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EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
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PROJECT PROPOSALS: PAKISTAN

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

Foam

- Terminal Umbrella - conversion to HCFC-141b and water blown technology in the manufacture of rigid polyurethane foam (thermoware) World Bank

Refrigeration

- Elimination of CFC-11 and CFC-12 converting to HCFC-141b and HFC-134a in the manufacture of refrigeration equipment at United Refrigeration Industries Ltd. World Bank
- Elimination of CFC-11 and CFC-12 by converting to HCFC-141b and HFC-134a in the manufacture of commercial refrigeration equipment at Dawlance P. Ltd. World Bank
- Elimination of CFC-11 and CFC-12 by converting to HCFC-141b and HFC-134a in the manufacture of commercial refrigeration equipment at Shadman Electronic Industries P. Ltd. World Bank

PROJECT EVALUATION SHEET **PAKISTAN**

SECTOR: FOAM ODS use in sector (1995):

620 ODP tonnes

Sub-sector cost-effectiveness thresholds: Rigid

US \$16.86/kg

Project Titles:

Conversion to HCFC-141b and water blown technology in the manufacture of rigid polyurethane foam (thermoware) for Terminal Umbrella project.

Project Data	Rigid
	Terminal Umbrella
ODS phase-out (ODP tonnes)	105.65
Proposed project duration (months)	24
Incremental capital cost (US \$)	671,000
- including contingency (%)	10
Incremental operational cost (US \$)	127,500
Total project cost (US \$)	798,500
Local ownership (%)	100
Export component (%)	0
Amount requested (US \$) {Original}	718,900
{Revised}	
Cost effectiveness (US \$/kg)	6.80
National Coordinating Agency	Ministry of Environment, Local Government & Rural Development (M/oELG&RD)
Implementing Agency	The World Bank
Technical review completed?	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 (US \$)	

PROJECT DESCRIPTION

Conversion to HCFC-141b and water blown technology in the manufacture of rigid polyurethane foam (thermoware) for Terminal Umbrella project.

1. World Bank reports in the project document that the Pakistan Country Programme indicates only three enterprises and a total ODS consumption of 250 tonnes (baseline 1994). Recent investigations, involving information received from chemical suppliers and the Pakistan Plastics Manufacturing Association (PPMA) puts the 1995 ODS use in the foam sector closer at 700 tonnes. 390 tonnes is used in rigid foam applications out of which 375 tonnes is used for thermoware production by 29 enterprises. Five projects (including one thermoware umbrella project for 19 enterprises) have been approved in the foam sector to phase out 582 tonnes.
2. The CFC consumption for 1996 was reported to be 1,671 ODP tonnes.
3. The project is a terminal umbrella project covering 12 enterprises one of whom is not yet in operation. It is stated that the twelfth enterprise was added at the request of the other 11 enterprises who agreed to give up portions of their funds to the company to ensure that it also produced satisfactory products. The project will lead to replacement of the remaining CFC-11 in thermoware applications in Pakistan. Project impact is 105.65 tonnes CFC-11 per year. HCFC-141b foam blowing agent will be used as an interim solution and water blown as a final solution.
4. The justification for the use of HCFC-141b is provided in the analysis of technology selection.
5. Eleven of the 12 enterprises currently operate low pressure machines of different makes and capacities (5 kg/min - 60 kg/min), installed at different times from 1983 to 1995. The twelfth company (Descent) has not installed its 1994 Cannon C7RF2. It is proposed to replace all the low pressure machines (including the uninstalled machine) with a specially designed thermoware dispenser with chiller and integral premixer. The document states that it is difficult to obtain premixed polyol blend in Pakistan, hence the need for the premixer.
6. The project implementation will be driven by systems suppliers. It is indicated that initial formulation development will be performed by the system suppliers, followed by extensive in-house production trials. Product testing will be done during the evaluation phase by the suppliers, followed by outside certification testing for the purpose of independent verification of the insulation values achieved. All technology transfer will be provided by the chemical suppliers - BASF, ICI and Simpson. Coordination of implementation will be handled through the Pakistan Plastics Manufacturing Association(PPMA).

7. The total capital cost for the 12 enterprises excluding contingency amounts to US \$610,000 while the incremental operating cost is 127,500. The capital cost of the Descent project is however not included in the project cost.
8. The list below indicates of the proposed beneficiary enterprises.

Pakistan Thermoware Terminal Umbrella Project
List of Enterprises

Company	Cost Effectiveness US \$/kg	ODS Consumption ODP Tonnes	Project Cost US \$
ANZ Insutech Enterprise	8.33	8.5	65,000
Beli Enterprise	13.21	5	60,750
Decent	NA	0	0
Dynamic Plastic Industries	5.58	14	71,500
Friends Plastic	5.58	14	71,500
Islamuddin and Sons	15.66	3.5	53,250
Janjua Plastic Industries	15.64	3	43,000
Kohinoor Plastic Containers	8.33	8.5	65,000
Mehrab Plastics	3.79	24	83,500
Rashid Sons	5.01	16	73,600
Sonia Enterprises	7.26	10	66,800
Yasrab Industries	8.33	8.5	65,000
TOTAL	6.8	115	718,900

SECRETARIAT'S COMMENTS

1. As indicated in other similar thermoware projects the Secretariat communicated to the World Bank the information about the technical merits of continuing use of the existing low pressure machines for the conversion of the thermoware projects with a suggestion for it to calculate the project costs based on retrofit of the existing machines. This information is reproduced in paragraphs 2 and 3.

2. HCFC-141b, HCFC-141b + water, or water-based systems are used on low pressure machines satisfactorily to produce thermoware products without any changes in processes or method of production. Enterprises in the developed countries (such as Coleman in USA) continue to use their low pressure machines after conversion to HCFC-141b without any adverse effect on product quality or consumer acceptability.

3. Further, since off ratio systems are supplied as standard commercial systems it is not necessary to replace the current low pressure machines with high pressure in this type of production. The low pressure machines have variable ratio capability. Where the machine has fixed ratio, in most cases it can be retrofitted with new pumps and drives to provide variable ratio capability. With regard to insulation performance, the Secretariat was advised by thermoware manufacturers in developed countries that while initial thermal conductivity of CFC-11 systems is lower than HCFC-141b or water systems such differences have only marginal effect on consumer products such as thermoware. Differences in actual performance of the consumer products such as thermoware products produced were negligible whether they were produced on low or high pressure machines.
4. With regard to the difficulty in obtaining preblended systems currently, the Secretariat drew attention to the unique implementation arrangement for the project which assures the leading role of such systems suppliers with global market for systems. They could be encouraged to provide such pre-blended systems.
5. With regard to the inclusion of Descent, the enterprise with no production, the Secretariat advised the World Bank that funding of the ineligible project from contributions from the other projects would result in de facto funding of the project from the Multilateral Fund and would not be eligible.
6. With regard to Islamuddin (ODS consumption 3.5 tonnes) which had requested an additional high pressure machine for thermoware production while it used its current low pressure machine for flexible molded foam, the World Bank was informed that, based on advice received by the Secretariat, the low pressure machine was capable of running all the proposed foams. Also, the additional high pressure equipment would constitute additional capacity. Hence the project cost should be based on retrofit of the existing low pressure machine.
7. The project is a terminal umbrella project and the Government is not expected to request any more funding for projects in thermoware production. Furthermore, the project document indicates that the enterprises have been informed that HCFCs are transitional substances. They have also been informed that, under the current rules of the Multilateral Fund, no additional funding can be requested.
8. The issues identified in the project are still under discussion with the World Bank. The outcome will be communicated to the Sub-Committee on Project Review.

PROJECT EVALUATION SHEET PAKISTAN

SECTOR: REFRIGERATION ODS use in sector (1996): 1,615 ODP tonnes

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

Project Titles:

- (a) Conversion to CFC-free technology in the manufacture of commercial refrigeration equipment at Shadman Electronic Industries P. Ltd.
- (b) Conversion to CFC-free technology in the manufacture of commercial refrigeration equipment at Dawlance P. Ltd.
- (c) Conversion to CFC-free technology in the manufacture of refrigeration equipment at United Refrigeration Industries Ltd.

Project Data	Commercial		Domestic
	Shadman Electronic Ind.	Dawlance P. Ltd.	United Refrigeration Industries Ltd.
ODS phase-out (ODP tonnes)	15.53	35.15	88.85
Proposed project duration (months)	24	24	24
Incremental capital cost (US \$)	205,700	203,500	214,500
- including contingency (%)	10	10	10
Incremental operational cost (US \$)	146,868	345,674	321,855
Total project cost (US \$)	352,568	549,174	536,355
Local ownership (%)	100	100	100
Export component (%)	0	0	0
Amount requested (US \$) {Original}	236,936	534,631	536,355
{Revised}			
Cost effectiveness (US \$/kg)	15.21	15.21	6.04
National Coordinating Agency	Ministry of Environment, Local Government and Rural Development		
Implementing Agency	The World Bank		
Technical review completed?	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 (US \$)			

PROJECT DESCRIPTION

General for three projects

1. The commercial refrigeration sub-sector is estimated to consume 683 ODP tonnes (1995). This includes 412 MT of CFC-12 refrigerant (80 MT as initial charge in manufacturing new equipment and 312 MT for servicing and about 271 MT of CFC-11 is used as a blowing agent for the polyurethane foam insulation. Thus, a total 351 MT of ODP tonnes is used for manufacturing new commercial refrigeration equipment. The annual production of commercial refrigeration units is about 200,000 units, estimated to be produced predominantly by about 10-15 manufacturers. The Executive Committee approved one commercial refrigeration project in Pakistan to phase out 11.5 ODP tonnes.
 2. The domestic refrigeration sector consumed about 625 ODP tonnes in 1995. This included 475 ODP tonnes of CFC-12 used for initial charge and for servicing as a refrigerant and about 150 ODP tonnes used as a blowing agent for the polyurethane foam insulation. The domestic refrigeration sub-sector comprises of seven major manufacturers with about ten installed production lines and a combined production of 230,000 units annually. The Executive Committee approved six domestic refrigeration projects in Pakistan to phase out 300 ODP tonnes.
 3. The following three projects are medium/large sized enterprises that manufacture a wide range of refrigeration equipment. The implementation of these projects will result in the phasing out of 139.53 ODP tonnes.
 4. The implementation of these projects will help Pakistan in meeting its obligations for the 1999 freeze in ODS consumption.
 5. List of baseline equipment and a disposal plan is attached to each of the three projects.
- (a) Conversion to CFC-free technology in the manufacture of commercial refrigeration equipment at Shadman Electronic Industries P. Ltd.**
1. This project will phase out the consumption of 13 MT of CFC-11 and 4 MT of CFC-12 in the production of commercial refrigeration equipment at Shadman Electronic Industries P. Ltd., by converting foam operations to HFC-141b based systems (as an interim step to CFC-free systems) and HFC-134a as the refrigerant. The proposal seeks funding for replacement of existing low pressure foam dispenser with an equivalent high pressure dispenser, refrigerant evacuation and charging equipment and provision for trials, training and eligible incremental operating costs.

(b) Conversion to CFC-free technology in the manufacture of commercial refrigeration equipment at Dawlance P. Ltd.

1. This project will phase out the consumption of 28.5 MT of CFC-11 and 9.4 MT of CFC-12 in the production of commercial refrigeration equipment at Dawlance P. Ltd., by converting foam operations to HCFC-141b based systems (as an interim step to CFC-free systems) and HFC-134a as the refrigerant. Part of the enterprise's production is small volume one and two door freezers equipped with compressors of 1/6 HP to 1/4 HP capacity. The company has a batch premixer, equipped with an electrical stirrer which is installed in air-conditioned room. The proposal seeks funding for retrofitting of existing foam dispensers, introduction of pre-mixing station, refrigerant evacuation and charging equipment and provision for trials, training and eligible incremental operating costs.

(c) Conversion to CFC-free technology in the manufacture of refrigeration equipment at United Refrigeration Industries Ltd.

1. This project will phase out the consumption of about 75 MT of CFC-11 and 21 MT of CFC-12 in the production of domestic refrigeration equipment at United Refrigeration Industries Ltd., by converting foam operations to HCFC-141b based systems (as an interim step to CFC-free systems) and HFC-134a as the refrigerant. The enterprise is equipped with premixing similar to these installed in Dawlance. The proposal seeks funding for new pre-mixing equipment, refrigerant evacuation and charging equipment and provision for trials, training and eligible incremental operating costs.

Justification of the use of HCFC-141b

The three companies have considered all the options available to substitute CFC-11 in foam operation, including cyclopentane. The three enterprises have selected HCFC-141b interim technology based on the following considerations.

"HCFC-141b based systems are technically mature and commercial available. They provide relatively the most acceptable insulation value and energy efficiency, and the lowest investment and operating costs. No major changes in the auxiliary equipment and tooling in the production program are needed. The enterprises have been fully informed about substitute technologies. The enterprises have chosen HCFC-141b 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 the enterprise to the extent required".

SECRETARIAT'S COMMENTS

1. The Secretariat has discussed with World Bank the requested capital and operating costs. Several issues have been raised regarding the replacement of the existing premixers, the cost associated with replacement and retrofit of vacuum pumps, the calculation on incremental cost for compressors, the classification of Dawlance as a commercial refrigeration project, and IOC related to the increase in foam density.
2. The Secretariat is still discussing the issues raised in the Secretariat's comments with the World Bank. The Sub-Committee on Project Review will be informed accordingly.