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EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Twenty-fifth Meeting
Montreal, 29-31 July 1998

PROJECT PROPOSALS: INDIA

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

Refrigeration

- Elimination of CFCs in the manufacture of commercial refrigeration equipment at Sandeep Refrigeration World Bank
- Elimination of CFC-11 and CFC-12 converting to HCFC-141b and HFC-134a in the manufacture of commercial refrigeration equipment at Prashant Refrigeration Appliances World Bank
- Elimination of CFC-11 and CFC-12 by converting to HCFC-141b and HFC-134a in the manufacture of domestic refrigerators at BPL Refrigeration Ltd. World Bank

Solvent

- Conversion of precision cleaning and coating processes from ODS solvents to heat cleaning technologies and ODS free solvent coating at Malhotra Shaving Products Ltd. UNIDO

PROJECT EVALUATION SHEET INDIA

SECTOR: REFRIGERATION

ODS use in sector (1991): 1990 ODP tonnes

Sub-sector cost-effectiveness thresholds: Commercial 15.21 US \$/kg
 Domestic 13.76 US \$/kg

Project Titles:

- (a) Elimination of CFC-11 and CFC-12 converting to HCFC-141b and HFC-134a in the manufacture of commercial refrigeration equipment at Prashant Refrigeration Appliances
 (b) Elimination of CFCs in the manufacture of commercial refrigeration equipment at Sandeep Refrigeration
 (c) Conversion to CFC-free technology in the manufacture of refrigerators at BPL Refrigeration Ltd.

Project Data	Commercial		Domestic
	Prashant Refrigeration	Sandeep Refrigeration	BPL Refrigeration Ltd.
ODS phase-out (ODP tonnes)	8.75	9.94	136
Proposed project duration)	2 years	2 years	36
Incremental capital cost (US \$)	79,200	79,200	427,000
- including contingency (%)	10	10	10
Incremental operational cost (US \$)	37,250	43,350	876,203
Total project cost (US \$)	116,450	122,550	1,303,203
Local ownership (%)	100	10	100
Export component (%)	-	-	0
Amount requested (US \$) {Original}	116,450	122,550	1,303,203
{Revised}	-	-	
Cost effectiveness (US \$/kg)	12.52	12.33	9.650
National Coordinating Agency	Ministry of Environment & Forests		
Implementing Agency	World Bank		
Technical review completed?	Yes		

Secretariat's Recommendations:			
Amount recommended (US \$)	109,558	113,184	
Project impact (ODP tonnes)	8.75	9.94	
Cost effectiveness (US \$/kg)	12.52	11.38	
Implementing Agency support cost (US \$)	14,243	14,714	
Total cost to Multilateral Fund (US \$)	123,801	127,898	

PROJECT DESCRIPTION

- (a) **Elimination of CFC-11 and CFC-12 converting to HCFC-141b and HFC-134a in the manufacture of commercial refrigeration equipment at Prashant Refrigeration Appliances**
 - (b) **Elimination of CFCs in the manufacture of commercial refrigeration equipment at Sandeep Refrigeration**
1. It is indicated in the project documents that ODS consumption in the refrigeration sector was 1990 ODS tonnes in 1991 and has been. Of this total, the commercial refrigeration sub-sector is said to account for 1000 ODS tonnes and to have been growing at 20% p.a. The sub-sector is said to be comprised of about 100 relatively organised manufacturing enterprises, about 30 medium-sized and an undetermined number of small unorganized enterprises. The Executive Committee has approved 12 projects in the commercial refrigeration sector, phasing out 180 ODP tonnes.
 2. The two projects submitted are medium sized enterprises that manufacture a range of commercial refrigeration units: chest freezers, bottle/water coolers, display cabinets, and custom built chilling and freezing units. The implementation of these projects will result in the phasing out of 19.3 ODP tonnes.
 3. Conversion to HFC-134a refrigerant involves the replacement of leak detectors, evacuation/charging units, compressors, as well as redesign and modification of the refrigeration systems.
 4. The proposal seeks to replace low pressure foam dispensers, made by the enterprises themselves, with internationally sourced high pressure foam dispensers for conversion from CFC-11 based foam technology to water/HCFC-141b based technology. It is stated that the low-pressure dispensers cannot be retrofitted, and that new foam equipment will enable implementation of emerging fully-water-based, ODS-free systems.
 5. It is stated in the project documents that these companies recognize the transitional nature of the HCFC-141b/water foam technologies. They prefer to switch to a combination of water/HCFC-141b based technology at this stage, and to eventually implement ODS-free (fully water-blown) conversion once the commercial introduction of technologically mature water-based systems is realized. No significant additional investments are foreseen to convert to fully water blown technology and any costs will be borne by the enterprises.
 6. The project documents state that replaced equipment will be scrapped or surrendered to an approved agency. No details of the method of verification are given. A scrap value of US \$100 is listed for vacuum pumps.

7. In each project the main component of capital costs related to the foam operation is a high pressure foam dispenser at a cost of US \$45,000. In the refrigeration section, the main components are manual charging units and vacuum pumps. Each project includes US \$30,000 for trials, technology transfer and training, US \$15,000 each for the foam and refrigeration component.
 8. Incremental operating costs are requested for the higher chemical and component costs for two years duration and do not reflect growth. No IOC have been requested for HFC-134a compressors at this time
 9. It is stated that approval of each project will assist India in meeting its obligations for the 1999 freeze in ODS consumption.
- (c) **Conversion to CFC-free technology in the manufacture of refrigerators at BPL Refrigeration Ltd.**
10. 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, on 12 installed production lines.
 11. A total amount of 1,490 ODP tonnes will be phased-out as a result of conversion of four domestic refrigerator manufacturers already approved by the Executive Committee.
 12. The project document contains the following statement:

“The India country programme specifies unconstrained demand for ODS up to the year 2010, based on growth rates expected in the ODS consuming sectors. These growth rates were established in consultation with the industry, considering the characteristic demand patterns in these sectors. The actual growth rates have been largely consistent with those specified in the approved Country Programme document. The average annual consumption of ODS for the years 1995-97 (excluding completed ODS phase-out projects) is estimated to be 18,860 MT. The approval of this project will help India in meeting its obligations for the 1999 freeze in ODS consumption. Complete phase out of CFCs in this sector, is targeted by 2010.”
 13. BPL is one of the major domestic refrigerator manufacturers in India. The company was established in 1992 and commenced commercial production in 1993. The installed capacity was 300,000 units per year. BPL presently operates two foaming production lines and two refrigeration assembly lines. The production level was 178,440 refrigerators in 1996-1997 financial year. In 1996, during a plant re-layout, two new drum units for door foaming were installed, replacing the earlier 40 carousel-mounted door

foaming fixtures. The installed capacity did not change. Costs related to this replacement of production equipment is not included in the proposal.

14. This project proposes to eliminate about 116 MT of CFC-11 and 33 MT of CFC-12 consumption annually by converting foam operations to HCFC-141b as the blowing agent and to HFC-134a as the refrigerant. The project includes incremental capital costs covering changes to the existing production line, re-design, testing, trials and training and also incremental operating costs resulting from conversion to the new technology.
15. Several substitute technologies have been considered for the foaming operations. HCFC-141b based technology was chosen. The following justification for this option is provided in the project proposal:

“BPL Refrigeration carried out in 1995-96, a partial re-layout of the factory premises, that included construction of a new administrative building and a store in a previously open area. As a result, it will no longer be feasible to store and handle hydro-carbons safely and in line with local regulations. Thus, the option of cyclo-pentane based systems can no longer be exercised.
16. BPL has been informed about other substitute technologies and that HCFC-141b is a transitional substance. They have also been informed that no further funding can be given under the present rules of the MLF. Based on that and the above considerations, BPL Refrigeration, have chosen HCFC-141b based systems as an interim technology, to maintain product standards and acceptability, until the commercial introduction of liquid HFCs, which is chosen as the permanent technology. No significant additional investments are foreseen to be needed to convert to HFC based systems and will be borne by BPL Refrigeration to the extent required.”
17. The proposal requests funding for retrofitting of the existing pre-mixing station and the acquisition of a new pre-mixing station for the door foaming line. Capital costs include also piping, retrofitting of foaming machines, training and technical assistance, installation, prototype testing, trials and quality certification.
18. Conversion to HFC-134a entails replacement and retrofitting vacuum pumps, replacement of refrigerant charging units and production leak detectors, re-design, testing and trials, technology transfer, quality certification and training.
19. Operating costs are requested for a period of 6 months. The incremental cost of compressors is included in the calculation of operating cost at US \$ 4.25/unit.
20. The list of the baseline equipment and the disposal plan is provided in the proposal.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

- (a) **Elimination of CFC-11 and CFC-12 converting to HCFC-141b and HFC-134a in the manufacture of commercial refrigeration equipment at Prashant Refrigeration Appliances**
- (b) **Elimination of CFCs in the manufacture of commercial refrigeration equipment at Sandeep Refrigeration**

1. The terms of approval of the four commercial refrigeration projects approved for India at the 23rd Meeting provided that "no further projects would be considered by the Executive Committee until its requirements from the 22nd meeting [in relation to technology transfer, trials and training] had been met". The requirement from the 22nd meeting was to "develop a group approach with the objective of providing effective technology transfer and trials at 50% of the cost allocated in the original projects". The two proposals submitted to the 25th meeting do not meet this requirement..

2. The project proposals contain no evidence of the World Bank or its consultant developing innovative and cost effective approaches to delivery of technology transfer/trials activities. Instead, the project proposals contain a statement that "in compliance with the relevant EC decision, these costs are now reduced by 50 %. The enterprise will have to finance the additional costs themselves". There is no group approach and the total cost of technology transfer and trials is US \$20,000, which is 2/3 of the cost in the previous projects.

3. The context of the Committee's previous approvals appears clear: it is unreasonable to bring forward a succession of unconnected small commercial refrigeration projects, each one of which contains inefficient mechanisms and costs for technology transfer and associated activities. In addressing this issue in the context of the last four projects (23rd Meeting) the World Bank advised the Secretariat that the geographical diversity and differing implementation progress of the various enterprises prevented a group approach. These suggestions are not convincing. A great deal of the focus for smaller enterprises will be on the ability of the experts developing such projects, in conjunction with countries' ozone units, to select and group enterprises on the basis of common technologies, common suppliers, common locations and relevant time-frames, so that the new technologies, and the trials processes that go with their use, can be provided more effectively.

4. The Secretariat's comments for the previous four projects suggested that those projects might be approved as submitted, in a spirit of compromise and to maintain momentum. It is not possible to make this suggestion again, in the light of the Committee's terms of approval "that no more projects would be considered..." until its requirements had been met.

5. With regard to equipment disposal the World Bank advised that detailed arrangements have been set up and that disposal is a formal part of the sub-grant agreement with the financial intermediary.

6. Costs requested for certain capital equipment items and for components included in incremental operating cost calculations were higher than in the projects previously approved. In the case of the foam machines, a cost increase of US \$3,000 to US \$43,000 per unit was included after discussions with the World Bank as it reflected actual purchase cost for machines acquired in approved projects. In other cases, costs remained as established in previously approved projects. Minor adjustments to project costs were agreed with the World Bank on this basis.

(c) Conversion to CFC-free technology in the manufacture of refrigerators at BPL Refrigeration Ltd.

7. The Secretariat discussed with the World Bank the following issues related to the eligibility and the costs of equipment as submitted in the project proposal.

8. Data on CFC-12 consumption by BPL calculated on the basis of CFC-12 charge per unit is not consistent with data available in the Secretariat. The accuracy of the data has a bearing on the calculation of ODS phase out, incremental operating cost and the cost-effectiveness. The World Bank was requested to verify the presented data.

9. The cost of a new additional automatic continuous pre-mixer for door foaming operation and associated costs are requested in the proposal. The request is based on the intention of the enterprise to use two different foam formulations for cabinet and door foaming. The company is presently using one formulation for cabinets and doors with one pre-mixer in the baseline. The use of two different blends for cabinets and doors is not an absolute necessity in the transition from CFC-11 to HCFC-141b systems. There are HCFC 141b-based foam systems available from different suppliers which can be used for foaming both cabinets and doors. No request for additional pre-mixing equipment has been approved so far on the basis of two blends. The Secretariat proposed that the company should bear the requested cost of the second pre-mixer.

10. The Secretariat raised several issues related to the requested costs for retrofitting and replacement of vacuum pumps.

11. Incremental operating costs requested for MDI, blowing agent, condenser and evaporator are higher than in similar conversion projects. The World Bank was requested to justify the requested incremental operating costs.

12. Incremental operating cost associated with compressor is requested in the submitted project at US \$ 4.25 per unit. The Secretariat informed the World Bank that this cost cannot be considered in the absence of a decision of the Executive Committee on incremental operating cost for compressors.

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

RECOMMENDATION

1. The Executive Committee might consider whether it wishes to approve the commercial refrigeration projects for Prashant Refrigeration and Sandeep Refrigeration in the absence of a group approach to technology transfer, trials and training.

PROJECT EVALUATION SHEET **INDIA**

SECTOR: SOLVENT ODS use in sector (1991): 4,876 ODP tonnes

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

Project Title:

Conversion of precision cleaning and coating processes from CFC-113 solvents to heat cleaning technologies and Vydax/IPA coating at Malhotra Shaving Products Ltd.

Project Data	CFC-113
	Malhotra Shaving Products
ODS phase-out (ODP tonnes)	13.6
Proposed project duration (months)	18
Incremental capital cost (US \$)	378,400
- including contingency (%)	10
Incremental operational cost (US \$)	(94,942)
Total project cost (US \$)	283,458
Local ownership (%)	100
Export component (%)	20
Amount requested (US \$) {Original}	265,552
{Revised}	255,112
Cost effectiveness (US \$/kg)	18.76
National Coordinating Agency	Ministry of Environment and Forests
Implementing Agency	UNIDO
Technical review completed?	Yes

Secretariat's Recommendations:

Amount recommended (US \$)	255,112
Project impact (ODP tonnes)	13.6
Cost effectiveness (US \$/kg)	18.76
Implementing Agency support cost (US \$)	33,164
Total cost to Multilateral Fund (US \$)	288,276

PROJECT DESCRIPTION

Conversion of precision cleaning and coating processes from CFC-113 solvents to heat cleaning technologies and Vydax/IPA coating at Malhotra Shaving Products Ltd.

1. It is stated in the project document that the 1991 consumption of solvents in India was 4876 ODP tonnes, of which the CFC-113 consumption was 240 ODP tonnes. Phase-out of some 62 ODP tonnes has already been funded by the Multilateral Fund. This project will phase out the use of 17 MT of CFC-113. It is proposed to be implemented during 1998-1999 and is said to contribute to meeting India's CFC freeze target.
2. Malhotra Shaving Products Ltd. produces approximately 750 million razor blades per year. The single-shift production capacity of the plant is approximately 400 million razor blades per year. The proposed conversion involves two processes: (a) cleaning of the razor blades with CFC-113 to remove greases, oil, abrasives, wax, and; (b) blade-edge coating in which CFC-113 is used as a carrier to spray Teflon on the edges of razor blades.
3. The phaseout will be accomplished by replacing solvent based cleaning with a heat cleaning process and by changing to iso-propyl alcohol in the process to deposit the Teflon coating.
4. 20 per cent of production is exported to non-Article 5 countries. This has been reflected in the level of grant requested.
5. The project document indicates that the enterprise will be required to certify and provide evidence that replaced equipment has been destroyed, modified or rendered non-operational.
6. Main capital costs

Furnace for heat cleaning:	US \$333,000
Eligible cost after 40% reduction for increased capacity	US \$200,000
Spray coating system for use with flammable solvent	US \$120,000
Eligible cost after 45% reduction for increased capacity	US \$ 66,000
Ammonia cracker to produce nitrogen for furnace	US \$ 20,000
Automatic fire protection system for the spray coating room	US \$ 12,000

Incremental operating savings

7. Incremental operating savings for four years (at net present value) have been calculated as US \$29,950 and deducted from the proposed level of grant. There are nett savings because costs are no longer incurred for the purchase of CFC-113 solvent, however costs for electricity will increase.

SECRETARIAT'S COMMENT AND RECOMMENDATION

COMMENT

1. The Secretariat discussed plant capacity with UNIDO to establish the increase in capacity of the cleaning furnace and the IPA spray system. Costs associated with the capacity increase were removed from the proposed incremental capital costs. It was also established that retrofit of the existing spray coating system is not possible in view of the need to operate in a flammable environment.

RECOMMENDATION

1. Blanket approval of the project is requested, together with 13 per cent agency support costs, at the level of funding indicated below:

Project Title	Project Cost US \$	Support Cost US \$	Implementing Agency
Conversion of precision cleaning and coating processes from CFC-113 solvents to heat cleaning technologies and Vydax/TPA coating at Malhotra Shaving Products Ltd.	255,112	33,164	UNIDO