



**United Nations
Environment
Programme**

Distr.
LIMITED



UNEP/OzL.Pro/ExCom/22/35
3 May 1997

ORIGINAL: ENGLISH

Executive Committee of
the Multilateral Fund for the
Implementation of the Montreal Protocol

Twenty-second Meeting
Nairobi, 28-30 May 1997

PROJECT PROPOSALS: INDIA

This document includes the comments and recommendations from the Fund Secretariat on the following projects:

Foam

- Elimination of CFCs in the manufacture of rigid PU foam insulation at Super Urethane Products P. Ltd. UNDP
- Elimination of CFCs in the manufacture of rigid PU foam insulation at Delta Foams Engineering Co. UNDP
- Elimination of CFCs in the manufacture of rigid PU foam insulation at Blowkings UNDP
- Elimination of CFCs in the manufacture of rigid polyurethane foam in small and medium-sized enterprises (SMEs) UNDP
- Elimination of CFCs in the manufacture of rigid polyurethane foam chemical systems at Polymermann (Asia) Ltd. UNDP

Refrigeration

- Elimination of CFCs in the manufacture of commercial refrigeration equipment at Hindustan Refrigeration Industries World Bank
- Elimination of CFCs in the manufacture of commercial refrigeration equipment at Standard Refrigeration Appliances World Bank
- Elimination of CFCs in the manufacture of commercial refrigeration equipment at Refrigerators and Home Appliances P. Ltd. World Bank

- Elimination of CFCs in the manufacture of commercial refrigeration equipment at Polar Enterprises World Bank
- Elimination of CFCs in the manufacture of commercial refrigeration equipment at Refrigeration Components and Accessories World Bank
- Elimination of CFCs in the manufacture of commercial refrigeration equipment at Sheetal Engineering Works P. Ltd. World Bank
- Conversion of refrigerator manufacture to cyclopentane foam blowing agent and to HCF-134a refrigerant at Videocon Appliances Ltd. World Bank
- Elimination of CFCs in the manufacture of domestic refrigerators at Maharaja International Ltd. World Bank
- Conversion of domestic refrigerator manufacture to cyclopentane blowing agent and either R-600a or HCF-134a refrigerant at Voltas Ltd. World Bank
- Conversion to non-CFC technology in the production of MAC systems at Sanden Vikas India Ltd. World Bank
- Conversion to non-CFC technology in the production of MAC systems at Pranav Vikas India Ltd. World Bank

Solvent

- Elimination of 1,1,1 TCA from the precision cleaning processes at Modi Xerox World Bank

SECTOR:	Foams	ODS use in sector (1991):	1,577 ODP tonnes
Sub-sector cost-effectiveness thresholds:	Rigid		7.83 US \$/kg

- (a) Elimination of CFCs in the manufacture of rigid PU foam insulation at Blowkings.
- (b) Elimination of CFCs in the manufacture of rigid PU foam insulation at Delta Foams Engineering Co.
- (c) Elimination of CFCs in the manufacture of rigid PU foam insulation at Super Urethane Products T. Ltd.
- (d) Elimination of CFCs in the manufacture of rigid polyurethane foam in small and medium-sized enterprises (SMEs)
- (e) Systems house operations at Polymermann (Asia) Ltd.

Project Data	Rigid				Systems House
	Blowings	Delta	Super	SMEs	Polymermann
ODS phase-out (ODP tonnes)	19	12	42.4	290	N/A
Proposed project duration (Yrs)	2	2	2	3	
Incremental capital cost (US \$)	105,000	70,000	230,000	1,404,000	385,000
Contingency (%)	10	7	10	10	10
Incremental operational cost (US \$)	17,000	10,000	42,000		N/A
Total project cost (US \$)	132,000	85,000	295,000	1,404,000	385,000
Local ownership (%)	100	100	100	100	100
Export component (%)	0	0	0	0	0
Amount requested (US \$) {Original}	132,000	85,000	295,000	1,595,000	466,000
{Revised}				1,404,000	385,000
Cost effectiveness (US \$/kg)	7.51	7.64	7.54	5.5	N/A
National Coordinating Agency	Ministry of Environment & Forests (MOEF)				
Implementing Agency	UNDP				
Technical review completed?	Yes	Yes	Yes	Yes	Yes

Amount recommended (US \$)	132,000	85,000	282,000	1,404,000	385,000
Project impact (ODP tonnes)	17.57	12	39.1	290	N/A
Cost effectiveness (US \$/kg)	7.51	7.64	7.21	4.84	N/A
Implementing Agency support cost (US \$)	17,160	11,050	36,660	182,520	50,050
Total cost to Multilateral Fund (US \$)	149,160	96,050	318,660	1,586,520	435,050

PROJECT DESCRIPTION

Rigid Polyurethane Foam

1. At Blowkings, Delta Foams and Super Urethane, production is to be converted to water blown formulations, preceded by HCFC-141b as an interim step. Each project includes equipment replacement, as well as trials, training, technology transfer, contingency and incremental operational costs.

- (a) Elimination of CFCs in the manufacture of rigid PU foam insulation at Blowkings.

2. Blowkings will phase out the use of about 19 ODP tonnes of CFC-11 annually, in the manufacture of rigid foam for insulation applications. The company currently uses Cannon C-30 dispenser; output 30 lit/min., FF1600 dispenser; output 9 lit/min. at 1:1 ratio.

3. The main costs of the project are as follows:

High pressure dispenser	US \$80,000
Retrofit of low pressure dispenser	5,000
Technology transfer, trials and training	20,000
Incremental operational cost	17,000

- (b) Elimination of CFCs in the manufacture of rigid PU foam insulation at Delta Foams Engineering Co.

4. Delta Foams Engineering will phase out the use of about 12 ODP tonnes of CFC-11 annually, in the manufacture of rigid foam for insulation applications. The company currently uses the following equipment: C-60 dispenser; output 40 lit/min., Mark IV-A dispenser; output 12 lit/min.

5. The main costs of the project are as follows:

High pressure dispenser	US \$40,000
Retrofit of low pressure dispenser	15,000
Technology transfer, trials and training	15,000
Incremental operational cost	10,000

- (c) Elimination of CFCs in the manufacture of rigid PU foam insulation at Super Urethane Products T. Ltd.

6. Super Urethane Products will phase out the use of about 42.4 ODP tonnes of CFC-11 annually, in the manufacture of rigid foam for insulation applications. The company currently uses the following equipment: two C-60 dispensers; output 60 lit/min., one Viking mini-block producing machine; output 100 cu.m/hr.

7. The main costs of the project are as follows:

High pressure dispensers	US \$180,000
Retrofit of mini-block machine	15,000
Conditioning of pre-mixing unit	10,000
Technology transfer, trials and training	25,000
Incremental operational cost	42,000

- (d) Elimination of CFCs in the manufacture of rigid polyurethane foam in small and medium-sized enterprises (SMEs)

8. Eighty small and medium-sized enterprises (SMEs), producing rigid polyurethane foam, for thermoware and general insulation applications, estimated to represent about 70% of the enterprises in this sub-sector in India, will eliminate CFCs from their production. The project will be implemented in conjunction with the project for Polymermann (Asia) P. Ltd., a local polyurethane chemical systems producer in which that enterprise will develop the CFC-free systems required by the SMEs to implement the conversion.

9. The original costs of the project were as follows:

General works	US \$99,000
User enterprises	1,496,000
Polymermann (Asia) Ltd.	466,000
Incremental operational cost	4,960

10. A list of 70 of the 80 beneficiary enterprises in the project was provided. UNDP would provide information on the remaining 10 at a later date. The list provides information about the ODS consumption, the equipment being used and the products of the enterprises.

11. 60 (85%) of the known enterprises produce thermoware products while 10 (15%) produce general insulation foam products. Systems usage ranges from 6 tonnes to 39 tonnes per year with an average of 21 tonnes per year, while CFC usage ranges from 1 tonne to about 7 tonnes per year with average usage of 3.6 tonnes per year. 38 of the 70

enterprises use foam dispensers in their operations while 32 employ hand mixing operations.

12. All the enterprises will phase-out CFC-11 through the use of HCFC-141b initially and eventually water-blown systems using equipment to be provided through the project. All the enterprises in the group are expected to adopt similar technology. Similar equipment will be supplied to all the enterprises.

Polymermann (Asia) P. Ltd.

13. In this project, the facilities for the production of polyether and polyester based polyols at Polymermann (Asia) P. Ltd., will be converted to enable production of CFC-free formulations. The project also envisages the establishment of facilities for customizing, trials, evaluation and validation of CFC-free formulations, which will ensure indigenous and economic availability of these formulations, and also lead to a substantial indirect reduction in the incremental costs of phase-out of CFCs by the small and unorganized downstream foam producers serviced by this enterprise. This project is in line with the Government of India policy to support the role of the polyol producers, in making CFC-free formulations available to the user industry, and is similar in nature to the previous approved projects in this sector viz., Manali Petrochemicals, UB Petroproducts and Expanded Incorporation. The project will be implemented in conjunction with the group project covering small and medium enterprises (SMEs) in the rigid polyurethane foam sub-sector.
14. The original cost of the project was US \$466,000, which included high pressure dispenser (US \$120,000), pre-mixer (US \$80,000), measuring and testing devices (US \$55,000), ventilation (US \$40,000), explosion proof storage (US \$20,000), 'EO/PO' Pilot blender (US \$35,000) and jigs, molds, fixtures for trials (US \$15,000).

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

Rigid Polyurethane Foam

Super Urethane Products

1. The temperature conditioning for premixing unit was considered an ineligible capital cost item. Thus the capital cost was adjusted to US \$242,000.

SME Project

2. The project was discussed particularly in relation to technology transfer procedures, supply of equipment to the beneficiary enterprises, baseline conditions of the enterprises and systems house component. Consequently, the project costs (excluding contingency) were reorganized as follows:

- (i) Technology transfer and training component: US \$140,000

This item comprises the cost of equipment identification and evaluation as well as training at enterprise level to be arranged by UNDP.

- (ii) Enterprise level component: US \$1,136,000

The project was discussed in the light of Multilateral Fund's rules relating to cost eligibility and cost effectiveness. Although cost estimates were based on a budget provided by a domestic manufacturer of equipment, it was agreed that the supply of equipment would be open to all suppliers who would be able to provide appropriate equipment that would be within the budget of the project. The Secretariat noted that the specifications of equipment included in the project should be taken as a guide and that UNDP should be in a position to select any equipment that could be found to be cost effective and appropriate for the production activities of the enterprises. In arriving at the budget for the high pressure foam dispensers, suitable provisions have been made to reflect the differences in the baseline conditions existing at the enterprise level. The implementing agency will however retain the flexibility in allocating budgets for and in procurement of the foam dispensers for individual enterprises, to ensure that the project objective is achieved and the selected technology can be applied in accordance with established industrial standards and practices for operation and environmental/occupational safety. The project costs at the enterprise level, including technology transfer were agreed as follows:

Equipment for 44 enterprises foam dispensers @ US \$15,000 each	US \$	660,000
Equipment for 36 enterprises operating without foam dispensers @ US \$11,000 each		396,000
Technology transfer and training		140,000
Trials at each enterprise @ US \$1,000 each for 80 enterprises		80,000
Sub-total		<u>1,276,000</u>

The total project cost at enterprise level including 10% contingency (US \$127,600) amounted to US \$1,403,600 (US \$1,404,000).

(iii) Polymermann (Asia) Ltd.

The project was separated from the SME project in view of the fact that the company provided systems for a cross-section of foam manufacturers including the SME's.

One high pressure dispenser and pre-mixer for trials and demonstration	US \$	160,000
One Lab-scale autoclave reactor		15,000
One EO/PO Pilot blender		35,000
Jigs, molds, fixtures for trials		15,000
Ventilation, grounding and hydrocarbon monitoring		40,000
Explosion-proof hydrocarbon drum storage		20,000
Testing and measurements		25,000
Trial materials		20,000
Technology transfer for formulations (external process expert)		20,000
Sub-total		350,000
10% Contingency		35,000
Total	US \$	385,500

3. The approval of the systems house project for Polymermann (Asia) Ltd. will bring to four the number of systems house conversion projects approved for India

Impact of Projects on 1999 Freeze

4. The project documents indicate as follows:

The implementation of these projects, which will phase out CFC-11/12, will contribute directly to helping India to achieve the 1999 freeze.

RECOMMENDATION

1. The Fund Secretariat recommends blanket approval of the projects with the funding levels and associated support costs as indicated below.

Project Title	Project Cost US \$	Support Cost US \$	Implementing Agency
(a) Elimination of CFCs in the manufacture of rigid PU foam insulation at Blowkings.	132,000	17,160	UNDP
(b) Elimination of CFCs in the manufacture of rigid PU foam insulation at Delta Foams Engineering Co.	85,000	11,050	UNDP
(c) Elimination of CFCs in the manufacture of rigid PU foam insulation at Super Urethane Products T. Ltd.	282,000	36,660	UNDP
(d) Elimination of CFCs in the manufacture of rigid polyurethane foam in small and medium-sized enterprises (SMEs)	1,404,000	182,520	UNDP
(e) Systems house operations at Polymermann (Asia) Ltd.	385,000	50,050	UNDP

2. With regard to project (d) above (SMEs), UNDP should be mindful of the need to make the supply of equipment open to all interested equipment suppliers capable of supplying suitable foam equipment during project implementation to ensure cost-effectiveness.

PROJECT EVALUATION SHEET **INDIA**

SECTOR: REFRIGERATION ODS use in sector (1991): 1990 ODP tonnes

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

Project Titles:

- (a) Elimination of CFCs in the manufacture of commercial refrigeration equipment at Polar Enterprises
- (b) Elimination of CFCs in the manufacture of commercial refrigeration equipment at Refrigeration Components & Accessories
- (c) Elimination of CFCs in the manufacture of commercial refrigeration equipment at Sheetal Engineering Works P. Ltd.
- (d) Elimination of CFCs in the manufacture of commercial refrigeration equipment at Hindustan Refrigeration Industries
- (e) Elimination of CFCs in the manufacture of commercial refrigeration equipment at Refrigerators & Home Appliances P. Ltd.
- (f) Elimination of CFCs in the manufacture of commercial refrigeration equipment at Standard Refrigeration Appliances

Project Data	Commercial Refrigeration					
	Polar	Refrig. Comp.	Sheetal	Hindustan Ref.	Refrig. Home	Standard
ODS phase out (ODP tonnes)	11.5	9.5	9.2	10.2	12	20
Proposed project duration (Yrs)	2	2	2	2	2	1.5
Incremental capital cost (US\$)	80,850	80,300	81,950	81,400	83,600	89,100
Contingency (%)	10	10	10	10	10	10
Incremental operational cost (US \$)	57,340	45,070	45,680	50,920	63,700	81,080
Total project cost (US\$)	138,190	125,370	127,630	132,320	147,300	170,180
Local ownership (%)	100	100	100	100	100	100
Export component (%)						
Amount requested (US\$) {Original	138,000	125,000	128,000	132,000	147,000	170,000
{Revised						
Cost effectiveness (US\$/kg.)	12.0	12.16	13.91	12.44	12.25	8.54
National Coordinating Agency	Ministry of Environment and Forests (MOEF)					
Implementing Agency	World Bank	World Bank	World Bank	World Bank	World Bank	World Bank
Technical review completed?	Yes	Yes	Yes	Yes	Yes	Yes
Secretariat's Recommendations						
Amount recommended (US \$)						
Project Impact (ODP tonnes)						
Cost effectiveness (US \$/kg)						
Implementing Agency support cost (US\$)						
Total cost to Multilateral Fund						

PROJECT DESCRIPTION

- (a) Elimination of CFCs in the manufacture of commercial refrigeration equipment at Polar Enterprises
(Phase-out of 8 ODP tonnes of CFC-11 and 3.5 ODP tonnes of CFC-12)
- (b) Elimination of CFCs in the manufacture of commercial refrigeration equipment at Refrigeration Components & Accessories
(Phase-out of 6.5 ODP tonnes of CFC-11 and 3 ODP tonnes of CFC-12)
- (c) Elimination of CFCs in the manufacture of commercial refrigeration equipment at Sheetal Engineering Works P. Ltd.
(Phase-out of 6.2 ODP tonnes of CFC-11 and 3 ODP tonnes of CFC-12.)
- (d) Elimination of CFCs in the manufacture of commercial refrigeration equipment at Hindustan Refrigeration Industries
(Phase-out of 6.9 ODP tonnes of CFC-11 and 3.3 ODP tonnes of CFC-12)
- (e) Elimination of CFCs in the manufacture of commercial refrigeration equipment at Refrigerators & Home Appliances P. Ltd.
(Phase-out of 8.4 ODP tonnes of CFC-11 and 3.6 ODP tonnes of CFC-12)
- (f) Elimination of CFCs in the manufacture of commercial refrigeration equipment at Standard Refrigeration Appliances
(Phase-out of 15.5 ODP tonnes of CFC-11 and 4.5 ODP tonnes of CFC-12).

1. These projects will achieve phase-out of the quantities of CFC-11 and CFC-12 indicated above which are consumed in the production of commercial refrigeration equipment. The phase-out will be achieved by converting foam operations to water-blown systems (with a combination of water and HCFC-141b based systems as an interim step) and to HFC-134a as the refrigerant. The projects propose the replacement of existing low pressure foam pouring units by equivalent high pressure units, the supply of refrigerant evacuation and charging equipment, and provision for trials, training and eligible incremental operating costs.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

- 1. Each project contains a statement that " implementation of the projects will contribute to helping India to achieve the 1999 freeze."
- 2. The six projects involve small to medium enterprises manufacturing from around 2000 to 6000 items of commercial refrigeration equipment per year. The enterprises are basically small

metal working shops which have developed expertise in the manufacture of foam-filled metal refrigeration cabinets and the addition of simple refrigeration circuits.

3. HCFC-141b foam technology is proposed. Each project contains detailed justification for the use of a transitional chemical. On technical grounds, the use of HCFC-141b makes for a simple and cheap conversion process.

4. In this regard it should be noted that although the projects are for small and medium enterprises, each was submitted at a cost lower than the cost effectiveness threshold for this sector, with no financial contribution from the enterprises. There is also scope for more cost-effective project design and implementation in the future as outlined below.

5. Each project has a total provision of US \$30,000 for technology transfer and trials. This level of funding is recommended as it is consistent with allocations in previous projects, and costs of this order could be expected when implementing an individual project. However this amounts to a total of US \$180,000 for the six projects. As well, an additional US \$350,000 was allocated for technology transfer and trials in some 14 similar projects previously approved for India. Clearly, substantial efficiencies can be realized if the technology transfer for these projects is organized on the basis of project groups, instead of individual implementations. This should be reflected in all future projects of this nature.

6. Minor amendments have been recommended in operational costs to reflect established costs of hardware such as capillary tubes and filter/dryers.

7. Incremental operating costs in each project include costs for compressors. Since compressor manufacture is being funded in India, no recommendation can be made on this cost element, and thus the total project costs, until the policy on compressor costs has been decided by the Executive Committee. All other cost elements have been agreed with the World Bank. The project costs will be calculated after a policy decision on compressor costs has been taken so that the projects can go forward for approval.

RECOMMENDATIONS

1. The Fund Secretariat recommends that the projects be approved. The level of funding should be calculated on the basis of the decision taken by the Executive Committee on incremental operating costs for compressors.

2. The Fund Secretariat further recommends that the World Bank be asked to develop a group approach for the transfer of technology in these projects, in similar projects in India already approved but not yet implemented, and in future projects prepared in the commercial refrigeration sub-sector in India, with the objective of providing effective technology transfer and trials at 50 per cent of the cost allocated in the current projects.

PROJECT EVALUATION SHEET **INDIA**

SECTOR: Refrigeration ODS use in sector (1991): 1,990 ODP tonnes

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

Project Titles:

- (a) Elimination of CFCs in the manufacture of domestic refrigerators at Maharaja International Ltd.
- (b) Conversion of refrigerator manufacture to cyclopentane foam blowing agent and to HFC-134a refrigerant at Videocon Appliances Ltd.
- (c) Conversion of domestic refrigerator manufacture to cyclopentane blowing agent and either R-600a or HFC-134a refrigerant at Voltas Ltd.

Project Data	Domestic		
	Maharaja	Videocon	Voltas
ODS phase-out (ODP tonnes)	59.83	358.7	354
Proposed project duration (Yrs)	2.5	2.5	2.5
Incremental capital cost (US\$)	1,057,000	2,268,800	4,338,900
Contingency (%)	10	10	10
Incremental operational cost (US\$)	427,852	1,508,064	51,765
Total project cost (US\$)	1,590,552	4,003,744	4,824,555
Local ownership (%)	49	100	97.93
Export component (%)			
Amount requested (US\$) {Original	779,370	4,003,744	4,724,687
{Revised			
Cost effectiveness (US\$/kg)	9.69	8.73	10.08 or 12.62 ¹
National Coordinating Agency	MOEF	MOEF	MOEF
Implementing Agency	World Bank	World Bank	World Bank
Technical review completed?	Yes	Yes	Yes

<i>Secretariat's Recommendations</i>			
Amount recommended (US \$)			2,724,378
Project impact (ODP tonnes)			354
Cost effectiveness (US \$/kg)			7.73 or 11.8 ¹
Implementing Agency support cost (US\$)			354,169
Total cost to Multilateral Fund			3,078,547

¹ Cost-effectiveness depends on choice of final technology option for refrigerant, between HFC-134a and isobutane.

PROJECT DESCRIPTION

- (a) Elimination of CFCs in the manufacture of domestic refrigerators at Maharaja International Ltd.
- (b) Conversion of refrigerator manufacture to cyclopentane foam blowing agent and to HFC-134a refrigerant at Videocon Appliances Ltd.
- (c) Conversion of domestic refrigerator manufacture to cyclopentane blowing agent and either R-600a or HFC-134a refrigerant at Voltas Ltd.

1. ODS consumption in the domestic refrigeration sub-sector in 1991 was 700 MT. The updated 1996 figure provided by the Government of India is about 2,200 MT. The domestic refrigeration sub-sector in India is comprised of eight manufacturers with a combined total production capacity of over 5 million units annually.

2. The total amount of 772.5 ODP tonnes will be phased-out as a result of conversion of three domestic refrigerator manufacturers under the proposed projects.

3. Implementation of three domestic refrigeration projects submitted to the 22nd Executive Committee Meeting is essential for India to meet the 1999 freeze.

Maharaja International Ltd. & Videocon Appliances Ltd.

4. Maharaja and Videocon are major domestic refrigerator manufacturers in India with a production level of 100,000 and 410,000 units in 1996 respectively. The companies have chosen cyclopentane as a substitute for CFC-11 blowing agent and HFC-134a as a new refrigerant.

5. Conversion to cyclopentane involves the installation of a cyclopentane storage facility, the replacement of pre-mixing stations, retrofitting of foaming machines and foaming jigs and the installation of equipment to meet necessary safety requirements, training and technical assistance, installation, start-up and commissioning.

6. Conversion to HFC-134a entails changes to the existing production lines, re-design, testing and trials, technology transfer, installation and training.

7. Operating costs are requested for a period of 6 months. The cost of imported compressors is included in the calculation of operating cost.

Voltas Ltd.

8. Voltas has three refrigerator factories. The total production level was 493,000 units in 1996.

9. The company has chosen cyclopentane as a substitute for CFC-11 blowing agent. The project requests financial allocations only for conversion of the foam operation, as Phase I of the

project. Phase II, refrigerant conversion will be submitted at a future date. Phase II will involve the replacement of CFC-12 with either HFC-134a or isobutane. Options in Phase II are being kept open because the direction that will be taken by the domestic refrigeration industry in India is not yet clear. An estimate of the cost of Phase II conversion is provided in the project document for both options. The cost-effectiveness is calculated on the basis of Phase I and Phase II for each option. The cost-effectiveness of each option is below the threshold value.

10. The Phase I conversion as proposed, involves installation of cyclopentane storage facility, replacement of pre-mixing stations, installation of additional pre-heating ovens, retrofitting of foaming machines and foaming jigs and the installation of equipment to meet necessary safety requirements. The project also covers funding safety audit, technical assistance, training, installations, start-up and commissioning.

11. Incremental operating costs are requested for a 6 month period.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

1. The project document advises that implementation of the three projects is essential to meet the 1999 freeze.

Voltas

2. All the cost elements have been discussed and agreed upon with the World Bank. Costs of retrofitting of foaming machines, cyclopentane storage, modification of jigs and safety equipment have been adjusted in accordance with the recent quotations. Cost of new pre-heating ovens and civil work has been recognized as ineligible.

Videocon and Maharaja

3. All the cost elements have been discussed and agreed upon with the World Bank. Without any provision for incremental operating costs associated with non-CFC compressors, the grant amounts have been determined as follows:

Videocon	US \$1,835,115
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Maharaja	US \$510,000
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4. The only issue needing consideration before recommending the two projects for blanket approval, is that of the incremental cost for HFC-134a compressors. Two projects for compressor conversion have been funded in India, and three more compressor conversion projects

are expected to be submitted for consideration by the Executive Committee in the future. Since compressor conversion has already been funded in India, no recommendations can be made on this cost element and thus, on the total project costs until the policy on compressor costs has been decided by the Executive Committee. The project costs will be calculated after a decision on compressor costs has been taken so that projects can go forward for approval.

5. The World Bank has advised that, following final determination of project costs, it will need to inform the enterprise of the proposed level of grant and obtain confirmation that the enterprise wishes to proceed.

6. Safety related costs for conversion of certain foaming system components need further evaluation by the implementing agencies and the Secretariat with involvement of specialized experts. The results of this examination will be reported to the Executive Committee in due course.

RECOMMENDATIONS

1. The Fund Secretariat recommends blanket approval of the project for Voltas as indicated in the table below:

2. The Fund Secretariat recommends approval of the project for Maharaja and Videocon. The level of funding should be calculated on the basis of the decision taken by the Executive Committee on incremental operating costs for compressors.

	Project Cost US \$	Support Cost US \$	Implementing Agency
(a) Elimination of CFCs in the manufacture of domestic refrigerators at Maharaja International Ltd.	t.b.a	t.b.a.	World Bank
(b) Conversion of refrigerator manufacture to cyclopentane foam blowing agent and to HFC-134a refrigerant at Videocon Appliances Ltd.	t.b.a	t.b.a.	World Bank
(c) Conversion of domestic refrigerator manufacture to cyclopentane blowing agent and either R-600a or HFC-134a refrigerant at Voltas Ltd.	2,724,378	354,169	World Bank

PROJECT EVALUATION SHEET **INDIA**

SECTOR: REFRIGERATION ODS use in sector (199): ODP tonnes

Sub-sector cost-effectiveness thresholds: MAC and compressors N/A

Project Titles:

- (a) Conversion to non-CFC technology in the production of MAC compressors at Sanden Vikas Limited
(b) Conversion to non-CFC technology in the production of MAC systems at Pranav Vikas Limited

Project Data		
	Sanden Vikas	Pranav Vikas
ODS phase-out (ODP tonnes)	8.36	-
Proposed project duration (Yrs)	2	2
Incremental capital cost (US \$)	572,312	1,150,873
Contingency (%)	10	10
Incremental operational cost (US \$)	-	-
Total project cost (US \$)	1,144,624	1,150,873
Local ownership (%)	50	100
Export component (%)	-	-
Amount requested (US \$) {Original}	572,312	1,150,873
{Revised}		
Cost effectiveness (US \$/kg)	N/A	N/A
National Coordinating Agency	The Ministry of Environment and Forests	
Implementing Agency	World Bank	World Bank
Technical review completed?	Yes	Yes

Secretariat's Recommendations:		
Amount recommended (US \$)	490,820	944,914
Project impact (ODP tonnes)	8.36	-
Cost effectiveness (US \$/kg)	N/A	N/A
Implementing Agency support cost (US \$)	63,807	122,839
Total cost to Multilateral Fund (US \$)	554,627	1,067,753

PROJECT DESCRIPTION

- (a) Conversion to non-CFC technology in the production of MAC compressors at Sanden Vikas Limited
- (b) Conversion to non-CFC technology in the production of MAC systems at Pranav Vikas Limited

1. The project proposals are to convert CFC-12 based MAC compressors manufactured by Sanden Vikas India Ltd. (SVIL), and condensers manufactured by Pranav Vikas India Ltd. (PVIL) to HFC-134a refrigerant.

2. There is no direct CFC phase out from the MAC conversion; however, the project will phase out 8.36 ODP tonnes of CFC-113 used as solvent for washing compressor components by switching to a separate parts washing machine using an aqueous solution. In addition, the project will result in indirect phase out of 39.2 tonnes of CFC-12 used in the initial refrigerant charge of MAC units and reduction in CFC-12 servicing demand. Implementation of the project will contribute to helping India to achieve the 1999 freeze.

3. SVIL and PVIL are two companies belonging to the same group which produces MACs. SVIL is 50% owned by Sanden International of Japan. SVIL was established in 1982, with an installed capacity of 50,000 MAC units per year. PVIL was established in 1987; it is totally owned by Indian partners of SVIL, and manufactures condensers for supply to SVIL.

4. During the period April 1995 to March 1996, 16,066 MACs sets and 1,345 additional compressors were manufactured by SVIL, and 18,009 additional condensers were manufactured by PVIL.

5. The SVIL project is to modify the compressor assembly line to make it suitable for HFC-134a. The change will involve modification and replacement of equipment and related components. SVIL is proposing to import only the critical pieces of equipment and components (crimping machine and swaging machine) and assemble the production line in-house after locally sourcing other equipment (benches, conveyor system, tooling for checks), and modifying power lines, compressed air supply and circulation of solvents. This approach will minimize investment costs in the compressor manufacturing facility.

6. The eligible capital cost for the conversion of the compressor and MAC assembly lines in the original proposal was estimated at US \$1,107,035 including technology transfer fees, training, and installation and commissioning costs, before deducting the foreign ownership component.

7. The enterprise proposes to finance additional costs associated with equipment for manufacturing the compressor cylinder block, front housing, receiver drier and oil dehydrator, and technology transfer fees, estimated at US \$1,249,548. The Secretariat has not reviewed these costs, some of which would not be eligible.

8. The PVIL project is to modify the existing serpentine design condenser and evaporators to aluminum parallel flow technology to cope with increased condenser capacity required for HFC-134a refrigerant. Conversion entails replacement of the fin machine and associated equipment, including tube decoiling, straightening and cutting machinery and tube cleaning facilities, and an automatic temperature controlled brazing furnace.
9. The eligible capital cost for the conversion of the MAC evaporator and condenser line in the original proposal was estimated at US \$826,320 including technology transfer fees, training, and installation and commissioning costs. In addition, US \$200,000 will be paid by the enterprise for equipment that would also be used for the production of evaporators.
10. The company is planning to re-locate its operations to a new plant which involves expenses on land and building. It will also finance costs associated with cleaning equipment, air compressor, and electrical distribution and control systems, estimated at US \$1,178,589. The Secretariat has not reviewed these costs, some of which would not be eligible.
11. Incremental operating costs are not being requested.
12. The salvage value of redundant equipment has been estimated at US \$75,000 in SVIL and US \$146,000 in PVIL.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

1. The total project cost indicated in the Project Cover Sheet of the original proposal is US \$4,494,861. Of this amount, US \$1,723,184 is being claimed from the Multilateral Fund, after adjusting for foreign ownership component and deducting costs associated with additional equipment and land acquisition to be borne by the enterprises. However, not all of the project costs are related to the conversion to HFC-134 refrigerant for the current production capacity at the enterprises. Therefore, much of the costs proposed to be financed by the enterprises cannot be regarded as "cost sharing" and should not appear as part of the total project cost. The Secretariat's review dealt only with the incremental costs for the conversion of the existing manufacturing facilities.
2. The World Bank and the Secretariat discussed issues regarding increase in production capacity associated with the new equipment being requested, taking into consideration the sizes of the components currently manufactured by the enterprises. However, additional information provided by the World Bank, indicated that the new equipment will match the current installed production capacity.
3. Several pieces of equipment for production of condensers (fin machine, assembly machine, brazing furnace, multi-chamber tube and dies and tools for header plate production) would also be

used for production of evaporators and radiators which are not eligible for funding since they are not related to the change in refrigerant. The Secretariat and the World Bank agreed that 83% of the cost of this equipment was eligible, the difference being borne by the enterprise.

4. The Secretariat and the World Bank also agreed that some pieces of equipment used for production and testing of compressors were not eligible considering that these pieces are independent of the refrigerant used.

5. The technology transfer fees claimed from the Multilateral Fund, will be used both to obtain new compressor designs and designs for a range of MAC components, and to establish a new compressor production line. The Secretariat and the World Bank agreed that only the portion related to the compressor design, estimated at US \$175,000 was eligible for funding from the Multilateral Fund.

RECOMMENDATION

1. The Fund Secretariat recommends approval of the projects at the funding levels indicated below:

<u>Project Title</u>	<u>Project Cost</u> <u>US \$</u>	<u>Support</u> <u>Cost US \$</u>	<u>Implementing</u> <u>Agency</u>
(a) Conversion to non-CFC technology in the production of MAC compressors at Sanden Vikas Limited	490,820	63,807	World Bank
(b) Conversion to non-CFC technology in the production of MAC systems at Pranav Vikas Limited	944,914	122,839	World Bank

PROJECT EVALUATION SHEET **INDIA**

SECTOR: SOLVENT ODS use in sector (1991): 1490 ODP tonnes

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

Project Title:

Elimination of 1.1.1 TCA from the precision cleaning processes at Modi Xerox

Project Data	TCA
	Modi Xerox
ODS phase-out (ODP tonnes)	6.07
Proposed project duration (Yrs)	1
Incremental capital cost (US \$)	256,045
Contingency (%)	nil
Incremental operational cost (US \$)	600
Total project cost (US \$)	256,645
Local ownership (%)	64
Export component (%)	10
Amount requested (US \$) {Original}	164,253
{Revised}	-
Cost effectiveness (US \$/kg)	27.06
National Coordinating Agency	Ministry of Environment & Forests
Implementing Agency	World Bank
Technical review completed?	Yes

<i>Secretariat's Recommendations:</i>	
Amount recommended (US \$)	130,819
Project impact (ODP tonnes)	6.07
Cost effectiveness (US \$/kg)	21.55
Implementing Agency support cost (US \$)	17,006
Total cost to Multilateral Fund (US \$)	147,825

PROJECT DESCRIPTION

Elimination of 1.1.1 TCA from the precision cleaning processes at Modi Xerox

1. Modi Xerox is a 64 percent locally owned manufacturer of photocopying machines, supplying predominantly the local market. This project will provide funding for the elimination of an annual consumption of 60.7 ODP tonnes of TCA at Modi Xerox, which has already been accomplished by replacing current TCA-based cleaning process with one that uses a non-ozone depleting, non-chlorinated aqueous detergent. Previously, the enterprise used TCA in a two-sump vapour degreaser to remove machine oils, metal fillings, and other contaminants from photoreceptor parts which must be precision cleaned to a very high standard of cleanliness prior to their next step in the manufacturing process, that of placing a coating of selenium on the surface of the photoreceptor. The new cleaning process requires the purchase and installation of equipment capable of cleaning with the new aqueous solution. The new equipment makes use of heat from high-temperature, high-purity rinse water to assist drying of the parts.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

1. The proposal contains a statement that "implementation of the project will contribute to helping India to achieve the 1999 freeze".
2. The project was first submitted to the 18th Meeting of the Executive Committee but withdrawn before completion of the Secretariat's review. The project has subsequently been implemented by the enterprise and is being submitted for retroactive funding. Contingency costs have not been requested. The main difference from the initial proposal is that funding has not been requested for a high capacity de-ionized water system initially requested.
3. Minor cost and eligibility issues were discussed with the World Bank, for instance, to determine the duty and tax-free cost of the capital equipment, and the extent of consultant's costs which were eligible for funding. Corresponding amendments to capital costs were agreed. The proportion of product exported to non-Article 5 countries was clarified (10 percent).

RECOMMENDATION

1. The Fund Secretariat recommends blanket approval of the project with associated support costs at the funding level indicated in the table below:

<u>Project Title</u>	<u>Project Cost</u> US \$	<u>Support</u> <u>Cost US \$</u>	<u>Implementing</u> <u>Agency</u>
Elimination of 1.1.1 TCA from the precision cleaning processes at Modi Xerox	130,819	17,006	World Bank