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EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Twenty-ninth Meeting
Beijing, 24-26 November 1999

PROJECT PROPOSALS: INDIA

This document includes 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 integral skin polyurethane foam at Coolwels Automobile Engineers	UNDP
• Conversion from CFC-11 to fully water-based technology in the manufacture of flexible molded polyurethane foam at Delite Foam and Polymers	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 Harjas Plastic and Metal Components P. Ltd.	UNDP
• Conversion from CFC-11 to HCFC-141b technology in the manufacture of integral skin polyurethane foam at Jaiswal Industries	UNDP
• Conversion from CFC-11 to HCFC-141b technology in the manufacture of integral skin polyurethane foam at Premium Mouldings & Pressings P. Ltd.	UNDP
• Conversion from CFC-11 to fully water-based technology in the manufacture of flexible molded polyurethane foam and from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at Reactive Polymers Ltd.	UNDP

• Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam insulation at 24 small and medium-sized enterprises	UNDP
• Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam insulated thermoware at Crystal Electronics and Plastics	UNDP
• Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam insulated thermoware at Mayur Jugs P. Ltd.	UNDP
• Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam insulated thermoware at National Plastics	UNDP
• Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam insulation at Saddle Poly Products P. Ltd.	UNDP
• Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam insulation at Santech Industries	UNDP
• Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam insulated thermoware at Tokyo Plast International Ltd.	UNDP

Refrigeration

• Conversion of CFC-12 refrigerator manufacture to HFC-134a at Voltas (Hyderabad)	IBRD
• Conversion of CFC-12 refrigerator and compressor manufacture to R-600a at GGEAL (Phase II)	IBRD

PROJECT EVALUATION SHEET
INDIA

SECTOR: Foam ODS use in sector (1997): 2,737 ODP tonnes

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

Project Titles:

(a) Conversion from CFC-11 to HCFC-141b technology in the manufacture of integral skin polyurethane foam at Coolwels Automobile Engineers
(b) Conversion from CFC-11 to fully water-based technology in the manufacture of flexible molded polyurethane foam at Delite Foam and Polymers
(c) 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 Harjas Plastic and Metal Components P. Ltd.
(d) Conversion from CFC-11 to HCFC-141b technology in the manufacture of integral skin polyurethane foam at Jaiswal Industries
(e) Conversion from CFC-11 to HCFC-141b technology in the manufacture of integral skin polyurethane foam at Premium Mouldings & Pressings P. Ltd.
(f) Conversion from CFC-11 to fully water-based technology in the manufacture of flexible molded polyurethane foam and from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at Reactive Polymers Ltd.

Project Data	**Integral skin**	**Integral skin**	**Integral skin**	**Integral skin**	**Integral skin**	**Multiple-subsectors**
	Coolwels	**Delite Foam**	**Harjas**	**Jaiswal**	**Premium**	**Reactive Polymers**
Enterprise consumption (ODP tonnes)	17.18	11.20	21.50	14.20	19.25	30.94
Project impact (ODP tonnes)	15.75	11.20	20.24	13.06	17.71	29.62
Project duration (months)	36	36	36	36	36	36
Initial amount requested (US $)	133,221	188,832	246,386	152,070	138,432	354,175
Final project cost (US $):						
Incremental capital cost (a)	75,000	90,000	98,000	100,000	74,000	185,000
Contingency cost (b)	7,500	9,000	9,800	10,000	7,400	18,500
Incremental operating cost (c)	50,721	131,466	138,586	42,070	57,032	204,742
Total project cost (a+b+c)	133,221	230,466	246,386	152,070	138,432	408,242
Local ownership (%)	100%	100%	100%	100%	100%	100%
Export component (%)	0%	0%	0%	0%	0%	0%
Amount requested (US $)	133,221	188,832	246,386	152,070	138,432	354,175
Cost effectiveness (US $/kg.)	8.46	16.86	12.17	11.64	7.82	12.08
Counterpart funding confirmed?		Yes				Yes
National coordinating agency	Ministry of Environment & Forests					
Implementing agency	UNDP					

Secretariat's Recommendations						
Amount recommended (US $)	133,221			152,070	138,432	
Project impact (ODP tonnes)	15.75			13.06	17.71	
Cost effectiveness (US $/kg)	8.46			11.64	7.82	
Implementing agency support cost (US $)	17,319			19,769	17,996	
Total cost to Multilateral Fund (US $)	150,540			171,839	156,428	

* Includes integral skin (cost-effectiveness US $16.86/kg) and rigid foam (cost-effectiveness US $7.83).

PROJECT EVALUATION SHEET
INDIA

SECTOR: Foam ODS use in sector (1997): 2,737 ODP tonnes

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

Project Titles:

(g) Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam insulation at 24 small and medium-sized enterprises

(h) Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam insulated thermoware at Crystal Electronics and Plastics

(i) Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam insulated thermoware at Mayur Jugs P. Ltd.

(j) Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam insulated thermoware at National Plastics

(k) Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam insulation at Saddle Poly Products P. Ltd.

(l) Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam insulation at Santech Industries

(m) Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam insulated thermoware at Tokyo Plast International Ltd.

Project Data	**Rigid**	**Rigid**	**Rigid**	**Rigid**	**Rigid**	**Rigid**	**Rigid**
	24 SMEs	**Crystal**	**Mayur Jugs**	**National Plastics**	**Saddle Poly**	**Santech**	**Tokyo Plast**
Enterprise consumption (ODP tonnes)	107.10	19.78	18.28	39.10	16.45	15.90	33.00
Project impact (ODP tonnes)	97.72	18.29	16.90	36.15	15.21	14.70	30.51
Project duration (months)	36	36	36	36	36	36	36
Initial amount requested (US $)	990,864	123,343	119,412	212,491	119,087	115,101	196,394
Final project cost (US $):							
Incremental capital cost (a)	604,800	65,000	65,000	100,000	100,000	100,000	75,000
Contingency cost (b)	60,480	6,500	6,500	10,000	10,000	10,000	7,500
Incremental operating cost (c)	325,584	51,843	47,912	102,481	43,115	41,674	113,894
Total project cost (a+b+c)	990,864	123,343	119,412	212,481	153,115	151,674	196,394
Local ownership (%)	100%	100%	100%	100%	100%	100%	100%
Export component (%)	0%	0%	0%	0%	0%	0%	0%
Amount requested (US $)	990,864	123,343	119,412	212,491	119,087	115,101	196,394
Cost effectiveness (US $/kg.)	10.14	6.75	7.07	5.88	7.83	7.83	6.43
Counterpart funding confirmed?					Yes		
National coordinating agency	Ministry of Environment & Forest						
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 DESCRIPTION

Sector Background

- Latest available total ODS consumption (1997)		7,549.4	ODP tonnes
- Baseline consumption* of Annex A Group I substances (CFCs)		6,681	ODP tonnes
- 1998 consumption of Annex A Group I substances		Not reported	
- Baseline consumption of CFCs in foam sector		2,391.2	ODP tonnes
- 1998 consumption of CFCs in foam sector		Not reported	
- Funds approved for investment projects in foam sector as of March 1999	US $	16,087,874	
- Quantity of CFC to be phased out in foam sector as of end of 1998		2,110	ODP tonnes
- Quantity of CFC phased out in foam sector as of end of 1998		1,011.1	ODP tonnes
- Quantity of CFCs to be phased out in foam projects approved in 1999 (27th and 28th Meetings)		311.7	ODP tonnes
- Funds approved for investment projects in the foam sector in 1999 (27th and 28th Meetings).	US $	2,268,401	

*Baseline consumption of Annex A controlled substances refers to average of the consumption for the years 1995-1997 inclusive.

Integral Skin foam

Coolwels, Delite, Harjas, Jaiswal and Premium

1. The four companies consumed a total of 83.33 ODP tonnes of CFC-11 in 1998, with individual company consumption ranging from 11.2 - 21.5 ODP tonnes. The companies produce various polyurethane integral skin and flexible molded products for various applications. Coolwels and Premium Moldings manufacture integral skin foam for steering wheels and arm rests for automotive interior trim applications. Harjas and Jaiswal manufacture integral skin arm rests for furniture applications, Harjas also manufactures flexible molded seat cushions for furniture.

2. All the companies produce their foam using low pressure machine ranging in capacity from 14 – 20 kg/min and use a combination of 2 – 3mm thick fiberglass molds and some metallic molds. All the companies will phase out the use of CFC in the production of integral skin foam by converting to HCFC-141b. The production of flexible molded foams will be converted to water-blown.

3. The incremental capital cost of conversion relates to the retrofit of the low pressure machines at US $25,000, mold heating systems at US $10,000 each, upgradation of the fiberglass molds at US $1,000 per mold, trials, technology transfer and training at US $20,000. The

incremental operational costs for the integral skin foam projects related to the higher cost of HCFC-141b systems.

4. The incremental operational cost of the flexible molded foams include the cost of higher usage of MDI as well as costs associated with the claim for 7.5% density increase due to the fact that the CFC foam is blown at a density of 42 kg/m^3 and that the water-blown systems said to be currently available (in India) are blown at 48 kg/m^3.

Multiple Sub-sector

Reactive Polymers

Integral Skin Component:

5. Reactive Polymers Ltd. manufactures flexible molded polyurethane foam seat cushions for furniture applications. It used 13.54 ODP tonnes of CFC-11 in 1998 in the production of the foam using a low pressure machine, 45 glass fiber molds and some metallic molds. The expected changes and associated capital and operational costs described above for the flexible molded foam operations apply also to this project.

Rigid Foam Component:

6. The company also manufactures rigid polyurethane foam insulation products such as boards, panels and pipe sections. It used 16.078 ODP tonnes of CFC-11 in this production using an in-house fabricated low pressure machine. The company will convert its production to HCFC-141b.

7. The incremental capital cost of conversion relates to replacement of the low pressure machine with a high pressure dispenser at the cost of US $80,000. Technology transfer, trials and training for the two components amount to US $25,000. The incremental operational cost includes costs associated with the claim for a 7.5% increase in foam density due to the fact that the CFC-11 foam now being produced has a density of only 32-35kg/m^3.

Rigid Foam

Crystal Electronics, Mayur Jugs, National Plastics, Saddle Poly, Santech and Tokyo Plast

8. The six individual rigid foam companies consumed a total of 142.5 ODP tonnes of CFC-11 in 1998. Their individual consumption ranged from 15.9 – 39.1 ODP tonnes (see cover sheet).

9. Four of the companies, namely Crystal, Mayur Jugs, National Plastics and Tokyo Plast manufacture thermoware products such as flasks, casseroles, hot/cool cases, etc. It stated that the density of the rigid foam used to make these parts is 32 kg/m^3. The other two companies (Saddle Poly and Santech) manufacture rigid polyurethane in-situ foam, insulation foam for slabs,

boards, panels and pipe sections. The density of these foam parts is also stated to be only 32 kg/m^3.

10. All the companies operate low output low pressure dispensers, some of which were fabricated in-house. They will convert their production to the use of HCFC-141b. The capital cost of conversion includes, for the thermoware producers, replacement of the low pressure machines with medium pressure ones at US $45,000 each. For the general insulation producers (Saddle Poly, Santech), their 20 and 30 kg/min low pressure dispensers will be replaced with equivalent high pressure dispensers at US $80,000 each. Other costs include technology transfer, training and trials at the average of US $20,000 per company. The incremental operational costs include costs associated with the claim for 7.5% increase in density said to be required for the HCFC-141b foam. This amounts to 46% of the operational costs of each project and ranges from US $22,000 to US $149,770 per enterprise with a total amount for all the rigid foam enterprises of US $439,350.

24 Small and Medium-sized Enterprises

11. This project is submitted to request for funding for the 24 small and medium sized enterprises (SMEs) under the provisions of the Executive Committee Decision 25/56.

12. The 24 SMEs consumed a total of 107.1 ODP tonnes of CFC-11 in the production of thermoware and general insulation (slabs, boards, panels, etc.) products. Thirteen of the enterprises produce thermoware while 11 produce general insulation products. It is stated that all the enterprises were established before 25 July 1995.

13. Twelve of the enterprises operate low pressure dispensers while the other twelve employ hand mixing techniques. All the enterprises will phase out the use of CFC-11 by converting to the use of HCFC-141b technology. The capital costs include the cost of a 6 kg/min medium pressure dispenser at US $20,000 with a 33% deduction for technology upgrade for those enterprises currently without machines. The summary of the incremental capital cost is as follows:

12 Medium pressure dispensers for enterprises with dispensers	US $240,000
12 Medium pressure dispensers for enterprises without dispensers	US $160,800
Technical assistance and local coordinator	US $120,000
Trials	US $60,000
Training	US $24,000
10% contingency	US $60,480
Total	US $665,280

14. The total incremental operational cost amounts to US $325,584 which includes costs associated with a claim for a 7.5% increase in foam density for enterprises with dispensers, and 5% for enterprises without dispensers, an average of 6.25% per enterprise for the same reasons

described earlier (paragraph 7). The cost of 7.5% increase in density amounts to US $149,769 or 46% of the operational cost.

Government Plan

15. Decision 25/56 paragraph (c) requires that "the group project should be put forward with a government plan, including policies and regulations designed to ensure that the specific level of agreed reduction to be achieved was sustained. In fulfilment of this provision, a paper entitled "Sustainable ODS Phase-Out Plan for the Foam Sector" was annexed to the project and is attached to this Evaluation Sheet. The paper describes the regulatory measures, monitoring mechanism, incentive and fiscal measures among others to be undertaken or being undertaken to achieve the required goal.

Justification for the Use of HCFC-141b

16. A letter advising of the Government decision to use HCFC technology has been received by the Secretariat in accordance with Executive Committee decision 27/13 and is attached to this evaluation together with the information and commitments from the enterprises.

Time Frame for Project Implementation

17. All the foam projects have an implementation duration of three years.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

Integral Skin Foam Projects

1. The Secretariat and UNDP discussed the projects and agreed on the incremental capital and operating costs of Coolwels, Jaiswal and Premium Mouldings. With regard to the flexible molded foam projects (Delite, Harjas and Reactive Polymers), the Secretariat agreed with UNDP on all incremental capital costs. Incremental operating costs have not been agreed because the Fund Secretariat is unable to support costs for claimed increases in foam density. The Secretariat understands that on the basis of established industry practice, CFC-11-based flexible molded foam parts with densities over 34 kg/m^3, do not require an increase in density when converted to HCFC-141b. These include molded seat cushions, which by industry norms are molded at higher density to provide the necessary firmness. Therefore the seat cushions which are blown at 42 kg/m^3 will not require any increase in density.

2. Furthermore, the Secretariat was informed that systems suppliers should and are able to formulate water-blown systems which will fit the capabilities of existing machines or requirements. The claim for the costs associated with the increase in density is said to be based on field trials. However, technical information on densities of two systems being marketed in India supplied to UNDP by Expanded Incorporation (one of the systems houses which have been supported through the Multilateral Fund) and made available to the Secretariat showed on

analysis that two systems being supplied by this company already have molded density of over 40 kg/m^3, in which case no increase is required.

3. It may also be noted that the project's implementation time frame is three years and that US $2.4 million has been provided to all major Indian polyol producers to develop suitable systems for the foam industry. It should be expected that within the three years the systems houses should be able to supply systems that would not add to the operational costs of the enterprises as a result of the need to increase densities and thus encumber the Multilateral Fund.

4. For the above reasons the Fund Secretariat cannot recommend the costs associated with increase in density amounting to a total of US $179,031 as eligible incremental costs. Agreement has been reached on all other project costs and the capital costs of the 3 projects could be recommended for approval.

Rigid Foam Projects

5. The incremental capital costs of all the six projects for individual enterprises have been agreed between the Secretariat and UNDP.

6. Incremental operating costs have not been agreed because the Fund Secretariat is unable to support the costs for a claimed increase in foam density of 7.5% for all foam applications in all the six projects. With regard initially to the production of panels, it is generally recognised in the foam industry that for sandwich panels the CFC-based foam is used at a density ranging up to 40kg/$m^{3.}$. HCFC-141b foam is also used at a density of 38-40 kg/m^3. Where special panels are made with a density as low as 35 kg/m^3 or above 45 kg/m^3, these can be made with HCFC-141b at the same density to meet similar functional requirements.

7. Although information provided by one chemical systems supplier in India to UNDP and provided to the Secretariat indicated that rigid foams of all types produced in India have density of 32-35 kg/m^3, another supplier as indicated in paragraph 2 above gave information that showed a density of over 40 kg/m^3, indicating a situation where density increase will not be required.

8. With regard to thermoware products, the Secretariat has again been informed by industry experts that for good products that meet the heat retention standards of the industry, foam for thin-walled thermoware usually has a density of about 48 kg/m^3 or above, while for thick-walled products the density is usually about 40 –45 kg/m^3. Consequently, in these circumstances, a density increase is not required. In some circumstances, it is possible to produce thermoware products with foams of density as low as 32 kg/m^3. However, in these circumstances, the Secretariat understands that a similar level of functionality can be anticipated when HCFC-141b foam is produced with about the same density. More importantly, the chemical supplier is normally expected to supply systems which not only meet the density requirement of industry but also maintain the current ratio of chemical components, thus avoiding costly retrofit or replacement of existing equipment.

9. For rigid foam applications, low pressure dispensers are replaced with high pressure dispensers (rigid insulation) which improves processing parameters as well as compensates for loss in insulation. Also for rigid as well as integral skin foam applications, foam dispensers with

a 1:1 ratio are retrofitted at a cost of US $20,000 -US $30,000 for larger machines and about US $10,000 for smaller machines. Dispensers without temperature control have temperature control equipment provided at a cost of US $10,000 per unit. This reduces processing and de-mold times and increases productivity. The requested increase in density is additional to the benefits which result from these equipment changes.

10. Based on the information received from technical reports of World Bank's OORG and from industry experts as well as contradictions in information from systems suppliers in India, the Secretariat could not recommend the cost of the claim for increase in density which amounts in total to US $437,299 for the rigid foam projects as eligible incremental operational cost. The capital costs of the projects have been agreed with the implementing agency.

SME Project

11. The Government plan addressing Decision 25/56, paragraph (d) is attached for consideration of the Executive Committee.

12. The Secretariat's comments regarding the claim for the cost of increase in density in rigid foams are applicable to this project also.

13. The cost of the equipment and technology transfer component of the project are being discussed between the Secretariat and UNDP and the outcomes will be communicated to the Sub-Committee on Project Review.

14. The project is being submitted for individual consideration primarily on account of decision 25/56.

RECOMMENDATIONS

1. The Fund Secretariat recommends the projects for Coolwels, Jaiswal and Premium Mouldings for blanket approval with the level of funding and associated support costs as indicated in the table below.

2. The rest of the projects are submitted for individual consideration.

	Project Title	Project Funding (US$)	Support Cost (US$)	Implementing Agency
(a)	Conversion from CFC-11 to HCFC-141b technology in the manufacture of integral skin polyurethane foam at Coolwels Automobile Engineers	133,221	17,319	UNDP
(b)	Conversion from CFC-11 to fully water-based technology in the manufacture of flexible molded polyurethane foam at Delite Foam and Polymers			UNDP

(c)	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 Harjas Plastic and Metal Components P. Ltd.			UNDP
(d)	Conversion from CFC-11 to HCFC-141b technology in the manufacture of integral skin polyurethane foam at Jaiswal Industries	152,070	19,769	UNDP
(e)	Conversion from CFC-11 to HCFC-141b technology in the manufacture of integral skin polyurethane foam at Premium Mouldings & Pressings P. Ltd.	138,432	17,996	UNDP
(f)	Conversion from CFC-11 to fully water-based technology in the manufacture of flexible molded polyurethane foam and from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at Reactive Polymers Ltd.			UNDP
(g)	Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam insulation at 24 small and medium-sized enterprises			UNDP
(h)	Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam insulated thermoware at Crystal Electronics and Plastics			UNDP
(i)	Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam insulated thermoware at Mayur Jugs P. Ltd.			UNDP
(j)	Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam insulated thermoware at National Plastics			UNDP
(k)	Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam insulation at Saddle Poly Products P. Ltd.			UNDP
(l)	Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam insulation at Santech Industries			UNDP
(m)	Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam insulated thermoware at Tokyo Plast International Ltd.			UNDP

PROJECT EVALUATION SHEET
INDIA

SECTOR: Refrigeration ODS use in sector (1997): 2,973 ODP tonnes

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

Project Titles:

(a) Conversion of CFC-12 refrigerator and compressor manufacture to R-600a at GGEAL (Phase II)
(b) Conversion of CFC-12 refrigerator manufacture to HFC-134a at Voltas (Hyderabad)

Project Data	**Domestic**	**Domestic**
	GGEAL	**Voltas**
Enterprise consumption (ODP tonnes)		
Project impact (ODP tonnes)	147.06	25.83
Project duration (months)	27	25
Initial amount requested (US $)	4,410,288	856,338
Final project cost (US $):		
Incremental capital cost (a)	2,371,802	770,100
Contingency cost (b)	237,180	61,690
Incremental operating cost (c)	4,741,497	277,788
Total project cost (a+b+c)	7,350,479	1,109,578
Local ownership (%)	60%	100%
Export component (%)	0%	0%
Amount requested (US $)	4,410,288	856,338
Cost effectiveness (US $/kg.)	8.26	13.76
Counterpart funding confirmed?		
National coordinating agency	Ministry of Environment and Forests	
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 (1997)	14,815.9	ODP tonnes
-	Baseline consumption* of Annex A Group I substances (CFCs)	6,681.0	ODP tonnes
-	1998 consumption of Annex A Group I substances	Not available	ODP tonnes
-	Baseline consumption of CFCs in refrigeration sector	2,770.0	ODP tonnes
-	1998 consumption of CFCs in refrigeration sector	Not available	
-	1997 consumption of CFCs in refrigeration sector	2,973.0	ODP tonnes
-	Funds approved for investment projects in refrigeration sector as of July 1999	US $ **1,4284,852**	
-	Quantity of CFC to be phased out in refrigeration sector as of July 1999 (28th Meeting)	1,995	ODP tonnes

*Baseline consumption of Annex A controlled substances refers to average of the consumption for the years 1995-1997 inclusive.

1. The domestic refrigeration subsector in India is comprised of seven major original equipment manufacturers which have joint venture/license agreements with international groups such as Whirlpool, General Electric, Matsushita, Electrolux and others. Six of the seven domestic refrigeration enterprises have received assistance from the Multilateral Fund to phase out a consumption of 1,670 ODP tonnes. The commercial refrigeration sub-sector consists of about 300 small- and medium-sized enterprises. The Multilateral Fund has assisted 25 of these enterprises to phase out 352 ODP tonnes. The Multilateral Fund has also funded the conversion of three out of six compressor manufacturers. The Government of India decided not to seek compensation for conversion of the remaining compressor manufacturers.

Project description

(a) Conversion of CFC-12 refrigerator and compressor manufacture to R-600a at GGEAL (Phase II)

2. GGEAL (Godrej and General Electric Appliances Ltd.) is a joint venture enterprise with 40% General Electric (US) and 60% Indian ownership. The Executive Committee approved US $2,691,570 for conversion of foam operations at GGEAL to cyclopentane technology at its 20th Meeting. The project will phase out 568 ODP tonnes. According to the progress report submitted by the World Bank the completion of international bidding procedures was delayed for the start-up of the project. Now, the sub-grant agreement has been signed. No funds have been disbursed so far.

3. The proposed project (Phase II) is to convert the refrigerant operations to isobutane technology which will enable the phase out of 147.06 tonnes CFC-12 per year currently used in

production by the Godrej Refrigerator Plant (Mumbai). Eight models of refrigerator are currently produced under the Godrej brand name. In 1998, the total production was 581,840 units.

4. Two existing production lines at GGEAL are equipped with refrigerant charging boards, including transfer pumps, leak detection and evacuation equipment, and ultrasonic tube welding machines. Funding is requested for conversion of the two production lines to isobutane technology including safety measures to handle the flammable refrigerant. The cost of technical assistance, including safety audit and training is included in the project to assist Godrej engineers to design the necessary production changes, and to redesign the models currently produced to meet safety requirements. The proposal requests costs of replacement of leak detectors with helium leak detection systems, and new isobutane charging boards with transfer pumps. The proposal also seeks funding of new ultrasonic welding machines, new thermoforming moulds, new presses for production of redesigned evaporators and retrofitting of a calorimeter for testing. Some isobutane production equipment (charging boards and leak detectors) have been provided to GGEAL under ECOFRIG projects outside the Multilateral Fund.

5. The proposal includes funding of US $285,000 for the provision of isobutane charging and leak detection equipment and training to GGEAL service centers.

6. The proposal requests incremental operating costs for new refrigerant and capillary tubes, costs associated with new isobutane compressors (US $8.32/unit), modified evaporators for conventional refrigerators (US $1.1/unit) and new solid state thermostats for frost-free models at (US $9.60/unit). The total incremental operating cost requested is calculated at US $4,741,497 for a six month period.

(b) Conversion of CFC-12 refrigerator manufacture to HFC-134a at Voltas (Hyderabad)

7. Voltas produces a variety of refrigeration and cooling appliances, engineering products, agro products, chemicals and textile machinery. It has three refrigerator manufacturing plants (Nandalur, Warora and Hyderabad). The Executive Committee approved US $2,723,378 for conversion of foam operations at these three plants to cyclopentane technology at its 22nd Meeting. The grant was calculated on the basis of 98.2% of Indian ownership. The project will phase out 354 ODP tonnes. According to the progress report submitted by the World Bank the appraisal has been completed for the Hyderabad plant and the sub-grant agreement has been signed. No funds have been disbursed so far.

8. Voltas has recently entered a joint venture agreement with Electrolux (Sweden) for operations at two plants (Nandalur and Warora), with Elecrolux holding 74% of the shares. Conversion of refrigeration operations to non-ODP technologies at Nandalur and Warora will be undertaken at the expense of the joint venture partners. It is also expected that a large portion of the funds approved at the 22nd Meeting of the Executive Committee for conversion of the foam lines at Nandalur and Warora will be returned to the Multilateral Fund as a consequence of the change of ownership, as required by Decision 19/38.

9. The proposal indicates that Voltas maintains full ownership of Hyderabad refrigerator plant. The transfer of ownership of the two other Voltas plants to Electrolux has resulted in

significant changes in the production activities of the Hyderabad plant. Production of all models but one manufactured at the time of formulating the project submitted to the 22nd Meeting has been discontinued. New products, including drink coolers for Pepsi, "badged" refrigerators and freezers made for other refrigerator manufacturers including LG Electronics, BPL, and Hindustan Lever will be manufactured under specific contracts. The proposal indicates that nine models or refrigerator and visi-coolers have been produced at some time in the period 1998-1999 but some of these models are currently not being produced.

10. The project proposal (Phase II) is to convert the refrigerant operations at the Hyderabad plant to HFC-134a technology. On the basis of consumption in 1999, the project will enable the phase out of 25.83 ODP tonnes CFC-12 per year.

11. The existing production lines are equipped with refrigerant charging boards, including transfer pumps, leak detectors, evacuation equipment and a dehydration oven. Some of the production equipment was acquired in the period 1996-1999 but funding for conversion of the relevant items has not been sought. Funding is requested for conversion of the production lines to HFC-134a technology including costs of HFC-134a charging boards with transfer pumps, leak detectors, retrofitting of vacuum pumps and a new dehydration oven. Costs of technical assistance, training and certification are included in the project to assist Voltas in redesigning models currently produced. The proposal seeks funding for a new data logger and for retrofitting of a calorimeter for testing.

12. The proposal also includes funding of US $200,000 for provision of HFC-134a charging and leak detection equipment and training to Voltas service centers.

13. The proposal requests incremental operating costs for new refrigerant, capillary tubes, HFC-134a compressors (US $3.00/unit), evaporator/condensers and dryers. Incremental operating costs are requested for a six month period.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

(a) Conversion of CFC-12 refrigerator and compressor manufacture to R-600a at GGEAL (Phase II)

1. The Secretariat has discussed with the World Bank the eligibility, incrementality and cost issues of the requested incremental capital and operating costs of the GGEAL project.

2. The Executive Committee has approved 16 projects for conversion to isobutane technology. Several budget items included in the proposal have never been requested before or approved by the Executive Committee. These items include, under incremental capital cost:

(i) US $ 50,000 for retrofitting of calorimeter for compressor testing. Calorimeters are used for testing of compressors at the compressor manufacturing plant. Typically, compressors are not tested in refrigerator manufacturing plants. The requested cost is ineligible for funding.

(ii) The cost of new presses and dies for manufacturing redesigned evaporators is requested at US $ 381,776. This category of costs has neither been claimed nor approved in any other hydrocarbon based projects. Some of the existing evaporator manufacturing equipment was installed after July 1995 and is, therefore, ineligible for funding. Explanations/justifications provided for the replacement of the existing presses are not adequate. Presses are able to produce a wide range of product designs using different type of dies. No break down of requested costs in relation to the baseline has been provided. Additionally, costs for evaporator modification are requested at US $ 1.1/unit as part of incremental operating cost. In other similar hydrocarbon based projects these have been the only costs sought for evaporators, irrespective of whether the evaporators were bought in or manufactured by the enterprise.

(iii) US $400,000 is requested for four helium leak detection systems. Other technology (Ecotec 500 mass spectrometer leak detectors) is available to perform the same functions more cost-effectively. Ecotec detectors were included in the Germany-China bilateral project (Kuming) which was approved at the 27th Meeting. Two other projects (Moganshan and Zhejiang, China) are presented to the 29th Meeting using the same technology. In all other approved projects when helium leak detectors have been funded, the level of funding was at 50% of the cost of the equipment in recognition of the technological upgrade involved. The number of the requested helium detection systems (two per production line) needs to be justified.

(iv) Three new ultrasonic welding machines at US $ 35,000 per unit are requested in addition to three machines available at GGEAL. The explanations provided regarding the number of the requested machines per line are not adequate. In all other approved projects when new ultrasonic welding machines have been funded, the level of funding has been at 50% of the cost of the equipment in recognition of the technological upgrade involved.

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(v) Alarm repeat panels are not a necessary requirement in conversion to R600a refrigerant. This item has never been requested in similar approved projects. This item was requested in the Phase I for GGEAL but was not approved. The requested cost of US $ 20,000 is not eligible for funding.

(vi) The proposal requests the cost of equipment and training for service centers at US $ 285,000. The eligibility of equipment to service appliances with a substitute refrigerant is questionable. It is not included in the Indicative List of Categories of Incremental Costs. Refrigeration service represents a significant sub-sector in terms of ODS consumption in India. A comprehensive strategy should be

developed and submitted to the Executive Committee before the Secretariat can recommend approval of any funding related to servicing in India. Because of these reasons, similar requests in other refrigeration projects in India and elsewhere have not been included in proposals for consideration by the Executive Committee.

(vii) A number of other capital cost items are requested at a level of costs which is not consistent with past approvals.

3. Under incremental operating costs:

(i) Costs for isobutane compressors at US $ 8.32/unit are requested in the proposal. Incremental cost of compressor has been determined on the basis of cost of manufacturing new R600a compressors by GGEAL compressor plant versus costs of the presently produced CFC-12 compressors. Incremental operating costs for isobutane compressors have not been requested or approved previously. On the basis of the best information available to the Secretariat, there is little if any difference in the international market prices of CFC-12 and isobutane compressors of comparable quality and performance.

(ii) Costs for a new solid state thermostat are requested at US $ 9.60/unit. The Secretariat has been advised by German industry experts that when the thermostat is not moved away from the refrigeration system compartment it can be enclosed in a sealed box rather than replaced with solid state thermostat. This is a cost-effective and a safe solution which is used by many German enterprises. This solution is also recommended in the Manual for the Safe Design of Domestic Refrigeration Appliances (Ecofrig Publication, 1997).

4. The Secretariat is still discussing the above issues with the World Bank. The Sub-Committee on Project Review will be informed accordingly.

(b) Conversion of CFC-12 refrigerator manufacture to HFC-134a at Voltas (Hyderabad)

5. The Secretariat has discussed with the World Bank implications arising from the change of ownership, production data and production activities of Voltas.

6. The Secretariat has requested the World Bank to provide precise, verified information about the status of ownership of the Hyderabad refrigerator plant. The Secretariat has not yet received this information.

7. The proposal does not provide clear information on the current production level of the enterprise. The Secretariat has sought clarifications from the World Bank. The required data have not yet been made available.

8. The transfer of ownership to Electrolux has resulted in significant changes in the production activities of the Hyderabad plant. Production of all models but one manufactured at

the time of formulating the project submitted to the 22nd Meeting has been discontinued. Voltas manufacturing activity has changed from production of the company's own products to contract manufacturing. The Secretariat has requested the World Bank to provide a clear account of the status of the Hyderabad refrigeration plant. The Secretariat is awaiting the requested information.

9. Additionally, eligibility of costs requested for model development is questionable since all but one of the models are new and originate from other manufacturers.

10. Two budget items (calorimeter and dehydration oven) included in the proposal have never been requested or approved by the Executive Committee for previous projects. Comments regarding calorimeter provided in paragraphs 2(a) above under the GGEAL project are applicable to Voltas.

11. US $150,000 is requested for a dehydration oven requested to dehydrate bought-in evaporators and condensers. This item has never been requested in over 200 refrigeration projects approved by the Executive Committee, including 30 projects in India. Companies providing evaporators and condensers to Voltas would be expected to meet the necessary requirements for equipment to be used in HFC-134a based product. The higher costs for new evaporators and condensers which meet these requirements are included in the requested incremental operating cost. Therefore this item is not eligible for funding from the Multilateral Fund.

12. The World Bank has informed the Secretariat that costs of equipment for service centres and associated training will not be requested.

13. The Secretariat is still discussing the above issues with the World Bank. The Sub-Committee on Project Review will be informed accordingly.