baseline consumption of CFCs in refrigeration sector	2,075.00 ODP tonnes
- Consumption of CFCs in refrigeration sector in 1999	1,945.00 ODP tonnes
- Funds approved for investment projects in refrigeration sector as of July 2000 (31 st Meeting)	US\$28,569,557.00
- Quantity of CFC to be phased out in investment projects in refrigeration sector as of July 2000	1,992.00 ODP tonnes

1. The 1999 data on the refrigeration sector in Iran has been recently furnished to UNIDO by the Government of Iran. In the domestic refrigeration sub-sector, there are about 20 large and medium-sized manufacturers and many small-scale enterprises. In the commercial refrigeration sub-sector, there are about 30 relatively large-scale manufacturers, 200 medium-sized manufacturers, and many small -sized enterprises. According to the information from the Government of Iran, some of the major refrigeration manufacturing companies have been converted to non-CFC technologies, and by the end of the year 2000 it is expected that a total of 1,400 tonnes of CFCs will be eliminated.

2. The sectoral consumption data provided by the Government of Iran indicates that CFC consumption due to refrigeration was 2,100 ODP tonnes (1995), 1,070 ODP tonnes (1996), 3,045 ODP tonnes (1997), 2,695 ODP tonnes (1998) and 1,945 ODP tonnes (1999). It is noted that CFC consumption tripled between 1996 and 1997.

3. The Executive Committee has approved about US \$28,569,557 for 37 projects to phase out 1,992 ODP tonnes of CFC for enterprises manufacturing refrigeration equipment in the refrigeration sector. Based on data reported by Iran, the country is in compliance with the CFC freeze. In order to meet the 50% CFC reduction by 2005, an additional 2,300 ODP tonnes of CFC must be phased out.

Fourteen refrigeration enterprises

4. In total, fourteen projects have been submitted for review. Of these, eleven are prepared by UNDP and three by UNIDO. General Industries is the largest enterprise in this group, consuming 33 ODP tonnes. The remaining proposals are for small- and medium-sized enterprises with similar backgrounds.

5. The fourteen enterprises consumed 224.44 ODP tonnes of CFC-11 and 59.72 ODP tonnes of CFC-12 (in 1999) in the manufacture of domestic and commercial refrigeration equipment.

All of the enterprises manufacture similar equipment (refrigerators, domestic and commercial freezers and refrigerator/freezer combo units), and operate low-pressure foam dispensers which are predominantly locally made, assorted foaming moulds and jigs, production and portable refrigerant charging machines, vacuum pumps and leak detectors in the baseline. Some models of refrigeration equipment are manufactured for commercial applications. Since all refrigeration appliances produced are equipped with compressors below 250 watt capacity, under Decision 26/36 the projects must be considered under the rules and guidelines applicable for the domestic refrigeration sub-sector.

6. The projects will phase out 284.16 ODP tonnes of CFC-11 and CFC-12 in the manufacture of refrigeration equipment. This will be achieved by converting CFC-11 to HCFC-141b as the foam blowing agent, and CFC-12 to HFC-134a as the refrigerant. The residual ODP consumption as a result of the use of HCFC-141b will be 15.71 ODP tonnes. Under the current projects, the existing low-pressure machines will be replaced by high-pressure dispensers. All enterprises will require provision of production or portable charging units, new vacuum pumps and retrofitting of vacuum pumps and leak detectors. Other costs include re-design, testing, trials, technical assistance and training. Incremental operating costs are requested by the enterprises reflecting the higher cost of chemicals and an increase in foam density for a six month duration.

Justification for the use of HCFC-141b

7. Justification for the use of HCFC-141b by the companies has been provided in each project document by the agencies, samples of which are included in this evaluation. The Government of Iran has also provided letters endorsing the use of HCFC-141b by the enterprises.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

1. The up-dated information on ODS consumption in Iran was received by the Secretariat at the time of preparation of this evaluation document. However, the breakdown of total consumption in the sector between CFC use for manufacturing and servicing was not included. Figures indicating the division between manufacturing and servicing have been requested by the Secretariat.

2. Six of the fourteen enterprises were not included in the list of domestic/commercial enterprises officially provided to the Secretariat by UNIDO and the Government of Iran at the time of consideration of the Iranian compressor project in March 1999. The production of remaining eight enterprises is not consistent with production figures reported in the list. The grant for Iran Compressor Manufacturing Company (ICMC) was calculated on the basis of the total number of hermetic compressors used in Iran. This data was computed using the information on the production figures provided in the above list.

3. A new list of refrigeration companies was provided to the Secretariat as part of preparation of the 2001-2002 business plans. About 50% of the enterprises in this new list were not included in the information made available earlier to the Secretariat.

4. The Secretariat has requested UNIDO and UNDP to clarify this matter, since it has implications not only for the accuracy of costs already approved, but also for the overall credibility of data being provided for the country. The Secretariat has been informed that the list of refrigeration enterprises provided in relation to the ICMC project was “basically a tentative list”. The compiling of a final and a reliable list is underway, which is expected to be completed by the end of the year. The grant allocated for conversion of ICMC (US \$ 1,076,148) was approved by the Executive Committee at its 28th Meeting. New and divergent information on the number of compressors used in the refrigeration sector might lead to the conclusion that the level of grant approved was erroneous.

5. The Secretariat has analyzed the ODP consumption data in the refrigeration sector in Iran for 1996 and 1997 in line with aggregated production data provided to the Secretariat by UNIDO at the time of reviewing the ICMC compressor conversion project in Iran. The ODP consumption almost tripled between 1996 and 1997 (from 1,070 to 3,045 ODP tonnes), while production figures have not increased significantly for the same period. The Secretariat has requested UNIDO to clarify this matter.

6. The Secretariat has discussed with UNIDO the issue of equivalent replacement of refrigerant charging boards. The issue has been resolved and the budget has been adjusted accordingly.

7. The incremental capital and operating costs have been agreed between the Secretariat, UNIDO and UNDP.

8. The projects are submitted for individual consideration because of the substantial discrepancies to date concerning the structure and consumption of the refrigeration sector in Iran and the consequent implications for the validity of previously approved funding and the assessment of future incremental costs.

Annex

Additional Justification for Use of HCFC technology (UNDP)

The implementing agency expert appraised the prospective recipient enterprise, Boloorin Yazd Refrigerator Co. during July 1999, prior to the preparation of this project document, and had detailed discussions with the technical and managerial personnel of the enterprise, regarding the choice of technology for replacing the existing CFC-based technology, under the project. The enterprise was briefed in detail about the following:

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

Boloorin Yazd Refrigerator Co. preferred selection of HCFC-141b based technology, in their manufacture of domestic refrigeration equipment offering the following reasons:

- a) Hydrocarbons are flammable and constitute a fire, explosion, safety and security risk. The factory premises of Boloorin Yazd Refrigerator Co. are not equipped or designed for handling such hazardous chemicals. To implement this technology they may need to drastically re-layout or even have to move the factory. This is not commercially viable to them, as it would be very expensive and time-consuming.
- b) Their factory workers are not familiar with use of flammable chemicals and it would be extremely expensive to re-train them and change their mindset.
- c) The product specifications may change and lot of investments would be needed for this changeover.

Boloorin Yazd Refrigerator Co. thus prefer HCFC-141b technology, which would be relatively much cheaper, easier and quicker to implement without making major changes in their manufacturing activities.

Justification for Use of HCFC technology (UNIDO)

FOAM OPERATION

Interim Technologies

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

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

Long term Technologies

Pentane (n-, iso-, cyclo) based systems require extensive safety related provisions/investments due to their flammability. Due to safety considerations, the use of pre-blended systems is not viable and additional investments for in-house pre-mixing are required. Cyclopentane has miscibility limitations with polyols. The molded densities and insulation values are still inferior to those obtained with HCFC-141b. The advantages are their relatively lower unit costs, they are environmentally friendly (no ODP/GWP or health hazards) and constitute a permanent technology. Hydrocarbons are therefore the preferred conversion technology for large and organized users, where the safety requirements can be complied with and investments can be economically justified. In case of this enterprise, implementation of hydrocarbon based technology will require enormous investments for changing the plant layout completely (as the current layout is not suitable for handling hazardous substances consistent with local regulations), which are not justified by the level of their production.

Gaseous HFCs have been used successfully in some cases but have not been applied widely due to cost, technical and/or availability factors.

For water-based systems, the insulation values, density and commercial availability are unsatisfactory at present. However, these systems have acceptable processing characteristics and are expected to be mature and commercially viable in the near future, especially for applications where insulation values are not critical. They are environmentally friendly and safe (zero ODP/GWP, no health or safety hazards) and constitute a permanent technology.

Chemical and systems suppliers and the appliance industry are extensively evaluating liquid HFC-based systems. Preliminary trials with non-optimized formulations indicate lower molded foam densities, insulation values comparable to HCFC-141b and no solvent action. However, issues such as the time frame for commercial availability of liquid HFCs, their costs and their impact on climate change, need to be addressed satisfactorily. On the whole, liquid HFCs are considered to be the only potential zero-ODP alternatives to hydrocarbons.

Based on the above, cost safety and technical considerations as well as due to the lack of expertise and well trained personnel, the enterprise will convert to CFC-free systems for their rigid polyurethane foam operations. Until the commercial introduction of mature CFC-free systems (up to 3-4 years at the earliest) HCFC-141b based systems will be selected as an interim technology, to maintain product standards and acceptability. The company is aware that no further funding will be made available from the MFMP for the future conversion to final substitute.



ISLAMIC REPUBLIC of IRAN
Department of the Environment

Date 24/09/2000
Ref. 2-304478...

In the Name of God, the Compassionate, the Merciful

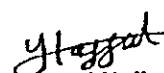
Ms. Seniz Yalcindag
Director
UNIDO/MPB
Vienna

Subject : Commitment letter of projects involving HCFCs.

Dear Madam,

In line with decision 27/13 of the Executive Committee and in recognition of Article 2F of the Montreal Protocol, the Government of I.R.Iran.

- a) Verifies that it had reviewed the specific situation at the Tehran Shirak Co. as well as its HCFC commitments under the article 2F;
- b) States that based on the prevailing circumstances at Tehran Shirak Co. At the present time the conversion of the Tehran Shirak Co. requires the use of HCFC-141b for the interim period as stipulated in the Montreal Protocol;
- c) Confirms that the Government and recipient enterprise understands that no funding would be available from the Fund for future conversion from HCFCs for the said company whenever such a conversion to other alternatives will be required.


Yousef Hojjat
Deputy Head of Department
For Human Environment



Islamic Republic of Iran
Department of Environment

Ref: OZ/1491
Date: 4 Oct. 2000

In the name of God

Dr. Omer El-Arini
Chief Officer
Multilateral Fund Secretariat
Montreal, Canada

4 October 2000

Dear Dr. El-Arini,

Reference is made to the commercial refrigeration/Foam sector projects prepared for the submission to the 32nd ExCom as follows:

- | | | |
|------------------------|------------------------|---------------------|
| 1 - General Industries | 2 - Electro Ara | 3 - Nobough |
| 4 - Parsa Sezan | 5 - Ideal Sardar | 6 - Rezvan Co |
| 7 - Sepand Afroz | 8 - Samaye Sepahan | 9 - Shageyegh |
| 10 - Hanzad | 11 - Sana Commercial | 12 - Ghaynar Khazar |
| 13 - Zenoz Senast | 14 - Yakhchalsazi Yazd | 15 - Golsama |
| 16 - Boloorin | 17 - Ojan cooling Ind | 18 - Anzabi |
| 19 - Part | 20 - Mersun. | |

Please be advised that we recognize that the technology choice is HCFC-141B even though this alternative is considered to be an interim one. Indeed at the time being we have no other choice due to the many national and global factors prevailing the technology selection, and because of commercial availability of HCFC-141B. The counterparts have acknowledged that they would convert to ODS free technology if regulations request them to do so and this is understood and endorsed by us as well.

Thank you and best regards,

for: S. Ferdousi
Yousef Hozjat
Deputy Head of Department for
Human Environment Affairs



**United Nations
Environment
Programme**



Distr.
Limited

UNEP/OzL.Pro/ExCom/32/30/Jordan
9 November 2000

ORIGINAL: ENGLISH

EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Thirty-second Meeting
Ouagadougou, 6-8 December 2000

PROJECT PROPOSAL: JORDAN

This document consist of the comments and recommendations of the Fund Secretariat on the following project proposal:

Aerosol:

- Phase-out of CFC-12 in the manufacture of hair lacquers by conversion to hydrocarbon propellant at Jordan Tunisian Chemical Company

UNIDO

Halon:

- Terminal halon 1211 and halon 1301 phaseout umbrella project for fire equipment manufacturers and suppliers in Jordan converting to ABC powder, CO₂, HFC-227ea and inert gases as substitutes

World Bank

PROJECT EVALUATION SHEET JORDAN

SECTOR: Aerosol ODS use in sector (1999): 40 ODP tonnes

Sub-sector cost-effectiveness thresholds: Filling plant US \$4.40/kg

Project Titles:

- (a) Phase-out of CFC-12 in the manufacture of hair lacquers by conversion to hydrocarbon propellant at Jordan Tunisian Chemical Company

Project Data	Filling plant
	Jordan Tunisian
Enterprise consumption (ODP tonnes)	12.00
Project impact (ODP tonnes)	12.00
Project duration (months)	26
Initial amount requested (US \$)	52,800
Final project cost (US \$):	
Incremental capital cost (a)	73,500
Contingency cost (b)	7,350
Incremental operating cost (c)	-12,306
Total project cost (a+b+c)	68,544
Local ownership (%)	100%
Export component (%)	0%
Amount requested (US \$)	52,800
Cost effectiveness (US \$/kg.)	4.40
Counterpart funding confirmed?	Yes
National coordinating agency	Ozone Project Preparation & Implementation Unit
Implementing agency	UNIDO

<i>Secretariat's Recommendations</i>	
Amount recommended (US \$)	52,800
Project impact (ODP tonnes)	12.00
Cost effectiveness (US \$/kg)	4.40
Implementing agency support cost (US \$)	6,864
Total cost to Multilateral Fund (US \$)	59,664

PROJECT DESCRIPTION

(a) Phaseout of CFC-12 in the manufacture of hair lacquers by conversion to hydrocarbon propellant at Jordan Tunisia Chemical Company

1. In 1999, the total ODS consumption in the aerosol sector was 40 tonnes as reported in the Progress of Implementation of Country Programme (24 April 2000). The Executive Committee has already approved seven investment projects for the phase out of 325 tonnes of CFCs used in the manufacturing of aerosol products and has allocated about US \$954,000 for their implementation. In addition, the Committee approved at its 7th Meeting a project proposal for LPG purification to be used in aerosol products and allocated US \$700,000 to the World Bank for its implementation

2. There are two aerosol plants that are still producing aerosol products using CFC-propellant: Jordan Tunisia Chemical Company and Arab Centre for Pharmaceuticals and Chemicals. Jordan Tunisia Chemical Company produces hair lacquer (100,000 cans/year) and Arab Centre for Pharmaceuticals and Chemicals produces different pharmaceutical aerosols (312,994 cans/year) such as lignosol, septisol, neosol, multisol and meconasol. The total CFC consumption is 33 tonnes.

3. The Government of Jordan has only submitted the request for the conversion of the Jordan Tunisia Chemical Company to hydrocarbon aerosol grade propellant (HAP) technology. A project for the conversion of the Arab Centre for Pharmaceuticals and Chemicals plant will be submitted to a later meeting of the Committee.

4. Conversion entails installation of a gas filler machine with a propellant handling system and portable gas detectors, a conveyor system, retrofit of process pump, a manual water bath for testing filled cans and construction of an open air filling room.

5. Technical assistance will be provided for performance and supervision of engineering designs, installation of equipment and commissioning of the plant and training.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

1. The Secretariat pointed out that benefits realized from the LPG purification project (approved at the 7th Meeting) were not included in the calculation of the eligible incremental costs of the project, as was done for the aerosol projects submitted and approved at the 20th Meeting. UNIDO agreed to take into consideration the LPG purification project in the calculation of incremental operating savings.

2. The calculation of the total operating savings in the project has been based on three components: (i) the difference in costs associated with the formulations based on CFCs or HAPs, (ii) increase in maintenance costs (at 5% of capital investment) due to the use of HAP, and (iii)

increase in energy consumption due to the hot water bath and additional ventilation. The Secretariat pointed out that the incremental costs associated with maintenance are very difficult to quantify and not all of them are incremental (for example, old pieces of equipment which will be replaced with new equipment; capital costs associated with racks, OAFR, and lighting). Furthermore, the increase in energy consumption due to the use of water baths is not incremental, since water baths should be in the baseline of any aerosol plant, irrespective of the propellant used. Thus, operating costs/savings were adjusted accordingly (from US \$1,273 to US \$12,306).

RECOMMENDATION

1. The Fund Secretariat recommends blanket approval of the project with associated support costs at the funding level shown in the table below:

	Project Title	Project Funding (US\$)	Support Cost (US\$)	Implementing Agency
(a)	Phase-out of CFC-12 in the manufacture of hair lacquers by conversion to hydrocarbon propellant at Jordan Tunisian Chemical Company	52,800	6,864	UNIDO

PROJECT EVALUATION SHEET JORDAN

SECTOR: Halon ODS use in sector (1999): 255 ODP tonnes

Sub-sector cost-effectiveness thresholds: Fire Protection US \$1.48/kg

Project Titles:

- (a) Terminal halon 1211 and halon 1301 phaseout umbrella project for fire equipment manufacturers and suppliers in Jordan converting to ABC powder, CO₂, HFC-227ea and inert gases as substitutes

Project Data	Extinguisher/fixed system
	Terminal umbrella
Enterprise consumption (ODP tonnes)	421.80
Project impact (ODP tonnes)	421.80
Project duration (months)	38
Initial amount requested (US \$)	982,300
Final project cost (US \$):	
Incremental capital cost (a)	563,000
Contingency cost (b)	
Incremental operating cost (c)	
Total project cost (a+b+c)	563,000
Local ownership (%)	100%
Export component (%)	0%
Amount requested (US \$)	563,000
Cost effectiveness (US \$/kg.)	1.33
Counterpart funding confirmed?	
National coordinating agency	Ozone Unit
Implementing agency	IBRD

<i>Secretariat's Recommendations</i>	
Amount recommended (US \$)	563,000
Project impact (ODP tonnes)	421.80
Cost effectiveness (US \$/kg)	1.33
Implementing agency support cost (US \$)	71,930
Total cost to Multilateral Fund (US \$)	634,930

PROJECT DESCRIPTION

1. The project is part of the overall strategy for halon phase out in Jordan. This terminal umbrella project will reduce the national consumption of halons from the present consumption to 0 in 2003. The document indicated a current consumption average for 1998 and 1999 of 421.8 ODP tonnes. The requested funding is based on Decision 25/50 regarding terminal umbrella projects. Jordan will develop and implement the necessary policies and regulatory measures to prevent future import of halons from the end of 2003. The project will cover all remaining halon equipment manufacturing enterprise in Jordan. In addition to the listed companies, there are a number of very small fire equipment companies located outside the Amman area, which have not been included by the halon survey. This project will cover these companies through a workshop and no additional funding will be requested in this sector.

2. Standard capital costs are requested for extinguisher manufacturers conversion to ABC powder and CO₂ fire extinguishers production and for the conversion of halon system manufacturers and suppliers to non ODS fire extinguishing agents. Funding for capital costs, technical assistance and training to the halon fire equipment manufacturers and suppliers are requested based on typical standard costs for the industry. In accordance with Decision 25/50 regarding terminal umbrella projects for a larger number of smaller enterprises, incremental operating costs and savings are not calculated nor claimed.

3. A Halon Management and Banking project was approved at the 29th meeting of the Executive Committee. The Government will ban import of halons not later than by the end of 2003 through the existing ODS import/export control. The ban will be enforced by customs authorities, which will receive the necessary training for its enforcement. The regulation will, however, allow the use of recycled halons for existing halon fire fighting equipment so that existing equipment do not need to be replaced but can remain in place until end of its technical lifetime.

4. The Civil Defense in Jordan will have a key role in the implementation of the halon phase-out regulation as it relates to fire safety in general. It will issue and enforce the necessary supporting regulations and guidance controlling installation of new fire extinguishing systems and sale of new halon fire equipment. Civil Defense will play a key role in the implementation of the halon phase-out strategy for Jordan as 1) all fire equipment in Jordan are certified by the Civil Defense, 2) It issues and enforces fire safety codes, and 3) it conducts inspections to ensure that safety requirements are followed.

5. The Jordan fire equipment market consist of a small number of larger companies which covers the full range of fire protection equipment and a large number of very small companies. Two of the larger fire equipment companies have their own complete fire extinguisher production, including cylinder production. The smaller fire equipment companies are mainly dealing with fire extinguishers filling and servicing. They normally buy locally made cylinders and other components based on Jordan fire extinguisher standard specifications. Valves, hoses etc. are purchased from international suppliers. The in-house production operation normally

include painting, filling, pressure testing and labeling of fire extinguishers. Equipment used for filling is either automatic or semiautomatic filling machines. Extinguishers are often sold under their own brand names. The companies obtain the necessary licenses and certifications for their operation from Civil Defense.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

1. The Fund Secretariat and the World Bank agreed a revised budget for this project. However, the World Bank had not confirmed the Government's agreement as of 8 November 2000.
2. The project costs are consistent with capital costs recommended for use in preparing such projects in Decision 20/46 as well as previous decisions of the Executive Committee on the halon fire extinguisher and fixed system sub-sector.
3. The Fund Secretariat noted that the latest halon consumption reported for 1999 was 255 ODP tonnes while the project is to phase-out 421.8 ODP tonnes. The World Bank indicated that it was aware of the consumption figures for 1999 but the phase-out in the project is the consumption collected from enterprises during the preparation of the project.
4. Several companies included in this terminal umbrella project are halon fillers and suppliers that have halon filling equipment with minimum or inconsistent patterns of filling and refilling cylinders produced elsewhere. As part of the project, halon filling equipment will be destroyed for these 22 companies as well as for the two larger size halon extinguisher manufacturers.
5. The project will also provide 6 system manufacturers equipment for alternative chemicals, licenses, some tooling, software, and training.

RECOMMENDATIONS

1. The Sub-Committee on Project Review may wish to consider recommending the approval of this project in amounts indicating in the tables below and with the understanding that this is a terminal project for the halon sector in Jordan.

	Project Title	Project Funding (US\$)	Support Cost (US\$)	Implementing Agency
(a)	Terminal halon 1211 and halon 1301 phaseout umbrella project for fire equipment manufacturers and suppliers in Jordan converting to ABC powder, CO ₂ , HFC-227ea and inert gases as substitutes	563,000	71,930	IBRD



**United Nations
Environment
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Distr.
Limited

UNEP/OzL.Pro/ExCom/32/30/Libya
9 November 2000

ORIGINAL: ENGLISH

EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Thirty-second Meeting
Ouagadougou, 6-8 December 2000

PROJECT PROPOSALS: LIBYA

This document consist of the comments and recommendations of the Fund Secretariat on the following project proposals:

Foam:

- | | |
|--|------|
| • Phaseout of CFC-11 by conversion to methylene chloride (MC) in the manufacture of flexible polyurethane foam at Ben Ghazi Unit | UNDP |
| • Phaseout of CFC-11 by conversion to methylene chloride (MC) in the manufacture of flexible polyurethane foam at Garabouli Unit | UNDP |
| • Phaseout of CFC-11 by conversion to methylene chloride (MC) in the manufacture of flexible polyurethane foam at Sebha Unit | UNDP |
| • Phasing out of CFC-11 in the manufacture of rigid polyurethane foam at Electrical Household Appliance-Tajura by conversion to a combination of water + HCFC-141b based systems | UNDP |

Refrigeration:

- | | |
|--|-------|
| • Phasing out ODS in the production of refrigerators and freezers at Electrical Household Appliances Manufacturing | UNIDO |
|--|-------|

PROJECT EVALUATION SHEET LIBYA

SECTOR: Foam ODS use in sector (1999): 758.5 ODP tonnes

Sub-sector cost-effectiveness thresholds: Flexible slabstock US \$6.23/kg
Rigid US \$7.83/kg

Project Titles:

- (a) Phaseout of CFC-11 by conversion to methylene chloride (MC) in the manufacture of flexible polyurethane foam at Ben Ghazi Unit
- (b) Phaseout of CFC-11 by conversion to methylene chloride (MC) in the manufacture of flexible polyurethane foam at Garabouli Unit
- (c) Phaseout of CFC-11 by conversion to methylene chloride (MC) in the manufacture of flexible polyurethane foam at Sebha Unit
- (d) Phasing out of CFC-11 in the manufacture of rigid polyurethane foam at Electrical Household Appliance-Tajura by conversion to a combination of water + HCFC-141b based systems

Project Data	Flexible slabstock			Rigid
	Ben Ghazi Unit	Garabouli Unit	Sebha Unit	EHA-Tajura
Enterprise consumption (ODP tonnes)	31.40	40.30	26.00	16.60
Project impact (ODP tonnes)	31.40	40.30	26.00	15.30
Project duration (months)	36	36	36	36
Initial amount requested (US \$)	142,120	141,970	161,980	119,802
Final project cost (US \$):				
Incremental capital cost (a)	133,000	136,000	139,000	95,000
Contingency cost (b)	13,300	13,600	13,900	9,500
Incremental operating cost (c)	-21,440	-39,790	-24,803	30,110
Total project cost (a+b+c)	124,860	109,810	128,097	134,610
Local ownership (%)	100%	100%	100%	100%
Export component (%)	0%	0%	0%	0%
Amount requested (US \$)	124,860	109,810	128,097	119,802
Cost effectiveness (US \$/kg.)	3.98	2.72	4.93	7.83
Counterpart funding confirmed?			Yes	Yes
National coordinating agency	Ministry of Environment and Climate Changes			
Implementing agency	UNDP	UNDP	UNDP	UNDP

Secretariat's Recommendations				
Amount recommended (US \$)	124,860	109,810	128,097	119,802
Project impact (ODP tonnes)	31.40	40.30	26.00	15.30
Cost effectiveness (US \$/kg)	3.98	2.72	4.93	7.83
Implementing agency support cost (US \$)	16,232	14,275	16,653	15,574
Total cost to Multilateral Fund (US \$)	141,092	124,085	144,750	135,376

PROJECT DESCRIPTION

Sector Background

- Latest available total ODS consumption (1997)	1,234.0 ODP tonnes
- Baseline consumption of Annex A Group I substances (CFCs)	716.7 ODP tonnes
- Consumption of Annex A Group I substances for the year 1997	647.5 ODP tonnes
- Baseline consumption of CFCs in foam sector	Not Available ODP tonnes
- Consumption of CFCs in foam sector in 1999*	758.5 ODP tonnes

*Based on data from the Libya country programme

1. The preparation of Libya's country programme has just been completed and is being submitted to approval by the Executive Committee at this 32nd Meeting. The country programme indicates a total 1999 Annex A ODS consumption of 947.45 ODP tonnes. The country programme indicates that the foam sector (including use in refrigeration) accounts for 758.45 ODP tonnes or 80% of Libya's ODS consumption in 1999.

2. However as of the time of dispatch of documentation information available to the Fund Secretariat showed that Libya had not reported its ODS consumption data for 1998 and 1999 to the Ozone Secretariat.

3. Based on data reported by Libya to the Ozone Secretariat, the country is in compliance with the CFC freeze. In order to meet the 50% CFC reduction by 2005, an additional 289.15 ODP tonnes of CFC must be phased out.

- (a) **Phaseout of CFC-11 by conversion to methylene chloride (MC) in the manufacture of flexible polyurethane foam at Ben Ghazi Unit**
- (b) **Phaseout of CFC-11 by conversion to methylene chloride (MC) in the manufacture of flexible polyurethane foam at Garabouli Unit**
- (c) **Phaseout of CFC-11 by conversion to methylene chloride (MC) in the manufacture of flexible polyurethane foam at Sebha Unit**

Flexible Slabstock Foam

Ben Ghazi, Garabouli, Sebha

4. Three companies (Ben Ghazi, Garabouli and Sebha) are 100% Libyan companies manufacturing flexible slabstock polyurethane foam for the furniture industry using equipment and quantities of CFC-11 (1999) indicated in the table below. All three companies will convert the foam production to the use of methylene chloride.

Table 1: Profile of the flexible slabstock foam producing enterprises

Name of Enterprise	Date Established	ODS Consumption OPD tonnes	Baseline Equipment ¹	Year*	ICC** US \$	IOS*** US \$
Ben Ghazi	1994	31.4	LP Hyma conventional 100 kg/min	1994	157,300	21,440
Garabouli	1994	40.3	LP Viking Maxfoam 250 kg/min	1994	160,600	39,790
Sebha	1984	26.0	LP Viking Maxfoam 250 kg/min	1984	163,900	24,803

*Year – year of purchase and/or installation of equipment

**ICC – incremental capital cost, including 10% contingency.

***IOS – incremental operational savings

¹ LP – Low pressure

5. The existing foam equipment at the enterprises will be retrofitted to use methylene chloride. This includes replacement of the CFC storage tanks and metering systems with new storage tank and metering systems for use with methylene chloride, encapsulation of parts of the production lines, metering system for stabilizer additive, methylene chloride monitor. The incremental capital costs of the projects include the following:

Incremental capital costs in US \$

	Ben Ghazi	Garabouli	Sebha
MC storage tank and metering system	25,000	29,000	25,000
Machine enclosure including extractor fans	67,000	60,000	67,000
Ventilation in curing room	14,000	20,000	20,000
MC detectors	8,000	8,000	8,000
Trials, technology transfer and training	19,000	19,000	19,000

6. The projects are expected to accrue incremental operational savings as indicated in table 1 above.

Rigid Foam

(d) Phasing out of CFC-11 in the manufacture of rigid polyurethane foam at Electrical Household Appliance – Tajura unit by conversion to a combination of water + HCFC-141b based systems

Electrical Household Appliance (E.H.A.) - Tajura

7. E.H.A.- Tajura produces rigid polyurethane foam for insulated water heaters. It operates OMS 40 kg/min low pressure dispenser. Its CFC-11 consumption average of the last twelve months (1999 / 2000) was 16.6 tonnes. The production will be converted to a combination of HCFC-141b and water. The incremental capital cost of the project conversion amounts to US \$110,000 (including 10% contingency). This includes the cost of replacement of the low pressure machine with an equivalent high pressure machine at US \$80,000 and trials, technology

transfer and training for US \$20,000. The project costs also include incremental operating cost of US \$30,110.

Justification for the use of HCFC-141b

8. Justification for the use of HCFC-141b by E.H.A. has been provided in the project document and as an annex to the document, including projected “techno-economic” impact of zero ODP technologies as well as estimated cost of conversion to zero ODP technology. The Government of Libya has also provided a letter endorsing the use of HCFC-141b by the company consistent with Decision 27/13.

9. A copy of the justification (additional justification) annexed to the project and the letter of the Government of Libya supporting the choice of HCFC-141b are attached to this evaluation.

Impact of the projects

10. A total of 114.3 ODP tonnes will be phased out from the three foam projects. This will eliminate 12% of Libya’s 1999 consumption of Annex A Group I substances. There will be residual ODS consumption of 1.3 tonnes as a result of the use of HCFC-141b conversion technology.

SECRETARIAT’S COMMENTS AND RECOMMENDATIONS

COMMENTS

1. The Fund Secretariat and UNDP discussed the projects and agreed on the eligible grants.

RECOMMENDATIONS

1. The Fund Secretariat recommends blanket approval of the Ben Ghazi, Garabouli, Sebha and E.H.A.-Tajura projects with the funding levels and associated support costs indicated below.

	Project Title	Project Funding (US\$)	Support Cost (US\$)	Implementing Agency
(a)	Phaseout of CFC-11 by conversion to methylene chloride (MC) in the manufacture of flexible polyurethane foam at Ben Ghazi Unit	124,860	16,232	UNDP
(b)	Phaseout of CFC-11 by conversion to methylene chloride (MC) in the manufacture of flexible polyurethane foam at Garabouli Unit	109,810	14,275	UNDP
(c)	Phaseout of CFC-11 by conversion to methylene chloride (MC) in the manufacture of flexible polyurethane foam at Sebha Unit	128,097	16,653	UNDP
(d)	Phasing out of CFC-11 in the manufacture of rigid polyurethane foam at Electrical Household Appliance-Tajura by conversion to a combination of water + HCFC-141b based systems	119,802	15,574	UNDP

Annex

Additional Justification for Using HCFC-141b Technology

UNDP technical expert appraised the enterprise in June 2000, prior to the preparation of this project document, and had discussions with the company's representatives about the choice of technology for replacing the existing CFC-based technology. The enterprise was briefed in detail about the following:

- (a) An overview of the available interim (low ODP) and permanent (zero ODP) replacement technologies.
- (b) The "techno-economic impact" of each technology on the products manufactured, and the processes and practices employed.
- (c) Possible implications of each technology, in terms of its known impact on environment, health and safety, such as ozone depleting potential, global warming potential, occupational health, etc.
- (d) It was emphasized to the enterprise that HCFC technologies are interim technologies due to their residual ODP and therefore may continue to adversely affect the environment, although at a lower rate than CFCs.
- (e) It was further explained that HCFCs may become controlled substances under present or future international conventions and will therefore also need to be phased out at a future date, and any investments required for their phase-out and for conversion to a permanent technology will have to be borne by the enterprise themselves.

The main conclusions reached by the enterprise through discussions with technical expert were:

- 1. HCFC-141b will maintain the insulation properties required by the enterprise's customers.
- 2. All Water based formulations do not provide sufficient insulation properties for the application and would require a significant cost increase to the enterprise.
- 3. Hydrocarbon technology was seen as not a feasible option due to the layout of the plant operations. The use of hydrocarbons in this environment would be risky and very expensive.

In view of the above, the technology selected is HCFC-141b based systems in the interim, until permanent technology (either water based or HFC-based systems) is available and can provide the required physical properties.

Projected Techno-economic Impact of Zero-ODP Technologies

The projected impact of applying various zero-ODP technologies with respect to the selected technology (HCFC-141b) in this project is summarized as below:

Water based technologies are not sufficiently developed to meet the needs of this application (insulated water heater tanks) which has stringent insulation/thickness requirements. Therefore, they can not be considered.

HFC-134a based systems are not offered in the applicable regional area and are not a feasible zero-ODP option.

Hydrocarbons cannot be used for safety reasons related to the plant layout.

Thus, the selection of HCFC-141b based systems, as the preferred conversion technology, is justified taking into account all the technical, commercial and cost factors.

Estimated Cost of Future Conversion to Zero-ODP Technology

At the present time, there are no zero-ODP technology options, which can be applied cost-effectively for this project (refer to Annex 7).

The following possibilities exist for a future conversion to zero-ODP technology, based on information available presently:

- Water based systems
- HFC based systems

If and when liquid HFC or water-based systems become technically mature and commercially available, the capital investments required to apply this technology are expected to be negligible. The equipment installed/retrofit under this project will be suitable for processing either of these systems. Future costs are expected to be in the area of incremental operating costs, related to higher isocyanate usage (in the case of water based) or higher costs of the HFCs. It is assumed that by the time water-based systems become available, no further density increase will be required.

Before:	12,1 t HCFC-141b	@ US\$ 3,20= 38 573
<u>After:</u>	<u>20,1 t MDI increase</u>	<u>@ US\$ 2,50= 50 235</u>
Incremental Operating Costs/y		11 662

It is unknown what the price would be of the HFCs in the future; therefore, IOCs related to a potential conversion to HFC technology are not quantifiable at this point.



البنية الوطنية للنفط NATIONAL OIL CORPORATION

10/10/2000

ENTERED

Mr. Frank Pinto
Principal Technical Advisor and Chief
Montreal Protocol Unit, UNDP
New York - USA
Can. No. : 01/2000/0002

01/10/2000

Dear Mr. Pinto

As Coordinating office for matters related to the Montreal Protocol in Libya, this office requests UNDP-New York to send the following three projects to the 32nd Meeting of the Executive Committee which will be held in Ouagadougou in December 2000. Please note that the documents must be sent to the Multilateral Fund Secretariat in Montreal before the deadline of 11th October 2000.

Company Name	Applications	City	ODP	US\$
BENGHAZI UNIT	Flexible Slabstock PU Foam for Bedding and furniture	BENGHAZI	34 t	158,985
GARABOLI UNIT	Flexible Slabstock PU Foam for Bedding and furniture	GARABOLI	37 t	158,818
SEBHA UNIT	Flexible Slabstock PU Foam for Bedding and furniture	SEBHA	26 t	182,091
ELECTRICAL HOUSE- HOLD APPLIANCE	Rigid PU Foam for insulated water heater tanks	TAJURA	16.6 t	135,376

As you are aware, these projects were prepared by UNDP's International Consultant - Dr. Allal Jnoui.

I would also like to refer to the Executive Committee Decision 27/13 regarding the use of HCFC's in these foam projects and would like the following points noted:

- The companies have received full information concerning the various technologies that are available to phase out CFC's, and were fully briefed about the existing options for their specific subsectors. They realize that HCFC's constitute an interim solution, but they feel that this transitional step will assist them to switch to a non-ODP solution at a later date.
- The use of HCFC-141b is justified at this moment because it will allow to maintain critical insulation values for the panels and spray foam applications. The HCFC-141b option requires minimum change at the manufacturing plant and is commercially available and economically feasible in Libya.
- As for other technological solutions, it was found that:
 - Systems for water-blown technology are not yet available in Libya
 - Hydrocarbons would result in safety concerns due to the flammability of the end-product. Some plants would have to relocate, resulting in delays.

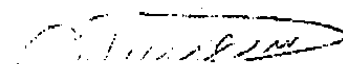


المؤسسة الوطنية للنفط
NATIONAL OIL CORPORATION

- CFC-245fa and others are not commercially available at this time.

As indicated in the documents, the consumption of ODS in Libya for the foam sector may have been underestimated. We will follow up on this issue and will correct data that was previously submitted to the Ozone Secretariat in Nairobi in due course.

Yours sincerely


ABDULLATIF SALEM BENRAGEB

Manager

Office of National Committee for Climate Change



PROJECT EVALUATION SHEET LIBYA

SECTOR: Refrigeration ODS use in sector (1999): 137.4 ODP tonnes

Sub-sector cost-effectiveness thresholds: Domestic US \$13.76/kg

Project Titles:

- (a) Phasing out ODS in the production of refrigerators and freezers at Electrical Household Appliances Manufacturing

Project Data	Domestic
	Household appliances
Enterprise consumption (ODP tonnes)	57.00
Project impact (ODP tonnes)	53.40
Project duration (months)	30
Initial amount requested (US \$)	705,627
Final project cost (US \$):	
Incremental capital cost (a)	336,400
Contingency cost (b)	30,140
Incremental operating cost (c)	191,573
Total project cost (a+b+c)	558,113
Local ownership (%)	100%
Export component (%)	0%
Amount requested (US \$)	558,113
Cost effectiveness (US \$/kg.)	10.45
Counterpart funding confirmed?	Yes
National coordinating agency	National Committee for Climate Change
Implementing agency	UNIDO

<i>Secretariat's Recommendations</i>	
Amount recommended (US \$)	558,113
Project impact (ODP tonnes)	53.40
Cost effectiveness (US \$/kg)	10.45
Implementing agency support cost (US \$)	71,392
Total cost to Multilateral Fund (US \$)	629,505

PROJECT DESCRIPTION

Sector background

- Latest available total ODS consumption (1999)	947.32 ODP tonnes
- Baseline consumption of Annex A Group I substances (CFCs)	788.43 ODP tonnes
- Consumption of Annex A Group I substances for the year 1999	845.90 ODP tonnes
- Baseline consumption of CFCs in refrigeration sector	Not available ODP tonnes
- Consumption of CFCs in refrigeration sector in 1999	137.40 ODP tonnes
- Funds approved for investment projects in refrigeration sector as of July 2000 (31st Meeting)	US \$0
- Quantity of CFC to be phased out in investment projects in refrigeration sector as of end of 1999	0 ODP tonnes

1. The country programme for Libya has been submitted for consideration by the Executive Committee at the 32nd Meeting. The 1999 CFC consumption exceeds 1995-1997 CFC baseline consumption.

(a) Phasing out ODS in the production of refrigerators and freezers at Electrical Household Appliances Manufacturing

2. Electrical Household Appliances Manufacturing (EHAM) which is the only producer of domestic refrigerators and freezers in Libya operates four production plants. Two domestic refrigerator plants in Tripoli and Rujban and the freezer plant in Muserat are using CFC-11 and CFC-12 as a blowing agent and refrigerant respectively. The proposal covers all three production plants mentioned above. In addition to these three plants, a new production plant was installed in 1999 in Tripoli using HCFC-141b and HFC-134a. This plant is not included in the proposal.

3. The company consumed 48 ODP tonnes of CFC-11 and 9.0 ODP tonnes of CFC-12 in the production of domestic refrigeration appliances (double-door refrigerators and deep freezers) in 1999. The enterprise operates three low-pressure dispensers and one high-pressure dispenser for foaming operations in the baseline.

4. The proposal will phase-out the current consumption of 58.5 ODP tonnes by converting EHAM from CFC-11 to HCFC-141b as the foam blowing agent and from CFC-12 to HFC-134a as the refrigerant. Under the current project, the existing low-pressure foam dispensers will be replaced by three high-pressure foam dispenser (US \$255,000). The enterprise will require refrigerant charging units (US \$60,000), vacuum pumps (US \$56,000) and leak detectors (US \$21,000). Other costs include redesign, trials, technical assistance (US \$8,000), installation, testing and training (US \$15,000). Incremental operating costs are requested for a period of six months by the enterprise reflecting the higher cost of chemicals and an increase in foam density.

Justification for the use of HCFC-141b

5. The enterprises have selected HCFC-141b technology to replace CFC-11 in foam blowing operations. It is an interim solution until HFC systems are commercially available. A letter of justification from the agency is attached. As at the time of preparation of this document a letter advising the Government decision to use HCFC technology has not been received by the Secretariat, however information received from UNIDO indicates that the letter will be submitted shortly. The Sub-Committee on Project Review will be advised accordingly.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS**COMMENTS**

1. The Secretariat has discussed with UNIDO the possibility of rationalization of the conversion of the foaming lines in the Tripoli plant. Subsequently, it was agreed that one high pressure foaming machine equipped with two mixing heads would replace two low pressure dispensers used in the baseline. The Secretariat also discussed with UNIDO the equivalent replacement and retrofitting of existing vacuum pumps. The capital costs have been adjusted accordingly.

2. The Secretariat has questioned the incremental operating costs associated with foam density. Subsequently, UNIDO adjusted these costs.

RECOMMENDATIONS

1. The Fund Secretariat recommends blanket approval of the commercial refrigeration project from UNIDO with the level of funding and associated support costs as indicated below, subject to receipt of the letter from the Government of Libya concerning HCFC use.

	Project Title	Project Funding (US\$)	Support Cost (US\$)	Implementing Agency
(a)	Phasing out ODS in the production of refrigerators and freezers at Electrical Household Appliances Manufacturing	558,113	71,392	UNIDO

Annex

Justification for the use of HCFC-141b

CFC-141b technology

Although a tentative solution, HCFC-141b foam blowing technology is used as an alternative to CFC-11 in domestic refrigerator factories in order to facilitate CFCs phase out, particularly at small industry or factories located in the residential area where storage of inflammable substances is not allowed.

For the HCFC-141b foam blowing technology, it is required to operate with high pressure foaming machines to ensure same foam quality with satisfactory insulation and mechanical performances as those given by the CFC-11 foaming mainly due to the reduced flow ability of the PU formulation with HCFC-141b

Alternative for the company

As described in the company background, it has two manufacturing sites of FB30 refrigerators due to the product distribution and social reasons. These two lines have relatively small production capacity (ca. 50 units per day). The factory in Tripoli is located in the residential area and has no extra space to install a cyclopentane storage tank. The Rujban factory is smaller and located also in the residential area of the small town in the mountain side, far from the company headquarter in Tripoli. It would not be suitable to operate cyclopentane foaming in both factories, since this technology would require permission of the local administration for the operation as well as very careful operation after the intensive training of workers in terms of safety operation.

The freezer factory at Muserat is located in the industrial area and has daily production of more than 100 units. It may be possible to operate cyclopentane foaming at the Muserat factory for freezer production. However, the expansion of this factory to incorporate domestic refrigerator production is not possible at the moment, since the existing production line has no extra space to accommodate additional refrigerator production of more than 100 units per day.

The company management should keep the current operation at three sites as the company strategy. In this circumstance, it is impossible to apply the cyclopentane foam blowing technology in the company. Also the grants available from the Multilateral Fund would not be satisfactory to provide three foaming systems adequate for cyclopentane foaming technology for existing three production lines, and the company has no financial resources to invest for reconstruction of the factories to apply the cyclopentane foaming technology.

After the extensive consideration, it has been decided that the company takes HCFC-141b foam blowing technology as an alternative to CFC-11 technology. This transitional technology is only the one to facilitate the CFC phase out at Electrical Household Appliances. However, the company is committed to convert the appliances production lines to a long-term solution (liquid HFCs blowing agents and new insulation technology) when it will become commercially viable, or to convert to the hydrocarbon technology in the future by their own expenses,.



**United Nations
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Distr.
Limited

UNEP/OzL.Pro/ExCom/32/30/Macedonia
9 November 2000

ORIGINAL: ENGLISH

EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Thirty-second Meeting
Ouagadougou, 6-8 December 2000

PROJECT PROPOSALS: MACEDONIA

This document consist of the comments and recommendations of the Fund Secretariat on the following project proposals:

Aerosol:

- Phase-out of CFC 11/12 in the manufacture of aerosols by conversion to HFC and hydrocarbon propellants at Alkaloid A.D. UNIDO

Fumigant:

- Phase-out of methyl bromide in tobacco seedling and horticulture production sector UNIDO

PROJECT EVALUATION SHEET MACEDONIA

SECTOR: Aerosol ODS use in sector (1999): 25 ODP tonnes

Sub-sector cost-effectiveness thresholds: Filling plant US \$4.40/kg

Project Titles:

- (a) Phase-out of CFC 11/12 in the manufacture of aerosols by conversion to HFC and hydrocarbon propellants at Alkaloid A.D.

Project Data	Filling plant
	Alkaloid
Enterprise consumption (ODP tonnes)	25.00
Project impact (ODP tonnes)	25.00
Project duration (months)	26
Initial amount requested (US \$)	110,000
Final project cost (US \$):	
Incremental capital cost (a)	170,000
Contingency cost (b)	17,000
Incremental operating cost (c)	150,986
Total project cost (a+b+c)	337,986
Local ownership (%)	100%
Export component (%)	0%
Amount requested (US \$)	110,000
Cost effectiveness (US \$/kg.)	4.40
Counterpart funding confirmed?	Yes
National coordinating agency	Ministry of Environment
Implementing agency	UNIDO

<i>Secretariat's Recommendations</i>	
Amount recommended (US \$)	110,000
Project impact (ODP tonnes)	25.00
Cost effectiveness (US \$/kg)	4.40
Implementing agency support cost (US \$)	14,300
Total cost to Multilateral Fund (US \$)	124,300

PROJECT DESCRIPTION

Phaseout of CFC-11 and CFC-12 in the manufacture of pharmaceutical aerosols by conversion to HFC-134a and hydrocarbon propellant at Alkaloid A.D.

1. The Government of Macedonia is submitting one project proposal in the aerosol sector for Alkaloid A.D., the only company producing aerosols in the country. According to the country programme, in 1994 the total CFC consumption in the aerosol sector was estimated at 20 tonnes, mainly used for production of pharmaceutical and veterinary applications (182,670 cans/year) and different cosmetic products (15,000 cans/year of hair sprays and 115,200 cans/year of deodorants) which were earlier contract filled in Kinkida, Serbia.
2. Implementation of this project will result in the phase-out of 25 tonnes of CFC-12, and the complete phaseout of CFCs in the aerosol sector in the country.
3. Alkaloid A.D., will convert to HFC-134a technology for its pharmaceutical products and to HAP technology for the cosmetics products. Conversion entails installation of an automated indexing gasser with two propellant fillers, gas detection system, a conveyor, a molecular sieve system for hydrocarbon and construction of an external enclosed gassing room.
4. Technical assistance will be provided for performance and supervision of engineering designs, installation of equipment and commissioning of the plant and training.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

1. The Secretariat and UNIDO discussed cost issues regarding conveyer systems (US \$2,250/m), automated indexing gasser (US \$30,000), propellant transfer pump (US \$5,000) and gas detector system (US \$30,000). Subsequently, UNIDO agreed to adjust the capital cost of the project by US \$11,000.
2. The calculation of the total operating savings in the project has been based on three components: (i) the difference in costs associated with the formulations based on CFCs or HAPs, (ii) increase in maintenance costs (at 5% of capital investment) due to the use of HAP, and (iii) increase in energy consumption due to additional ventilation. The Secretariat pointed out that the incremental costs associated with maintenance are difficult to quantify and not all of them are incremental (for example, old pieces of equipment which will be replaced with new equipment; capital costs associated with racks, external enclosed gassing room, and lighting). Therefore, UNIDO agreed to adjust operating costs to US \$150,986 from the original figure of US \$171,591.
3. The Secretariat also sought clarification on the high costs of request for technology transfer (US \$20,000) and safety audit (US \$8,000). This issue was also raised by the technical

reviewer of the project. UNIDO stated that these requests were based on the type of aerosol products manufactured at the plant (where special formulations would be developed for the pharmaceutical products) as well as other several non-CFC based products using flammable and explosive substances which are manufactured in the complex where Alkaloid is located. Subsequently, UNIDO agreed to adjust these costs by US \$6,000.

RECOMMENDATION

1. The Fund Secretariat recommends blanket approval of the project with associated support costs at the funding level shown in the table below:

	Project Title	Project Funding (US\$)	Support Cost (US\$)	Implementing Agency
(a)	Phase-out of CFC 11/12 in the manufacture of aerosols by conversion to HFC and hydrocarbon propellants at Alkaloid A.D.	110,000	14,300	UNIDO

PROJECT EVALUATION SHEET MACEDONIA

SECTOR: Fumigant ODS use in sector (1999): 27.24 ODP tonnes

Sub-sector cost-effectiveness thresholds: n/a

Project Titles:

(a) Phase-out of methyl bromide in tobacco seedling and horticulture production sector

Project Data	Methyl bromide	
Enterprise consumption (ODP tonnes)		48.40
Project impact (ODP tonnes)		48.40
Project duration (months)		60
Initial amount requested (US \$)		1,520,929
Final project cost (US \$):		
Incremental capital cost (a)		1,382,663
Contingency cost (b)		138,266
Incremental operating cost (c)		
Total project cost (a+b+c)		1,520,929
Local ownership (%)		100%
Export component (%)		0%
Amount requested (US \$)		0
Cost effectiveness (US \$/kg.)		55.83
Counterpart funding confirmed?		
National coordinating agency	Ministry of Environment UNIDO	
Implementing agency		

<i>Secretariat's Recommendations</i>	
Amount recommended (US \$)	
Project impact (ODP tonnes)	
Cost effectiveness (US \$/kg)	
Implementing agency support cost (US \$)	
Total cost to Multilateral Fund (US \$)	

PROJECT DESCRIPTION

Phase-out of methyl bromide in tobacco seedling and horticulture production sector

Background

2. The Government of Macedonia is submitting a project to phase out 27.2 ODP tonnes of methyl bromide (MB) use for tobacco seedlings and for the horticulture sector, representing the entire MB consumption in the country.

3. Tobacco is cultivated over 21,900 ha of land with a total production of 34,700 tonnes of tobacco leaves per year. The production cycle is from February to October. The two main tobacco varieties cultivated in Macedonia are Oriental (94 per cent of the total production) and Virginia (6 per cent of the total). About 10 per cent of the total population of Macedonia is employed in the production of tobacco, with a revenue estimated at US \$2,000/ha.

4. In total, 438 ha of land is used for the production of tobacco seedlings. Each seedbed (with an area of 10 m²), produces an average of 10,000 seedlings of Oriental tobacco or 5,000 seedlings of Virginia tobacco. Between 150,000 and 200,000 seedlings of Oriental tobacco or 20,000 seedlings of Virginia tobacco are needed to cover a surface area of one ha.

5. The production of tobacco in Macedonia is by farmers organized in co-operatives and through tobacco companies, known as “kombinats.” They purchase tobacco leaves from the farmers for the manufacture of cigarettes, provide a variety of technical services (one technician per 200 farmers) and financial support to their members, including plant protection during the production of seedlings, for transplanting to the open fields, and cropping. About 10 per cent of Oriental tobacco seedlings are cultivated as a security stock in case of major disease or other hazards. Soil fumigants are used extensively. The agricultural policy in Macedonia encourages the kombinats to provide financial support to farmers for sowing material, chemicals and fertilisers as well as machinery. Any expenses incurred are deducted from the by-out price of the tobacco at the end of the harvest.

MB consumption

6. The total MB consumption in Macedonia has been estimated at 27.3 ODP tonnes, mainly in tobacco seedbeds (24.8 ODP tonnes), vegetable seedlings in greenhouses (glass or plastic covers) and protected crops such as tomato, cucumber and pepper (2.5 ODP tonnes).

Export

7. The total production of tobacco leaves in Macedonia is used for the manufacture of cigarettes for the local market.

Alternative technologies selected

8. The alternative technology to replace MB in the production of tobacco seedlings is the floating tray system, which has been tested in Macedonia with excellent results giving better developed seedling roots; healthier and more uniform plants; and more efficient transplanting to open fields (farmers do not need to sort the best seedlings, thus reducing the time for transplanting). Implementation of this technology requires installation of micro-tunnels with a surface area of 10 m², covered with polyethylene sheets, with 36 plastic trays. The unitary cost of a micro-tunnel is about US \$60, including US \$54 for the trays (representing 90 per cent of the total cost of the micro-tunnel).

9. The alternative technology selected for the seedlings in greenhouses and protected crops is solarization in combination with biofumigation; it is adequate for controlling most pathogens found within the top 20 cm of soil. Farmers readily accept this alternative technology since it is an effective method for soil treatment, improves soil fertility and is cheap.

Training programme

10. The project includes training programmes in the use of the alternative technologies. The training will be organised in collaboration with the kombinats and provided by the staff of the Faculty of Agriculture. Approximately 12,570 farmers will be trained in the use of the floating tray system (i.e., installation of micro-tunnels; handling and cleaning a seeder and pelletized seeds; preparation of trays; monitoring water conductivity; clipping the seedlings; selecting pesticides; transplanting of the seedlings to an open field).

11. In addition, 1,200 farmers will be trained in the use of solarization in combination with biofumigation technology.

Policy measures

12. The Government of Macedonia is committed to phase out the entire consumption of MB by 2005, with the following phaseout schedule: 2.7 ODP tonnes in 2001-2002; 5.4 ODP tonnes in 2002-2003; 8.1 ODP tonnes in 2003-2004; an additional 11.0 in 2004-2005. Upon completion of the project, the Government will issue a regulation forbidding the use of MB in the entire tobacco and horticultural producing subsectors.

Implementation modalities

13. The project will be implemented by UNIDO in cooperation with the Ozone Office at the Ministry of the Environment. UNIDO will inform the Executive Committee about the progress achieved (through annual reports) indicating phase out achievements and costs involved. UNIDO will also inform the Committee on cases of unjustified project delays, which could potentially result in cancellation of the project.

14. The estimated time for the implementation of the project is 5 years.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

1. At its 26th Meeting, the Executive Committee approved a project to demonstrate three alternatives to the use of methyl bromide (non soil cultivation, biofumigation and low dose chemicals) in tobacco and horticultural production, and allocated US \$259,600 to UNIDO for its implementation. The investment project submitted to the 32nd Meeting has been prepared based on results of the demonstration project.

Incremental costs

2. The cost of the investment project was based on 12 per cent loss of viable transplants, similar to the loss rate from traditional seedbeds treated with MB, notwithstanding the higher performance rates of plants grown in floating trays. Results obtained from the demonstration project, indicated that the percentage of germination in the floating tray system (tested in different kombinats) was 90 per cent or higher, compared to 56 per cent when applying MB. Furthermore, the survival rate recorded two weeks after transplanting plants from the floating tray system ranged from 90 per cent to 95 per cent while the percentage from plants treated with MB ranged from 65 per cent to 70 per cent. UNIDO indicated that 20 per cent loss is considered a normal value for many multinationals. However, taking into consideration the good results obtained in Macedonia during the demonstration project, a 12 per cent loss rate was considered when designing the project.

3. The Secretariat also questioned the dosage of fertilizers in the floating tray system (4 times higher than the rate applied in traditional seedbeds treated with MB) and the costs of fertilizers (almost 15 times higher than the cost of fertilizers applied in traditional seedbeds), substrate (US \$57.14/m³) considering that four different substrates are locally available trays (US \$1.50/tray of 589 cells), and the big difference in labour (1.25 w/d for traditional beds with MB and 6.6 w/d for the floating tray system).

Training programmes and farm associations

4. The Secretariat and UNIDO discussed cost issues regarding logistical arrangements for workshops, production of brochures, transportation and co-ordination.

Policy measures

5. UNIDO has prepared an agreement between the Executive Committee and the Government of Macedonia with the commitments proposed and action plan for the phase out of MB in the tobacco sector in Macedonia.

Phase out schedule

6. Based on the experience gained during the implementation of the demonstration projects, the availability of high-level national experts, the organization scheme of the tobacco industry (through kombinats) and the existing training and research infrastructure in the country, the Secretariat considered that the project could be fully implemented in a shorter period of time (less than the proposed 5 years). In this regard, UNIDO indicated that the Government of Macedonia requested implementation of the project in five years; furthermore, as proposed, the project will achieve the 2002 freeze, and a complete phase out by 2005.

RECOMMENDATION

1. The Fund Secretariat and UNIDO are still discussing cost issues. The results of the discussion will be conveyed to the Executive Committee.



**United Nations
Environment
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Distr.
Limited

UNEP/OzL.Pro/ExCom/32/30/Malawi/Corr.1
17 November 2000

ORIGINAL: ENGLISH

EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Thirty-second Meeting
Ouagadougou, 6-8 December 2000

**Corrigendum
PROJECT PROPOSALS: MALAWI**

- Page 6, after para 5:

Add the following new paragraphs 6 and 7:

6. The total surface area of tobacco seedlings where MB is currently applied is 400 ha. Based on this area, the total cost of the project has been recalculated at US \$2,999,824 after taking into consideration operating savings of over US \$1 million for a two-year period. This cost will cover the minimum equipment requirements for achieving a complete phase out of MB used in the tobacco sectors in Malawi.

7. The project will be funded in the following four instalments: US \$400,000 at the 32nd Meeting of the Executive Committee, US \$1,000,000 at the 34th Meeting, US \$1,300,000 at the 37th Meeting and US \$299,824 at the 40th Meeting.

Replace paragraph 1 under Recommendation with the following three paragraphs:

RECOMMENDATIONS

1. The Executive Committee may wish to consider the project proposal based on comments contained in documents UNEP/OzL.Pro/ExCom/32/30/Malawi and 32/30Malawi/Corr.1.
2. If the project is approved, the Executive Committee may also wish to request UNDP to disburse the funds allocated in tranches according to the proposed MB phase out schedule indicated in the project proposal; if Malawi does not meet the reduction requirements outlined in the proposal, the Multilateral Fund, through UNDP, will withhold funding for the subsequent tranche of funding until such time as the required reduction has been met.
3. The Executive Committee may also wish to request UNDP to submit an annual progress report of the implementation of the project to the Fund Secretariat.



**United Nations
Environment
Programme**

Distr.
Limited

UNEP/OzL.Pro/ExCom/32/30/Malaysia
10 November 2000

ORIGINAL: ENGLISH

EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Thirty-second Meeting
Ouagadougou, 6-8 December 2000

PROJECT PROPOSALS: MALAYSIA

This document consist of the comments and recommendations of the Fund Secretariat on the following project proposals:

Refrigeration:

- Conversion from CFC-11 to HCFC-141b and from CFC-12 to HFC-134a technology in the manufacture of commercial refrigeration equipment at Three Enterprises UNDP
- Replacement of refrigerant CFC-12 with HFC-134a and foam blowing agent CFC-11 with HCFC-141b in the manufacture of commercial refrigeration equipment at Tung Kiong Factories Sdn. Bhd. UNIDO
- Conversion from CFC-11 to HCFC-141b and from CFC-12 to HFC-134a technology in the manufacture of commercial refrigeration equipment at Eleven Small and Medium-sized Enterprises UNDP

PROJECT EVALUATION SHEET MALAYSIA

SECTOR: Refrigeration ODS use in sector (1999): 1,642 ODP tonnes

Sub-sector cost-effectiveness thresholds: Commercial US \$15.21/kg
Domestic US \$13.76/kg

Project Titles:

- (a) Conversion from CFC-11 to HCFC-141b and from CFC-12 to HFC-134a technology in the manufacture of commercial refrigeration equipment at Three Enterprises
- (b) Replacement of refrigerant CFC-12 with HFC-134a and foam blowing agent CFC-11 with HCFC-141b in the manufacture of commercial refrigeration equipment at Tung Kiong Factories Sdn. Bhd.
- (c) Conversion from CFC-11 to HCFC-141b and from CFC-12 to HFC-134a technology in the manufacture of commercial refrigeration equipment at Eleven Small and Medium-sized Enterprises

Project Data	Commercial		Multiple-subsectors
	Three Enterprises	Tung Kiong	Eleven SMEs
Enterprise consumption (ODP tonnes)	37.00	20.20	68.70
Project impact (ODP tonnes)	34.86	18.85	64.85
Project duration (months)	36	30	36
Initial amount requested (US \$)	513,245	276,963	975,268
Final project cost (US \$):			
Incremental capital cost (a)	278,600	104,100	627,000
Contingency cost (b)	27,860	7,910	62,700
Incremental operating cost (c)	204,885	90,065	417,750
Total project cost (a+b+c)	511,345	202,075	1,107,450
Local ownership (%)	100%	100%	100%
Export component (%)	0%	0%	0%
Amount requested (US \$)	505,184	202,075	960,658
Cost effectiveness (US \$/kg.)	14.49	10.72	15.21
Counterpart funding confirmed?	Yes	Yes	Yes
National coordinating agency	Department of Environment		
Implementing agency	UNDP	UNIDO	UNDP

<i>Secretariat's Recommendations</i>			
Amount recommended (US \$)	505,184	202,075	960,658
Project impact (ODP tonnes)	34.86	18.85	64.85
Cost effectiveness (US \$/kg)	14.49	10.72	15.21
Implementing agency support cost (US \$)	65,570	26,270	115,672
Total cost to Multilateral Fund (US \$)	570,754	228,345	1,076,330

PROJECT DESCRIPTION

Sector Background

- Latest available total ODS consumption (1999)	2,364.30 ODP tonnes
- Baseline consumption of Annex A Group I substances (CFCs)	3,271.10 ODP tonnes
- Consumption of Annex A Group I substances for the year 1999	2,010.10 ODP tonnes
- Baseline consumption of CFCs in refrigeration sector	2,342.00 ODP tonnes
- Consumption of CFCs in refrigeration sector in 1999	1,642.00 ODP tonnes
- Funds approved for investment projects in refrigeration sector as of July 2000 (31st Meeting)	US\$11,422,864.00
- Quantity of CFC to be phased out in investment projects in refrigeration sector as of end of 1999	884.00 ODP tonnes

1. The Executive Committee has approved US \$11,422,864 for 15 projects to phase out 884 ODP tonnes of CFC for enterprises manufacturing refrigeration equipment in the refrigeration sector in Malaysia.

2. Based on data reported by Malaysia to the Ozone Secretariat, the country is in compliance with both the CFC freeze and the 50% reduction by 2005.

3. All three projects are in the commercial refrigeration sub-sector. Two proposals are umbrella projects covering eleven and three enterprises, respectively, and the third project covers the ODS phase out at Tung Kiong Factories.

Eleven enterprises

4. The eleven small and medium-sized enterprises (Asian Refrigeration, Ban Lee, Kim Refrigeration, Mutiara Refrigeration, Perniagaan Setar, Power Cool, PU Manufacturing, Silver Refrigeration, Speed Electrical, Unicorn and Wan Sun Hin) consumed 52.54 ODP tonnes of CFC-11 and 16.16 ODP tonnes of CFC-12 in the manufacture of commercial refrigeration equipment in 1999. All eleven enterprises are involved in the production of commercial bottle coolers, chest freezers and display cabinets. All enterprises employ hand-mixing techniques for foaming operations in the baseline.

5. The current project will phase out 52.54 ODP tonnes of CFC-11 and 16.16 ODP tonnes of CFC-12 in the manufacture of commercial refrigeration equipment at the eleven enterprises. This will be achieved by converting CFC-11 to HCFC-141b as the foam blowing agent, and CFC-12 to HFC-134a as the refrigerant. Under the current project, the hand mixing of foam chemicals will be replaced by operations using high-pressure dispensers (US \$275,000). The funding level of high pressure dispensers has been determined at US \$25,000 per enterprise. The enterprises will provide the necessary counterpart funding due to the hand-mixing baseline. All enterprises will require charging units (US \$66,000) and vacuum pumps (US \$55,000). Other costs include re-design, testing, trials (US \$110,000), technical assistance (US \$165,000) and training (US \$55,000). Incremental operating costs are requested by the enterprises reflecting the

higher cost of chemicals and an increase in foam density. The total incremental operating cost for the eleven enterprises is US \$417,750.

Three enterprises

6. The three enterprises (SKE Fookmei, Master Shanghai Turnparts and Maltar Industries) consumed 29.02 ODP tonnes of CFC-11 and 7.97 ODP tonnes of CFC-12 in the manufacture of commercial refrigeration equipment in 1999. All three enterprises are involved in the production of commercial display cabinets, reach-in freezers and walk-in coolers. SKE Fookmei and Maltar Industries employ hand-mixing techniques for foaming operations in the baseline, while Master Shanghai Turnparts operates a low-pressure dispenser.

7. The current project will phase out 29.02 ODP tonnes of CFC-11 and 7.97 ODP tonnes of CFC-12 in the manufacture of commercial and domestic refrigeration equipment at the three enterprises. This will be achieved by converting CFC-11 to HCFC-141b as the foam blowing agent, and CFC-12 to HFC-134a as the refrigerant. The project includes incremental capital costs covering partial costs of high-pressure foam dispensers (US \$149,000). Fookmei and Maltar will provide the necessary counterpart funding in purchasing high pressure dispensers due to the hand-mixing baseline. The three enterprises will be provided with charging units (US \$18,000), vacuum pumps (US \$15,000) and leak detectors (US \$6,000). Other costs include, re-design, testing, trials (US \$30,000), technical assistance (US \$45,000) and training (US \$15,000). Incremental operating costs are requested by the enterprises reflecting the higher cost of chemicals and an increase in foam density. The total incremental operating cost for the three enterprises is US \$206,785.

Tung Kiong Factories

8. The enterprise consumed 13.8 ODP tonnes of CFC-11 and 7.1 ODP tonnes of CFC-12 in the manufacture of commercial refrigeration equipment (freezers, cold room panels and fishing boxes) on average between 1997 and 1999. The enterprise employs hand-mixing techniques for foaming operations in the baseline.

9. The current project will phase-out 13.8 ODP tonnes of CFC-11 and 7.1 ODP tonnes of CFC-12 in the manufacture of domestic refrigeration equipment at Tung Kiong Factories in Malaysia. This will be achieved by converting from CFC-11 to HCFC-141b as the foam blowing agent and from CFC-12 to HFC-134a as the refrigerant. Under the current project, the hand-mixing techniques will be replaced by a low-pressure foam dispenser (US \$75,000). The enterprise will require refrigerant charging units (US \$30,000), vacuum pumps (US \$7,500) and a leak detector (US \$6,000). Other costs include testing, trials, training (US \$5,000) and technical assistance (US \$15,000). Incremental operating costs are requested by the enterprise reflecting the higher cost of chemicals and an increase in foam density.

Justification for the use of HCFC-141b

10. The enterprises in all three projects have selected HCFC-141b technology to replace CFC-11 in their foam blowing operations. It is an interim solution until non-CFC systems (different from hydrocarbons) are commercially available. A letter advising the Government decision to use HCFC technology has been received by the Secretariat in accordance with the Executive Committee Decision 27/13 and is attached to this evaluation together with a justification from the implementing agency.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

1. The Secretariat has discussed with UNDP and UNIDO the incremental capital and operating costs and the requirements of Decision 31/45 on the new sub-sector for assembly, installation and servicing. Part of the production of the three enterprises (SKE Fookmei, Master Shanghai Turnparts and Malter Industries) (UNDP) and Tung Kiong Factories (UNIDO) have been identified to be under the new sub-sector. Subsequently, part of the incremental operating costs have been recognized as ineligible.
2. The level of funding of the high pressure dispenser in the Tung Kiong Factories project has been reduced to reflect the hand-mixing baseline at the enterprise.
3. The Secretariat and UNDP agreed that the cost of training and technical assistance will be reduced in two umbrella projects through providing training and technical assistance to groups of enterprises at a time.

RECOMMENDATIONS

1. The Fund Secretariat recommends blanket approval of the three refrigeration projects, two for UNDP and one for UNIDO, with the level of funding and associated support cost as indicated below.

	Project Title	Project Funding (US\$)	Support Cost (US\$)	Implementing Agency
(a)	Conversion from CFC-11 to HCFC-141b and from CFC-12 to HFC-134a technology in the manufacture of commercial refrigeration equipment at Three Enterprises	505,184	65,570	UNDP
(b)	Replacement of refrigerant CFC-12 with HFC-134a and foam blowing agent CFC-11 with HCFC-141b in the manufacture of commercial refrigeration equipment at Tung Kiong Factories Sdn. Bhd.	202,075	26,270	UNIDO
(c)	Conversion from CFC-11 to HCFC-141b and from CFC-12 to HFC-134a technology in the manufacture of commercial refrigeration equipment at Eleven Small and Medium-sized Enterprises	960,658	115,672	UNDP

Annex

Additional Justification for use of HCFC technology (UNDP)

The implementing agency expert appraised the prospective eleven recipient enterprises prior to the preparation of this project document (August 2000) and had detailed discussions with the technical and managerial personnel of the enterprises, regarding the choice of technology for replacing the existing CFC-based technology, under the project. The enterprises were briefed in detail about the following:

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

The eleven enterprises preferred selection of HCFC-141b based technology, in their manufacture of commercial refrigeration equipment for the following reasons:

- a) The only zero-ODP technology alternative available for this application is hydrocarbon-based systems (for the foam operation).
- b) The eleven enterprises are small/medium-sized with their factory premises located in congested industrial or commercial areas. The implementation of elaborate safety, monitoring and fire mitigation systems, to counter the fire and explosion hazards involved with using hydrocarbons, cannot be effected in their current premises. Furthermore, it is extremely expensive to install such systems and will not be a long-term economic option for them, given their production levels. The adaptation of the product design and processes for using hydrocarbons is complex and expensive.

The eleven enterprises have therefore selected HCFC-141b based systems as the interim conversion technology, as this technology would ensure early and cost-effective phase-out of their CFC-11 based foaming technology, with no safety hazard, while maintaining the product and processing characteristics at acceptable levels.

Additional Justification for use of HCFC technology (UNIDO)

During the formulation mission in December 1999, the expert discussed in detail with the enterprise the different technology options described above. In its evaluation of the technology options to replace CFC 11, Tung Kiong Factories considered the following criteria:

- Environmental acceptability
- Physical properties
- Maturity of the technology
- Safety and applicability in the enterprise factory environment
- Price, product availability, and cost-effectiveness
- Energy efficiency impact
- CFC-11 replacement technology selected by competitors
- Multilateral Fund Executive Committee decisions relating to HCFC and hydrocarbon technologies.

To assist the enterprise in the selection of a CFC-11 replacement technology, separate project budgets were prepared for the HCFC-141b, and cyclo-pentane, technology options.

Whilst recognising the environmental benefits of cyclo-pentane versus HCFC-141b, Tung Kiong Factories selected HCFC-141b as a first stage, interim, replacement for CFC-11. The decision in favour of HCFC-141b were based on the better insulation value, lower investment and operational costs, and the fact that it is more appropriate to the existing skill levels of the work forces at the company.

Tung Kiong Factories understands the implications of the selection of HCFC-141b technology, and the potential cost of subsequent replacement of HCFC-141b at an undetermined future date. They accept and commit to a future change from HCFC-141b to a zero-ODP technology, and that they will have to bear all of the associated costs.

Other factors also influenced the enterprise decisions in favour of HCFC-141b technology:

- HCFC-141b is the technology adopted by most of their existing, or potential, competitors in Malaysia and South East Asia. With no local supplies, no other local demand, and their own very small requirements, the enterprises were concerned about both product availability, and the price of pentanes in Malaysia.
- Whilst Multilateral Fund Executive Committee decisions relating to CFC-11 replacement technology selection may "presume" against the use of HCFCs, such HCFC based technologies are not prohibited and may still be considered eligible for Multilateral Fund assistance. Department of Environment (DOE), the responsible Malaysian Government counterpart, supports the selection of HCFC-141b as an "interim" CFC replacement technology at Tung Kiong Co.
- Tung Kiong Factories expressed concerns regarding the longer-term safety issues related to the introduction of a flammable blowing agent technology into their factory environment and their choice at the present time is a non-flammable CFC replacement.

Water blown foam formulations do not yet represent a commercially available option and technically this technology does not meet the Tung Kiong Factories' requirement on insulation value/energy efficiency for Cold Room insulation applications. At the present time, liquid HFC technology does not meet the criteria on maturity and commercial availability of the technology. However, liquid HFC technology is considered a likely zero-ODP candidate to replace HCFC-141b in the time frame of 2003 – 2005 subject to successful results from ongoing toxicological and environmental impact studies.

The selection of HCFC-141b technology by the enterprises in this project as the immediate replacement for CFC-11 is a realistic and sensible choice under the prevailing circumstances. The enterprises understand that HCFC-141b is an interim solution that will require a change to an appropriate zero-ODP technology at some future date. Based on the present status of non-flammable zero-ODP technologies, they expect to utilise HCFC-141b technology until approximately 2005.

Tung Kiong Factories will phase-out the use of CFC-11 in all its PU foaming operations by replacement with HCFC-141b. This is recognised as an interim step to an ODS-free system. The enterprise justification for the technology selection is provided.

The present production of the rigid PU foam for insulation purposes is based on manual mixing system, which is not sufficient for HCFC-141b technology and not acceptable due hygienic point of view.

The project includes the purchase of one low-pressure foaming machine with chiller of 100 kg/min for the HCFC-141b duty at a cost of approx. US\$ 75,000, two charging boards suitable for 134a with a cost of US \$30,000, a production leak detector at a cost of US \$6,000 and three vacuum pumps at a cost of US \$7,500. Funds are also requested for "General Consultancy Services/Technology Transfer" (US \$15,000), "Model redesign and testing" (US \$10,000) and "Contingencies" (US \$11,850).

The purchase of Foaming Machine is necessary for the required foam quality, in terms of uniform cell structure, homogeneity and long term dimension stability especially for insulation purposes.

Incremental Operating Costs of US \$121,104 associated with the technology change from CFC-11 to HCFC-141b and CFC-12 to HFC-134a are requested for a period of TWO YEARS. These Incremental Operating Costs are calculated for the discontinuous rigid PU panels and for the redesign of the cooling circuit components and the compressors.

HCFC-141b is a non-flammable liquid (no flash point), but it is moderately flammable in the gaseous state. The flammability limits are 7.6 - 17.1% by volume in air. The usually recommended PEL (Permissible Exposure Limit) is 500 ppm based on an eight-hour time-weighted average. In the intended application, the use of HCFC-141b should not pose a significant risk. Should additional extract ventilation be judged necessary to ensure the adherence to safe worker exposure levels following commissioning of the new HCFC-141b equipment then Tung Kiong Factories undertakes to install such additional extract ventilation at its own cost.

Formulation changes will be needed to optimise the insulation value, structural stability, and density of the PU foam produced with HCFC-141b.

Based on the present status of the development of non-flammable zero-ODP replacement technologies for CFC-11 for PU insulation foam blowing operations, Tung Kiong Factories expects to utilise the interim HCFC-141b technology only until 2005.



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Jld. 8 (2)

Date: 4 October 2000

Dr. Omar El-Arini
Chief Officer
Multilateral Fund Secretariat
1800 Mc Gill College Ave, 27th Floor
Montreal
CANADA

Dear Dr. Omar,

HCFC 141b JUSTIFICATION FOR PROJECT PROPOSALS ON COMMERCIAL REFRIGERATION/FOAM

Reference is made to the commercial refrigeration/foam sector projects prepared for the submission to the 32nd ExCom as follows:

Group 1:

1. Asian Refrigeration Engineering Sdn. Bhd.
2. Ban Lee Refrigeration Works
3. Kim Refrigeration Industries
4. Mutiara Refrigeration
5. Perniagaan Setar
6. Power Cool Equipment (M) Sdn. Bhd.
7. PU Manufacturing
8. Silver Refrigeration And Air-Cond Trading Sdn. Bhd.
9. Speed Electrical
10. Unicorn
11. Wan Sun Hin

Group 2:

1. SKE Fookmei
2. Master Shanghai Turnparts
3. Malter Industries

Please be advised that we recognize that the technology choice is HCFC-141B even though this alternative is considered to be an interim one. Indeed at the time being we have no other choice due to the many national and global factors prevailing the technology selection, among them are:

- Commercial availability of HCFC-141B
- Low conversion costs of hydrocarbon technology

The counterparts have acknowledged that they would convert to ODS free technology if regulations request them to do so and this is understood and endorsed by us as well.

This justification complies with ExCom's decision 27/12. Thank you and best regards,

Yours sincerely,



(LEE CHOONG MIN)
for Director General of Environment, Malaysia

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**United Nations
Environment
Programme**



Distr.
Limited

UNEP/OzL.Pro/ExCom/32/30/Mali
8 November 2000

ORIGINAL: ENGLISH

EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Thirty-second Meeting
Ouagadougou, 6-8 December 2000

PROJECT PROPOSALS: MALI

This document consist of the comments and recommendations of the Fund Secretariat on the following project proposals:

Refrigeration:

- Implementation of the RMP: national programme for recovery and recycling of refrigerants UNDP
- Implementation of the RMP: monitoring the activities UNDP

PROJECT EVALUATION SHEET MALI

SECTOR: Refrigeration ODS use in sector (1999): 93.96 ODP tonnes
RMP

Sub-sector cost-effectiveness thresholds: n/a

Project Titles:

- (a) Implementation of the RMP: national programme for recovery and recycling of refrigerants
- (b) Implementation of the RMP: monitoring the activities

Project Data	RMP	
	(a)	(b)
Enterprise consumption (ODP tonnes)		
Project impact (ODP tonnes)	6.30	
Project duration (months)	36	36
Initial amount requested (US \$)	102,658	15,455
Final project cost (US \$):		
Incremental capital cost (a)	94,598	14,050
Contingency cost (b)	8,060	1,405
Incremental operating cost (c)		
Total project cost (a+b+c)	102,658	15,455
Local ownership (%)	100%	100%
Export component (%)	0%	0%
Amount requested (US \$)	102,658	15,455
Cost effectiveness (US \$/kg.)	16.29	
Counterpart funding confirmed?		
National coordinating agency	Ministere de l'Environnement et de l'eau	
Implementing agency	UNDP	UNDP

<i>Secretariat's Recommendations</i>		
Amount recommended (US \$)	102,658	15,455
Project impact (ODP tonnes)	6.30	
Cost effectiveness (US \$/kg)	16.29	
Implementing agency support cost (US \$)	13,346	2,009
Total cost to Multilateral Fund (US \$)	116,004	17,464

PROJECT DESCRIPTION

- (a) Implementation of the RMP: national programme for recovery and recycling of refrigerants
- (b) Implementation of the RMP: monitoring the activities

1. At its 29th Meeting, the Executive Committee approved the refrigeration management plan (RMP) project for Mali (UNEP/OzL.Pro/ExCom/29/64). The RMP identified two training programmes: (i) training for customs officers, to identify and develop techniques for collecting data on consumption of ODS import and ODS-based refrigeration equipment and a license/quota system for CFC imports; and (ii) a “train the trainers” programme for refrigeration technicians in good management practices, aimed at improving service practices to prevent release of CFCs into the atmosphere. The Committee allocated US \$130,980 to UNEP for its implementation.

2. The RMP also included a sub-project for the establishment of a refrigerant recovery and recycling network for implementation by UNDP. However, the Secretariat and UNDP agreed to defer the recovery and recycling project after ODS-related legislation was put into place in the country and the training programme for refrigeration service technicians was underway.

3. The Government of Mali has submitted a request for the establishment of a recovery and recycling network comprising 25 refrigerant recovery and 3 recycling units for servicing commercial and industrial refrigeration equipment, at a total cost of US \$102,650. This subproject also provides for two training workshops for service technicians to give practical demonstrations on recovery and recycling equipment.

4. Implementation of this project will lead to recovery and recycling of 6.3 tonnes of CFC each year. This amount would be additional to the amount of refrigerant which would be saved from the teaching of good service and maintenance practices at the training seminars.

5. The Ozone Unit will be responsible for the monitoring, co-ordination and implementation of proposed phase-out activities within the approved RMP. It will monitor the overall programme, distribute the recovery equipment and establish the recycling centers, monitor the amount of CFC recycled and redistribute the equipment as necessary. The project also includes a request in the amount of US \$15,455 for engaging a local consultant to collect data from all the service workshops that are included in the recovery and recycling project.

SECRETARIAT’S COMMENTS AND RECOMMENDATIONS

COMMENTS

1. The Fund Secretariat sought clarification from UNDP on whether the Government of Mali was made aware of the commitments, responsibilities and financial implications associated with decision 31/48 (i.e., 50 per cent reduction of CFC baseline by 2005 and 85 per cent reduction by 2007; that all refrigeration sub-sectors have been carefully assessed; and that a system for monitoring and reporting on progress for delivering the phase out targets has been

established). UNDP informed the Secretariat that the recovery/recycling project submitted to the 32nd Meeting should have been presented together with the RMP approved at the 29th Meeting. Work on the proposal started in early 2000 (i.e. before the adoption of decision 31/48). UNDP, however, has had discussions with the Government of Mali on the implications of decision 31/48, and as a result has included in its 2001 Business Plan a request for a complementary project in the end-user sector (in light of decision 31/48).

2. Upon a request by the Secretariat regarding the responsibilities of the implementing agencies in the overall implementation of the RMP, UNDP indicated that, as bound by its agreement with the Committee, it will facilitate compliance with the provisions of the Montreal Protocol by Article 5 countries, through execution of the projects within the RMP project. ODS phaseout resulting from legislative measures and through implementation of activities stipulated in the RMP, are the final responsibility of the countries.

RECOMMENDATION

1. The Fund Secretariat recommends blanket approval of the projects at the funding level indicated below:

	Project Title	Project Funding (US\$)	Support Cost (US\$)	Implementing Agency
(a)	Implementation of the RMP: national programme for recovery and recycling of refrigerants	102,658	13,346	UNDP
(b)	Implementation of the RMP: monitoring the activities	15,455	2,009	UNDP



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Distr.
Limited

UNEP/OzL.Pro/ExCom/32/30/Mexico
10 November 2000

ORIGINAL: ENGLISH

EXECUTIVE COMMITTEE OF
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Ouagadougou, 6-8 December 2000

PROJECT PROPOSAL: MEXICO

This document consist of the comments and recommendations of the Fund Secretariat on the following project proposal:

Foam:

- Foam sector ODS phaseout plan

UNDP

PROJECT EVALUATION SHEET

MEXICO

SECTOR: Foam ODS use in sector (1999): 890 ODP tonnes

Sub-sector cost-effectiveness thresholds:

Project Titles:

(a) Foam sector ODS phaseout plan

Project Data	Multiple-subsectors
Enterprise consumption (ODP tonnes)	890.00
Project impact (ODP tonnes)	826.00
Project duration (months)	60
Initial amount requested (US \$)	700,150
Final project cost (US \$):	
Incremental capital cost (a)	3,592,500
Contingency cost (b)	359,250
Incremental operating cost (c)	0
Total project cost (a+b+c)	3,951,750
Local ownership (%)	100%
Export component (%)	0%
Amount requested (US \$)	578,050
Cost effectiveness (US \$/kg.)	4.78
Counterpart funding confirmed?	
National coordinating agency	National institute of Ecology (INE)
Implementing agency	UNDP

<i>Secretariat's Recommendations</i>	
Amount recommended (US \$)	
Project impact (ODP tonnes)	
Cost effectiveness (US \$/kg)	
Implementing agency support cost (US \$)	
Total cost to Multilateral Fund (US \$)	

PROJECT DESCRIPTION

Foam sector ODS phaseout plan

1. It is proposed to phase out the remaining consumption of CFC-11 in the foam sector in Mexico by the end of 2005 by means of a sector plan. The plan has been prepared making use of Decision 25/50 on terminal umbrella projects where there are significant numbers of small enterprises. Two hundred and forty two enterprises will phase out the use of 890 ODP tonnes of CFC-11 (additional to the consumption of enterprises with projects currently under implementation) at a total proposed cost of US \$5,099,740 and with a cost-effectiveness of US \$5.55/kg. The proposed incremental costs are for capital equipment (US \$4,695,900) and management (US \$310,000) plus contingency costs at 10 percent. Under Decision 25/50, incremental operating costs and savings are not taken into account. Funding is proposed in five tranches commencing in December 2000, to be approved annually based on the achievement of annual performance targets which include proposed activities and phase-out targets.

2. The proposal indicates that data on the numbers of remaining enterprises and their consumption was established through a survey of the seven domestic foam chemicals suppliers, which together supply most of the foam industry, and the international chemicals suppliers serving the Mexican market. The survey was conducted this year, together with a national industry workshop. The survey results were audited and reconciled by UNDP experts and resulted in a list of remaining ODS foam sector users. The proposal notes that the CFC-11 consumption indicated in the survey is more than double the reported 1998 sector consumption of 390 tonnes and suggests that contributing factors could be: lack of inclusion in government figures of imported foam chemicals containing CFC-11; illegal imports; disruption of phase-out momentum because of a recent lack of funded projects, and; inclusion in consumption figures of enterprises which use CFC replacements. It is pointed out that double counting of non-CFC-using enterprises will be addressed in the final qualification audit undertaken within the project. The proposal suggests that, apart from this, there is little reason to question the reports from the suppliers.

3. A comprehensive discussion of available technologies is provided. The technologies selected for the various foam applications are:

Rigid Foam (Insulating):	HCFC-141b
Rigid Integral Skin Foam:	Water
Shoe-soles:	Water, Hexane or HFC-134a

4. The incremental capital costs are based on the typical costs of retrofit or replacement of foam production equipment found in Mexico for the various application groups identified. These costs are readily established on the basis of approved projects. Also on the basis of information from approved projects a projection was made of the relative proportions of retrofitting and provision of new equipment likely to be required in the listed enterprises. The standard

incremental capital costs per enterprises for the four classes of applications identified are indicated in Table 1 below:

Table 1

Category	Action	Equipment Cost	Trials	Training	TOTAL
RPF – Sprayfoam, Transportation, Pipe insulation	25% replacement by small-medium HP dispenser, 75% retrofit of existing dispenser	\$12,500	1,000	1,000	14,500
RPF – panels, miscellaneous	25% replacement by medium HP dispenser, 75% retrofit	\$17,500	1,000	1,000	19,500
ISF – other applications	Retrofit for water blown	\$10,000	1,000	1,000	12,000
Shoe-soles	Costs based on hexane conversion, as per existing hexane retrofit package in Mexico	\$35,000	1,000	1,000	37,000

5. The proposal includes a detailed modality for implementation of the project in which the roles of the Government of Mexico, local consultants, UNOPS and UNDP are indicated, together with the activities they will undertake and the relevant target dates. The modality is based on: an awareness campaign to ensure all eligible users have the opportunity to participate; verification visits to all enterprises to confirm eligible ODS use and commitment to phase out; preparation and implementation of regulatory support, and; provision of technical and financial assistance to each eligible user to complete the phase-out.

6. The key implementation milestones and the phase-out proposed to be achieved each year of the programme is indicated in Table 2 below:

Table 2

Year	Performance target	Amount (grant)	ODP eliminated	Number of enterprises
2000	Sector plan approved by ExCom Request for first disbursement	US\$ 700,150	--	--
2001	- Steering committee installed - Awareness workshops conducted - Qualification activities for pipe insulation and transportation completed - Implementation of sub-projects "Pipe" and "Transportation" - Request for second disbursement	US\$ 1,291,125	100	37
2002	- Qualification activities for spray completed - Compliance verification for pipe insulation and transportation completed - Implementation of the first batch of sprayfoam sub-projects - Request for third disbursement	US\$ 1,291,125	265	75
2003	- Compliance verification for spray-I completed - Implementation of the second batch of sprayfoam sub-projects - Request for fourth disbursement	US\$ 1,267,750	270	80
2004	- Qualification activities for the remaining sub-projects completed - Compliance verification for spray-II completed - Implementation of the remaining sub-projects - Finalisation of regulatory action program - Request for final disbursement	US\$ 35,200	191	50
2005	- Compliance verification for remaining sub-projects completed - Preparation of Project Completion Report - Promulgation of regulation to forbid the use of CFCs in the foam sector - Completion of post-monitoring arrangements	--	826	242

7. The costs proposed for institutional support and management are indicated in Tables 3 and 4 below together with a summary of the total incremental capital costs for conversion based on the standard costs identified above.

Table 3: Management Plan

Description	Requested MLF grant in US\$		
	QTY	Unit cost	Total cost
Supervisory Activities			
Steering Committee Meetings	2/yr for 4 years	1,000	8,000
Sundries		2,000	2,000
Supporting Activities			
Advertisements			5,000
Workshops	3	5,000	15,000
Regulatory Activities			10,000
Technical Assistance and Monitoring			
Enterprises	242	1,000	242,000
Subtotal			282,000
Contingency 10%			28,200
Total			310,200

Table 4: Individual Enterprise Group Project Summary

Description	Requested MLF grant in US		
	# of companies	Unit cost	Total cost
RPF – Spray, Transportation, Pipe Insulation	192	14,500	2,784,000
RPF – Panels, Miscellaneous	37	19,500	721,500
ISF – Other	4	12,000	48,000
Shoe-soles	9	37,000	333,000
Subtotal			3,886,500
Contingency 10%			388,650
Total			4,275,150

8. The proposed total projects costs, the schedule of annual approvals and the associated ODS phase-out schedule are indicated in Table 5 below:

Table 5

Year of approval	2000	2001	2002	2003	2004	Total
Annual CFC-11 Phase-out (ODS tonnes)	Nil	100	265	270	191	826
Max remaining consumption (ODS tonnes)	890	790	525	255	64	n.a.
Project Cost US \$	700,150	1,291,125	1,291,125	1,267,750	35,200	4,585,350

9. It is indicated in the proposal that no further funding will be requested for the foam sector in Mexico.

SECTOR BACKGROUND

10. In the original Country Programme of Mexico (1990), ODS use in the foam industry was indicated as 1,629 tonnes (1989), with a breakdown of 35% CFC-11 (thermoplastic foams) and 65% CFC-11 (polyurethane foams). No further breakdown of the use per application was provided at that time.

11. Recent consumption of CFCs in Mexico has been reported by the Government as follows:

CFC 11 only ODP tonnes	1989	1995	1996	1997	Baseline 95- 97	1998
Foam	1,629	1,250	1,000	800	1,017	390
Refrigeration	NA	886	815	487	729	276
Other	NA	50	50	66	55	86
Total	2,106	2,186	1,865	1,353	1,801	752
All CFCs						
Total	8,048	4,875	4,896	4,159	4,643	3,496

12. A phase-out strategy for the Mexican foam industry was presented in 1996, followed by a sub-strategy paper for the shoe-sole industry in the same year. From 1991 to 2000 inclusive, 21 projects in the foam sector (excluding foam used in the refrigeration sector) were approved for funding through the Multilateral Fund, resulting in the phase-out of 1,465 ODP tonnes. MLF grants totalling US\$ 8.68 million were approved for these projects. Most of the large foam manufacturers have completely phased out the use of CFCs, either through funded projects or without assistance as a result of market and regulatory conditions. The remaining enterprises using CFCs are small and medium sized enterprises.

13. Consumption of CFC-11 in the foam sector in 1998 was reported to be only 390 ODP tonnes. Data provided by the Government of Mexico in April 2000 indicates that the 1999 consumption was 435 ODP tonnes.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

1. The Secretariat is recommending this project for individual consideration principally because consumption figures from project preparation data are over double the reported foam sector consumption not yet addressed by funded projects, and with a similar increase in the anticipated number of enterprises remaining. This introduces an element of uncertainty in approving funding based on enterprise numbers (notwithstanding the flexibility incorporated in Decision 25/50 on terminal phase out for small enterprises).

2. The Secretariat is also recommending that an undertaking be sought from the Government of Mexico that (a) the data when verified will be reconciled with data already reported under Article 7 and progress with implementation of country programmes and (b) the consumption phased-out under the project, if approved, will at the time of implementation be fully taken into account in reporting future reductions in Annex A Group 1 consumption.

3. The Secretariat and UNDP have agreed on all cost aspects of the proposal.

4. Detailed comments are as follows.

5. The apparent consumption in the foam sector of 890 tonnes identified by UNDP during project preparation is more than double the 1999 consumption reported by the Government of Mexico in April this year. Reported consumption in 1998 was lower, being 390 tonnes. Additionally, an analysis of consumption undertaken by the Secretariat in March 2000 on the basis of data reported by Mexico (country programme implementation and Article 7 data) implementing agencies' progress reports and a (January 1998) Mexico SME study prepared with UNDP assistance, indicated that the likely consumption in the foam sector remaining to be addressed (after all funded projects were completed) was around 100-120 tonnes in, possibly, 75-100 small enterprises.

6. Noting that the list of enterprises now identified was intended to exclude all those for whom projects have been approved but not yet implemented (total consumption of which at the beginning of 2000 was an additional 610 tonnes), the Secretariat raised with UNDP the consistency and reliability of the new data. The project document stated that the survey had been audited and reconciled by UNDP experts to avoid duplication within the current list and with enterprises which were part of previously approved projects. The Secretariat's review indicated that of the 242 enterprises on the list some 19 duplications appeared to remain.

7. The Secretariat also noted that all six domestic foam chemicals suppliers had already received Multilateral Fund projects and sought advice as to why the enterprises they supplied had not been identified during preparation of these previous projects and why they were still supplying CFC-based chemicals.

8. In view of the above, the Secretariat requested additional information on survey criteria and methods and on enterprise consumption levels

9. It was also noted that since Mexico was a producer of CFCs with only a low level of imports, the CFC-11 used in the foam sector was likely to have been counted in Mexico's overall CFC consumption reported under Article 7. If the consumption in the foam sector was higher than previously predicted by more than 500 tonnes, it appears that this would have to be offset by equivalent lower consumption for other applications. Additionally the annual consumption phased out in this project at the time it is implemented will need to be fully taken account of in future reports on consumption in Mexico.

10. UNDP advised the Secretariat that chemicals suppliers were bound through previous projects not to supply CFCs to customer enterprises that were listed in the various projects, but that to other customers they could still supply CFC-based foam chemicals. No costs from the current proposal were allocated to chemicals suppliers as they have all received projects. UNDP further advised that previous projects dealt only with small numbers (10-25) of consumers per supplier usually in specific foam applications. Thus full listings of all customers were not obtained in earlier surveys.

11. UNDP said that the six chemicals suppliers had been contacted, briefed on the purpose of the survey and requested to provide information on all enterprises/customers still using CFCs. About 20-25 enterprises were contacted by telephone because their aggregate consumption from various suppliers raised questions. No site visits were conducted. UNDP said that the design of the project submitted under Decision 25/50 which provided for circumstances where the quality of data was not high, enabled details of each enterprise including all eligibility requirements, to be checked by site visits during the project implementation. Those not eligible would not be funded. UNDP acknowledged the duplications with previous project enterprises which accounted for about 25 tonnes of CFC-11, and the duplication of new enterprises on the lists of more than one chemicals supplier. UNDP said that in this checking process an additional 5 apparently eligible enterprises had registered for the project. The minimum consumption of any enterprise was 50kg of CFC-11 per year, corresponding to 1.2 tonnes of foam chemicals used. Approximately 50 enterprises (25 percent) had consumption of less than one tonne of CFC-11 per year. UNDP provided the original lists from the national consultant indicating the sales of foam chemicals by each supplier to each enterprise.

12. Bearing in mind the magnitude of the discrepancy in sector consumption, UNDP agreed to undertake immediately a site visit survey of 10 percent of the enterprises to provide additional corroboration of the information collected in the survey. The Sub-Committee on Project Review will be advised of the outcome of the additional survey. UNDP also agreed to represent to the Government of Mexico the need to reconcile the data from this project with country data on consumption and, if the project were approved, the need to account for the phase-out achieved

when the project is implemented in all relevant future reports of sector and national consumption.

13. The Secretariat discussed with UNDP the enterprise conversion costs, in particular the proportion of enterprises which would be likely to need only retrofit compared to provision of new equipment. It was agreed that information from previous projects indicated that a proportion of 75 percent retrofit to 25 percent new equipment was justified. Eligible capital costs were determined on this basis. With this adjustment, the Secretariat and UNDP agreed on all elements of the proposed projects costs.

14. UNDP is seeking approval of the first annual payment at this meeting. UNDP confirmed that the performance indicators in Table 2 above would be the criteria for consideration of each year's funding request.

RECOMMENDATION

1. The project is recommended for individual consideration.



**United Nations
Environment
Programme**

Distr.
Limited

UNEP/OzL.Pro/ExCom/32/30/Morocco
9 November 2000

ORIGINAL: ENGLISH

EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Thirty-second Meeting
Ouagadougou, 6-8 December 2000

PROJECT PROPOSALS: MOROCCO

This document consist of the comments and recommendations of the Fund Secretariat on the following project proposals:

Foam:

- Phasing out of CFC-11 in the manufacture of rigid polyurethane foam at Engequife by conversion to a combination of water + HCFC-141b based systems UNDP
- Phasing out of CFC-11 in the manufacture of rigid polyurethane foam at Interfer by conversion to a combination of water + HCFC-141b based systems UNDP

Fumigant:

- Phase out of methyl bromide for soil fumigation in strawberry production UNIDO

PROJECT EVALUATION SHEET MOROCCO

SECTOR: Foam ODS use in sector (1999): 581 ODP tonnes

Sub-sector cost-effectiveness thresholds: Rigid US \$7.83/kg

Project Titles:

- (a) Phasing out of CFC-11 in the manufacture of rigid polyurethane foam at Engequife by conversion to a combination of water + HCFC-141b based systems
- (b) Phasing out of CFC-11 in the manufacture of rigid polyurethane foam at Interfer by conversion to a combination of water + HCFC-141b based systems

Project Data	Rigid	
	Engequife	Interfer
Enterprise consumption (ODP tonnes)	7.80	11.00
Project impact (ODP tonnes)	7.20	10.10
Project duration (months)	36	36
Initial amount requested (US \$)	56,391	78,973
Final project cost (US \$):		
Incremental capital cost (a)	82,000	107,500
Contingency cost (b)	8,200	10,750
Incremental operating cost (c)	11,677	20,114
Total project cost (a+b+c)	101,877	138,364
Local ownership (%)	100%	100%
Export component (%)	0%	0%
Amount requested (US \$)	56,391	78,973
Cost effectiveness (US \$/kg.)	7.83	7.83
Counterpart funding confirmed?	Yes	Yes
National coordinating agency	Ministry of Trade, Industry and Crafts	
Implementing agency	UNDP	UNDP

<i>Secretariat's Recommendations</i>		
Amount recommended (US \$)	56,391	78,973
Project impact (ODP tonnes)	7.20	10.10
Cost effectiveness (US \$/kg)	7.83	7.83
Implementing agency support cost (US \$)	7,331	10,266
Total cost to Multilateral Fund (US \$)	63,722	89,239

PROJECT DESCRIPTION

Sector Background¹

- Latest available total ODS consumption (1999)	855.55 ODP tonnes
- Baseline consumption of Annex A Group I substances (CFCs)	802.30 ODP tonnes
- Consumption of Annex A Group I substances for the year 1999	870.60 ODP tonnes
- Baseline consumption of CFCs in foam sector	553.00 ODP tonnes
- Consumption of CFCs in foam sector in 1999	554.00 ODP tonnes
- Funds approved for investment projects in foam sector as of end of 1999	US\$3,080,667
- Quantity of CFC to be phased out in investment projects in foam sector as of end of 1999	636.70 ODP tonnes
- Quantity of CFC phased out in investment projects in foam sector as of end of 1999	0 ODP tonnes
- Funds approved for investment projects in the foam sector in 2000	US\$0
- Quantity of CFC to be phased out in investment projects in foam sector approved in 2000	N/A ODP tonnes

¹ ODS consumption data based on data reported to the Fund Secretariat on 12 October 2000.

As of the time of preparation of this evaluation Morocco had not reported its 1999 ODS consumption data to the Ozone Secretariat.

1. Based on data reported by Morocco to the Ozone Secretariat in 1998, the country needed 121.3 ODP tonnes of CFC to be phased out in order to meet the freeze. As of August 2000, the phase out of 669.9 ODP tonnes of CFC has been approved but not yet implemented. Therefore, the country will be able to meet the 50% reduction of CFC by 2005, and remains in good position for the complete phase out by 2010.

Rigid Foam

- (a) **Phasing out of CFC-11 in the manufacture of rigid polyurethane foam at Engequife by conversion to a combination of water + HCFC-141b based systems**
- (b) **Phasing out of CFC-11 in the manufacture of rigid polyurethane foam at Interfer by conversion to a combination of water + HCFC-141b based systems**

2. The two companies listed below (Engequife and Interfer) manufacture rigid polyurethane foam sandwich panels for refrigerated truck bodies and cold rooms. Engequife is also involved in sheet steel processing. Both companies use low pressure machines and premixed systems. Their production will be converted to the use of a combination of water and HCFC-141b. This involves replacement of the existing low pressure machines with high pressure machines at the cost of US \$67,000 and US \$90,000 for Engequife and Interfer respectively, and trials, technology transfer and training at US \$15,000 and US \$17,500 respectively. The projects are expected to incur incremental operating cost as indicated in the table below.

Table 1: Profile of the rigid foam-producing enterprises

Name of Enterprise	Date Established	ODS Consumption OPD tonnes	ODS Phase out ODP tonnes	Baseline Equipment ¹	Year*	ICC** US \$	IOC*** US \$
Engequife	1994	7.8	7.2	OMS LPD 60 kg/min	1994	90,200	11,677
Interfer	1990	11.0	10.1	Cannon C-30 RF3 240 kg/min	1992	118,250	20,114

*Year – year of purchase and/or installation of equipment

**ICC – incremental capital cost including 10% contingency

***IOC – incremental operating cost

¹ LPD – Low pressure dispenser

Justification for the use of HCFC-141b

3. Justification for the use of HCFC-141b by the two companies has been provided in each project document and as annexes to the document, including projected “techno-economic” impact of zero ODP technologies as well as estimated cost of conversion to zero ODP technology. The Government of Morocco has also provided a letter supporting the use of HCFC-141b by the companies consistent with Decision 27/13.

4. A sample of the justification (additional justification) annexed to the projects and the letter of the Government of Morocco supporting the choice of HCFC-141b are attached to this evaluation.

Impact of the projects

5. A total of 17.3 ODP tonnes will be phased out from the two foam projects. This will eliminate 2% of Morocco’s 1999 consumption of Annex A Group I substances. There will be residual ODS consumption of 1.5 tonnes as a result of the use of HCFC-141b conversion technology.

SECRETARIAT’S COMMENTS AND RECOMMENDATIONS

COMMENTS

1. The Fund Secretariat and UNDP discussed the projects and agreed on the eligible grants.

RECOMMENDATIONS

1. The Fund Secretariat recommends blanket approval of the Engequife and Interfer projects with the funding levels and associated support costs indicated below.

	Project Title	Project Funding (US\$)	Support Cost (US\$)	Implementing Agency
(a)	Phasing out of CFC-11 in the manufacture of rigid polyurethane foam at Engequife by conversion to a combination of water + HCFC-141b based systems	56,391	7,331	UNDP
(b)	Phasing out of CFC-11 in the manufacture of rigid polyurethane foam at Interfer by conversion to a combination of water + HCFC-141b based systems	78,973	10,266	UNDP

Annex

Additional Justification for Using HCFC-141b Technology

UNDP technical expert appraised the enterprise in June 2000, prior to the preparation of this project document, and had discussions with the company's representatives about the choice of technology for replacing the existing CFC-based technology. The enterprise was briefed in detail about the following:

- (a) An overview of the available interim (low ODP) and permanent (zero ODP) replacement technologies.
- (b) The "techno-economic impact" of each technology on the products manufactured, and the processes and practices employed.
- (c) Possible implications of each technology, in terms of its known impact on environment, health and safety, such as ozone depleting potential, global warming potential, occupational health, etc.
- (d) It was emphasized to the enterprise that HCFC technologies are interim technologies due to their residual ODP and therefore may continue to adversely affect the environment, although at a lower rate than CFCs.
- (e) It was further explained that HCFCs may become controlled substances under present or future international conventions and will therefore also need to be phased out at a future date, and any investments required for their phase-out and for conversion to a permanent technology will have to be borne by the enterprise themselves.

The main conclusions reached by the enterprise through discussions with technical expert were:

- 1. HCFC-141b will maintain the insulation properties required by the enterprise's customers.
- 2. All Water based formulations do not provide sufficient insulation properties for the application and would require a significant cost increase to the enterprise.
- 3. Hydrocarbon technology was seen as not a feasible option due to the layout of the plant operations. The use of hydrocarbons in this environment would be risky and very expensive.

In view of the above, the technology selected is HCFC-141b based systems in the interim, until permanent technology (either water based or HFC-based systems) is available and can provide the required physical properties.

Projected Techno-economic Impact of Zero-ODP Technologies

The projected impact of applying various zero-ODP technologies with respect to the selected technology (HCFC-141b) in this project is summarized as below:

Water based technologies are not sufficiently developed to meet the needs of this application (insulated truck bodies) which has stringent insulation/thickness requirements. Therefore, they cannot be considered.

HFC-134a based systems are not offered in the applicable regional area and are not a feasible zero-ODP option.

Hydrocarbons cannot be used for safety reasons related to the plant layout.

Thus, the selection of HCFC-141b based systems, as the preferred conversion technology, is justified taking into account all the technical, commercial and cost factors.

Estimated Cost of Future Conversion to Zero-ODP Technology

At the present time, there are no zero-ODP technology options, which can be applied cost-effectively for this project.

The following possibilities exist for a future conversion to zero-ODP technology, based on information available presently:

- Water based systems
- HFC based systems

If and when liquid HFC or water-based systems become technically mature and commercially available, the capital investments required to apply this technology are expected to be negligible. The equipment installed/retrofit under this project will be suitable for processing either of these systems. Future costs are expected to be in the area of incremental operating costs, related to higher isocyanate usage (in the case of water based) or higher costs of the HFCs. It is assumed that by the time water-based systems become available, no further density increase will be required.

Before:	5,7 t HCFC-141b	@ US\$ 3,20= 18 156
After:	9,4 t MDI increase	@ US\$ 2,50= 23 646
Incremental Operating Costs/y		5 489

It is unknown what the price would be of the HFCs in the future; therefore, IOCs related to a potential conversion to HFC technology are not quantifiable at this point.

ROYAUME DU MAROC
MEI
MINISTÈRE DE L'INDUSTRIE,
DU COMMERCE, DE L'ÉNERGIE ET DES MINES
DÉPARTEMENT DU COMMERCE ET DE L'INDUSTRIE
N° _____ DPI/ DICP/C

Rabat, le

ENTERED

OCT 1 2000

FAX

Fax n°: 231/00/MEI/DPI/C	Nb de pages: 3
De : DIRECTION DE LA PRODUCTION INDUSTRIELLE Tél: (07) 76 22 97 Fax: (07) 76 35 37	
A : PROGRAMME DES NATIONS UNIES POUR LE DÉVELOPPEMENT FAX: 00 1 212 906 6947	
Att : MONSIEUR F. PINTO	
Objet : Reconversion des substances appauvrissant la couche d'ozone dans le secteur de la mousse polyuréthane.	
P.J. : 2	

Monsieur,

Dans le cadre de la mise en œuvre des dispositions du Protocole de Montréal, le bureau ozone du Maroc a identifié et formulé, avec l'assistance du PNUD, deux projets de reconversion dans le secteur de la mousse polyuréthane.

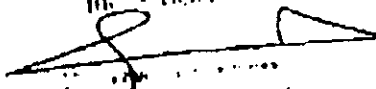
Ces projets concernent la reconversion des sociétés suivantes:
INTERFERT ET FNGEQUIFE.

À ce sujet, j'ai l'honneur de vous informer que lesdites Sociétés ont été tenues au courant que les HCFC font partie des substances de transition qui faciliteront le passage à une solution définitive et satisfaisante pour l'environnement.

Aussi, les sociétés concernées se sont engagées à financer par leurs propres moyens la reconversion de la technologie utilisant les HCFC.

Veuillez agréer, Monsieur, l'expression de mes salutations distinguées.

Le Directeur de la Production
M. Rachid P.L.


Signé : Rachid P.L.

PROJECT EVALUATION SHEET MOROCCO

SECTOR: Fumigant ODS use in sector (1999): 767.4 ODP tonnes
(155 ODP in strawberries)

Sub-sector cost-effectiveness thresholds: n/a US \$/kg
n/a US \$/kg

Project Titles:

(a) Phase out of methyl bromide for soil fumigation in strawberry production

Project Data	Methyl bromide
Enterprise consumption (ODP tonnes)	1,279.00
Project impact (ODP tonnes)	259.00
Project duration (months)	60
Initial amount requested (US \$)	3,245,937
Final project cost (US \$):	
Incremental capital cost (a)	2,164,665
Contingency cost (b)	216,467
Incremental operating cost (c)	864,805
Total project cost (a+b+c)	3,245,937
Local ownership (%)	100%
Export component (%)	0%
Amount requested (US \$)	2,189,729
Cost effectiveness (US \$/kg.)	
Counterpart funding confirmed?	
National coordinating agency	Ozone Office, Ministry of Industry
Implementing agency	UNIDO

<i>Secretariat's Recommendations</i>	
Amount recommended (US \$)	
Project impact (ODP tonnes)	
Cost effectiveness (US \$/kg)	
Implementing agency support cost (US \$)	
Total cost to Multilateral Fund (US \$)	

PROJECT DESCRIPTION

Phase out of methyl bromide for soil fumigation in strawberry production

Background

2. The Government of Morocco is submitting a project to phase out the entire consumption (155 ODP tonnes) of methyl bromide (MB) used for soil disinfestation in strawberries. During the last ten years, strawberry production increased from 4,582 tonnes covering 205 ha to a total of 70,830 tonnes covering 2,430 ha.

3. Strawberry seedlings are imported from Spain and planted in the fields in September. The planting density ranges between 50,000 and 60,000 plants/ha. The strawberry fields are located along the Atlantic coast in the northern part of Morocco.

4. The strawberry production cycle varies from one to two years. For new planting, clearing of residues from the previous crop is done in July and August; soil preparation for disinfestation is done in August and September. The production period starts with the second yield from the two-year cycle plantings in December and continues until June. The reason for a two-year cycle is to enable harvesting in December (very early production) for export of fresh strawberries to European markets (until March); from April to June strawberries are exported as frozen fruits.

4. The strawberry producers are organized in the “Association Marocaine des Producteurs de Fraise” and into Producers Groups for the management and export of their production through certified packing stations.

MB consumption

5. In 1999, the estimated consumption of MB in Morocco totalled 770 ODP tonnes. Its primary use is for production of tomatoes (390 ODP tonnes), followed by cucurbits (161 ODP tonnes) and strawberries (155 ODP tonnes). The remaining 64 ODP tonnes are consumed in the production of bananas and cut flowers.

6. MB consumption for strawberries increased from 22 ODP tonnes in 1992 to 73 ODP tonnes in 1998 and to 155 ODP tonnes in 1999 (a two-fold increase from the previous year).

7. MB is applied using the hot gas method. Once the soil is prepared, polyethylene perforated tubes (application pipes) are lined in the soil surface, and covered with the black mulch plastic sheets. MB is then vaporized in a heat exchange device and delivered as a gas to the soil at a dosage rate of 280 kg/ha. After two or three days, planting holes are made to the plastic sheets.

MB projects already approved

8. The Executive Committee has approved the following MB projects for Morocco:
- (a) Project to demonstrate four alternatives to the use of MB in horticulture: steam pasteurisation, non-soil cultivation, solarization, and low-dose chemicals, in combination with an IPM, approved by the Committee at its 22nd Meeting at a funding level of US \$487,300 under UNIDO's implementation;
 - (b) Project to demonstrate three alternatives to the use of MB: enemy plants, organic amendments and grafting on resistant rootstocks in combination with an integrated pest management system in tomatoes and cucurbits, approved by the Committee at its 26th Meeting at a funding level of US \$229,523 as a bilateral co-operation project by the Government of Germany;
 - (c) Investment project for the phase-out of 61 OPD tonnes of MB in the production of cut flowers and bananas, approved by the Committee at its 29th Meeting at a funding level of US \$1,006,652 as a bilateral co-operation project by the Government of France.

Export

9. Over the last three production cycles, strawberries have been exported to the European markets as fresh fruit as follows: 34.2 per cent of total production in 1997-1998, 42.6 per cent in 1998-1999, and 17.7 per cent in 1999-2000.

Alternative technologies selected

10. Weeds and leaf diseases are the major pests affecting strawberry production. In two-year cycle crops, root knot nematodes and mites (which develop during summer) affect the quality of the fruit and cause significant loss in crop yield.

11. The alternative technologies selected for phasing out MB are: solarization in combination with metam sodium (in 285 ha); solarization in combination with dichloropropene (in 223 ha); biofumigation (in 247 ha); and negative pressure steam (in 169 ha). These technologies will be applied in combination with an integrated pest management (IPM) programme. The alternative techniques were tested in two crop production cycles (1998-1999 and 1999-2000) and selected based on their technical and economic feasibility.

12. The use of chemical alternatives requires modification of the irrigation systems currently available in farms (estimated at US \$262,625 for metam sodium and US \$73,640 for dichloropropene). Negative pressure steam technology requires installation of perforated pipes in the soil (at a depth of at least 60 cm to be protected from plugging) and an electric fan, at a total cost of US \$5,150/ha and the use of 9 steam generators (at a cost of US \$56,600/unit). Each steam generator is used to treat a surface area of 20 ha.

Training programme

13. The project includes training programmes in the use of the alternative technologies, which will be organised in collaboration with the “Association Marocaine des Producteurs de Fraise”. Approximately 370 farmers and 5 extension agents will be trained in the proposed alternative techniques. The extension agents or trainers will first receive a two-week training by national and international experts in the field of IPM. During the five years of the project, extension agents will train 370 farmers.

Policy measures

14. The country has effective means to control the use and import of MB, which are controlled by an authorization permit issued by the Plant Protection Service valid for a one-year period. MB is applied only by well-trained and qualified technicians, using quality equipment under conditions of strict personnel safety.

15. Upon completion of the project in 2005, the Government will issue a regulation banning MB in the entire strawberry production subsector.

Implementation modalities

16. The project will be implemented by UNIDO in cooperation with the Direction de la Protection des Végétaux, des Contrôles Techniques et de la Repression des Fraudes and the Institut Agronomique et Vétérinaire Hassan II, under the national coordination of the Ozone Unit of the Ministry of Industry.

17. UNIDO will inform the Executive Committee about the progress achieved (through annual reports) indicating phase out achievements and costs involved, and will also inform the Committee on cases of unjustified project delays, which could potentially result in cancellation of the project.

18. The estimated time for the implementation of the project is 5 years.

SECRETARIAT’S COMMENTS AND RECOMMENDATIONS**COMMENTS***Export component*

1. The Secretariat pointed out that the export component has not been considered in the calculation of the eligible cost of the project. UNIDO informed the Secretariat that the majority of the growers export strawberries (as a fresh fruit) through local commercial agencies.

Selection of alternatives

2. Findings from the demonstration project show that biofumigation is an effective alternative technology in controlling the main soil-borne pests and diseases, does not require new equipment or modifications to existing equipment and has low operating costs. Based on these results, the Secretariat sought a clarification from UNIDO on the reasons for not replacing MB completely with biofumigation.

3. The project proposes use of negative pressure steam and solarization in combination with dichloropropene as alternative technologies for the control of root-knot nematodes. Taking into consideration the differences in capital costs of the negative pressure steam technology (US \$1.38 million covering a surface area of 169 ha) and dichloropropene technology (US \$73,600 for a total area of 223 ha), the Secretariat proposed to UNIDO to use only the dichloropropene technology.

4. UNIDO explained that the MB phase-out programme has taken into consideration a gradual reduction in the use of chemical fumigants. Four alternative technologies were tested during the two-year demonstration project; as a result, the soilless culture technology was not technically and economically feasible under Moroccan conditions. The phase out programme will commence in 2001 covering a surface of 139 ha, 80 per cent of which will use chemical alternatives; at the end of the project, only 40 per cent of the surface area will be treated with chemical fumigants. The use of metam sodium in combination with solarization is recommended for control of soil borne fungal diseases and weeds, a problem in all production areas in Morocco; solarization in combination with dichloropropene (control of root-knot nematodes with limited fungicide and herbicide control) is proposed for Gharb and Loukkous regions; bio-fumigation (for nematodes and fungi) will be used where there is availability of a suitable organic matter.

5. UNIDO also informed the Secretariat that during the demonstration project the use of steam sterilization gave good results. During the first year the sheet-steam technique was tested with poor results; since steam was not reaching a required depth in sandy soils. During the second year, the negative pressure technique was used with good results. This technique, which does not require waiting time after its application as in the case of MB, will be used in very intensive production systems (crops grown during summer and therefore there is no time for using other fumigation techniques before planting the strawberry crop) and for some surfaces areas with very high incidence of soil borne pest and diseases. The total area to be treated with this technology is 169 ha.

Incremental costs

6. The Secretariat has sought clarification on the use of negative pressure steam sterilization which requires new equipment. Strawberry farmers want to use this technology for ecological, effective and sustainability reasons. Because of logistical problems and equipment cost, steam cannot be applied to the entire surface area during the project timeframe. Chemical alternatives will be used for a transition period to reach a complete phase out of MB at the completion of the

project (5 years). Afterwards, farmers will gradually replace the chemicals with steam through their own resources. UNIDO also indicated that the low-capacity boiler included in the demonstration project and two other boilers available in the country for the production of cut-flowers will be used.

7. The Secretariat and UNIDO discussed issues related to labour costs associated with irrigation which has never been claimed in MB investment projects; the request for a safety kit for the application of metam sodium; the use of each irrigation equipment (venturi and metam sodium storage tank) in an area of 50 ha rather than 2 ha; and the addition of plastic sheets and labour in the calculation of the operating costs for MB treatment.

8. Incremental operating costs were estimated on the basis of differences in costs between MB and alternative chemicals, using high dosage rates of these products taking into account that these chemicals will be applied in combination with solarization. It has been demonstrated that the dosage rate of chemicals can be reduced when fumigation is combined with solarization. Increasing the activity of a fumigant by solarization and retaining it for a longer time in the soil can be as effective for soil fumigation as the standard procedures. Subsequently, UNIDO agreed to request only the plastic needed for the application of the metam sodium and dichloropropene technologies.

Training programmes

9. The Secretariat and UNIDO agreed to adjust the cost of training programme from US \$447,650 to US \$300,000 considering that MB is applied by registered fumigation companies in Morocco; it is assumed that the staff of the strawberry association consists of high-level scientists and technicians who provide technical support to farmers; the number of farmers to be trained is low (370).

Policy measures

10. Upon a suggestion by the Secretariat UNIDO will prepare an agreement between the Executive Committee and the Government of Morocco with the commitment proposed and an action plan for the phase out of MB in the strawberry sector in Morocco.

RECOMMENDATIONS

1. The Fund Secretariat and UNIDO have agreed on the total cost of the project (US \$2,189,729). The export component has not been taken into consideration. Based on the above considerations, the Executive Committee may wish to consider the level of funding of the project.

2. If the project is approved, the Executive Committee may also wish to request UNIDO to disburse the funds allocated in tranches according to the proposed MB phase out schedule indicated in the project proposal; if Morocco does not meet the reduction requirements outlined

in the proposal, the Multilateral Fund, through UNIDO, will withhold funding for the subsequent tranche of funding until such time as the required reduction has been met.

3. The Executive Committee may also wish to request UNIDO to submit an annual progress report on the implementation of the project to the Fund Secretariat.



**United Nations
Environment
Programme**

Distr.
Limited

UNEP/OzL.Pro/ExCom/32/30/Nigeria
7 November 2000

ORIGINAL: ENGLISH

EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Thirty-second Meeting
Ouagadougou, 6-8 December 2000

PROJECT PROPOSALS: NIGERIA

This document consist of the comments and recommendations of the Fund Secretariat on the following project proposals:

Refrigeration:

- | | |
|--|-------|
| • Replacement of refrigerant CFC-12 with HFC-134a and foam blowing agent CFC-11 with HCFC-141b in the manufacture of commercial refrigeration equipment at Coldcare Nigeria Ltd. | UNIDO |
| • Replacement of refrigerant CFC-12 with HFC-134a, and foam blowing agent CFC-11 with HCFC-141b in the manufacture of commercial refrigeration equipment at Akocen Nigeria Ltd. | UNIDO |
| • Replacement of refrigerant CFC-12 with HFC-134a, and foam blowing agent CFC-11 with HCFC-141b in the manufacture of commercial refrigeration equipment at Bosmak Nigeria Ltd. | UNIDO |

PROJECT EVALUATION SHEET NIGERIA

SECTOR: Refrigeration ODS use in sector (1998): 991.6 ODP tonnes

Sub-sector cost-effectiveness thresholds: Commercial US \$15.21/kg
Domestic US \$13.76/kg

Project Titles:

- (a) Replacement of refrigerant CFC-12 with HFC-134a, and foam blowing agent CFC-11 with HCFC-141b in the manufacture of commercial refrigeration equipment at Akocen Nigeria Ltd.
- (b) Replacement of refrigerant CFC-12 with HFC-134a and foam blowing agent CFC-11 with HCFC-141b in the manufacture of commercial refrigeration equipment at Coldcare Nigeria Ltd.
- (c) Replacement of refrigerant CFC-12 with HFC-134a, and foam blowing agent CFC-11 with HCFC-141b in the manufacture of commercial refrigeration equipment at Bosmak Nigeria Ltd.

Project Data	Commercial	Commercial	Multiple-subsectors
	Akocen	Coldcare	Bosmak
Enterprise consumption (ODP tonnes)	12.80	12.10	11.37
Project impact (ODP tonnes)	12.12	11.43	10.77
Project duration (months)	30	30	30
Initial amount requested (US \$)	180,664	173,700	154,245
Final project cost (US \$):			
Incremental capital cost (a)	133,300	150,000	131,500
Contingency cost (b)	10,830	11,700	12,150
Incremental operating cost (c)	13,764	11,500	10,595
Total project cost (a+b+c)	157,894	173,200	154,245
Local ownership (%)	100%	100%	100%
Export component (%)	0%	0%	0%
Amount requested (US \$)	157,894	173,200	154,245
Cost effectiveness (US \$/kg.)	13.03	15.15	14.32
Counterpart funding confirmed?	Yes	Yes	Yes
National coordinating agency	Federal Ministry of Environment		
Implementing agency	UNIDO	UNIDO	UNIDO

<i>Secretariat's Recommendations</i>			
Amount recommended (US \$)	157,894	173,200	154,245
Project impact (ODP tonnes)	12.12	11.43	10.77
Cost effectiveness (US \$/kg)	13.03	15.15	14.32
Implementing agency support cost (US \$)	20,526	22,516	20,052
Total cost to Multilateral Fund (US \$)	178,420	195,716	174,297

PROJECT DESCRIPTION

Sector Background

- Latest available total ODS consumption (1998)	5,476.10 ODP tonnes
- Baseline consumption of Annex A Group I substances (CFCs)	3,650.00 ODP tonnes
- Consumption of Annex A Group I substances for the year 1998	4,761.50 ODP tonnes
- Baseline consumption of CFCs in refrigeration sector	Not available ODP tonnes
- Consumption of CFCs in refrigeration sector in 1998	991.60 ODP tonnes
- Funds approved for investment projects in refrigeration sector as of July 2000 (31st Meeting)	US\$4,610,197.00
- Quantity of CFC to be phased out in investment projects in refrigeration sector as of end of 1999	271.00 ODP tonnes

1. According to the updated statistics presented in project proposals, 1,844 ODP tonnes were used in 1998 as refrigerants, and of this amount, 293 ODP tonnes were used for initial charge and 1,550 tonnes for servicing. The Executive Committee has approved about US\$ 4,610,197 for 11 projects to phase out 271 ODP tonnes of CFC for enterprises manufacturing refrigeration equipment in the refrigeration sector.

2. Two of the three projects are in the commercial refrigeration sub-sector (Akocen and Coldcare), whereas the third (Bosmak) is a multiple sub-sector project. The enterprises have similar consumption figures and conversion strategies. Therefore, they will be grouped for the purposes of the project description.

Akocen, Bosmak and Coldcare

3. The three enterprises (Akocen, Bosmak and Coldcare) consumed 25.68 ODP tonnes of CFC-11 and 10.59 ODP tonnes of CFC-12 in the manufacture of commercial and domestic refrigeration equipment in 1998. Akocen and Coldcare manufacture commercial ice block machines; Coldcare produces water coolers. Bosmak produces domestic refrigerators ranging in size from 120 to 200 litres, it also produces commercial refrigeration units. All enterprises operate low-pressure foam dispensers in the baseline.

4. The current projects will phase out 25.68 ODP tonnes of CFC-11 and 10.59 ODP tonnes of CFC-12 in the manufacture of commercial and domestic refrigeration equipment at the three enterprises. This will be achieved by converting CFC-11 to HCFC-141b as the foam blowing agent, and CFC-12 to HFC-134a as the refrigerant. Under the current projects, the existing low-pressure machines will be replaced by high-pressure dispensers (US \$85,000 each). All enterprises will require charging units (US \$20,000 each), vacuum pumps and leak detectors (US \$6,000-6,500 each). Other costs include consultancy fees (US \$5,000 each), re-design, testing, trials and training (US \$10,000-20,000 each). Incremental operating costs are requested by the enterprises reflecting the higher cost of chemicals and an increase in foam density.

Justification for the use of HCFC-141b

5. The three enterprises have selected HCFC-141b technology to replace CFC-11 in their foam blowing operations. It is an interim solution until non-CFC systems (different from hydrocarbons) are commercially available. A letter advising the Government decision to use HCFC technology has been received by the Secretariat in accordance with the Executive Committee Decision 27/13 and is attached to this evaluation together with a justification from the implementing agency.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

1. The Secretariat has discussed with UNIDO the eligible cost of the replacement of a low pressure dispenser in Akocen which is about 15 years old. The funding of a new high pressure foaming machine has been reduced accordingly. The cost of new vacuum pumps has been adjusted to reflect the cost of retrofitting instead of replacement of a number of the existing vacuum pumps.

RECOMMENDATIONS

1. The Fund Secretariat recommends blanket approval of the commercial refrigeration projects from UNIDO with the level of funding and associated support costs as indicated below.

	Project Title	Project Funding (US\$)	Support Cost (US\$)	Implementing Agency
(a)	Replacement of refrigerant CFC-12 with HFC-134a, and foam blowing agent CFC-11 with HCFC-141b in the manufacture of commercial refrigeration equipment at Akocen Nigeria Ltd.	157,894	20,526	UNIDO
(b)	Replacement of refrigerant CFC-12 with HFC-134a and foam blowing agent CFC-11 with HCFC-141b in the manufacture of commercial refrigeration equipment at Coldcare Nigeria Ltd.	173,200	22,516	UNIDO
(c)	Replacement of refrigerant CFC-12 with HFC-134a, and foam blowing agent CFC-11 with HCFC-141b in the manufacture of commercial refrigeration equipment at Bosmak Nigeria Ltd.	154,245	20,052	UNIDO

FEDERAL MINISTRY OF ENVIRONMENT**GAMES VILLAGE, P.M.B. 3150, SURULERE, LAGOS.****Telephone/Fax 01-5851570-1****E-mail fepa@hyperia.com****Our Ref. FMENV/PCEH/N****Date 9th October, 2000**

The Director,
Montreal Protocol Unit,
SES/IEE,
UNIDO, Vienna
43-1-213463026
Attention: Mrs. H.S. Yakindag/Dr. R. Oshima

Subject: Projects Involving HCFCs

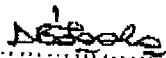
In line with the decision 27/13 of the Executive Committee and in recognition of Article 2F of the Montreal Protocol, the Government of Nigeria

- 1) verifies that it had reviewed the specific situation at the enterprises: Akocen Nig. Ltd., Bosmak Nig. Ltd., Coldcare Nig. Ltd. as well as their HCFC commitments under the Article 2F;
- 2) states that based on the prevailing circumstances at:

Akocen Nigeria Ltd.
Bosmak Nigeria Ltd.
Coldcare Nigeria Ltd.

at the present time the conversion of these enterprises requires the use of HCFC-141b for the interim period as stipulated in the Montreal Protocol;

3. confirms that the Government and the recipient enterprises understood that no funding will be available from the Fund for the future conversion from HCFCs for the said companies whenever such a conversion to other alternatives will be required.


Dr. D.B. Omotosho,
(National Ozone Officer)
for Hon. Minister.



**United Nations
Environment
Programme**



Distr.
Limited

UNEP/OzL.Pro/ExCom/32/30/Pakistan
10 November 2000

ORIGINAL: ENGLISH

EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Thirty-second Meeting
Ouagadougou, 6-8 December 2000

PROJECT PROPOSALS: PAKISTAN

This document consist of the comments and recommendations of the Fund Secretariat on the following project proposals:

Refrigeration:

- Conversion from CFC-11 to HCFC-141b and from CFC-12 to HFC-134a technology in the manufacture of commercial refrigeration equipment at Mumtaz Engineers World Bank
- Conversion from CFC-11 to HCFC-141b and from CFC-12 to HFC-134a technology in the manufacture of commercial refrigeration equipment at Pakistan Airconditioning Engineering Co. P. Ltd. (PAECO) World Bank

PROJECT EVALUATION SHEET PAKISTAN

SECTOR: Refrigeration ODS use in sector (199): ODP tonnes

Sub-sector cost-effectiveness thresholds: Commercial US \$15.21/kg
Domestic US \$13.76/kg

Project Titles:

- (a) Conversion from CFC-11 to HCFC-141b and from CFC-12 to HFC-134a technology in the manufacture of commercial refrigeration equipment at Pakistan Airconditioning Engineering Co. P. Ltd. (PAECO)
- (b) Conversion from CFC-11 to HCFC-141b and from CFC-12 to HFC-134a technology in the manufacture of commercial refrigeration equipment at Mumtaz Engineers

Project Data	Commercial	Multiple-subsectors
	PAECO	Mumtaz
Enterprise consumption (ODP tonnes)	21.00	14.68
Project impact (ODP tonnes)	19.74	13.94
Project duration (months)	36	36
Initial amount requested (US \$)	176,681	204,736
Final project cost (US \$):		
Incremental capital cost (a)	153,000	161,000
Contingency cost (b)	15,300	16,100
Incremental operating cost (c)	58,300	97,741
Total project cost (a+b+c)	226,600	274,841
Local ownership (%)	100%	100%
Export component (%)	0%	0%
Amount requested (US \$)	176,681	204,736
Cost effectiveness (US \$/kg.)	8.95	14.69
Counterpart funding confirmed?	Yes	Yes
National coordinating agency	Ministry of Environment	Ministry of Environment and Forest
Implementing agency	IBRD	IBRD

<i>Secretariat's Recommendations</i>		
Amount recommended (US \$)	176,681	204,736
Project impact (ODP tonnes)	19.74	13.94
Cost effectiveness (US \$/kg)	8.95	14.69
Implementing agency support cost (US \$)	22,969	26,616
Total cost to Multilateral Fund (US \$)	199,650	231,352

PROJECT DESCRIPTION

Sector Background

- Latest available total ODS consumption (1998)	1,324.00 ODP tonnes
- Baseline consumption of Annex A Group I substances (CFCs)	1,679.40 ODP tonnes
- Consumption of Annex A Group I substances for the year 1997	1,197.00 ODP tonnes
- Baseline consumption of CFCs in refrigeration sector	Not Available ODP tonnes
- Consumption of CFCs in refrigeration sector in 1999	977.00 ODP tonnes
- Funds approved for investment projects in refrigeration sector as of July 2000 (31st Meeting)	US\$5,385,604.00
- Quantity of CFC to be phased out in investment projects in refrigeration sector as of end of 1999	464.00 ODP tonnes

1. The Executive Committee has approved about US \$5,385,604 for 11 projects to phase out 464 ODP tonnes of CFC for major manufacturers of domestic and commercial refrigeration equipment in Pakistan. There are about 15 remaining medium-sized commercial refrigeration enterprises in Pakistan with total annual production of approximately 200,000 units.

Mumtaz Engineers

2. The enterprise consumed 10.8 ODP tonnes of CFC-11 and 3.88 ODP tonnes of CFC-12 in the production of commercial refrigeration equipment (visi-coolers, deep-freezers and milk chillers) in 1999. Part of Mumtaz's production is equipped with compressors below 250 wt capacity, this part of the production qualifies as domestic refrigeration sector project. The enterprise currently operates one low-pressure dispenser for foaming operations in the baseline.

3. The current project will phase-out 10.8 ODP tonnes of CFC-11 and 3.88 ODP tonnes of CFC-12 in the manufacture of domestic refrigeration equipment at Mumtaz Engineers in Pakistan by converting from CFC-11 to HCFC-141b as the foam blowing agent and from CFC-12 to HFC-134a as the refrigerant. Under the current project, the existing low-pressure foam dispenser will be replaced by a high-pressure foam dispenser (US \$90,000). The enterprise will require refrigerant charging units (US \$35,000), vacuum pumps (US \$4,000), temperature conditioning system (US \$10,000) and leak detectors (US \$2,000). Other costs include redesign, testing, trials (US \$10,000), training (US \$10,000) and technical assistance (US \$10,000). Incremental operating costs are requested by the enterprise reflecting the higher cost of chemicals and an increase in foam density.

Pakistan Airconditioning Engineering (PAECO)

4. The enterprise consumed 18 ODP tonnes of CFC-11 and 3 ODP tonnes of CFC-12 in the production of commercial refrigeration equipment (blast-freezers, cold stores and refrigerated trailers) and rigid foam for insulation sandwich panels in 1999. The enterprise currently operates one low-pressure dispenser for foaming operations.

5. The project will phase-out 18 ODP tonnes of CFC-11 and 3 ODP tonnes of CFC-12 in the manufacture of domestic refrigeration equipment at Pakistan Airconditioning. This will be achieved by converting from CFC-11 to HCFC-141b as the foam blowing agent and from CFC-12 to HFC-134a as the refrigerant. The existing low-pressure foam dispenser will be replaced by a high-pressure foam dispenser (US \$90,000). The enterprise will require refrigerant charging units (US \$20,000), vacuum pumps (US \$6,000), temperature conditioning system (US \$10,000) and leak detectors (US \$2,000). Other costs include redesign, testing, trials (US \$10,000), training (US \$10,000) and technical assistance (US \$10,000). Incremental operating costs are requested by the enterprise reflecting the higher cost of chemicals and an increase in foam density.

Justification for the use of HCFC-141b

6. The two enterprises have selected HCFC-141b technology to replace CFC-11 in their foam blowing operations. It is an interim solution until non-CFC systems (different from hydrocarbons) are commercially available. A letter advising the Government decision to use HCFC technology has been received by the Secretariat in accordance with the Executive Committee Decision 27/13 and is attached to this evaluation together with a justification from the implementing agency.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

1. The Secretariat has discussed with the World Bank the incremental operating costs in the PAECO project and the requirements of Decision 31/45 on the new sub-sector for assembly, installation and servicing. Part of the production of PAECO has been identified to be under the new sub-sector. Subsequently, part of the incremental operating costs have been recognized as ineligible.

2. The incremental capital and operating costs of the Mumtaz and PAECO projects have been agreed between the Secretariat and the World Bank

RECOMMENDATIONS

1. The Fund Secretariat recommends blanket approval of the refrigeration projects from the World Bank with the level of funding and associated support costs as indicated below.

	Project Title	Project Funding (US\$)	Support Cost (US\$)	Implementing Agency
(a)	Conversion from CFC-11 to HCFC-141b and from CFC-12 to HFC-134a technology in the manufacture of commercial refrigeration equipment at Pakistan Airconditioning Engineering Co. P. Ltd. (PAECO)	176,681	22,969	IBRD
(b)	Conversion from CFC-11 to HCFC-141b and from CFC-12 to HFC-134a technology in the manufacture of commercial refrigeration equipment at Mumtaz Engineers	204,736	26,616	IBRD

Annex

Additional Justification for use of HCFC technology

The implementing agency expert appraised the prospective recipient enterprise, Mumtaz Engineers, prior to the preparation of this project document, during February 2000, and had detailed discussions with the technical and managerial personnel of the enterprise, regarding the choice of technology for replacing the existing CFC-based technology, under the project. The enterprise was briefed in detail about the following:

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

Mumtaz Engineers indicated their preference for selection of HCFC-141b based technology, in their manufacture of rigid polyurethane foam. The justifications offered by them are summarized as below:

1. Hydrocarbon (pentanes) technology involves fire and explosion hazards. The local laws governing the use of hydrocarbons cannot be complied with, in the existing manufacturing premises of Mumtaz Engineers, as they are located in a crowded industrial area with a factory not designed for using hazardous chemicals. Due to the sharp competition, investments on changing or relocating the factory are not commercially justified at this point. The production is labor intensive. Therefore there are a large number of workers in the factory at any given time. Hydrocarbon technology will cause a safety and security risk, due to the fire and explosion hazard.
2. HCFC-141b based formulations are commercially available, which are being successfully used by their competitors who have earlier participated in the Montreal Protocol programme. They also doubt that pentanes of the necessary grades are easily or economically available for the relatively small quantities they consume.
3. Mumtaz Engineers also feel, that the additional equipment required for using pentane-based technology would present a long term operation and maintenance challenge, in terms of additional costs and trained labor. They would rather opt for simple and rugged equipment, which is adequate for HCFC based systems.

Mumtaz Engineers indicated that HCFCs are environmentally much safer than CFCs. The changeover is cost-effective and quick as compared to other options. The technology is proven. Thus, they would prefer HCFC technology.

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No 7(1)/Env/IA/O/2000
Government of Pakistan
Ministry of Environment, Local Government
& Rural Development
Ozone Cell
Room No. 611, Shaheed-e-Millat Secretariat
Jinnah Avenue, Islamabad.



Islamabad, 06 October 2000

Subject: **PAKISTAN MONTREAL PROTOCOL PROJECT: MUMTAZ & PAECO**

Dear Mr. Pedersen,

I am desired to refer to the World Bank's fax message of 11 September 2000 on the captioned subject and pleased to convey the concurrence of the Ministry of Environment, Local Government & Rural Development, Government of Pakistan, Islamabad for submission of the following ozone depleting substance (ODS) phase out sub-projects to the Multilateral Fund for the implementation of the Montreal Protocol.

- i. Conversion from CFC-11 to HCFC-141b and from CFC-12 to HFC-134a technology in the manufacture of commercial refrigeration equipment at Mumtaz Engineers; and
- ii. Conversion from CFC-11 to HCFC-141b and from CFC-12 to HFC-134a technology in the manufacture of commercial refrigeration equipment at Pakistan Airconditioning Engineering Co. (Pvt) Ltd. (PAECO).

2. We have reviewed the conversion of enterprises mentioned above and their proposal for the use of HCFC as a substitute. The government endorses the selection of HCFC for the enterprises as agreed by respective enterprise vide para 'd' of the letter of commitment.

3. Pakistan is aware that HCFC is a transitional substance and later conversion to a non-ODS substance. Pakistan also agreed that in accordance with ExCom decisions, no further funding can be requested for the transition to a non ODS substitute in the future.

With best regards,

Sincerely yours,

M. Ajmal
(MUHAMMAD AJMAL)
NPD

6/10/2000

✓ MR. ERIK PEDERSEN
The World Bank
Washington DC, USA
Fax: 202-522-3230

C.C.

MR. JITENDRA SHAN, Environmental Engineer, Dept / Div. No. 26845
The World Bank, Washington, DC, USA. Fax: 202-522-1864



**United Nations
Environment
Programme**

Distr.
Limited

UNEP/OzL.Pro/ExCom/32/30/Paraguay
7 November 2000

ORIGINAL: ENGLISH

EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Thirty-second Meeting
Ouagadougou, 6-8 December 2000

PROJECT PROPOSALS: PARAGUAY

This document consist of the comments and recommendations of the Fund Secretariat on the following project proposals:

Refrigeration:

- | | |
|---|------|
| • Implementation of the RMP: national programme for recovery and recycling of CFC-12 refrigerant | UNDP |
| • Implementation of the RMP: policy dialogue programme on complementary policy and enforcement | UNEP |
| • Implementation of the RMP: monitoring and control of ODS and ODS based equipment/training customs and other inspection officers | UNEP |
| • Implementation of the RMP: training of trainers and refrigeration technicians | UNEP |

PROJECT EVALUATION SHEET PARAGUAY

SECTOR: Refrigeration ODS use in sector (1999): 345.3 ODP tonnes
RMP

Sub-sector cost-effectiveness thresholds: n/a

Project Titles:

- (a) Implementation of the RMP: national programme for recovery and recycling of CFC-12 refrigerant
- (b) Implementation of the RMP: policy dialogue programme on complementary policy and enforcement
- (c) Implementation of the RMP: monitoring and control of ODS and ODS based equipment/training customs and other inspection officers
- (d) Implementation of the RMP: training of trainers and refrigeration technicians

Project Data	RMP			
	(a)	(b)	(c)	(d)
Enterprise consumption (ODP tonnes)				
Project impact (ODP tonnes)	23.05			
Project duration (months)	36	9	12	48
Initial amount requested (US \$)	285,158	12,000	50,000	184,000
Final project cost (US \$):				
Incremental capital cost (a)	262,280			
Contingency cost (b)	22,878			
Incremental operating cost (c)				
Total project cost (a+b+c)	285,158			
Local ownership (%)	100%	100%	100%	100%
Export component (%)	0%	0%	0%	0%
Amount requested (US \$)	285,158	10,000	44,920	168,020
Cost effectiveness (US \$/kg.)	12.37			
Counterpart funding confirmed?				
National coordinating agency	Unidad de Accion Ozono			
Implementing agency	UNDP	UNEP	UNEP	UNEP

<i>Secretariat's Recommendations</i>				
Amount recommended (US \$)	285,158	10,000	44,920	168,020
Project impact (ODP tonnes)	23.05			
Cost effectiveness (US \$/kg.)	12.37			
Implementing agency support cost (US \$)	37,071	1,300	5,840	21,843
Total cost to Multilateral Fund (US \$)	322,229	11,300	50,760	189,863

PROJECT DESCRIPTION

- (a) Implementation of the RMP: national programme for recovery and recycling of CFC-12 refrigerant
- (b) Implementation of the RMP: policy dialogue programme on complementary policy and enforcement
- (c) Implementation of the RMP: monitoring and control of ODS and ODS based equipment/training customs and other inspection officers
- (d) Implementation of the RMP: training of trainers and refrigeration technicians

Background

1. The refrigeration and air-conditioning sector plays a vital role in the nation's economy. Its predominant sectors are based on agriculture (cattle breeding, dairy products and vegetables), which are dependent on refrigeration equipment. Also, for at least six months of the year, the average temperature in the capital city is above 40° C. In consequence, refrigeration equipment, air conditioners and MAC units operate continuously. Therefore, the RMP project will assist refrigeration equipment users to reduce and subsequently phase out CFC consumption in a co-ordinated and cost effective manner.

2. In 1999, total CFC consumption in the refrigeration sector in the country was estimated at 349.1 tonnes, mainly CFC-12 (345.3 tonnes) for servicing domestic, commercial and industrial refrigeration equipment and MAC units. Consumption of HCFC-22 increased from 14.2 tonnes in 1998 to 23.2 tonnes in 1999.

3. There are approximately 5,000 refrigeration service technicians, working in both the formal and informal sectors (many of them have not received any formal training). This, combined with lack of tools and basic equipment results in handling practices which permit refrigerant emissions into the atmosphere.

Policy and legislation

4. The Government of Paraguay has already enacted legislation regarding ODS. Presidential Decree No. 4980 mandates registration of all importers of ODS and the need to have a license. Registered importers are obliged to declare amounts of ODSs imported in 1995, 1996 and 1997. As of 1 July 1999, the annual import of Annex A Group 1 substances for each registered importer has been restricted to the average amount imported over the period 1995-1997. Moreover, this quota will be proportionally reduced on a yearly basis until the year 2005 when all imports of ODS would be prohibited. The Decree also prohibits the production of ODS in the country (either pure or mixtures) and the import of recycled ODS and new or used CFC-based refrigeration equipment (as of July 1999); it also establishes labeling requirements for ODS containers and refrigeration equipment and prohibits the importation of these if not correctly labeled.

5. In addition, the Ministry of the Environment proposes to enact legislation to prohibit and sanction the purposeful emission of ODS, once refrigerant recovery and recycling operations during servicing practices are put in place (through the recovery/recycling project included in the RMP. The Ministry of the Environment also proposes to enact legislation to prohibit the manufacture or assembly of new CFC-based refrigeration or air conditioning equipment once the conversion of the commercial refrigeration enterprises have been completed.

Sub-projects within the RMP

6. The RMP includes the following sub-projects:

- (a) Training programme for monitoring and control of ODS and ODS based equipment for customs officers and other inspection officers to identify ODS and ODS-based equipment imported into the country to understand the impact of ODS on the environment; development of statistics on national ODS consumption on an on-going basis, effective implementation of legislation, regulations and economic instruments to control and phase-out the import and consumption of ODS and implementation and enactment of regulations and controls over the import of CFC-based products/equipment.
- (b) Policy dialogue programme on complementary policy and enforcement aimed at launching a policy dialogue process amongst the various stakeholders to further develop the policy framework (legislative and regulatory aspects) that will need to be implemented within the country to complete the phase-out of ODS. Such a process will provide local stakeholders with a voice, thereby encouraging their ownership and the development of an effective and practical policy framework based on national circumstances.
- (c) “Train the trainers” programme for refrigeration technicians in good management practices, aimed at improving service practices to prevent release of CFCs into the atmosphere, and for retrofit of CFC-based equipment; updating existing refrigeration training curriculum; registering, certifying and licensing of technicians; reduction of CFCs used for flushing and due to leaks and bad servicing practices.
- (d) Establishment of a recovery and recycling network comprising 78 refrigerant recovery and 7 recycling machine units for servicing commercial and industrial refrigeration equipment, at a total cost of US \$102,650. This subproject also provides for five training workshops for service technicians on practical demonstrations on recovery and recycling equipment. Implementation of this project will lead to recovery and recycling of 23 tonnes of CFC each year. This amount would be additional to the amount of refrigerant which would be saved from the teaching of good service and maintenance practices at the training seminars.
- (e) Additional activities, such as extension of training programmes, conversion of

refrigeration installations and end-user applications will be submitted to a later meeting of the Executive Committee.

Monitoring

7. The Ozone Unit will be responsible for the monitoring, co-ordination and implementation of proposed phase-out activities within the approved RMP. It will monitor the overall programme, distribute the recovery equipment and establish the recycling centers, monitor the amount of CFC recycled and redistribute the equipment as necessary. The project also includes a request in the amount of US \$9,500 for engaging a local consultant to collect data from all the service workshops that are included in the recovery and recycling project.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

1. The Fund Secretariat sought clarification from UNDP on whether the Government of Paraguay was made aware of the commitments, responsibilities and financial implications associated with decision 31/48 (i.e., 50 per cent reduction of CFC baseline by 2005 and 85 per cent reduction by 2007; that all refrigeration sub-sectors have been carefully assessed; and a system established for monitoring and reporting on progress for delivering the phase out targets). UNDP stated that the Government of Paraguay was fully informed of decision 31/48 and understands the importance of effective monitoring and enforcement of the legislation approved, to continue the policy dialogue amongst stakeholders and successfully implement the training programmes proposed in the RMP, specially to customs officials.

2. UNDP also informed the Secretariat that during the preparation of the project, UNDP assisted the Government of Paraguay to include in the legislation (approved in July 1999) elements that would sustain ODS phase out activities in the servicing sector. The legislation in place has established a licensing system and mandates importers to be registered; prohibits imports of CFC-based refrigeration equipment and of recycled ODS; bans installation of new ODS production plants, provides for labeling ODS containers; and establishes a quota system with ODS reduction until end of 2005, when ODS consumption should be zero.

3. The Secretariat pointed out that additional activities, such as extensions of training, conversion of key refrigerant installations and end-user applications will be submitted later. UNDP considered it more convenient to finalize the RMP project, and prepare activities to address the end-user sector at a future date. Only after the sub-projects included in the RMP have been initiated, the appropriate conditions for the types of projects envisioned for the future, especially those relating to end-users (commercial or industrial refrigeration equipment and food processing facilities), will be known and understood. As a consequence, at present these projects could not be reliably identified and costed.

4. UNDP also informed the Secretariat that during the preparation of the RMP project, a number of commercial refrigeration manufacturing plants using 32.5 ODP tonnes were identified

(an umbrella project for the conversion of these enterprises has been included in the UNDP 2001 Business Plan).

5. The Secretariat and UNEP also discussed cost issues related to logistical arrangements and training material for the customs training, refrigeration service technicians and the policy dialogue programmes. Subsequently, it was agreed to adjust the costs for the programmes accordingly (as indicated in Table 1 above).

6. The Fund Secretariat also requested an explanation for the request for assessment and co-ordination of technical and policy issues included in the training programmes (at a total cost of US \$30,000). UNEP informed the Secretariat that the request for assistance and coordination of policy and technical issues represents UNEP's substantive management work (which is not covered under the agency's support cost), which includes: detailed definition of responsibilities of each stake-holder; definition of characteristics of the products and deliverables; guidance to local governments and experts on the work carried out at national level; review and comments on products and deliverables; preparation and delivery of targeted presentations at the workshops; follow-up and assistance on activities to be implemented after the workshop.

7. Upon a request by the Secretariat regarding the responsibilities of the implementing agencies in the overall implementation of the RMP, UNDP stated that as definitely bound by its agreement with the Executive Committee, it will indeed facilitate compliance by Paraguay with its commitments to the Protocol. As regarding the ODS phaseout resulting from legislative measures and the implementation of activities stipulated in the RMP, these are definitely country driven.

RECOMMENDATION

1. The Fund Secretariat, having taken into consideration the commitment by the Government of Paraguay that through the RMP project the country will be able to achieve the 50 per cent reduction of the CFC baseline by 2005 and 85 per cent reduction by 2007 without further assistance from the Multilateral Fund, recommends blanket approval of the training projects at the funding level indicated below:

	Project Title	Project Funding (US\$)	Support Cost (US\$)	Implementing Agency
(a)	Implementation of the RMP: national programme for recovery and recycling of CFC-12 refrigerant	285,158	37,071	UNDP
(b)	Implementation of the RMP: policy dialogue programme on complementary policy and enforcement	10,000	1,300	UNEP
(c)	Implementation of the RMP: monitoring and control of ODS and ODS based equipment/training customs and other inspection officers	44,920	5,840	UNEP
(d)	Implementation of the RMP: training of trainers and refrigeration technicians	168,020	21,843	UNEP



**United Nations
Environment
Programme**



Distr.
Limited

UNEP/OzL.Pro/ExCom/32/30/Sri Lanka
15 September 2000

ORIGINAL: ENGLISH

EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Thirty-second Meeting
Ouagadougou, 6-8 December 2000

PROJECT PROPOSAL: SRI LANKA

This document consist of the comments and recommendations of the Fund Secretariat on the following project proposal:

Refrigeration:

- | | |
|---|------|
| • Implementation of the RMP: monitoring the activities | UNDP |
| Incentive programme for the commercial and industrial end-user refrigeration | UNDP |
| Implementation of the RMP: training of the established refrigeration technicians including train the trainers | UNDP |
| Implementation of the RMP: customs training programme | UNEP |

PROJECT EVALUATION SHEET SRI LANKA

SECTOR: Refrigeration ODS use in sector (1998): 238.4 ODP tonnes

Sub-sector cost-effectiveness thresholds: Commercial US \$15.21/kg

Project Titles:

- (a) Implementation of the RMP: monitoring the activities
- (b) Incentive programme for the commercial and industrial end-user refrigeration
- (c) Implementation of the RMP: training of the established refrigeration technicians including train the trainers
- (d) Implementation of the RMP: customs training programme

Project Data	RMP	RMP	RMP	RMP
	(a)	(b)	(c)	(d)
Enterprise consumption (ODP tonnes)				
Project impact (ODP tonnes)		5.00		
Project duration (months)	24	72		
Initial amount requested (US \$)	15,455	250,000	231,000	87,000
Final project cost (US \$):				
Incremental capital cost (a)	14,050	250,000		
Contingency cost (b)	1,405			
Incremental operating cost (c)				
Total project cost (a+b+c)	15,455	250,000		
Local ownership (%)	100%	100%	100%	100%
Export component (%)	0%	0%	0%	0%
Amount requested (US \$)	15,455	250,000	231,000	87,000
Cost effectiveness (US \$/kg.)		50.00		
Counterpart funding confirmed?				
National coordinating agency	Montreal Protocol Unit			
Implementing agency	UNDP		UNEP	

<i>Secretariat's Recommendations</i>				
Amount recommended (US \$)	15,455	Issue	219,000	87,000
Project impact (ODP tonnes)				
Cost effectiveness (US \$/kg)				
Implementing agency support cost (US \$)	2,009		28,470	11,310
Total cost to Multilateral Fund (US \$)	17,464		247,470	98,310

PROJECT DESCRIPTION

- (a) Incentive programme for the commercial and industrial end-user refrigeration
- (b) Implementation of the RMP: monitoring the activities
- (c) Implementation of the RMP: training of the established refrigeration technicians including train the trainers
- (d) Implementation of the RMP: customs training programme

Background

1. Through a recent survey on the refrigeration sector it was found that refrigeration equipment operating in the country includes: 826,160 domestic refrigerators, 50,000 commercial refrigeration units and 2,500 industrial refrigeration units as well as cold stores. The total annual consumption of CFCs in the end-user sector (commercial and industrial equipment) was estimated at 57.5 ODP tonnes.

2. Between 1995 and 1998, total CFC consumption in the country was reduced from 569 ODP tonnes to 250.4 ODP tonnes. This reduction has been accomplished by implementation of three investment projects in the domestic refrigeration sector; a refrigerant recovery and recycling project and by the introduction of a licensing system to control imports of ODS. However, additional activities are needed to achieve the 2005 and 2007 CFC reductions stipulated in the Montreal Protocol.

Policy and legislation

3. The Government of Sri Lanka has already put into place legislative measures to control import of ODS and new ODS-based equipment (1 January 2000) for servicing applications (1 January 2005). Import license systems have been enacted for CFC, halons, HCFC and HBFC (13 November 1996); CTC, MCF and MB (24 December 1997); and used equipment containing CFCs (25 June 1996). The import license scheme authorizes import of a maximum amount of ODSs equivalent to 90 per cent of the total amount imported the previous year; and import of used CFC-based equipment is permitted only for personal use.

4. The Government has identified the need for further development of the legislation to control the amount of ODS unofficially imported into the country.

Projects already approved in the refrigeration servicing sector

5. The Executive Committee, at its 17th Meeting approved a national programme for recovery and recycling of refrigerants from commercial, industrial and domestic refrigeration equipment, excluding MAC units (US \$352,400 under UNDP's work programme). About 235 technicians have been trained through eight workshops conducted in 1998; 99 recovery machines have been distributed and 8 recycling centres have been established.

6. Through a survey conducted by UNDP in mid-2000, it was found that the total annual amount of CFC-12 recovered and recycled was 7.1 tonnes as compared to the 30.1 tonnes per year designed in the project document (there are no figures for the amount of CFCs that are recovered and re-used without being recycled). It was also found that some technicians build their own recovery machines using discarded parts from other refrigeration equipment. Moreover, some entrepreneurs are considering locally building recovery equipment for sale in the country.

Sub-projects contained in the RMP

7. The RMP includes a training programmes for customs officers and other government staff involved in the monitoring of ODS and ODS-based equipment. This project aims at training customs officers to increase their knowledge on ozone depletion issues; get acquainted with ODS import/export licensing systems and other national regulations related to the phase-out of ODS; identify ODS and ODS-based refrigeration (through CFC-detection equipment for all major customs entry points in the country); and establishment of a database on ODS imports at the Department of Customs.

8. The RMP also includes a train the trainers programme for refrigeration service technicians aimed at reducing CFC emissions in the refrigeration sector by improving the maintenance procedures and introducing good service practices. Approximately 218 tonnes of CFC-12 are used for servicing domestic, commercial and industrial refrigeration equipment by 9,400 service technicians in 2,200 workshops. Currently, many technicians vent the CFC contained in the refrigeration equipment during service practices. Often, leaks are found after the system has been charged; the new charge is then vented to repair the leak.

9. During the preparation of the RMP, it was found that replacement or retrofit of existing refrigeration equipment by each end user was not feasible or cost-effective at the present time. Therefore, the RMP includes a project to be implemented over a period of 5 years for establishing an incentive programme to encourage refrigeration end-users to replace, or permanently retrofit their existing ODS based equipment (fisheries, meat-processing plants, breweries, hospitals, hotels, restaurants, supermarkets), to zero/low-ODP refrigerants. During the period 2001-2006, any end-user (established prior to 25 July 1995) can apply to receive an incentive payment towards the cost of replacement/retrofit of their CFC-based equipment. Incentive payments (between US \$500 and US \$15,000) will be based on CFC consumption when equipment is replaced, or the cost for a permanent retrofit. The incentive project also includes a component for information dissemination and monitoring (advertisements in newspapers, information brochures for end-users and relevant industry associations, and workshops and annual meetings to report on progress of the programme). Following completion of the conversion, the end-user enterprise must provide invoices to confirm the total costs incurred during the conversion. The level of payment will be reviewed by the Ozone Office and UNDP (40 per cent of the incentive amount will be paid upon receipt of an application and the balance after conversion has been completed and a certification that the replaced equipment has been destroyed/rendered unusable has been issued).

10. The RMP project also includes a request for engaging a local consultant to collect data on CFCs recovered and recycled from the service workshops that are included in the recovery and recycling project (at US \$15,455); and a request for US \$92,900 for other projects related to the refrigeration servicing sector (possibly additional training programmes) that will be submitted at a later meeting of the Executive Committee.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

1. The Government of Sri Lanka submitted the RMP to the Fund Secretariat with an official letter of transmittal stating its commitment, responsibilities and the financial implications associated with decision 31/48 (i.e., 50 per cent reduction of CFC baseline by 2005 and 85 per cent reduction by 2007; that all refrigeration sub-sectors have been carefully assessed; and a system for monitoring and reporting on progress for delivering the phase out targets has been established).

2. During the preparation of the RMP, the current and forecast future consumption of CFCs in relation to the 50 per cent reduction by 2005 and 85 per cent by 2007 were taken into account. The activities proposed in the RMP, including legislative measures, would reduce CFC consumption to negligible levels from the year 2006 onwards.

3. The Secretariat and UNEP also discussed cost issues related to logistical arrangements and training material for the refrigeration training programme. Subsequently, it was agreed to adjust the costs for the programme accordingly (as indicated in Table 1 above).

4. The Fund Secretariat also requested an explanation for the request for assessment and co-ordination of technical and policy issues included in the training programmes (at a total cost of US \$40,00). UNEP informed the Secretariat that the request for assistance and coordination of policy and technical issues represents UNEP's substantive management work (which is not covered under the agency's support cost), which includes: detailed definition of responsibilities of each stake-holder; definition of characteristics of the products and deliverables; guidance to local governments and experts on the work carried out at national level; review and comments on products and deliverables; preparation and delivery of targeted presentations at the workshops; follow-up and assistance on activities to be implemented after the workshop.

5. Regarding the incentive programme for commercial and industrial end-user refrigeration, the Secretariat pointed out that this activity may be premature at the present time for the following reasons:

- (a) The CFC baseline for Sri Lanka is 400.4 ODP tonnes; the 1999 CFC consumption reported to the Ozone Secretariat is 216.4 ODP tonnes. Therefore, Sri Lanka is in compliance with the freeze controls and has almost met the 50% reduction.

- (b) Refrigeration technicians have not yet been trained in good refrigeration servicing practices;
- (c) The leakage rate of installed commercial refrigeration equipment is high (ranging from 8 per cent to over 70 per cent in the equipment surveyed);
- (d) The price of CFC-12 is very low (US \$2.54/kg) compared to the price of HFC-134a (US \$6.35/kg);
- (e) The total amount of CFCs estimated to be phased out from this programme is 4 tonnes over the period 2001 – 2006 and thus could not, on its own achieve the phaseout needed for the 2005 reduction (16.2 tonnes).

6. UNDP informed the Secretariat that the project aims, through the innovative mechanism, to apply the limited funding available as widely as possible amongst end-users in the commercial and industrial refrigeration sector. UNDP also felt that most requests for an incentive would come from end-users who must change their refrigeration system (i.e., age, innovation of business), and would be willing to select a non-CFC technology. Even if the number of end-users coming forward for an incentive is low at the beginning (i.e., during the first one or two years), it will increase as CFC prices continue to evolve. The incentive programme must start now so that the direct impact of at least 5 tonnes/year can be achieved in 2003-2004.

7. UNDP also pointed out that the annual CFC used by the surveyed enterprises is a realistic figure; not all of the consumption is for topping-up the systems due to leaks. Whilst there may be potential to reduce this by improvements in servicing techniques this is no more certain than the potential to reduce overall consumption by the proposed incentive programme. In Sri Lanka, the HFC-134a/CFC-12 price ration is 2.52:1; this is typical of many Article 5 countries and lower than many other Article 5 countries.

8. UNDP considered that all requirements under decisions 28/44 and 31/48 have been met. Regarding the issue of utilizing all the funds available without meeting the phase-out objectives of the RMP, UNDP is convinced that neither service technician training nor recovery and recycling projects will give any better guarantee. The incentive programme has the potential to start the process of elimination by conversion. Remaining consumption will be decreased through legislative measures, quota systems and market forces.

9. Upon a request by the Secretariat regarding the responsibilities of the implementing agencies in the overall implementation of the RMP, UNDP indicated that, as bound by its agreement with the Committee, it will facilitate compliance with the provisos of the Montreal Protocol by Article 5 countries, through execution of the specific projects within the RMP. UNDP considered that ODS phaseout resulting from legislative measures and through implementation of activities in the RMP, are the final responsibility of the country for which the implementing agency itself could not be held responsible.

RECOMMENDATION

1. The Fund Secretariat recommends approval of monitoring the activities, training of refrigeration technicians and customs training programme components with associated support costs at the funding level shown in the table below (items (a), (c), (d)).
2. The Executive Committee may wish to consider the incentive programme for the commercial/industrial refrigeration end-user sector in light of the above comments and observations.
3. The Executive Committee may wish to consider the RMP as a whole in the light of its conclusion on the incentive programme.

	Project Title	Project Funding (US\$)	Support Cost (US\$)	Implementing Agency
(a)	Implementation of the RMP: monitoring the activities	14,455	2,009	UNDP
(b)	Incentive programme for the commercial and industrial end-user refrigeration	Issue		UNDP
(c)	Implementation of the RMP: training of the established refrigeration technicians including train the trainers	219,000	28,470	UNDP
(d)	Implementation of the RMP: customs training programme	87,000	11,310	UNEP



**United Nations
Environment
Programme**

Distr.
Limited

UNEP/OzL.Pro/ExCom/32/30/Syria
10 November 2000

ORIGINAL: ENGLISH

EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Thirty-second Meeting
Ouagadougou, 6-8 December 2000

PROJECT PROPOSALS: SYRIA

This document consist of the comments and recommendations of the Fund Secretariat on the following project proposals:

Aerosol:

- | | |
|---|-------|
| • Phase-out of CFC-11 and 12 in the manufacture of hair lacquers by conversion to hydrocarbon propellant at Badran & Co. | UNIDO |
| • Phase-out of CFC-12 in the manufacture of insecticides by conversion to hydrocarbon propellant at Cheikh Ghazal Insecticide Plant | UNIDO |
| • Phase-out of CFC-11 and 12 in the manufacture of hair sprays by conversion to hydrocarbon propellant at Khadji & Zahka | UNIDO |
| • Phase-out of CFC-12 in the manufacture of hair lacquers by conversion to hydrocarbon propellant at Mahmoud Hamida | UNIDO |

Foam:

- | | |
|--|-------|
| • Conversion from CFC-11 to HCFC-141b in the production of rigid foam panels at Bassam Baghdan | UNIDO |
|--|-------|

Refrigeration:

- Conversion from CFC-11 to HCFC-141b technology and from CFC-12 to HFC-134a technology in the manufacture of commercial refrigeration equipment at Al-Raed Refrigeration

UNDP

PROJECT EVALUATION SHEET SYRIA

SECTOR: Aerosol ODS use in sector (1999): 73.1 ODP tonnes
Sub-sector cost-effectiveness thresholds: Filling plant US \$4.40/kg

Project Titles:

- (a) Phase-out of CFC-11 and 12 in the manufacture of hair lacquers by conversion to hydrocarbon propellant at Badran & Co.
- (b) Phase-out of CFC-12 in the manufacture of insecticides by conversion to hydrocarbon propellant at Cheikh Ghazal Insecticide Plant
- (c) Phase-out of CFC-11 and 12 in the manufacture of hair sprays by conversion to hydrocarbon propellant at Khadji & Zahka
- (d) Phase-out of CFC-12 in the manufacture of hair lacquers by conversion to hydrocarbon propellant at Mahmoud Hamida

Project Data	Filling plant			
	Badran	Cheikh Ghazal	Khadji & Zahka	Mahmoud Hamida
Enterprise consumption (ODP tonnes)	15.60	36.00	11.00	10.50
Project impact (ODP tonnes)	15.60	36.00	11.00	10.50
Project duration (months)	26	26	26	26
Initial amount requested (US \$)	68,640	107,379	48,400	46,200
Final project cost (US \$):				
Incremental capital cost (a)	84,000	110,550	140,500	84,000
Contingency cost (b)	8,400	11,055	14,050	8,400
Incremental operating cost (c)	-10,372	-34,252	-6,169	-7,524
Total project cost (a+b+c)	82,028	87,353	148,381	84,876
Local ownership (%)	100%	100%	100%	100%
Export component (%)	0%	0%	0%	0%
Amount requested (US \$)	68,640	87,298	48,400	46,200
Cost effectiveness (US \$/kg.)	4.40	2.42	4.40	4.40
Counterpart funding confirmed?	Yes	Yes	Yes	
National coordinating agency	General Commission for Environmental Affairs			
Implementing agency	UNIDO	UNIDO	UNIDO	UNIDO

<i>Secretariat's Recommendations</i>				
Amount recommended (US \$)	68,640	87,298	48,400	46,200
Project impact (ODP tonnes)	15.60	36.00	11.00	10.50
Cost effectiveness (US \$/kg)	4.40	2.42	4.40	4.40
Implementing agency support cost (US \$)	8,923	11,349	6,292	6,006
Total cost to Multilateral Fund (US \$)	77,563	98,647	54,692	52,206

PROJECT DESCRIPTION

- (a) Phase-out of CFC-11 and 12 in the manufacture of hair lacquers by conversion to hydrocarbon propellant at Badran & Co.
- (b) Phase-out of CFC-12 in the manufacture of insecticides by conversion to hydrocarbon propellant at Cheikh Ghazal Insecticide Plant
- (c) Phase-out of CFC-11 and 12 in the manufacture of hair sprays by conversion to hydrocarbon propellant at Khadji & Zahka
- (d) Phase-out of CFC-12 in the manufacture of hair lacquers by conversion to hydrocarbon propellant at Mahmoud Hamida

1. In 1997, the total consumption of CFCs in the aerosol sector in Syria amounted to 914 tonnes. The Executive Committee has approved eight investment projects for the phase out of 768 tonnes of CFCs in this sector. The Government of Syria has submitted to the consideration by the Executive Committee at its 32nd Meeting four additional projects in the aerosol sector, with a total consumption of 73.1 tonnes of CFCs. Implementation of these projects will lead to the complete phaseout of CFCs in this sector.

2. The projects under consideration are for the replacement of CFCs with hydrocarbon propellant used in manufacturing different types and sizes of aerosol products:

Khadji and Zahka	144,133 cans/year	Hair spray
Badran & Co.	65,000 cans/year	Hair lacquer
Mahmoud Hamida	50,830 cans/year	Hair lacquer
Cheikh Ghazal	294,000 cans/year	Insecticides

3. The aerosol filling process under operation at each enterprise utilises one aerosol filling line (two units for Cheikh Ghazal), comprising one product filler, and a crimper and gassing unit. The enterprise will convert to HAPs technology. Conversion entails installation of indexing propellant filler to be located in open air filling rooms including a propellant handling system, a manual water bath for testing filled cans, HAP storage and purification system, gas detectors and a fire control system. A conveyor system, explosion-proof lighting and ventilation systems are also requested. The gassing unit for Khadji and Zahka aerosol plant will be located in an enclosed gassing room.

4. Technical assistance will be provided for performance and supervision of engineering designs, equipment installation and commissioning of the plant. Training in production, quality control and safety procedures will also be provided.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

1. The Secretariat and UNIDO discussed cost issues regarding conveyer systems (US \$1,800/m), a processing pump (US \$6,500) for Mahmoud Hamida project; gas detector (hand held) equipment for Cheikh Ghazal project; and an indexing propellant filler for the Khadji and Zahka project. The Secretariat also sought clarification from UNIDO on the request for the construction of an enclosed gassing room (US 30,000) and a gas detection and monitoring system (US \$25,000) for the Khadji and Zahka project proposal. The projects for the other three enterprises include an open-air filling room (US \$8,000) and a gas detector (hand held) (US \$1,000). Taking into consideration that the four projects will be implemented concurrently, some of the items associated with technology transfer and technical advisory services (i.e., travel and per diem of consultant, freight of equipment) could be shared among them. Subsequently, UNIDO agreed to adjust the capital costs as follows:

Khadji and Zahka	US \$154,055
Badran & Co.	US \$92,200
Mahmoud Hamida	US \$92,400
Cheikh Ghazal	US \$121,550

2. Calculation of the total operating savings in the four projects has been based on three components: (i) the difference in costs associated with the formulations based on CFCs or HAPs, (ii) increase in maintenance costs (at 5% of capital investment) due to the use of HAP, and (iii) increase in energy consumption due to the hot water bath and additional ventilation. The Secretariat pointed out that the incremental costs associated with maintenance are very difficult to quantify and not all of them are incremental (for example, old pieces of equipment to be replaced with new equipment; capital costs associated with racks, OAFR, and lighting). Furthermore, the increase in energy consumption due to the use of water baths is not incremental, since water baths should be in the baseline of any aerosol plant, irrespective of the propellant used. Therefore, UNIDO agreed to adjust total operating savings as follows:

Khadji and Zahka	US \$6,169
Badran & Co.	US \$10,372
Mahmoud Hamida	US \$7,524
Cheikh Ghazal	US \$34,252

RECOMMENDATION

1. The Fund Secretariat recommends blanket approval of the projects with associated support cost at the funding levels indicated below:

	Project Title	Project Funding (US\$)	Support Cost (US\$)	Implementing Agency
(a)	Phase-out of CFC-11 and 12 in the manufacture of hair lacquers by conversion to hydrocarbon propellant at Badran & Co.	68,640	8,923	UNIDO
(b)	Phase-out of CFC-12 in the manufacture of insecticides by conversion to hydrocarbon propellant at Cheikh Ghazal Insecticide Plant	87,298	11,349	UNIDO
(c)	Phase-out of CFC-11 and 12 in the manufacture of hair sprays by conversion to hydrocarbon propellant at Khadji & Zahka	48,400	6,292	UNIDO
(d)	Phase-out of CFC-12 in the manufacture of hair lacquers by conversion to hydrocarbon propellant at Mahmoud Hamida	46,200	6,006	UNIDO

PROJECT EVALUATION SHEET SYRIA

SECTOR: Foam ODS use in sector (1999): 254.7 ODP tonnes

Sub-sector cost-effectiveness thresholds: Rigid US \$7.83/kg

Project Titles:

(a) Conversion from CFC-11 to HCFC-141b in the production of rigid foam panels at Bassam Baghdad

Project Data	Rigid	
	Bassam Baghdad	
Enterprise consumption (ODP tonnes)		18.50
Project impact (ODP tonnes)		16.40
Project duration (months)		24
Initial amount requested (US \$)		111,462
Final project cost (US \$):		
Incremental capital cost (a)		105,000
Contingency cost (b)		9,000
Incremental operating cost (c)		12,862
Total project cost (a+b+c)		126,862
Local ownership (%)		100%
Export component (%)		0%
Amount requested (US \$)		126,862
Cost effectiveness (US \$/kg.)		7.73
Counterpart funding confirmed?		
National coordinating agency	Ministry of Environment	
Implementing agency	UNIDO	

Secretariat's Recommendations	
Amount recommended (US \$)	126,862
Project impact (ODP tonnes)	16.40
Cost effectiveness (US \$/kg)	7.73
Implementing agency support cost (US \$)	16,492
Total cost to Multilateral Fund (US \$)	143,354

PROJECT DESCRIPTION

Sector Background

- Latest available total ODS consumption (1999)	1,808.79 ODP tonnes
- Baseline consumption of Annex A Group I substances (CFCs)	2,224.60 ODP tonnes
- Consumption of Annex A Group I substances for the year 1999	1,281.20 ODP tonnes
- Baseline consumption of CFCs in foam sector	2,337.00 ODP tonnes
- Consumption of CFCs in foam sector in 1999	254.70 ODP tonnes
- Funds approved for investment projects in foam sector as of end of 1999	US \$2,138,133.00
- Quantity of CFC to be phased out in investment projects in foam sector as of end of 1999	429.40 ODP tonnes
- Quantity of CFC phased out in investment projects in foam sector as of end of 1999	1,154.10 ODP tonnes
- Funds approved for investment projects in the foam sector in 2000	US \$446,104
- Quantity of CFC to be phased out in investment projects in foam sector approved in 2000	61.10 ODP tonnes

(a) Conversion from CFC-11 to HCFC-141b in the production of rigid foam panels at Bassam Baghdad

1. Bassam Baghdad established in 1985, produces rigid polyurethane foam panels for construction of cold storage rooms. It consumed 18.5 ODP tonnes of CFC-11 in 1999.
2. The company currently operates two Cannon low-pressure dispensers (60 kg/min and an 80 kg/min) commissioned in 1987 and 1988 respectively.
3. The production will be converted to the use of HCFC-141b. The cost of conversion includes the cost of replacement of the 60 kg/min and 80 kg/min low pressure machines with high pressure machines of equivalent capacity at US \$80,000 and US \$90,000 respectively, with company contribution of US \$24,000 and US \$18,000 respectively to account for the age of the machines, and commissioning and start up at US \$10,000. Incremental operating cost amounting to US \$12,862 for two years is requested.

Justification for the use of HCFC-141b

4. UNIDO provided justification for the use of HCFC-141b in the technology evaluation. It stated that during the preparation of the project the company was briefed on the available technological options and the related technical, commercial and other issues. UNIDO provided an annex giving details of the justification, projected "techno-economic" impact of zero ODP technologies and the cost of future conversion to non-ODS technology, which are attached as

annexes to this evaluation. The Government of Syria submitted a letter supporting the project as prepared. A copy of the letter is also attached.

Impact of the project

5. When implemented 16.4 ODP tonnes of CFC-11 will be phased out. This will eliminate 6.4% of Syria's 1999 consumption of Annex A Group I substances. There will be residual ODS consumption of 2.1 ODP tonnes as a result of the conversion to HCFC-141b.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

1. The Fund Secretariat and UNIDO discussed the project and agreed on the project's eligible grant as US \$126,862.

RECOMMENDATIONS

1. The Fund Secretariat recommends blanket approval of the Bassam Baghdad project with the funding level and associated support cost indicated below.

	Project Title	Project Funding (US\$)	Support Cost (US\$)	Implementing Agency
(a)	Conversion from CFC-11 to HCFC-141b in the production of rigid foam panels at Bassam Baghdad	126,862	16,492	UNIDO

Annex

Justification for Using HCFC Technology at Bassam Baghdan in Syria

The UNIDO technical expert appraised the enterprises in this project prior the preparation of this project document in June/July 2000, and had discussions with the company's representatives about the choice of technology for replacing CFC-based technology. The enterprise was briefed in detail about the following:

An overview of available interim (low ODP) and permanent (zero ODP) replacement technologies. The "techno-economic impact" of each technology on the products manufactured, and the process and practices employed.

Possible implications of each technology, in terms of its known impact on environment, health and safety, such as ozone depleting potential, global warming potential, occupational health, etc. It was emphasized to the company that HCFC technologies are interim technologies due to their residual ODP and therefore may continue to adversely affect the environment, although at a lower rate than CFC's.

It was further explained that HCFCs may become controlled substances under present or future international conventions and will therefore also need to be phased out at a future date, and any investment required for their phased-out and for conversion to a permanent technology will have to be borne by the enterprise itself.

The main conclusions reached by the enterprise through discussions with the UNIDO technical expert were:

The use of HCFC-141b is the only currently feasible option for the rigid P.U. foam production. Water blown technology at this point results in a product that could not be sold commercially, its density increases by 20-30% with a reduction in insulation value of 35-40%.

The companies are not prepared, as per today, to operate with inflammable and explosive materials. Their industrial safety, alarm monitoring and training system has been established in accordance with the relevant requirements of the existing production programme.

Many types of mechanical works, including welding are carried out in the production building, restricting application of flammable blowing chemicals.

Hydrocarbons are too expensive to be implemented for the small scale productions of foams.

In view of the above, among the solutions mentioned, HCFC-141b based systems is the interim technology selected until new developments (water or HCF-based systems) or new relocation of the factories allows the use of zero ODP technologies.

Projected Techno-economic Impact of zero-ODP Technologies at Bassam Baghdad

The projected impact of applying various zero-ODP technologies with respect to the selected technology (HCFC-141b) in this project is summarized below:

The only currently available zero-ODP technology is water-based systems. Water based systems are however, more expensive than other CFC-free technologies due to reductions in insulation value (requiring larger thickness) and lower cell stability (requiring higher thickness). Water based systems can be applied where insulation performance is relatively less critical, but In case of the enterprises in this project, which manufacture foam for thermal insulation application, thermal conductivity is crucial.

Presently, suitable water-based formulations are not technically mature or economical. If such formulations become available in the future, it is expected that there would still be some drawbacks related to performance and costs. The net additional impact on project cost due to increase densities, with water based systems, is conservatively expected to be about US \$225,000 with respect to HCFC-141b technology.

HFC-134a based systems are not offered in the applicable regional area and are not a feasible zero-ODP option.

Liquid HFC based systems do not meet requirements on maturity and availability at present time.

Thus, the selection of HCFC-141b based systems, as the preferred conversion technology, are justified taking into account all the technical, commercial and cost factors.

SYRIAN ARAB REPUBLIC
MINISTRY OF ENVIRONMENT

الجمهورية العربية السورية
وزارة الدولة لشؤون البيئة

Dear Dr. El-Arini,

Re: Endorsement for the 32nd Executive Committee Meeting

This is to acknowledge receipt of proposals for the following projects for the phase out of CFCs in the refrigeration manufactures sector under the Montreal Protocol at:

- Bassam Baghdad Co.

We fully accept the project proposals and to the best of our knowledge we find the proposals financially viable and acceptable. The Government of Syria would appreciate UNIDO submission of the above project proposal for 32nd Ex Com.

Thank you very much for your kind attention and cooperation.

Best regards.

Damascus, 2 October, 2000

M.Khalcd Klaly

Coordinator, National Ozone Unit

Dr. Omar E. El-Arini
Chief Officer
Multilateral Fund Secretariat
1800 Mc Gill College Ave
27th Floor
Montreal, Quebec
H3A3J6
Canada

PROJECT EVALUATION SHEET SYRIA

SECTOR: Refrigeration ODS use in sector (1999): 740 ODP tonnes

Sub-sector cost-effectiveness thresholds: Commercial US \$15.21/kg

Project Titles:

- (a) Conversion from CFC-11 to HCFC-141b technology and from CFC-12 to HFC-134a technology in the manufacture of commercial refrigeration equipment at Al-Raed Refrigeration

Project Data	Commercial	
	Al-Raed	
Enterprise consumption (ODP tonnes)		14.75
Project impact (ODP tonnes)		13.93
Project duration (months)		36
Initial amount requested (US \$)		211,800
Final project cost (US \$):		
Incremental capital cost (a)		142,000
Contingency cost (b)		14,200
Incremental operating cost (c)		114,198
Total project cost (a+b+c)		270,398
Local ownership (%)		100%
Export component (%)		0%
Amount requested (US \$)		211,800
Cost effectiveness (US \$/kg.)		15.21
Counterpart funding confirmed?		Yes
National coordinating agency	Ministry of State for Environmental Affairs, NOU	
Implementing agency	UNDP	

<i>Secretariat's Recommendations</i>	
Amount recommended (US \$)	211,800
Project impact (ODP tonnes)	13.93
Cost effectiveness (US \$/kg)	15.21
Implementing agency support cost (US \$)	27,534
Total cost to Multilateral Fund (US \$)	239,334

PROJECT DESCRIPTION

Sector Background

- Latest available total ODS consumption (1999)	1,783.00 ODP tonnes
- Baseline consumption of Annex A Group I substances (CFCs)	2,224.60 ODP tonnes
- Consumption of Annex A Group I substances for the year 1999	1,280.70 ODP tonnes
- Baseline consumption of CFCs in refrigeration sector	775.17 ODP tonnes
- Consumption of CFCs in refrigeration sector in 1999	740.00 ODP tonnes
- Funds approved for investment projects in refrigeration sector as of July 2000 (31st Meeting)	US\$10,901,406.00
- Quantity of CFC to be phased out in investment projects in refrigeration sector as of end of 1999	785.00 ODP tonnes

1. The refrigeration sector in Syria consists of four large enterprises (all have received assistance from the Multilateral Fund) with a consumption of about 174 ODP tonnes. The sector is also comprised of more than 60 medium-sized enterprises, 21 of which have received assistance from the Multilateral Fund. The total 1999 consumption in the refrigeration sector (740 ODP tonnes) is sub-divided into 307.6 ODP used for manufacturing of new refrigeration equipment and 432.3 ODP for servicing.

2. The Executive Committee has approved US \$10,901,406 for 18 projects to phase out 785 ODP tonnes of CFC for enterprises manufacturing refrigeration equipment.

3. Based on data reported by Syria to the Multilateral Fund Secretariat, the country is in compliance with both the CFC freeze and potentially with the 50% reduction in 2005.

Al-Raed

4. UNDP has submitted a project proposal for Al-Raed which is a medium-size commercial refrigeration enterprise consuming 11.25 ODP tonnes of CFC-11 and 3.50 ODP tonnes of CFC-12 in the production of commercial refrigeration equipment (visi-coolers, chest-freezers and display cabinets) in 1999. The enterprise operates two low-pressure dispensers for foaming operations in the baseline.

5. The current project will phase-out 11.25 ODP tonnes of CFC-11 and 3.50 ODP tonnes of CFC-12 by converting from CFC-11 to HCFC-141b as the foam blowing agent and from CFC-12 to HFC-134a as the refrigerant. Under the current project, the existing two low-pressure foam dispensers will be replaced by a high-pressure foam machine (US \$90,000). The enterprise will require refrigerant charging units (US \$6,000) and vacuum pumps (US \$4,000). Other costs include redesign, testing, trials (US \$10,000), training (US \$10,000) and technical assistance

(US \$20,000). Incremental operating costs are requested by the enterprise reflecting the higher cost of chemicals and an increase in foam density.

Justification for the use of HCFC-141b

6. Al-Raed has selected HCFC-141b technology to replace CFC-11 in foam blowing operations. It is an interim solution until HFC systems are commercially available. A letter advising the Government decision to use HCFC technology has been received by the Secretariat in accordance with the Executive Committee Decision 27/13 and is attached to this evaluation together with a justification from the implementing agency.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

1. The Secretariat and UNDP have agreed on the above project proposal and associated costs.

RECOMMENDATIONS

1. The Fund Secretariat recommends blanket approval of the project with the level of funding and associated support costs for UNDP as indicated below.

	Project Title	Project Funding (US\$)	Support Cost (US\$)	Implementing Agency
(a)	Conversion from CFC-11 to HCFC-141b technology and from CFC-12 to HFC-134a technology in the manufacture of commercial refrigeration equipment at Al-Raed Refrigeration	211,800	27,534	UNDP



**United Nations
Environment
Programme**

Distr.
Limited

UNEP/OzL.Pro/ExCom/32/30/Thailand
10 November 2000

ORIGINAL: ENGLISH

EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Thirty-second Meeting
Ouagadougou, 6-8 December 2000

PROJECT PROPOSALS: THAILAND

This document consist of the comments and recommendations of the Fund Secretariat on the following project proposals:

Foam:

- Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam (sprayfoam and blocks) at Isotech World Bank

Halon:

- Terminal halon 1211 and halon 1301 phaseout project for fire equipment manufacturers and suppliers in Thailand converting to ABC powder, CO₂, HFC-227ea and inert gases World Bank

Refrigeration:

- Umbrella project to convert CFC-12 commercial refrigeration to HCFC-134a, and CFC-11 to HCFC-141b as the blowing agent for foam insulation at 224 small and medium sized enterprises World Bank

PROJECT EVALUATION SHEET THAILAND

SECTOR: Foam ODS use in sector (1999): 1,202 ODP tonnes

Sub-sector cost-effectiveness thresholds: Rigid US \$7.83/kg

Project Titles:

- (a) Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam (sprayfoam and blocks) at Isotech

Project Data	Rigid
	Isotech
Enterprise consumption (ODP tonnes)	25.00
Project impact (ODP tonnes)	22.70
Project duration (months)	36
Initial amount requested (US \$)	153,193
Final project cost (US \$):	
Incremental capital cost (a)	72,500
Contingency cost (b)	7,250
Incremental operating cost (c)	65,193
Total project cost (a+b+c)	144,943
Local ownership (%)	100%
Export component (%)	0%
Amount requested (US \$)	144,943
Cost effectiveness (US \$/kg.)	6.38
Counterpart funding confirmed?	Yes
National coordinating agency	Department of Industrial Works
Implementing agency	IBRD

Secretariat's Recommendations	
Amount recommended (US \$)	144,943
Project impact (ODP tonnes)	22.70
Cost effectiveness (US \$/kg)	6.38
Implementing agency support cost (US \$)	18,843
Total cost to Multilateral Fund (US \$)	163,786

PROJECT DESCRIPTION

Sector Background

- Latest available total ODS consumption (1999)	4,592.70 ODP tonnes
- Baseline consumption of Annex A Group I substances (CFCs)	6,082.10 ODP tonnes
- Consumption of Annex A Group I substances for the year 1999	3,783.00 ODP tonnes
- Baseline consumption of CFCs in foam sector	2,116.00 ODP tonnes
- Consumption of CFCs in foam sector in 1999	2,832.00 ODP tonnes
- Funds approved for investment projects in foam sector as of end of 1999	US \$11,209.571
- Quantity of CFC to be phased out in investment projects in foam sector as of end of 1999	2,141.97 ODP tonnes
- Quantity of CFC phased out in investment projects in foam sector as of end of 1999	1,293.50 ODP tonnes
- Funds approved for investment projects in the foam sector in 2000	US \$259,536
- Quantity of CFC to be phased out in investment projects in foam sector approved in 2000	34.00 ODP tonnes

1. The Executive Committee has as of its 31st Meeting in July 2000 approved the amount of US \$11,469,107 to phase out 2,176 tonnes CFC from the foam sector, out of which 1,293.5 tonnes has been phased out.

Rigid Foam

(a) Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam (sprayfoam and blocks) at Isotech

Isotech

2. Isotech, a 100% Thai company founded in 1991 produces rigid polyurethane sprayfoam and small block foam for construction and other insulation applications. It operates a 8.5 kg/min Glascraft Mini II sprayfoam dispenser and uses handmixing technique for the production of the block foam. The company's CFC consumption was 25 tonnes in 1998.

3. Both sprayfoam and block foam production will be converted to HCFC-141b technology. This involves retrofit of Glascraft sprayfoam dispenser at US \$7,500 and replacement of the handmixing technique with a 60 kg/min high pressure foam dispenser at US \$90,000 with a company contribution of US \$50,000 to account for technology upgrade. Trials and technology transfer and training amount to US \$20,000. Incremental operating cost of US \$65,193 is requested.

Justification for the use HCFC-141b

4. Justification for the use HCFC-141b by Isotech has been provided in the project document and as an annex to the document, including projected “techno-economic” impact of zero ODP technologies as well as estimated cost of conversion to zero ODP technology. The Government of Thailand has also provided a letter endorsing the use of HCFC-141b by the company consistent with the Decision 27/13.

Impact of the projects

5. 25 ODP tonnes will be phased after project implementation. This will eliminate 0.6% of Thailand’s 1999 consumption of Annex A Group I substances. There will be residual ODS consumption of 2.3 tonnes as a result of the use of HCFC-141b conversion technology.

SECRETARIAT’S COMMENTS AND RECOMMENDATIONS

COMMENTS

1. The Fund Secretariat and the World Bank have discussed the project and agreed on the eligible grant as US \$144,943.

RECOMMENDATIONS

1. The Fund Secretariat recommends blanket approval of the Isotech project with the level of funding and associated support cost indicated below.

	Project Title	Project Funding (US\$)	Support Cost (US\$)	Implementing Agency
(a)	Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam (sprayfoam and blocks) at Isotech	144,943	18,843	IBRD

Annex

Additional Justification For Using HCFC-141b Technology

The World Bank technical expert appraised the enterprise in September 1999, prior to the preparation of this project document, and had discussions with the company's representatives about the choice of technology for replacing the existing CFC-based technology. The enterprise was briefed in detail about the following:

- (a) An overview of the available interim (low ODP) and permanent (zero ODP) replacement technologies.
- (b) The "techno-economic impact" of each technology on the products manufactured, and the processes and practices employed.
- (c) Possible implications of each technology, in terms of its known impact on environment, health and safety, such as ozone depleting potential, global warming potential, occupational health, etc.
- (d) It was emphasized to these enterprises that HCFC technologies are interim technologies due to their residual ODP and therefore may continue to adversely affect the environment, although at a lower rate than CFCs.
- (e) It was further explained that HCFCs may become controlled substances under present or future international conventions and will therefore also need to be phased out at a future date, and any investments required for their phase-out and for conversion to a permanent technology will have to be borne by the enterprises themselves.

The main conclusions reached by the enterprise through discussions with the World Bank technical expert were:

- 1. HCFC-141b will maintain the insulation properties required by the enterprise's customers for the insulating applications (both sprayfoam and blocks).
- 2. For the insulating applications, water based formulations do not provide sufficient insulation properties for the applications. Use of water based formulations could require an increase in foam thickness at higher densities (significant cost increases to the enterprise).
- 3. Hydrocarbon technology was seen as not a feasible option due to the fact that hydrocarbon technology is not recommended for field applications based on the lack of control of the operational conditions (presence of ignition sources, etc). In the block production, it is a feasible alternative from a technology standpoint, but is not practical, cost-effective, nor is it advisable from a safety perspective. The enterprise prefers to use a common chemical system for all its insulating foam applications. The costs for installing a pentane dispenser and premixer are very high (~\$300,000), for which the enterprise would bear most of the cost.

In view of the above, the technology selected is HCFC-141b based systems in the interim, until permanent technology (either water based or HFC-based systems) is available and can provide the required physical properties.

2822844



No. 0412/ 3649

Hazardous Substances Control Bureau
Department of Industrial Works
Rama VI Road, Ratchathewi
Bangkok 10400
Telephone: (662) 202-4228
Fax: (662) 202-4015

5 October B.E. 2543 (2000)

Dear Mr. Gorman,

**Subject: Submission of Thailand ODS Phaseout Projects and Endorsement
the use of HCFC-141b as a transitional substance.**

The Ozone Protection Unit within the Hazardous Substances Control Bureau, Department of Industrial Works, which is empowered by the Government to undertake the implementation of Thailand ODS phaseout program and to fulfill all obligations under the Montreal Protocol, would like to request the World Bank to submit the following projects for the consideration of the Executive Committee at its 32nd Meeting which will be held in December 2000.

1. Isotech and Chemicals Co., Ltd. - Conversion from CFC-11 to HCFC-141b Technology in the Manufacture of Rigid Polyurethane Foam (Sprayfoam and Blocks)
2. Terminal Halon 1211 and Halon 1301 Phaseout Project Plan for Fire Equipment Manufacturers and Suppliers in Thailand
3. Final tranche of funding for Umbrella Project to Convert CFC-12 Commercial Refrigeration to HFC-134a, and CFC-11 to HCFC-141b as the Blowing Agent for Foam Insulation at 224 Small and Medium Sized Enterprises

In addition, the Ozone Unit realizes that two of these projects, Isotech and Chemicals Co., Ltd. and Umbrella Project will involve the use of HCFCs. Prior to submission of these projects, the Ozone Unit had thoroughly reviewed the choices of alternatives and special situation of these projects where beneficiaries of these projects are small and medium scale enterprises. Considering the choices of alternatives that are commercially viable at the present time and the safety issues associated with various options, the Ozone Unit agrees with the industry that the most technically and financially feasible technology for these enterprises is the HCFC technology. The decision to adopt this HCFC technology should not be perceived as the lack of commitments of the Thai Government with regard to Article 2F of the Montreal Protocol. In spite of the fact that the Executive Committee had already decided that no funding would be made available for the

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-2-

future conversion from HCFC for the projects, the Thai Government believes that it is inevitable, at the present time, that HCFC must be used on an interim period as an alternative for the projects.

With this submission, we trust that the Executive Committee would approve the projects. The elimination of ODSs in these projects is considered as an essential component of the CFC phaseout strategy of the Thai Government and would contribute to the ability of the Thai Government to sustain the freeze of Thailand's consumption of ozone depleting substances.

I would like to take this opportunity to thank the World Bank for its continuing effort in assisting Thailand to phaseout the use of ozone depleting substances. Should you require any further clarification, please feel free to contact us. Thank you very much for your kind cooperation.

Sincerely yours,



(Wiraphon Rajadanuraks)
Director

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PROJECT EVALUATION SHEET THAILAND

SECTOR: Halon ODS use in sector (1998/1999): 392.599ODP tonnes

Sub-sector cost-effectiveness thresholds: Fire Protection US \$1.48/kg

Project Titles:

- (a) Terminal halon 1211 and halon 1301 phaseout project for fire equipment manufacturers and suppliers in Thailand converting to ABC powder, CO₂, HFC-227ea and inert gases

Project Data	Extinguisher/fixed system
	Terminal umbrella
Enterprise consumption (ODP tonnes)	436.00
Project impact (ODP tonnes)	436.00
Project duration (months)	37
Initial amount requested (US \$)	940,500
Final project cost (US \$):	
Incremental capital cost (a)	568,000
Contingency cost (b)	
Incremental operating cost (c)	
Total project cost (a+b+c)	568,000
Local ownership (%)	100%
Export component (%)	0%
Amount requested (US \$)	568,000
Cost effectiveness (US \$/kg.)	1.30
Counterpart funding confirmed?	
National coordinating agency	Department of Industrial Works
Implementing agency	IBRD

<i>Secretariat's Recommendations</i>	
Amount recommended (US \$)	568,000
Project impact (ODP tonnes)	436.00
Cost effectiveness (US \$/kg)	1.30
Implementing agency support cost (US \$)	72,480
Total cost to Multilateral Fund (US \$)	640,480

PROJECT DESCRIPTION

1. This project will lead to a complete phaseout of halon consumption (as defined by the Montreal Protocol) in Thailand. This terminal umbrella project will, when fully implemented, reduce the national consumption of halons from the present consumption of 436 ODP tonnes to 0 tonnes in 2003. The project and the requested funding is based on Decision 25/50 regarding terminal umbrella projects for a larger number of smaller enterprises. Thailand will develop and implement the necessary regulatory measure to prevent future import of halons from the end of 2003. The project will cover all remaining halon manufacturing enterprises in Thailand. Capital costs are requested for conversion of halon extinguisher manufacturers to ABC and CO2 extinguishers production and for conversion of halon system supply to other non-ODS substitute systems (HFC 227ea and inert gases). As a terminal umbrella project incremental operating costs and savings are not calculated.

2. A Halon Management and Banking project was approved at the 29th meeting of the Executive Committee. Accordingly, Thailand will introduce the necessary policies and legislation to stop new uses of halons and ban imports from end of 2003. This project will provide financial and technical support to the phaseout of the use of halon 1211 and halon 1301 in the manufacture of new fire extinguishers in Thailand. In addition more than 25 other halon consuming fire equipment companies were contacted during the preparation of the project. This project will cover these companies through a workshop and no additional funding will be requested in this sector.

3. The necessary national halon phaseout policies and regulation will support this terminal umbrella project. The policies are presently under discussions as part of the halon management and banking project. In addition to the policies regulating the use of halons, the regulation and enforcement of import of halons will be reviewed and strengthened. Import of large size (25 and 35 kg) halon fire extinguishers from China is a challenge, as it is neither captured by the Chinese export regulations, nor by the present Thai import control. There are two halon system manufacturers and suppliers in Thailand that are addressed in this project. The conversion to other substitutes are best dealt with through a combination of direct co-operation, financial support covering costs of introducing new substitutes and regulations controlling new application of halon 1301 and 1211.

4. The project lists the halon companies in Thailand. Aside from those fire equipment companies, larger corporations with their own in house safety organisations, smaller workshops, dealers and service shops exist which also are handling and servicing halon fire extinguishers and halon fire extinguishing systems. Hence the total number of larger corporations with own safety organization, fire equipment companies workshops and branches effected by the halon phaseout activities are estimated as more than 80 companies and corporations. Due to the ozone and halon regulations to be introduced and enforcement by the Government, all will have to terminate their halon operation activities. As many of them are only handling smaller amount of

halons and maybe only on a case by case basis, they will be dealt with through seminars and no funding is requested for conversion of equipment for those enterprises.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

1. The project costs are consistent with capital costs recommended for use in preparing such projects in Decision 20/46 as well as previous decisions of the Executive Committee on the halon fire extinguisher and fixed system sub-sector.
2. Several companies included in this terminal umbrella project are halon fillers and suppliers that have halon filling equipment with minimum or inconsistent patterns of filling and refilling cylinders produced elsewhere. As part of the project, halon filling equipment will be destroyed for these 17 companies as well as for the three larger size halon extinguisher manufacturers.
3. The project will also provide system manufacturers equipment for alternative chemicals, licenses, some tooling, software, and training.

RECOMMENDATIONS

1. The Sub-Committee on Project Review may wish to consider recommending the approval of this project in amounts indicated in the tables below and with the understanding that this is a terminal project for the halon sector in Thailand.

	Project Title	Project Funding (US\$)	Support Cost (US\$)	Implementing Agency
(a)	Terminal halon 1211 and halon 1301 phaseout project for fire equipment manufacturers and suppliers in Thailand converting to ABC powder, CO2, HFC-227ea and inert gases	568,000	72,480	IBRD

PROJECT EVALUATION SHEET THAILAND

SECTOR: Refrigeration ODS use in sector (1999): 2,062.2 ODP tonnes

Sub-sector cost-effectiveness thresholds: Commercial US \$15.21/kg

Project Titles:

- (a) Umbrella project to convert CFC-12 commercial refrigeration to HCFC-134a, and CFC-11 to HCFC-141b as the blowing agent for foam insulation at 224 small and medium sized enterprises

Project Data	Commercial
	Umbrella
ODP phase-out (ODP tonnes)	200
Proposed project duration (Months)	24
Maximum funding level approved (US \$)	2,631,486
The first tranche disbursed (US \$)	750,000
The second tranche disbursed (US \$)	1,000,000
Amount requested for the third tranche (balance) (US \$)	881,486
Cost effectiveness (US \$/kg)	13.15
National Coordinating Agency	Dept. of Industrial Works, Ministry of Industry
Implementing Agency	The World Bank
Technical review completed?	Yes

<i>Secretariat's Recommendations:</i>	
Amount recommended (US \$)	881,486
Project impact (ODP tonnes)	200
Cost effectiveness (US \$/kg)	13.15
Implementing Agency support cost (US \$)	106,963
Total cost to Multilateral Fund (US \$)	988,449

PROJECT DESCRIPTION

Sector Background

- Latest available total ODS consumption (1999)	4,516.10 ODP tonnes
- Baseline consumption of Annex A Group I substances (CFCs)	6,082.10 ODP tonnes
- Consumption of Annex A Group I substances for the year 1997	3,610.60 ODP tonnes
- Baseline consumption of CFCs in refrigeration sector	Not Available ODP tonnes
- Consumption of CFCs in refrigeration sector in 1999	2,062.20 ODP tonnes
- Funds approved for investment projects in refrigeration sector as of July 2000 (31st Meeting)	US \$12,956,733
- Quantity of CFC to be phased out in investment projects in refrigeration sector as of end of 1999	1,077.00 ODP tonnes

1. The commercial refrigeration sub-sector of Thailand is composed of approximately 15 large and a number of medium and small enterprises. Total consumption in the sector was estimated in 1999 at 2,062.2 tonnes of ODP. The Executive Committee has approved 20 projects for large enterprises in the sub-sector leading to phase out 1,077 ODP tonnes.

(a) Umbrella Project to Convert CFC-12 Commercial Refrigeration to HFC-134a, and CFC-11 to HCFC-141b as the Blowing Agent for Foam Insulation at 224 Small-and-Medium-Sized Enterprises.

2. This umbrella project was formulated by the World Bank to phase out 173 tonnes per year of CFC-12 (refrigerant) and CFC-11 (foam blowing agent) used in commercial refrigerators manufactured at 224 small-and medium-sized enterprises located throughout Thailand. The main products of these enterprises include refrigeration units, water coolers, and display cases that are sold to small grocery stores, “Mini-Marts”, schools, restaurants, and ice factories.

3. This project was approved by the Executive Committee at its 25th Meeting with “a maximum funding of US \$2,631,486, on the understanding:

- (a) That the amount be released in tranches;
- (b) That an initial distribution of a tranche of US \$750,000 be made to allow the project to move forward;
- (c) That it be understood that no further tranches would be forthcoming until specific data were provided to the Executive Committee; and
- (d) That if the specific data provided demonstrated that the project, through the non-service-related foam and refrigerant components, would achieve less than the 173 ODP-tonne reduction anticipated, the amount approved for the project would be reduced proportionally”. (Decision 25/42)

4. At the 28th Meeting, the World Bank requested the release of a second tranche of US \$1,000,000. In support of its request, the World Bank provided information on the non-service-related ODP consumption data for 100 companies. The consumption of the 100 companies was 169.73 ODP tonnes which was determined using both production data and purchase invoices. The requested funds were approved by the Executive Committee.
5. Kulthorn Engineering (KE) was appointed by the Department of Industrial Worlds of Thailand to undertake management of this project. Implementation of the second phase started immediately after the Executive Committee's approval in July 1998. Sixteen workshops were held in major cities in six regions covering commercial refrigeration enterprises in 70 provinces across the country. This represents coverage of more than 93% of all provinces in Thailand.
6. The objectives of these workshops were to reconfirm the commitments of those enterprises that had already expressed their interest to participate in this project during the project preparation phase prior to the submission of the proposal of this project to the Executive Committee, and to inform all commercial refrigerator manufacturers of the Government's policy to ban production of CFC-based commercial refrigerators after the completion of this project. 412 commercial refrigerator manufacturers attended the sixteen workshops hosted by KE.
7. Questionnaires used for collecting data for the preparation of the project proposal were revised and distributed to all 412 enterprises attending the above workshops. These questionnaires were designed to collect basic information for confirming Multilateral Fund funding eligibility. Information required from each enterprise includes enterprises' names, information of contact persons, types of business (i.e. manufacturers, servicing shops, or distributors), year of establishment, consumption of CFC-11 and CFC-12, and baseline equipment.
8. Based on the returned questionnaires, 389 enterprises were identified as eligible for funding from the Multilateral Fund. Site visits were made to these 389 enterprises by technical teams from KE. After on-site interviews, 228 of the total 389 enterprises were confirmed as eligible for funding under this project. That is, all 228 enterprises were found to be producing commercial refrigerators, and were established prior to July 1995. The total number of enterprises to be covered and financed under this project therefore exceeds the original number of enterprises indicated in the project proposal (within the approved project cost).
9. Most enterprises covered under this project are small-and medium-sized enterprises. During on-site visits to the enterprises, information pertaining to CFC consumption and baseline equipment reported in the returned questionnaires of each enterprise was verified. For each enterprise invoices or receipts of CFC purchase were inspected. In case a complete purchase is not available, the quantities of CFC-11 and CFC-12 used in the units produced by the enterprise were measured by charging or weighing the units.
10. Total CFC-11 consumption by 228 enterprises has been determined to be 200 ODP tonnes which exceeds the 173 ODP tonnes target phase out in the project approved at the 25th Meeting.

11. The World Bank is now requesting approval of the remaining balance of US \$881,486.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

1. The Secretariat examined the information on the ODP consumption provided by the World Bank for 228 enterprises. The information contains data on the products manufactured by each of the 228 enterprises, the number of units produced per year, the CFC-12 amount charged per unit, the amount of foam used per unit (and therefore the amount of CFC-11 used), and the number of compressors used.
2. The Secretariat discussed with the World Bank the methodology of determining the consumption data reported for the 228 enterprises. It appears that only 13 enterprises provided a complete set of invoices for purchase of CFCs and CFC containing materials for 12 months in 1998. The remaining 215 enterprises provided purchase invoices for a minimum of three continuous months in 1998.
3. Some of these enterprises consume only about 6 to 10 kg of CFC for a 12-month production. According to information from the World Bank all the 215 enterprises with incomplete records, including enterprises with very small CFC consumption, were visited by the evaluation team and measurements of CFC consumption were carried out on the spot.
4. The Secretariat discussed with the World Bank the issue of quantities of CFC consumed in freezers produced by the enterprises. These quantities are 3-5 fold higher than the norm for similar equipment in Multilateral Fund projects and lead to high levels of overall claimed consumption. The World Bank provided information on the specific features of freezer designs used by the small-sized enterprises in Thailand, to explain the difference.
5. The Secretariat also requested information from the World Bank regarding the capacity of compressors used by the enterprises. It appears from the per unit CFC consumption that many of these enterprises might use compressors below 250 wt and subsequently be classified under the domestic refrigeration sector. The size of compressor could also facilitate verification of the size of the refrigeration equipment and subsequently the use of CFC per unit. The World Bank did not provide the requested information because in its view, the decision of the Executive Committee relating to the approval of subsequent tranches of this project required only that ODS consumption be verified. This has been done.
6. Information from the latest progress report indicates that completion of the project is due in December 2000, although some additional delay may be expected since approval is only being sought at the 32nd Meeting. Given that the reported 1999 consumption in the refrigeration sector is 2,062.2 ODP tonnes, the claimed ODP phase out (200 ODP tonnes) will lead to removal of about 10% of total consumption in the sector.

RECOMMENDATIONS

1. The Secretariat recommends the project for blanket approval at the costs indicated in the table below, subject to the following conditions:

- (a) that no more funding will be requested for conversion of manufacturers of domestic and commercial refrigeration equipment in Thailand.
- (b) that starting from January 2001 onwards, the ODP consumption data in the refrigeration sector reported by Thailand will take into account a reduction of 200 ODP tonnes resulting from the phase out achieved by this project.

	Project Title	Project Funding (US\$)	Support Cost (US\$)	Implementing Agency
(a)	Umbrella project to convert CFC-12 commercial refrigeration to HCFC-134a, and CFC-11 to HCFC-141b as the blowing agent for foam insulation at 224 small and medium sized enterprises	881,486	106,963	IBRD



**United Nations
Environment
Programme**

Distr.
Limited

UNEP/OzL.Pro/ExCom/32/30/Tunisia
6 November 2000

ORIGINAL: ENGLISH

EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Thirty-second Meeting
Ouagadougou, 6-8 December 2000

PROJECT PROPOSALS: TUNISIA

This document consist of the comments and recommendations of the Fund Secretariat on the following project proposals:

Foam:

- | | |
|---|------------|
| • Phasing out of CFC-11 in the manufacture of rigid polyurethane foam at Societe Nouvelle de Coupe Industrielle (SNCI) by conversion to a combination of water +HCFC-141b based systems | World Bank |
| • Phasing out of CFC-11 in the manufacture of rigid polyurethane foam at Soften by conversion to a combination of water +HCFC-141b based systems | World Bank |
| • Phasing out of CFC-11 in the manufacture of rigid polyurethane foam at Bafes by conversion to a combination of water +HCFC-141b based systems | World Bank |
| • Phasing out of CFC-11 in the manufacture of rigid polyurethane foam at Societe de Construction Industrialisee (SCI) by conversion to a combination of water +HCFC-141b based systems | World Bank |
| • Phasing out of CFC-11 in the manufacture of rigid polyurethane foam at Coldeq by conversion to a combination of water +HCFC-141b based systems | World Bank |

PROJECT EVALUATION SHEET TUNISIA

SECTOR: Foam ODS use in sector (1998): 371 ODP tonnes

Sub-sector cost-effectiveness thresholds: Rigid US \$7.83/kg

Project Titles:

- (a) Phasing out of CFC-11 in the manufacture of rigid polyurethane foam at Bafes by conversion to a combination of water +HCFC-141b based systems
- (b) Phasing out of CFC-11 in the manufacture of rigid polyurethane foam at Coldeq by conversion to a combination of water +HCFC-141b based systems
- (c) Phasing out of CFC-11 in the manufacture of rigid polyurethane foam at Societe de Construction Industrialisee (SCI) by conversion to a combination of water +HCFC-141b based systems
- (d) Phasing out of CFC-11 in the manufacture of rigid polyurethane foam at Societe Nouvelle de Coupe Industrielle (SNCI) by conversion to a combination of water +HCFC-141b based systems
- (e) Phasing out of CFC-11 in the manufacture of rigid polyurethane foam at Soften by conversion to a combination of water +HCFC-141b based systems

Project Data	Rigid	Rigid	Rigid	Rigid	Rigid
	Bafes	Coldeq	SCI	SNCI	Soften
Enterprise consumption (ODP tonnes)	12.70	9.60	9.00	22.10	8.20
Project impact (ODP tonnes)	11.70	8.80	8.30	20.30	7.50
Project duration (months)	36	36	36	36	36
Initial amount requested (US \$)	91,477	68,917	64,700	159,123	59,079
Final project cost (US \$):					
Incremental capital cost (a)	80,000	80,000	100,000	100,000	80,000
Contingency cost (b)	8,000	8,000	10,000	10,000	8,000
Incremental operating cost (c)	24,329	18,543	17,520	46,235	15,991
Total project cost (a+b+c)	112,329	106,543	127,520	156,235	103,991
Local ownership (%)	100%	100%	100%	100%	100%
Export component (%)	0%	0%	0%	0%	0%
Amount requested (US \$)	91,477	68,917	64,700	156,235	59,079
Cost effectiveness (US \$/kg.)	7.83	7.83	7.83	7.78	7.83
Counterpart funding confirmed?	Yes	Yes	Yes	Yes	Yes
National coordinating agency	ANPE	ANPE	ANPE	ANPE	ANPE
Implementing agency	IBRD	IBRD	IBRD	IBRD	IBRD

<i>Secretariat's Recommendations</i>					
Amount recommended (US \$)	91,477	68,917	64,700	156,235	59,079
Project impact (ODP tonnes)	11.70	8.80	8.30	20.30	7.50
Cost effectiveness (US \$/kg)	7.83	7.83	7.70	7.78	7.83
Implementing agency support cost (US \$)	11,892	8,959	8,411	20,311	7,680
Total cost to Multilateral Fund (US \$)	103,369	77,876	73,111	176,546	66,759

PROJECT DESCRIPTION

Sector Background

- Latest available total ODS consumption (1998)	739.50	ODP tonnes
- Baseline consumption (average 1995-1997) of Annex A Group I substances (CFCs)	870.10	ODP tonnes
- Consumption of Annex A Group I substances for the year 1999	716.00	ODP tonnes
- Baseline consumption of CFCs in foam sector	463.33	ODP tonnes
- Consumption of CFCs in foam sector in 1999	366.00	ODP tonnes
- Funds approved for investment projects in foam sector as of end of 1999	US \$2,354,190	
- Quantity of CFC to be phased out in foam sector as of end of 1999	478.80	ODP tonnes
- Quantity of CFCs phased out from investment projects in the foam sector as of end of 1999	188.00	ODP tonnes
- Funds approved for investment projects in the foam sector in the year 2000	US \$0	
- Quantity of CFC to be phased out in foam projects approved in the year 2000	0	ODP tonnes

1. Based on data reported by Tunisia to the Ozone Secretariat, the country is in compliance with both the CFC freeze and the 50% CFC reduction by 2005. These accomplishments demonstrate that the country is in good position to achieve the complete phase out of CFC by 2010.

- (a) **Phasing out of CFC-11 in the manufacture of rigid polyurethane foam at Bafes by conversion to a combination of water +HCFC-141b based systems**
- (b) **Phasing out of CFC-11 in the manufacture of rigid polyurethane foam at Coldeq by conversion to a combination of water +HCFC-141b based systems**
- (c) **Phasing out of CFC-11 in the manufacture of rigid polyurethane foam at Societe de Construction Industrialisee (SCI) by conversion to a combination of water +HCFC-141b based systems**
- (d) **Phasing out of CFC-11 in the manufacture of rigid polyurethane foam at Societe Nouvelle de Coupe Industrielle (SNCI) by conversion to a combination of water +HCFC-141b based systems**
- (e) **Phasing out of CFC-11 in the manufacture of rigid polyurethane foam at Soften by conversion to a combination of water +HCFC-141b based systems**

Rigid Foam

1. Five companies listed in Table 1 below manufacture rigid polyurethane foam panels for insulation of storage and cold rooms and truck bodies. All the companies use low pressure

machines. Their production will be converted to the use of combination of water and HCFC-141b systems. The cost of conversion relates to the replacement of the existing low pressure machines with equivalent high pressure machines at US \$70,000-US \$90,000; trials, technology transfer and training at US \$10,000 each. Incremental operating costs as listed in table 1 are expected to be incurred by each company.

Table 1: Profile of the rigid foam producing enterprises

Name of Enterprise	Date Established	ODS Consumption OPD tonnes	ODS Phase out ODP tonnes	Baseline Equipment ¹	Year*	ICC** US \$	IOC*** US \$
Bafes	1993	12.7	11.7	TeeMac LPD 60 kg/min	1993	88,000	24,329
Coldeq	1983	9.6	8.8	OMS LPD 80 kg/min	1982	88,000	18,543
S.C.I.	1980	9.0	8.3	Cosmec LPD 100 kg/min	1990	110,000	17,520
S.N.C.I.	1990	22.1	20.3	Cosmec LPD 100 kg/min	1994	115,500	46,235
Soften	1984	8.2	7.5	Cannon C-60 LPD 60 kg/min	1986	88,000	15,991

*Year – year of purchase and/or installation of equipment

**ICC – incremental capital cost

***IOC – incremental operating cost

¹ LPD – Low pressure dispenser

Justification for the use of HCFC-141b

2. Justification for the use of HCFC-141b by all five companies has been provided in each project document and as annexes to the document, including projected “techno-economic impact of zero ODP technologies as well as estimated cost of conversion to zero ODP technology. The Government of Tunisia has also provided a letter endorsing the use of HCFC-141b by the companies.

3. A sample of the justification (additional justification) annexed to the projects and a copy of the letter of the Government of Tunisia supporting the choice of HCFC-141b are attached to this evaluation.

Impact of the projects

4. A total of 56.6 ODP tonnes will be phased out from the five foam projects. This will eliminate 7.9% of Tunisia’s 1999 baseline consumption of Annex A Group I substances. There will be residual ODS consumption of 5 ODP tonnes as a result of the conversion to HCFC-141b technology.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

1. The five projects and their associated costs have been discussed between the Secretariat and the World Bank and agreed.

RECOMMENDATIONS

1. The Fund Secretariat recommends blanket approval of the Bafes, Coldeq, SCI, SNCI and Soften projects with the funding levels and associated support costs indicated in the table below.

	Project Title	Project Funding (US\$)	Support Cost (US\$)	Implementing Agency
(a)	Phasing out of CFC-11 in the manufacture of rigid polyurethane foam at Bafes by conversion to a combination of water +HCFC-141b based systems	91,477	11,892	IBRD
(b)	Phasing out of CFC-11 in the manufacture of rigid polyurethane foam at Coldeq by conversion to a combination of water +HCFC-141b based systems	68,917	8,959	IBRD
(c)	Phasing out of CFC-11 in the manufacture of rigid polyurethane foam at Societe de Construction Industrialisee (SCI) by conversion to a combination of water +HCFC-141b based systems	64,700	8,411	IBRD
(d)	Phasing out of CFC-11 in the manufacture of rigid polyurethane foam at Societe Nouvelle de Coupe Industrielle (SNCI) by conversion to a combination of water +HCFC-141b based systems	156,235	20,311	IBRD
(e)	Phasing out of CFC-11 in the manufacture of rigid polyurethane foam at Soften by conversion to a combination of water +HCFC-141b based systems	59,079	7,680	IBRD

Annex

Additional Justification for Using HCFC-141b Technology

The World Bank technical expert appraised the enterprise in June 2000, prior to the preparation of this project document, and had discussions with the company's representatives about the choice of technology for replacing the existing CFC-based technology. The enterprise was briefed in detail about the following:

- (a) An overview of the available interim (low ODP) and permanent (zero ODP) replacement technologies.
- (b) The "techno-economic impact" of each technology on the products manufactured, and the processes and practices employed.
- (c) Possible implications of each technology, in terms of its known impact on environment, health and safety, such as ozone depleting potential, global warming potential, occupational health, etc.
- (d) It was emphasized to the enterprise that HCFC technologies are interim technologies due to their residual ODP and therefore may continue to adversely affect the environment, although at a lower rate than CFCs.
- (e) It was further explained that HCFCs may become controlled substances under present or future international conventions and will therefore also need to be phased out at a future date, and any investments required for their phase-out and for conversion to a permanent technology will have to be borne by the enterprise themselves.

The main conclusions reached by the enterprise through discussions with technical expert were:

1. HCFC-141b will maintain the insulation properties required by the enterprise's customers.
2. All Water based formulations do not provide sufficient insulation properties for the application and would require a significant cost increase to the enterprise.
3. Hydrocarbon technology was seen as not a feasible option due to the layout of the plant operations. The use of hydrocarbons in this environment would be risky and very expensive.

In view of the above, the technology selected is HCFC-141b based systems in the interim, until permanent technology (either water based or HFC-based systems) is available and can provide the required physical properties.

Projected Techno-economic Impact of Zero-ODP Technologies

The projected impact of applying various zero-ODP technologies with respect to the selected technology (HCFC-141b) in this project is summarized as below:

Water based technologies are not sufficiently developed to meet the needs of this application (insulated truck bodies) which has stringent insulation/thickness requirements. Therefore, they can not be considered.

HFC-134a based systems are not offered in the applicable regional area and are not a feasible zero-ODP option.

Hydrocarbons cannot be used for safety reasons related to the plant layout.

Thus, the selection of HCFC-141b based systems, as the preferred conversion technology, is justified taking into account all the technical, commercial and cost factors.

Estimated Cost of Future Conversion to Zero-ODP Technology

At the present time, there are no zero-ODP technology options, which can be applied cost-effectively for this project.

The following possibilities exist for a future conversion to zero-ODP technology, based on information available presently:

- Water based systems
- HFC based systems

If and when liquid HFC or water-based systems become technically mature and commercially available, the capital investments required to apply this technology are expected to be negligible. The equipment installed/retrofit under this project will be suitable for processing either of these systems. Future costs are expected to be in the area of incremental operating costs, related to higher isocyanate usage (in the case of water based) or higher costs of the HFCs. It is assumed that by the time water-based systems become available, no further density increase will be required.

Before:	6,9 t HCFC-141b	@ US\$ 3,10=	21 496
After:	11,5 t MDI increase	@ US\$ 2,50=	28 750
Incremental Operating Costs/y			7 254

It is unknown what the price would be of the HFCs in the future; therefore, IOCs related to a potential conversion to HFC technology are not quantifiable at this point.

République Tunisienne

Ministère de l'Environnement
et de l'Aménagement du TerritoireAGENCE NATIONALE DE
PROTECTION DE L'ENVIRONNEMENTالجمهورية التونسية
وزارة البيئة و التنمية الترابية
الوكالة الوطنية
للمحافظة البيئية

05 OCT. 2000

Nous gouvernement Tunisien, avons revue la conversion des 5 entreprises Tunisiennes a savoir, COLDEQ, SCI, BAFES, SNCI et SOFTEN et leur proposition d'utiliser les HCFC comme substitution du CFC-11, le gouvernement est d'accord sur le choix du HCFC pour cette application spécifique.

La Tunisie est consciente que le HCFC est une substance de transition et qu'une conversion ultérieure aux substances sans ODS sera nécessaire. La Tunisie est d'accord que conformément aux décisions actuelles du comité exécutif, aucun financement ne sera demandé pour une conversion aux substances sans ODS dans l'avenir.

Le Directeur du Contrôle
et de l'Unité Ozone

Hassen Hannachi



**United Nations
Environment
Programme**

Distr.
Limited

UNEP/OzL.Pro/ExCom/32/30/Turkey
10 November 2000

ORIGINAL: ENGLISH

EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Thirty-second Meeting
Ouagadougou, 6-8 December 2000

PROJECT PROPOSALS: TURKEY

This document consist of the comments and recommendations of the Fund Secretariat on the following project proposals:

Foam:

- | | |
|---|------------|
| • Umbrella project. Conversion from CFC-11 into all-water technology for flexible molded and HCFC-141b for integral skin foams at 11 enterprises | World Bank |
| • Conversion from CFC-11 into all-water technology for flexible molded and integral skin foams at Urosan | World Bank |
| • Phase-out of CFC-11 consumption by conversion to HCFC-141b technology at Purtiz Co. in the manufacture of rigid polyurethane foam for insulating purposes | UNIDO |

PROJECT EVALUATION SHEET TURKEY

SECTOR: Foam ODS use in sector (1999): 1,049 ODP tonnes

Sub-sector cost-effectiveness thresholds: Integral skin US \$16.86/kg
Rigid US \$7.83/kg

Project Titles:

- (a) Umbrella project. Conversion from CFC-11 into all-water technology for flexible molded and HCFC-141b for integral skin foams at 11 enterprises
- (b) Conversion from CFC-11 into all-water technology for flexible molded and integral skin foams at Urosan
- (c) Phase-out of CFC-11 consumption by conversion to HCFC-141b technology at Purtiz Co. in the manufacture of rigid polyurethane foam for insulating purposes

Project Data	Integral skin		Rigid
	11 enterprises	Urosan	Purtiz
Enterprise consumption (ODP tonnes)	57.50	39.50	58.00
Project impact (ODP tonnes)	56.10	39.50	52.85
Project duration (months)	36	36	30
Initial amount requested (US \$)	403,878	666,381	394,615
Final project cost (US \$):			
Incremental capital cost (a)	334,500	469,000	120,000
Contingency cost (b)	33,450	46,900	12,000
Incremental operating cost (c)	183,946	132,141	253,815
Total project cost (a+b+c)	551,896	648,041	385,815
Local ownership (%)	100%	100%	100%
Export component (%)	0%	0%	0%
Amount requested (US \$)	403,878	648,041	385,815
Cost effectiveness (US \$/kg.)	8.54	16.86	7.30
Counterpart funding confirmed?			Yes
National coordinating agency	Technology Development Foundation		Ministry of Environment
Implementing agency	IBRD		UNIDO

<i>Secretariat's Recommendations</i>			
Amount recommended (US \$)			
Project impact (ODP tonnes)			
Cost effectiveness (US \$/kg)			
Implementing agency support cost (US \$)			
Total cost to Multilateral Fund (US \$)			

PROJECT DESCRIPTION

Sector Background

- Latest available total ODS consumption (1999)	2,439.10	ODP tonnes
- Baseline consumption (average 1995-1997) of Annex A Group I substances (CFCs)	3,805.30	ODP tonnes
- Consumption of Annex A Group I substances for the year 1999	1,791.10	ODP tonnes
- Baseline consumption of CFCs in foam sector	2,344.70	ODP tonnes
- Consumption of CFCs in foam sector in 1999	1,049.00	ODP tonnes
- Funds approved for investment projects in foam sector as of end of 1999	US \$9,404,521.00	
- Quantity of CFC to be phased out in investment projects in foam sector as of end of 1999	1,621.65	ODP tonnes
- Quantity of CFC to be phased out in foam sector as of end of 1999	1,095.39	ODP tonnes
- Funds approved for investment projects in the foam sector in the year 2000	US \$607,297	
- Quantity of CFC to be phased out in foam projects approved in the year 2000	95.00	ODP tonnes

1. Based on data reported by Tunisia to the Ozone Secretariat, the country is in compliance with both the CFC freeze and the 50% CFC reduction by 2005. These accomplishments demonstrate that the country is in good position to achieve the complete phase out of CFC by 2010.

- (a) **Umbrella project. Conversion from CFC-11 into all-water technology for flexible molded and HCFC-141b for integral skin foams at 11 enterprises**
- (b) **Conversion from CFC-11 into all-water technology for flexible molded and integral skin foams at Urosan**
- (c) **Phase-out of CFC-11 consumption by conversion to HCFC-141b technology at Purtiz Co. in the manufacture of rigid polyurethane foam for insulating purposes**

Integral Skin

Umbrella project

2. The umbrella project is submitted by the World Bank for 11 SMEs (100% Turkish owned), producing flexible molded foam and/or integral skin foam for the automotive and furniture industry. The total consumption of the enterprises in 1999 was 57.50 ODP tonnes of CFC-11 of which the phase out of 49.2 tonnes will be covered by the project. All the companies started production between 1980 and 1992 except one company (Goldsit) which started production of flexible molded foam in 1997. The enterprises operate a total of 18 mainly low

pressure machines of various makes and aluminium, epoxy and polyester molds. Six of the machines were installed between 1996 and 1998 for which the related ODS consumption has been deducted from the calculations. Two of the enterprises, Yaris Kabin and Hisarkar export 20% and 15% respectively to non-Article 5 countries. The appropriate deductions have been made to account for this in the calculations.

3. The enterprises will convert the flexible molded foam production to all-water-blown and the integral skin to HCFC-141b. The capital cost of conversion includes the cost of dispenser retrofit of US \$10,000 per dispenser, trials US \$5,000 except 5 small producers where this is reduced to US \$1,500-2,500, training US \$5,000 and formulation assistance US \$5,000. The capital cost of seven of the enterprises also includes the cost of upgrade of the molds (US \$300 mold). Incremental operating costs of the projects range between US \$6,876 to US \$45,542.

Urosan

4. Urosan is a 100% owned Turkish company which produces a range of polyurethane foam products for the furniture industry, including flexible slabstock, flexible molded and integral skin foam. The flexible slabstock foam production has been converted to LCD technology with Multilateral Fund assistance. The company consumed 39.5 tonnes CFC-11 in 1999 in the production of the flexible molded and integral skin foams. The production of both types of foam will be converted to water-blown technology. The company currently uses one 14 year old Elastorgran high pressure dispenser and one 9-year old Urosan low pressure dispenser and epoxy molds. For the integral skin foam it operates a 14-year old OMS low pressure dispenser and a Saip high pressure dispenser installed in March 1995.

5. The company uses 80 epoxy molds for the flexible molded foam. For the integral skin foam production, it uses 65 epoxy molds, 15 of which were purchased after 1995 and 20 steel molds also purchased after 1995.

6. Both production of flexible molded foam and integral skin foam will be converted to water-blown. The company requests capital cost of US \$469,000 which includes the cost of retrofit of the dispensers which involves essentially replacement of the mixing heads (US \$50,000), in-mold coating (US \$20,000), ventilation for in-mold coating (US \$16,000), 50 aluminium reinforced epoxy molds (US \$150,000), reinforcement of 4 turn tables (US \$20,000), 4 air-water systems for turn tables (US \$28,000), mold carriers (US \$160,000). Trials, training and technology transfer costs amount to US \$25,000. Incremental operating cost of US \$132,141 is also requested.

Rigid Foam

Purtiz

7. Purtiz, a 100% Turkish owned company, produces rigid polyurethane foam products for a variety of applications, including pipe segments, insulation of LCD tanks, insulating panels for cold room buildings. The company consumed 52.9 tonnes of CFC-11 in 1999 in its production

of rigid foam. The production will be converted to HCFC-141b technology. The company currently uses three low pressure dispensers – a 14-year old 60 Kg/min Cannon – Viking, a 23-year old 15 kg/min Valentino and a 14-year old 20 kg/min Admiral. The company also uses two Gusmer sprayfoam dispensers for field operations. The capital cost of conversion includes the replacement of the current three low pressure machines with two new high pressure machines at a total cost of US \$155,000, with deduction of \$62,000 to account for their old age, retrofit of the sprayfoam dispensers at US \$3,000 each, technology transfer (US \$10,000), commissioning and start-up (US \$10,000). Incremental operational cost amounting to US \$253,815 is requested.

Justification for the use of HCFC-141b

8. Justification for the use of HCFC-141b is described in the document together with a comparison of conversion costs of replacement with HCFC-141b and with hydrocarbons which were discussed with the company. It states that the company, considering its location relative to other industries, the need to continue its field and factory productions based on one technology, long term safety issues relating to the use of inflammable blowing agent selected HCFC-141b technology as the interim technology until approximately 2005. A copy of the justification from UNIDO and the Government's letter endorsing the selection are attached as annexes to this evaluation.

Impact of the projects

9. 148.1 tonnes of CFC-11 will be phased out by the three projects. This constitutes 8.3% of Turkey's 1999 consumption of Annex A Group I substances. There will be residual ODS consumption of 6.55 tonnes as a result of the use of HCFC-141b.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

Integral skin foam

Umbrella project

1. Agreement has not been reached with the World Bank on the eligible grants of some of the individual enterprises in the group.

Urosan

2. Agreement on eligible grant for this project also has not been reached on account of the eligibility of the underlisted cost items as incremental cost, as well as the calculation of incremental operational costs.

- Aluminium reinforced epoxy molds	US \$150,000
- Reinforcement of turn tables	US \$20,000
- Air-water system for turn tables	US \$28,000
- Mold carriers	US \$160,000
- Costs relating to replacement of mixing heads	US \$30,000

3. The items have not been considered as essential for the conversion from CFC-based production to water-based and therefore have not been requested or approved in similar projects. The non-essentiality of these items has been confirmed by industry experts contacted by the Secretariat. Consequently the Secretariat informed the World Bank that costs associated with the above items are not incremental.

4. The discussion on the two projects is continuing and the outcome will be communicated to the Sub-committee on Project Review.

Rigid foam

5. The Secretariat and UNIDO have discussed the project and agreed on the eligible incremental capital cost. However no agreement has been reached on the incremental operating cost. The matter is still under discussion and the Sub-Committee on Project Review will be informed of its outcome.

Table 1: Profile of Enterprises in the Turkey Umbrella project – 11 Enterprises

Enterprise	Started Production	ODS Use Tonnes 1999	Foam Products*	Baseline Equipment/Year Installed**	Impact ODP Phase out Tonnes	ICC** * US \$	IOC** * US \$	Total Project Cost US \$	Requested Grant US \$	Cost-effectiveness US \$/kg
Erdogan Rurmenler	1986	0.45	ISF Automotive	Homemade LPD 1997 Hennecke LPD 1994	0.40	45,100	814	45,917	6,876	16.86
KarakayaCelik	1984	2.70	FSF furniture	LP homemade LPD	2.45	29,150	4,885	34,035	34,035	
Una Polyuretan	1994	0.55	ISF, FMF automotive	3 homemadeLPD 1994, 1996, 1997	0.57	37,950	985	38,935	8,322	16.86
Iksan Ltd	1989	1.49	FMF automotive	3 Cannon LPD 1989, 1993, 1998	1.49	38,500	6,443	44,943	25,037	16.86
Ak-Kom	1980	1.53	FMF automotive	1 Cannon LPD 1992	1.53	24,750	6,638	31,388	25,796	16.86
Karsan	1989	0.68	ISF, FMF furniture	1 OMS LPD	0.64	32,450	2,075	34,525	10,848	16.86
Goldsit	1992 FMF 1997	1.46	ISF, FMF furniture	Cannon HPD 1997 Cannon LPD 1995	1.40	37,400	2,646	40,046	22,352	16.86
Buoflex	1991	4.50	ISF furniture, automotive	Cannon LPD 1997 Cannon LPD 1991	4.08	37,400	8,142	45,542	45,542	11.16
Gervener	1984	30.00	ISF automotive	Gusmer LPD 1992	30.00	33,000	130,165	163,165	163,165	5.44
Yaris Kabin	1982	1.95	FMF automotive	Homemade LPD 1991	1.95	24,750	6,769	31,519	26,302	16.86
Hisarlar	1985	3.90	FMF automotive	OMS LPD 1988	3.90	27,500	14,383	41,883	35,601	10.74
Total					48.48	367,950	183,945	551,898	403,876	8.54

* FMF: flexible molded foam; ISF: integral skin foam

** All the baseline equipment were installed before 25 July 1995, except...

LPD: Low pressure dispenser

*** ICC: Incremental capital cost, including contingency (10%)

IOC: Incremental operating cost (2 years NPV)

Justification for Selection of Alternative Technology (World Bank)

The following technologies have been considered for the conversion of integral skin production:

- Hydrocarbons, especially pentanes, characterized by:
 - Good end-product quality;
 - Flammability, requiring special safety measures (ventilation, gas detection) in mixing area, pouring area as well as storage area; and
 - High conversion costs, e.g. new HP dispensers (retrofit of LP dispensers not possible), mixing equipment (premixed systems not available) and safety measures.
- HFC-134a, characterized by:
 - Good end-product quality;
 - Relatively high conversion costs (HP dispenser);
 - High operating costs; and
 - HFC-134a is contributing to global warming and is hence, part of the Kyoto Protocol and it's use may be restricted in future.
- All-water, characterized by:
 - Relatively high conversion costs (HP dispenser and molds); and
 - No skin formation requiring in-mold coating (IMC) for proper end-product quality;
- HCFC-141b, characterized by:
 - Good end-product quality;
 - Low conversion costs (dispensers can be retrofitted); and
 - Transitional technology due to the ODP of HCFC-141b.

The enterprises have been fully informed of the available technical options. They have also been informed that HCFC-141b is a transitional substance, and that they under the present rules of the Multilateral Fund will not be able to seek additional funding from MPMF at a later date to convert to a zero-ODP technologies. However, based on above – and especially the high conversion costs related to zero-ODP technologies, the enterprises producing integral skin foam have decided to convert to HCFC-141b. They are committed to convert into zero-ODP technology with their own funds in future.

A potential zero-ODP technology could be “liquid” HFC’s, e.g. HFC-245 or HFC-365, which are developed to be drop-ins for CFC-11 and HCFC-141b. The liquid HFC’s are expected to be commercially available within a couple of years. Conversion into liquid HFC’s will be minor.

For the production of flexible molded foam the following technologies has been considered:

- HCFC-141b, which is rejected due to its ozone depleting potential and due to the presence of final technologies that can be implemented at reasonable costs and with satisfying foam properties;
- LCD which is rejected due to high conversion costs;

- All-water which is selected as:
 - Existing dispensers can be used without modifications;
 - Reasonable conversion costs; and
 - Provides good foam properties.

Additional Justification for Using HCFC Technology (UNIDO)

Justification for Selection of HCFC-141b in the production of rigid polyurethane foam for insulating purposes

The following criteria were considered while evaluating the alternatives:

- Environmental acceptability
- Location of the company
- Physical properties of end products
- Maturity of the technology
- Safety and applicability in the enterprise factory environment
- Price, product availability, and cost-effectiveness
- Energy efficiency impact
- CFC-11 replacement technology selected by competitors
- MLF ExCom decisions relating to HCFC and hydrocarbon technologies

To assist the enterprises in the selection of a CFC 11 replacement technology, separate project budgets were prepared for the HCFC-141b, and n-pentane technology options. See annex D.

Whilst recognising the environmental benefits of n-pentane versus HCFC-141b, Purtiz Co. selected HCFC-141b as a first stage, interim, replacement for CFC-11. The decision in favour of HCFC-141b was based on the lower investment costs, and the fact that it is more appropriate to the existing skill level of the work forces at the enterprise.

The company is surrounded by textile and pharmaceutical as well as food processing companies with limited space for any relocation of current production facilities and let alone for eventual needed safety arrangements.

The company would like to keep its field operations while using one kind of foaming technology only. The use of n-pentane as a blowing agent would be practically impossible in such a case.

Purtiz Co. understands the implications of the selection of HCFC-141b technology, and the potential cost of subsequent replacement of HCFC-141b at an undetermined future date. They accept and commit to a future change from HCFC-141b to a zero-ODP technology, and that they will have to bear all associated costs.

Other factors also influenced the enterprise decisions in favour of HCFC-141b technology:

- HCFC-141b is the technology adopted by most of their existing, or potential, competitors in Turkey. With no local supplies, no other local demand, and its own small requirements, the enterprise was concerned about both product availability, and the price of pentanes in Turkey.
- Whilst MLF ExCom decisions relating to CFC-11 replacement technology selection may "presume" against the use of HCFCs, such HCFC based technologies are not prohibited and may still be considered eligible for MLF assistance. The Turkish Ministry of Environment, the responsible Government counterpart, supports the selection of HCFC-141b as an Ainterim@ CFC replacement technology at

Purtiz Co.

- Purtiz Co. expressed concern regarding the longer term safety issues related to the introduction of a flammable blowing agent technology into their factory environment and their choice *at the present time* is a non-flammable HCFC replacement.

The selection of HCFC-141b technology by the enterprise in this project as the immediate replacement of CFC -11 is a realistic and sensible choice under the prevailing circumstances. *The enterprise understands that HCFC -141b is an interim solution* that will require a change to an appropriate zero-ODP technology at some future date. Based on the present status of non-flammable zero-ODP technologies, *they expect to utilize HCFC-141b **technology until approximately 2005.***

REPUBLIC OF TURKEY
MINISTRY OF ENVIRONMENT

General Directorate of Environmental Pollution Prevention and Control

Eskişehir yolu 8.km Bilkent Kavşağı 06530 ANKARA

Tel: (90-312) 287 99 63 Fax: (90-312) 285 58 75

Our Reference: B.19.0.ÇKÖ.0.02.00.03-
Subject : HCFC Projects

3666-7490

September 3, 1999

To Whom it May Concern

Please note that I am writing to respond to the Decision 27/13 of Montreal Protocol Multilateral Fund Executive Committee.

I would like to inform you that the Regulation on the Phase-out of Ozone Depleting Substances entered into force on 25th July 1999 which introduces an early phase-out of Annex A Group I and Annex B Group II and III substances and adopts 1 January 2000 as the target date for phase-out. The imports of these substances have been subject to quantity restrictions since 30th June 1998. Our policy dictates that commencing on 1 January 2000 only the amounts required for servicing the products functioning of which relies on these substances shall be imported, and no allocation shall be made for use in manufacturing of new products either containing or produced with these substances.

Under this policy companies using these substances have to complete their technology conversion, as soon as possible, by the year 2000.

Therefore having reviewed the specific situations in the project(s) as well as our HCFC commitments under Article 2F of the Protocol and understood that no funding would be available for the future conversion from HCFCs for these companies, we have nonetheless determined that at the present time, the projects needed to use HCFCs for an interim period.

Best regards.



Serpil BAĞCI
Acting General Director

**REPUBLIC OF TURKEY
MINISTRY OF ENVIRONMENT**

General Directorate of Environmental Pollution and Control

*Eskişehir Yolu 8.km Bilkent Kavşağı Lodumlu 06530 Ankara-TURKEY
Tel:90-312-287 99 63 (10 lines) Fax:90-312-285 58 75*

Our Reference: B.19.0.ÇKÖ.0.02.00.03-
Subject :Pürtiz Project

4242

October 4, 2000

Ms.Şeniz YALÇINDAĞ
Director, Montreal Protocol Branch
Sectoral Support and Environmental Sustainability Division
United Nations Industrial Development Programme
P.O.Box.300 A-1400 Vienna, AUSTRIA

Dear Ms. Yalçındağ:

I am writing with reference to ODS phase-out project of Pürtiz Teknik İzolasyon Sanayi ve Tic. A.Ş.

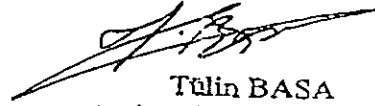
As you may well know, import of CFCs has been subjected to quantity restrictions since 1998. During the negotiations we requested, so the legislation dictates, the companies to phase-out the consumption of CFCs in their production lines as soon as possible.

Fully aware of the decisions taken by the Multilateral Fund Executive Committee, we hereby declare that we have reviewed the specific situations involved with the project(s) as well as our HCFC commitments under Article 2F; nonetheless determined that, at the present time, the projects needs to use HCFCs for an interim period; and thus understand that no funding will be available for the future conversion from HCFCs for these companies. Therefore I would like to inform you that the company concerned has been communicated on this issue and so advised.

Based on the information provided and the letters signed by Pürtiz Teknik İzolasyon Sanayi ve Tic. A.Ş., we hereby approve and endorse the ODS phase-out project of the company.

Please proceed with the relevant procedures for submission of the project and its implementation if Multilateral Fund Executive Committee agrees the funding.

Best regards.


Tulin BASA
Acting General Director



**United Nations
Environment
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Distr.
Limited

UNEP/OzL.Pro/ExCom/32/30/Turkey/Corr.1
17 November 2000

ORIGINAL: ENGLISH

EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Thirty-second Meeting
Ouagadougou, 6-8 December 2000

Corrigendum

PROJECT PROPOSALS: TURKEY

Replace page 2 with the following page 2.

Replace pages 5 and 6 with the following pages 5-6.

PROJECT EVALUATION SHEET TURKEY

SECTOR: Foam ODS use in sector (1999): 1,049 ODP tonnes

Sub-sector cost-effectiveness thresholds: Integral skin US \$16.86/kg
Rigid US \$7.83/kg

Project Titles:

- (a) Umbrella project. Conversion from CFC-11 into all-water technology for flexible molded and HCFC-141b for integral skin foams at 11 enterprises
- (b) Conversion from CFC-11 into all-water technology for flexible molded and integral skin foams at Urosan
- (c) Phase-out of CFC-11 consumption by conversion to HCFC-141b technology at Purtiz Co. in the manufacture of rigid polyurethane foam for insulating purposes

Project Data	Integral skin		Rigid
	11 enterprises	Urosan	Purtiz
Enterprise consumption (ODP tonnes)	57.50	39.50	58.00
Project impact (ODP tonnes)	48.70	39.50	52.85
Project duration (months)	36	36	30
Initial amount requested (US \$)	403,878	666,381	394,615
Final project cost (US \$):			
Incremental capital cost (a)	309,500	145,000	120,000
Contingency cost (b)	30,950	14,500	12,000
Incremental operating cost (c)	183,945	132,141	169,094
Total project cost (a+b+c)	524,396	291,641	301,094
Local ownership (%)	100%	100%	100%
Export component (%)	0%	0%	0%
Amount requested (US \$)	398,378	291,641	301,094
Cost effectiveness (US \$/kg.)	8.18	7.38	7.30
Counterpart funding confirmed?			Yes
National coordinating agency	Technology Development Foundation		Ministry of Environment
Implementing agency	IBRD		UNIDO

Secretariat's Recommendations			
Amount recommended (US \$)	398,378	291,641	301,094
Project impact (ODP tonnes)	48.50*	39.50	52.85
Cost effectiveness (US \$/kg)	8.21	7.38	5.70
Implementing agency support cost (US \$)	51,789	37,913	39,142
Total cost to Multilateral Fund (US \$)	450,167	329,554	340,236

*For purposes of calculating the cost-effectiveness of the projects only the ODS consumption eligible for funding has been taken into consideration.

of rigid foam. The production will be converted to HCFC-141b technology. The company currently uses three low pressure dispensers – a 14-year old 60 Kg/min Cannon – Viking, a 23-year old 15 kg/min Valentino and a 14-year old 20 kg/min Admiral. The company also uses two Gusmer sprayfoam dispensers for field operations. The capital cost of conversion includes the replacement of the current three low pressure machines with two new high pressure machines at a total cost of US \$155,000, with deduction of \$62,000 to account for their old age, retrofit of the sprayfoam dispensers at US \$3,000 each, technology transfer (US \$10,000), commissioning and start-up (US \$10,000). Incremental operational cost amounting to US \$253,815 is requested.

Justification for the use of HCFC-141b

8. Justification for the use of HCFC-141b is described in the document together with a comparison of conversion costs of replacement with HCFC-141b and with hydrocarbons which were discussed with the company. It states that the company, considering its location relative to other industries, the need to continue its field and factory productions based on one technology, long term safety issues relating to the use of inflammable blowing agent selected HCFC-141b technology as the interim technology until approximately 2005. A copy of the justification from UNIDO and the Government's letter endorsing the selection are attached as annexes to this evaluation.

Impact of the projects

9. 148.1 tonnes of CFC-11 will be phased out by the three projects. This constitutes 8.3% of Turkey's 1999 consumption of Annex A Group I substances. There will be residual ODS consumption of 6.55 tonnes as a result of the use of HCFC-141b.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

Integral skin foam (Umbrella project and Urosan)

1. The Secretariat and the World Bank concluded discussion on the two projects, namely Urosan and the Umbrella project for 11 enterprises and agreed on their costs. The cost of Urosan includes costs relating to the replacement of the mixing heads but not those relating to replacement of molds. The agreed costs are as follows:

	ICC (including 10% contingency) US \$	IOC US \$	Total US \$
Umbrella project	340,450	183,945	398,378
Urosan	159,500	132,141	291,641

2. Consequently the following amounts are recommended for approval of the two projects.

Umbrella project	US \$398,378
Urosan	US \$291,641

3. The summary of the project costs of the individual enterprises in the umbrella project is provided below.

Agreed project costs of Turkey Umbrella project – 11 Enterprises

Enterprise	Project Impact* ODP Tonnes	ICC US \$	IOC US \$	Total Project Cost US \$	Requested Grant US \$	Cost-effectiveness* US \$/kg
Erdogan Rurmenler	0.408	27,500	814	28,314	6,878	16.86
KarakayaCelik	2.45	29,150	4,885	34,035	34,035	13.91
Una Polyuretan	0.57	27,500	985	28,485	8,322	16.86
Iksan Ltd	1.49	38,500	6,443	44,943	25,037	16.86
Ak-Kom	1.53	27,500	6,638	34,138	25,796	16.86
Karsan	0.64	33,000	2,075	35,075	10,848	16.86
Goldsit	1.40	37,400	2,646	40,046	22,352	16.86
Burflex	4.08	37,400	8,142	45,542	45,542	11.16
Gervener	30.00	27,500	130,165	157,665	157,665	5.26
Yaris Kabin	1.95	27,500	6,769	34,269	26,302	16.86
Hisarlar	3.90	27,500	14,383	41,883	35,601	10.74
Total	48.50	340,450	183,945	524,395	398,378	8.21

*For purposes of calculating the cost-effectiveness of the projects only the ODS consumption eligible for funding has been taken into consideration.

Rigid foam (Purtiz)

4. The Secretariat and UNIDO also concluded discussions on the incremental operational cost of the Purtiz project which was agreed as US \$169,094 instead of the original calculated amount of US \$253,815 resulting in the following project cost.

Incremental capital cost	US \$159,500
Incremental operational cost	US \$169,094
Total project cost	US \$301,094

Therefore the amount of US \$301,094 is recommended for approval as the agreed grant of the project.

RECOMMENDATIONS

1. The Fund Secretariat recommends the Umbrella, Urosan and Purtiz projects for blanket approval with the funding levels and associated support costs indicated in the table below.

	Project Title	Project Funding (US\$)	Support Cost (US\$)	Implementing Agency
(a)	Umbrella project. Conversion from CFC-11 into all-water technology for flexible molded and HCFC-141b for integral skin foams at 11 enterprises	398,378	51,789	IBRD
(b)	Conversion from CFC-11 into all-water technology for flexible molded and integral skin foams at Urosan	291,641	37,913	IBRD
(c)	Phase-out of CFC-11 consumption by conversion to HCFC-141b technology at Purtiz Co. in the manufacture of rigid polyurethane foam for insulating purposes	301,094	39,142	UNIDO



**United Nations
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Distr.
Limited

UNEP/OzL.Pro/ExCom/32/30/Venezuela
10 November 2000

ORIGINAL: ENGLISH

EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Thirty-second Meeting
Ouagadougou, 6-8 December 2000

PROJECT PROPOSAL: VENEZUELA

This document consist of the comments and recommendations of the Fund Secretariat on the following project proposal:

Refrigeration:

- Phasing out CFC-12 with HFC-134a and CFC-11 with HCFC-141b at seven commercial refrigeration companies (umbrella project)

UNIDO

PROJECT EVALUATION SHEET VENEZUELA

SECTOR: Refrigeration ODS use in sector (1999): 1,992 ODP tonnes

Sub-sector cost-effectiveness thresholds: Commercial US \$15.21/kg
Domestic US \$13.76/kg

Project Titles:

- (a) Phasing out CFC-12 with HFC-134a and CFC-11 with HCFC-141b at seven commercial refrigeration companies (umbrella project)

Project Data	Multiple-subsectors
	Seven companies
Enterprise consumption (ODP tonnes)	33.97
Project impact (ODP tonnes)	32.33
Project duration (months)	24
Initial amount requested (US \$)	403,590
Final project cost (US \$):	
Incremental capital cost (a)	367,582
Contingency cost (b)	36,008
Incremental operating cost (c)	
Total project cost (a+b+c)	403,590
Local ownership (%)	100%
Export component (%)	0%
Amount requested (US \$)	403,590
Cost effectiveness (US \$/kg.)	12.48
Counterpart funding confirmed?	
National coordinating agency	FONDOIN
Implementing agency	UNIDO

<i>Secretariat's Recommendations</i>	
Amount recommended (US \$)	403,590
Project impact (ODP tonnes)	32.33
Cost effectiveness (US \$/kg)	12.48
Implementing agency support cost (US \$)	52,467
Total cost to Multilateral Fund (US \$)	456,057

PROJECT DESCRIPTION

Sector Background

- Latest available total ODS consumption (1999)	5,316.60 ODP tonnes
- Baseline consumption of Annex A Group I substances (CFCs)	3,321.60 ODP tonnes
- Consumption of Annex A Group I substances for the year 1999	1,922.10 ODP tonnes
- Baseline consumption of CFCs in refrigeration sector	Not available ODP tonnes
- Consumption of CFCs in refrigeration sector in 1999	Not available ODP tonnes
- Funds approved for investment projects in refrigeration sector as of July 2000 (31st Meeting)	US\$13,667,583.00
- Quantity of CFC to be phased out in investment projects in refrigeration sector as of end of 1999	560.00 ODP tonnes

1. Based on data reported by Venezuela to the Ozone Secretariat, 1999 ODS consumption includes 3,321.5 ODP tonnes of CTC.

2. The Executive Committee has approved US \$13,667,583 for 24 projects to phase out 560 ODP tonnes of CFC for enterprises manufacturing refrigeration equipment.

3. The major manufacturers in the domestic and commercial refrigeration sector have been converted to non-ODS technology. The project covers the ODS phase out at seven small-scale enterprises in the commercial refrigeration sub-sector in Venezuela.

Umbrella project

4. The seven enterprises (Vikingo, Eterna, Indarelca, J.R. Refrigeracion, Inelmem, Couttenye and Refrinaza) consumed 28.05 ODP tonnes of CFC-11 and 5.92 ODP tonnes of CFC-12 (average of 1997-1999) in the manufacture of various types of commercial refrigeration equipment; air-conditioners, display cabinets, cooling compartments and commercial freezers.

5. The current project will phase out 28.05 ODP tonnes of CFC-11 and 5.8 ODP tonnes of CFC-12 at the seven enterprises by converting CFC-11 to HCFC-141b as the foam blowing agent, and CFC-12 to HFC-134a as the refrigerant. At Inelmen and Couttenye the low-pressure foaming machines will be scrapped and replaced with high-pressure machines for US \$85,000 each. In addition mould heating will be purchased at a unit price of US \$14,000. J.R. Refrigeracion and Refrinaza will modify the existing manual foaming technology and each will receive a low-pressure foaming machine for US \$36,000 per piece. All companies except Refrinaza will receive various charging, leak detection and evacuation equipment for a total amount of US \$55,700. The redesign and trial production costs will be borne by the companies.

The training and consultancy component in total is US \$7,500. Incremental operating cost is not claimed due to the cost effectiveness threshold limitations.

Justification for the use of HCFC-141b

6. The enterprise has selected HCFC-141b technology to replace CFC-11 in its foam blowing operations. It is an interim solution until non-CFC systems (different from hydrocarbons) are commercially available. A letter advising the Government decision to use HCFC technology has been received by the Secretariat in accordance with the Executive Committee Decision 27/13 and is attached to this evaluation together with a justification from the implementing agency.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

1. All the incremental capital and operating costs have been agreed between the Secretariat and UNIDO.

RECOMMENDATIONS

1. The Fund Secretariat recommends blanket approval of the umbrella project from UNIDO with the level of funding and associated support costs as indicated below.

	Project Title	Project Funding (US\$)	Support Cost (US\$)	Implementing Agency
(a)	Phasing out CFC-12 with HFC-134a and CFC-11 with HCFC-141b at seven commercial refrigeration companies (umbrella project)	403,590	52,467	UNIDO

Annex

Justification for the Use of HCFC Technology

Foam Blowing Agent

Table 2. shows the CFC-11 various alternatives for foam blowing and their ozone depleting potentials.

Table 2. Alternative blowing agents to replace CFC-11

<i>Foaming Agent</i>	<i>Ozone Depleting Potential (ODP)</i>
HCFC-141b	0.11
HCFC-142b	0.065
HCFC-142b + HCFC-22	0.06
HFC-134a	0
Cyclopentane	0

It can be seen that HCFC-141b, HCFC-142b and the blend of HCFC-142b/HCFC-22 all have some ODP and are therefore accepted only as transitional substances.

When considering the currently available long-term replacements the field is narrowed to HFC-134a and cyclopentane. In Europe, HFC-134a was used as a blowing agent for a short time, but it was abandoned because it is very expensive compared to CFC-11 and cyclopentane. It is very unlikely that HFC-134a will become a widely used ultimate blowing agent for polyurethane foam in the refrigeration sector.

Lately, all major European manufacturers have already started using cyclopentane to produce polyurethane foam and similar trend is seen in many other parts of the world except North America. However, cyclopentane is an explosive chemical and its application would require, *inter alia*, the installation of the following new equipment:

Since cyclopentane and polyol cannot be delivered premixed in drums or tanks, as is the case with polyol and CFC-11, it is necessary to provide an expensive explosion proof mixing station. The same applies for the foaming machine.

In order to ensure operational safety when using the highly flammable and explosive cyclopentane and to meet the relevant requirements of the local authorities, it is necessary to install a gas detector system in the foaming department around the foaming machine.

Due to the current layout of the plants where several machines are installed next to each other installation of comprehensive automatic sprinkler fire protection systems is inevitable.

In order to prevent hazards and achieve compliance with established safety rules for the machinery and the plant, a safety exhaust system is also necessary in the foaming department in all areas where cyclopentane is in use and could escape.

All machinery and equipment which may come into contact with pure cyclopentane or cyclopentane/polyol must be explosion-proof and/or encapsulated.

To make the foaming jigs explosion-proof, it is necessary to replace electrical contacts, switches, motors etc. with specially designed explosion-proof ones. All foaming jigs and plugs must be fitted with a good earth connection to avoid sparks generated by static electricity. The workers' clothes and shoes must be made of antistatic material and the floor must be covered with antistatic paint.

As a precaution against static induced explosions, it is also necessary to inject nitrogen into the foaming cavity, immediately prior to the injection of the polyurethane material into the cabinet. This requires installation of N₂ tank, ring line and injection nozzles.

An emergency motor-generator must be provided to supply electric energy for the safety system even in case of black-outs.

Following completion of the installation an international institution in cooperation with local authorities must certify the safe operation of the foaming installation.

These safety measures and new equipment would increase the cost of the project by at least US \$300,000 by company which would make the cost effectiveness of the project unacceptably high. The recipient enterprises have no financial means to complement the Multilateral Fund grant with the additional funds required for the implementation of the project with cyclopentane technology.

Moreover, the recipient companies are very small enterprises with weak technical support staff especially in the field of maintenance and the present staff would be not able to run the plant and carry out the required maintenance procedures.

On the other hand, formulations with HCFC-141b are already in common use in Venezuela, so various system houses can supply the necessary chemicals and also the recipient companies can receive day to day technical support from their local raw material suppliers. It is also known, that several multinational chemical companies are developing new non-hazardous substances for the "drop-in" replacement of HCFC-141b commonly used in North America and many other parts of the world. It is foreseen that introduction of such new blowing agents would not require major changes of the manufacturing equipment. These new chemicals are anticipated to be on market in the first half of the next decade.

In the course of the project formulation the companies were made aware of all currently available technical solutions for the phase out of CFC-11. The transitional nature of HCFC-141b and its ODP was introduced to them. Moreover, it was underlined that no additional assistance will be available from the Multilateral Fund in case the local regulations will require phase out of HCFC-141b in the later future. Despite of all this and on the basis of the aforementioned technical and financial considerations the recipient companies decided to adopt HCFC-141b as a replacement for CFC-11 for foam blowing. This is a justified decision in the said circumstances.