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EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Thirty-fourth Meeting
Montreal, 18-20 July 2001

PROJECT PROPOSALS: INDIA

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

Foam:

• Conversion from CFC-11 to water-blown technology in the manufacture of flexible molded polyurethane foam at Flexo Foam P. Ltd.	Italy
• Conversion from CFC-11 to water-blown technology in the manufacture of flexible molded polyurethane foam at Malvika Polymers	Italy
• Conversion from CFC-11 to water-blown technology in the manufacture of flexible molded polyurethane foam at Oto Industries P. Ltd.	Italy
• Conversion from CFC-11 to water-blown technology in the manufacture of flexible molded polyurethane foam at Sutlej Coach Products P. Ltd.	Italy
• Conversion from CFC-11 to water-blown technology in the manufacture of flexible molded polyurethane foam at Nu-Foam Rubber Industries P. Ltd.	UNDP
• Conversion from CFC-11 to water-blown technology in the manufacture of flexible molded polyurethane foam at Viking Engineers P. Ltd.	UNDP
• Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam insulated thermoware at Apollo Steelcrafts	UNDP

• Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam insulated thermoware at Bhatia Plastics	UNDP
• Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at Caryaire Equipments India P. Ltd.	UNDP
• Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at Essa Aircons Ltd.	UNDP
• Conversion from CFC-11 to HCF-141b technology in the manufacture of rigid polyurethane foam spray and insitu insulation at fourteen enterprises	UNDP
• Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at Lear Insulation Engineering P. Ltd.	UNDP
• Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at Nandadeep Fibrotech P. Ltd.	UNDP
• Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at Poly Grass Fibre Industries P. Ltd.	UNDP
• Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at Polyrub Industries	UNDP
• Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam insulated thermoware at Prince Plastoware Ltd.	UNDP
• Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam insulated thermoware at Roome Plastics P. Ltd.	UNDP
• Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at seventeen small and medium-sized enterprises	UNDP
• Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam insulated thermoware at Solvay Moulding P. Ltd.	UNDP
• Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam insulated thermoware at SR Polymers and Printers	UNDP
• Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at UNC Plast Industries	UNDP

Process Agent:

• Conversion of chlorinated rubber manufacture from carbon tetra chloride to non-ODS process at Rishiroop Organics Pvt. Ltd. and Rishiroop Polymers Pvt. Ltd.	World Bank

• Conversion of carbon tetrachloride (CTC) as process agent to monochlorobenzene at M/S Benzo Chemical Industries, Tarapore	UNIDO
• Conversion of carbon tetrachloride (CTC) as process agent to ethylene dichloride at Chiplun Fine Chemicals Ltd., Ratnagiri	UNIDO
• Conversion of carbon tetrachloride (CTC) as process agent to monochlorobenzene at FDC Limited, Roha	UNIDO
• Conversion of carbon tetrachloride (CTC) as process agent to monochlorobenzene at GRD Chemicals Ltd., Indore, M.P.	UNIDO
• Conversion of carbon tetrachloride (CTC) as process agent to monochlorobenzene (MCB) at Pradeep Shetye Ltd., Alibagh	UNIDO

Refrigeration:

• Conversion from CFC-11 to HCFC-141b and from CFC-12 to HFC-134a technology in the manufacture of commercial refrigeration equipment at five enterprises	UNDP

Solvents:

• Conversion of carbon tetrachloride (CTC) as cleaning solvent to trichloroethylene at Engineer Industries, Mazgaon	UNIDO
• Conversion of carbon tetrachloride (CTC) as cleaning solvent to trichloroethylene at Sapna Coils Ltd., Palghar	UNIDO
• Conversion of carbon tetrachloride (CTC) as cleaning solvent to trichloroethylene at Sapna Engineering, Mazgaon	UNIDO

PROJECT EVALUATION SHEET
INDIA

SECTOR: Foam ODS use in sector (2000): 2,898 ODP tonnes

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

Project Titles:

(a) Conversion from CFC-11 to water-blown technology in the manufacture of flexible molded polyurethane foam at Flexo Foam P. Ltd.
(b) Conversion from CFC-11 to water-blown technology in the manufacture of flexible molded polyurethane foam at Malvika Polymers
(c) Conversion from CFC-11 to water-blown technology in the manufacture of flexible molded polyurethane foam at Oto Industries P. Ltd.
(d) Conversion from CFC-11 to water-blown technology in the manufacture of flexible molded polyurethane foam at Sutlej Coach Products P. Ltd.
(e) Conversion from CFC-11 to water-blown technology in the manufacture of flexible molded polyurethane foam at Nu-Foam Rubber Industries P. Ltd.
(f) Conversion from CFC-11 to water-blown technology in the manufacture of flexible molded polyurethane foam at Viking Engineers P. Ltd.

Project Data	**Integral skin**					
	Flexo Foam	**Malvika**	**Oto Industries**	**Sutlej Coach**	**Nu-Foam Rubber**	**Viking Engineers**
Enterprise consumption (ODP tonnes)	19.35	20.00	12.70	18.00	15.65	13.25
Project impact (ODP tonnes)	19.35	20.00	12.70	18.00	15.65	13.25
Project duration (months)	36	33	33	33	33	33
Initial amount requested (US $)	188,041	199,360	142,466	190,250	164,000	147,650
Final project cost (US $):						
Incremental capital cost (a)	70,500	77,500	62,500	79,500	66,500	64,500
Contingency cost (b)	7,050	7,750	6,250	7,950	6,650	6,450
Incremental operating cost (c)	107,741	111,360	70,966	100,050	87,000	73,950
Total project cost (a+b+c)	185,291	196,610	139,716	187,500	160,150	144,900
Local ownership (%)	100%	100%	100%	100%	100%	100%
Export component (%)	0%	0%	0%	0%	0%	0%
Amount requested (US $)	185,291	196,610	139,716	187,500	160,150	144,900
Cost effectiveness (US $/kg.)	9.57	9.83	11.00	10.41	10.23	10.94
Counterpart funding confirmed?						
National coordinating agency	Ministry of Environment & Forests					
Implementing agency	Italy	Italy	Italy	Italy	UNDP	UNDP

Secretariat's Recommendations						
Amount recommended (US $)	185,291	196,610	139,716	187,500	160,150	144,900
Project impact (ODP tonnes)	19.35	20.00	12.70	18.00	15.65	13.25
Cost effectiveness (US $/kg)	9.57	9.83	11.00	10.41	10.23	10.94
Implementing agency support cost (US $)	24,081	25,559	18,163	24,362	20,820	18,837
Total cost to Multilateral Fund (US $)	209,372	222,169	157,879	211,862	180,970	163,737

PROJECT EVALUATION SHEET
INDIA

SECTOR: Foam ODS use in sector (2000): 2,898 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 insulated thermoware at Apollo Steelcrafts
(h) Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam insulated thermoware at Bhatia Plastics
(i) Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at Caryaire Equipments India P. Ltd.
(j) Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at Essa Aircons Ltd.
(k) Conversion from CFC-11 to HCF-141b technology in the manufacture of rigid polyurethane foam spray and insitu insulation at fourteen enterprises

Project Data	**Rigid**				
	Apollo Steelcrafts	**Bhatia Plastics**	**Caryaire**	**Essa Aircons**	**Fourteen enterprises**
Enterprise consumption (ODP tonnes)	14.75	12.00	18.40	15.00	192.48
Project impact (ODP tonnes)	13.67	11.12	17.05	13.90	178.36
Project duration (months)	30	30	30	30	36
Initial amount requested (US $)	80,775	87,070	133,509	108,837	800,415
Final project cost (US $):					
Incremental capital cost (a)	46,500	61,500	103,000	93,000	182,500
Contingency cost (b)	4,650	6,150	10,300	9,300	18,250
Incremental operating cost (c)	25,775	20,969	32,521	15,178	558,415
Total project cost (a+b+c)	76,925	88,619	145,821	117,478	759,165
Local ownership (%)	100%	100%	100%	100%	100%
Export component (%)	0%	0%	0%	0%	0%
Amount requested (US $)	76,925	87,070	133,509	108,837	759,165
Cost effectiveness (US $/kg.)	5.63	7.83	7.83	7.83	4.26
Counterpart funding confirmed?			Yes	Yes	
National coordinating agency	Ministry of Environment & Forests				
Implementing agency	UNDP	UNDP	UNDP	UNDP	UNDP

Secretariat's Recommendations					
Amount recommended (US $)	76,925	87,070	133,509	108,837	759,165
Project impact (ODP tonnes)	13.67	11.12	17.05	13.90	178.36
Cost effectiveness (US $/kg)	5.63	7.83	7.83	7.83	4.26
Implementing agency support cost (US $)	10,000	11,319	17,356	14,149	93,508
Total cost to Multilateral Fund (US $)	86,925	98,389	150,865	122,986	852,673

PROJECT EVALUATION SHEET
INDIA

SECTOR: ODS use in sector (2000): 2,898 ODP tonnes

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

Project Titles:

(l) Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at Lear Insulation Engineering P. Ltd.

(m) Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at Nandadeep Fibrotech P. Ltd.

(n) Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at Poly Glass Fibre Industries P. Ltd.

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

(p) Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam insulated thermoware at Prince Plastoware Ltd.

Project Data	**Rigid**				
	Lear Insulation	**Nandadeep**	**Poly Glass Fibre**	**Polyrub**	**Prince Plastoware**
Enterprise consumption (ODP tonnes)	11.38	12.20	18.50	13.50	10.20
Project impact (ODP tonnes)	10.55	11.31	17.14	12.51	9.45
Project duration (months)	30	30	30	30	30
Initial amount requested (US $)	82,567	88,526	134,238	97,953	74,010
Final project cost (US $):					
Incremental capital cost (a)	93,000	93,000	93,000	93,000	61,500
Contingency cost (b)	9,300	9,300	9,300	9,300	6,150
Incremental operating cost (c)	21,557	24,906	36,283	25,973	17,823
Total project cost (a+b+c)	123,857	127,206	138,583	128,273	85,473
Local ownership (%)	100%	100%	100%	100%	100%
Export component (%)	0%	0%	0%	0%	0%
Amount requested (US $)	82,567	88,526	134,238	97,953	74,010
Cost effectiveness (US $/kg.)	7.83	7.83	7.83	7.83	7.83
Counterpart funding confirmed?	Yes	Yes	Yes	Yes	Yes
National coordinating agency	Ministry of Environment & Forests				
Implementing agency	UNDP	UNDP	UNDP	UNDP	UNDP

Secretariat's Recommendations					
Amount recommended (US $)	82,567	88,526	134,238	97,953	74,010
Project impact (ODP tonnes)	10.55	11.31	17.14	12.51	9.45
Cost effectiveness (US $/kg)	7.83	7.83	7.83	7.83	7.83
Implementing agency support cost (US $)	10,734	11,508	17,451	12,734	9,621
Total cost to Multilateral Fund (US $)	93,301	100,034	151,689	110,687	83,631

PROJECT EVALUATION SHEET
INDIA

SECTOR: ODS use in sector (2000): 2,898 ODP tonnes

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

Project Titles:

(q) Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam insulated thermoware at Roome Plastics P. Ltd.
(r) Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at seventeen small and medium-sized enterprises
(s) Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam insulated thermoware at Solvay Moulding P. Ltd.
(t) Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam insulated thermoware at SR Polymers and Printers
(u) Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at UNC Plast Industries

Project Data	**Rigid**				
	Roome Plastics	**Seventeen SMEs**	**Solvay Moulding**	**SR Polymers**	**UNC Plast**
Enterprise consumption (ODP tonnes)	19.50	60.62	28.13	21.20	12.35
Project impact (ODP tonnes)	18.07	55.78	26.07	19.65	11.44
Project duration (months)	30	36	30	30	30
Initial amount requested (US $)	105,496	417,740	201,835	98,852	89,607
Final project cost (US $):					
Incremental capital cost (a)	60,500	355,300	120,500	21,500	93,000
Contingency cost (b)	6,050	35,530	12,050	2,150	9,300
Incremental operating cost (c)	33,996	97,760	64,335	71,352	24,127
Total project cost (a+b+c)	100,546	488,590	196,885	95,002	126,427
Local ownership (%)	100%	100%	100%	100%	100%
Export component (%)	0%	0%	0%	0%	0%
Amount requested (US $)	100,546	417,740	196,885	95,002	89,607
Cost effectiveness (US $/kg.)	5.56	7.49	7.55	4.84	7.83
Counterpart funding confirmed?		Yes			Yes
National coordinating agency	Ministry of Environment & Forests				
Implementing agency	UNDP	UNDP	UNDP	UNDP	UNDP

Secretariat's Recommendations					
Amount recommended (US $)	100,546	417,740	196,885	95,002	89,607
Project impact (ODP tonnes)	18.07	55.78	26.07	19.65	11.44
Cost effectiveness (US $/kg)	5.56	7.49	7.55	4.84	7.83
Implementing agency support cost (US $)	13,071	54,306	25,595	12,350	11,649
Total cost to Multilateral Fund (US $)	113,617	472,046	222,480	107,352	101,256

PROJECT DESCRIPTION

Sector background

- Latest available total ODS consumption (1999)	24,978.40 ODP tonnes
- Baseline consumption of Annex A Group I substances (CFCs)	6,681.00 ODP tonnes
- Consumption of Annex A Group I substances for the year 2000*	5,614.33 ODP tonnes
- Baseline consumption of CFCs in foam sector	2,391.00 ODP tonnes
- Consumption of CFCs in foam sector in 2000*	2,898.00 ODP tonnes
- Funds approved for investment projects in foam sector as of end of 2000	US $26,366,269.00
- Quantity of CFC to be phased out in investment projects in the foam sector as of end of 2000	3,258.80 ODP tonnes
- Quantity of CFC phased out from approved investment projects in the foam sector as of end of 2000	2,082.14 ODP tonnes
- Quantity of CFCs in approved investment projects in the foam sector not yet completed as of end of 2000	1,160.20 ODP tonnes
- Quantity of CFCs remaining to be phased out in the foam sector	1,737.80 ODP tonnes

* Based on data reported to the Fund Secretariat by the Government of India on 6 June 2001.

1. India reported 1999 CFC consumption in the foam sector as 6,056.69 ODP tonnes out of which 4,075 ODP tonnes were reported to be contained in imported preblended polyol. India has also reported CFC consumption data for the foam sector for the year 2000 as 2,898 ODP tonnes, namely without the amount contained in imported premixed systems. However, UNDP and the Government of Italy stated in the project documents that all the enterprises producing rigid foams procure premixed CFC-11 based systems from the local polyol producers as well as traded imports, while all the enterprises producing flexible molded and integral skin foams procure only imported premixed CFC-11 based systems.

2. UNDP reported that the complete phase-out of ODS in the foam sector in India is scheduled for January 2003 through a comprehensive legislation which came into effect in July 2000.

Flexible Molded/Integral Skin Foam

Flexo Foam P. Ltd., Malvika Polymers, Nu-Foam Rubber Industries P. Ltd., Oto Industries P. Ltd., Sutlej Coach Products P. Ltd., Viking Engineers P. Ltd.

3. The enterprises were established between 1985 and 1993. A total of 98.95 ODP tonnes of CFC-11 in premixed systems was consumed by these enterprises between 1999 and 2000 in the manufacture of flexible molded foam seat cushions for automotive and/or furniture applications. Current consumption and other relevant data for each company are listed in Table 1. The

enterprises propose to phase out CFC-11 from their production by introducing water-blown technology.

4. All the companies currently use low-pressure dispensers and fiberglass molds without temperature control systems except for Sutlej Coach Products P. Limited which operates a high-pressure dispenser. The baseline equipment of the companies are listed in Table 1.

5. The request includes retrofitting the existing dispensers to replace gaskets, seals, and hoses (US $10,000 – US $15,000), and upgrading the current unsafe fiberglass molds to metal lined epoxy molds (US $20,000 – US $42,000) with temperature control systems (US $10,000 per enterprise). Other capital costs for each enterprise include the need for technical assistance, trials, and training (US $20,000). Please refer to Table 1 for a detailed profile of the companies.

6. The enterprises will phase out all 98.95 ODP tonnes of CFC-11 with the project's implementation of water-based technology.

Rigid Foam

Apollo Steelcrafts, Bhatia Plastics, Caryaire Equipments India P. Ltd., Essa Aircons Ltd., Lear Insulation Engineering P. Ltd., Nandadeep Fibrotech P. Ltd., Poly Glass Fibre Industries P. Ltd., Polyrub Industries, Prince Plastoware Ltd., Roome Plastics P. Ltd., Solvay Moulding P. Ltd., SR Polymers and Printers, UNC Plast Industries

7. The enterprises were established between 1964 and 1994. They consumed a total of 207.11 ODP tonnes of CFC-11 in premixed systems between 1999 and 2000 in the manufacture of thermoware products, foam boards, slabs, pipe sections, sandwich panels, and spray foam for the insulation, construction and transportation industries (please refer to Table 1 for consumption statistics of each enterprise). All of the companies will convert to HCFC-141b technology as an interim solution to phase out the use of CFC-11 in the production of rigid foam.

8. All the companies currently use low-pressure dispensers except for Apollo Steelcrafts which uses hand-mixing operations. Caryaire Equipment India P. Ltd. and Solvay Moulding P. Ltd. operate low-pressure dispensers and high-pressure dispensers. SR polymers operates one high-pressure dispenser only.

9. Six of the thirteen companies are requesting to replace the low-pressure dispensers with high-pressure dispensers at a cost of US $80,000 each, and five are requesting replacement with medium-pressure dispensers ranging from US $30,000 to US $45,000. Retrofitting of existing dispensers will cost US $5,000 each. Trials, technology transfer, and training has been estimated to cost between US $20,000 and US $30,000 for each enterprise. Please refer to Table 1 for a detailed profile of the individual rigid foam producing companies.

10. By converting to HCFC-141b technology, these companies will phase out a total of 191.93 ODP tonnes of CFC-11 from India's rigid foam sector. There will be residual ODS of 15.18 tonnes of CFC-11 per year.

Rigid Umbrella 14 Enterprises: East India Energy, Indo Polytech, Industrial Foam, Industrial Insulation, Jay Elastomers, Mag Hard Insulatora, Mahesh Products, Mona Wire and Insul, New Era Enterprises, Parkash Polymers, Rahul Industries, Shreeji Polurethanes, Sigma Projects, System Engineers

11. The enterprises were established between 1975 and May 1995. They consumed a total of 192.48 ODP tonnes of CFC-11 in premixed systems between 1999 and 2000 in the manufacture of rigid polyurethane foam spray and insitu insulation for the transportation and construction industries. The companies will eliminate the use of CFC-11 by converting to HCFC-141b technology as an interim solution. The chosen permanent solution is water/HFC-based systems when they become commercially available and viable. Please refer to Table 2 for a profile of these companies.

12. Each company operates a 7-8, 10, or 14 kg/min high-pressure foam dispenser installed between 1985 and 1995.

13. The companies are requesting to retrofit their existing dispensers at a cost of US $5,000 each totalling US $75,000. Trials, technology transfer, and technical assistance for all the companies combined will total US $145,000. Therefore, the incremental capital costs amount to US $242,000 with 10% contingency. The incremental operating costs total US $558,415 and the total project cost is US $800,415.

14. With the project's implementation, the companies will eliminate the use of 178.36 tonnes of CFC-11 by converting to HCFC-141b technology as an interim solution with residual ODS of 14.12 tonnes per year.

Rigid Umbrella 17 Enterprises: Air Pac Filters and Systems, BG Shirke Construction Technology, Fabwell Engineers, Footwork, Gowell Industries, HPS Air Systems, Kinetic Organics and Plastics, King Decors, Neha Insulations, Padmaja Packaging, Ram Plast Industries, Shri Sakthi Insulators, Sri Industries, Standard Engineering, Titan Enterprises, Velugu Industries, Venus PU Foams

15. All of these small and medium-sized enterprises were established and in commercial production before 25 July 1995. They consumed a total of 60.20 ODP tonnes of CFC-11 in premixed systems between 1999 and 2000 in the production of rigid polyurethane foam boards/slabs and pipe-sections by the hand-mixing method. Rigid foam production of these companies will be converted to HCFC-141b interim technology to eliminate the use of CFC-11. Please refer to Table 2 for a profile of the companies.

16. All the companies have hand-mix operations. The project has requested the purchase of medium-pressure dispensers for each company totalling US $227,800. Additional costs include US $127,500 for technical assistance, trials, and training. The sum of the incremental capital cost of US $390,830 (with 10% contingency) and the incremental operating cost of US $97,760 amounts to a total project cost of US $488,590.

17. A total of 55.78 ODP tonnes of CFC-11 will be phased out by the 17 enterprises with residual ODS of 4.42 tonnes per year as a result of the use of HCFC-141b technology.

Justification for conversion to HCFC-141b technology

18. The following justification was provided for the use of HCFC-141b:

> Hydrocarbon technology and water-based technology were options that were considered for the conversion. The use of hydrocarbon technology was deemed unfeasible due to safety reasons in view of the flammability of hydrocarbons. Furthermore, since hydrocarbons cannot be pre-mixed in polyols because of safety issues, additional investments on in-house premixing would be required and such investments were not considered economically viable. Water-based systems are presently not commercially available or technically mature in India and do not meet the technical product requirements regarding density and thermal conductivity. This may render the products non-competitive and may ultimately lead to closure of the plant. HCFC-141b technology was the preferred option because it was found to be cost-effective, safe, will maintain product and processing characteristics at acceptable levels, and is currently being successfully implemented by other enterprises in the same business sector in India.

19. The Government of India has endorsed the use the HCFC-141b by the enterprises consistent with Decision 27/13.

Table 1. Profile of the Enterprises by Sub-Sector

Enterprise and Year*	ODS Use (1999-2000) ODP tonnes	Baseline Equipment/Year of Installation	Action Proposed/Cost US $	Other/Cost US $	Trial, Tech Transfer & Training US $
FLEXIBLE MOLDED/INTEGRAL SKIN FOAM					
Flexo Foam P. Ltd. 1985	19.35	1990 30 kg/min LPD 1985-1994 28 Nos fiberglass molds	Retrofit LPD US $15,000 Replace with 28 mold upgrades Total: US $28,000	Mold heating system US $10,000	20,000
Malvika Polymers 1993	20.00	1993 40 kg/min LPD 1993 35 Nos fiberglass molds	Retrofit LPD US $15,000 Replace with 35 mold upgrades Total: US $35,000	Mold heating system US $10,000	20,000
Nu-Foam Rubber Industries P. Ltd. 1986	15.65	1994 30 kg/min LPD 1994 25 Nos fiberglass molds	Retrofit LPD US $15,000 Replace with 25 mold upgrades Total: US $25,000	Mold heating system US $10,000	20,000
Oto Industries P. Ltd. 1992	12.70	1992 60 kg/min LPD 1992-94 20 Nos fiberglass molds	Retrofit LPD US $15,000 Replace with 20 mold upgrades Total: US $20,000	Mold heating system US $10,000	20,000
Sutlej Coach Products P. Ltd. 1993	18.00	1994 40 kg/min HPD 1993-94 42 Nos fiberglass molds	Retrofit HPD US $10,000 Replace with 42 mold upgrades Total: US $42,000	Mold heating system US $10,000	20,000
Viking Engineers P. Ltd. 1987	13.25	1988 100 kg/min LPD 1989-94 22 Nos fiberglass molds	Retrofit LPD US $15,000 Replace with 22 mold upgrades Total: US $22,000	Mold heating system US $10,000	20,000

Enterprise and Year*	ODS Use (1999-2000) ODP tonnes	Baseline Equipment/Year of Installation	Action Proposed/Cost US $	Other/Cost US $	Trial, Tech Transfer & Training US $
RIGID FOAM					
Apollo Steelcrafts 1994	14.75	None	Purchase of 10 kg/min MPD US $30,000	None	20,000
Bhatia Plastics 1969	12.00	1991 10 kg/min LPD	Replace with 10 kg/min MPD US $45,000	None	20,000
Caryaire Equipments India P. Ltd. 1990	18.40	1990 30 kg/min LPD 1990 12 kg/min HPD	Replace with HPD US $80,000 Retrofit US $5,000	None	25,000
Essa Aircons Ltd. 1986	15.00	1990 30 kg/min LPD	Replace with HPD US $80,000	None	20,000
Lear Insulation Engineering P. Ltd. 1964	11.38	1989 30 kg/min LPD	Replace with HPD US $80,000	None	20,000
Nandadeep Fibrotech P. Ltd. 1994	12.20	1989 30 kg/min LPD	Replace with HPD US $80,000	None	20,000
Poly Glass Fibre Industries P. Ltd. 1970	18.50	1991 30 kg/min LPD	Replace with HPD US $80,000	None	20,000
Polyrub Industries 1989	13.50	1992 30 kg/min LPD	Replace with HPD US $80,000	None	20,000
Prince Plastoware Ltd. 1992	10.20	1993 10 kg/min LPD	Replace with 10 kg/min MPD US $45,000	None	20,000
Roome Plastics P. Ltd. 1992	19.50	1994 10 kg/min LPD	Replace with 10 kg/min MPD US $45,000	None	20,000
Solvay Moulding P. Ltd. 1987	28.13	1989 10 kg/min LPD 1994 10 kg/min LPD 1994 10 kg/min HPD	Replace with two 10 kg/min MPD Total: US $90,000 Retrofit US $5,000	None	30,000
SR Polymers and Printers 1992	21.20	1992 12 kg/min HPD	Retrofit US $5,000	None	20,000
UNC Plast Industries 1989	12.35	1989 30 kg/min LPD	Replace with HPD US $80,000	None	20,000

Table 2. Profile of the Umbrella Projects

Enterprise and Date Established	CFC Used	Impact ODP Eliminated (t/y)*	ICC** US $	Contingency	IOC*** US $	Total Project Cost US $	Grant Amount US $	Cost Effectiveness US $/kg/y
GROUP PROJECT 14 ENTERPRISES								
East India Energy 1995	11.67	10.81	15,000	1,500	33,859	50,359	47,609	4.40
Indo Polytech 1990	21.03	19.49	15,000	1,500	61,003	77,503	74,753	3.84
Industrial Foam 1994	17.30	16.03	15,000	1,500	50,186	66,686	63,936	3.99
Industrial Insulation 1995	12.00	11.12	15,000	1,500	34,816	51,316	48,566	4.37
Jay Elastomers 1991	10.50	9.73	15,000	1,500	30,466	46,966	44,216	4.54

Enterprise and Date Established	CFC Used	Impact ODP Eliminated (t/y)*	ICC** US $	Contingency	IOC*** US $	Total Project Cost US $	Grant Amount US $	Cost Effectiveness US $/kg/y
Mag Hard Insulatora 1975	9.00	8.34	15,000	1,500	26,116	42,616	39,866	4.78
Mahesh Products 1993	15.90	14.73	15,000	1,500	46,126	62,626	59,876	4.07
Mona Wire and Insul 1989	11.38	10.55	15,000	1,500	33,018	49,518	46,768	4.43
New Era Enterprises 1993	13.50	12.51	15,000	1,500	39,166	55,666	52,916	4.23
Parkash Polymers 1994	16.20	15.01	15,000	1,500	46,996	63,496	60,746	4.05
Rahul Industries 1990	21.80	20.20	15,000	1,500	63,236	79,736	76,986	3.81
Shreeji Polurethanes 1994	11.00	10.19	15,000	1,500	31,915	48,415	45,665	4.48
Sigma Projects 1994	12.00	11.12	15,000	1,500	34,816	51,316	48,566	4.37
System Engineers 1992	9.20	8.53	25,000	2,500	26,696	54,196	48,696	5.71
SUB-TOTAL	***192.48***	***178.36***	***220,000***	***22,000***	***558,415***	***800,415***	***759,165***	***4.26***
GROUP PROJECT 17 ENTERPRISES								
Air Pac Filters and Systems 1992	3.50	3.24	20,900	2,090	5,684	28,674	25,370	7.83
BG Shirke Construction Technology 1983	3.50	3.24	20,900	2,090	5,684	28,674	25,370	7.83
Fabwell Engineers 1993	3.15	2.92	20,900	2,090	5,115	28,105	22,866	7.83
Footwork 1994	3.15	2.92	20,900	2,090	5,115	28,105	22,866	7.83
Gowell Industries 1988	3.15	2.92	20,900	2,090	5,115	28,105	22,866	7.83
HPS Air Systems 1992	3.15	2.92	20,900	2,090	5,115	28,105	22,866	7.83
Kinetic Organics and Plastics 1994	5.25	4.86	20,900	2,090	8,526	31,516	31,516	6.48
King Decors 1992	3.15	2.92	20,900	2,090	5,115	28,105	22,866	7.83
Neha Insulations 1994	3.50	3.24	20,900	2,090	5,684	28,674	25,370	7.83
Padmaja Packaging 1991	3.15	2.92	20,900	2,090	5,115	28,105	22,866	7.83
Ram Plast Industries 1990	3.50	3.24	20,900	2,090	5,684	28,674	25,370	7.83
Shri Sakthi Insulators 1994	3.15	2.92	20,900	2,090	5,115	28,105	22,866	7.83
Sri Industries 1994	3.15	2.92	20,900	2,090	5,115	28,105	22,866	7.83
Standard Engineering 1960	3.15	2.92	20,900	2,090	5,115	28,105	22,866	7.83
Titan Enterprises 1994	2.80	2.60	20,900	2,090	4,547	27,537	20,360	7.83
Velugu Industries 1982	3.50	3.24	20,900	2,090	5,684	28,674	25,370	7.83

Enterprise and Date Established	CFC Used	Impact ODP Eliminated (t/y)*	ICC** US $	Contingency	IOC*** US $	Total Project Cost US $	Grant Amount US $	Cost Effectiveness US $/kg/y
Venus PU Foams 1994	6.30	5.84	20,900	2,090	10,230	33,220	33,220	5.69
SUB-TOTAL	***60.20***	***55.78***	***355,300***	***35,530***	***97,760***	***488,590***	***417,740***	***7.49***

*tonnes per year **incremental capital cost ***incremental operating cost

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

20. The components of the projects are consistent with the cost of similar projects approved and implemented in India and other Article 5 countries. The technology transfer and training (technical assistance) aspects of the projects were discussed as described in paragraph 29 below.

ODS consumption

21. The total amount of 98.95 ODP tonnes used in the integral skin foam sub-sector projects and an unspecified portion of the 455.79 ODP tonnes used in the rigid foam sub-sector projects are derived from imported premixed systems.

22. A request from India to revise its baseline as well as 1999 consumption data of Annex A Group I substances to include CFCs contained in imported premixed systems was referred by the Ozone Secretariat to the 25th Meeting of the Implementation Committee. The outcome of the Committee's deliberations was as follows:

> The Committee agreed to draw India's attention to decision I/12 A, and especially sub-paragraph (e) (iii), which made clear that polyols were to be regarded as a product under the terms of the Montreal Protocol so that CFCs in polyols should not be counted as consumption by the importing country. Some members pointed out that in Annex D, adopted at the Third Meeting of the Parties, polyols (pre-polymers) were listed as products containing CFCs and not as controlled substances. A member of the Secretariat observed that that could result in consumption phase out by the Multilateral Fund projects in a country to exceed the reported consumption by that country, but the Committee felt that no difficulty was raised by such a situation (UNEP/OzL.Pro/ImpCom/25/2 para. 16).

23. Apparently, as a result of the above conclusions, India did not report CFCs derived from imported premixed systems in its 2000 data report to the Fund Secretariat. However, in its report to the Fund Secretariat India stated that the CFC-11 consumption in the foam sector was provisional subject to finalization of the foam sector strategy being prepared by UNDP.

24. In view of the Implementation Committee's conclusions and in the absence of a report of the CFC consumption derived from imported premixed systems, it would not be possible to account for the CFCs being phased out from projects for enterprises that use imported premixed systems.

25. The Executive Committee may wish to provide guidance on how to account for the CFCs that are phased out from projects using imported premixed systems.

Action on relevant sections of Decision 33/2

26. UNDP informed the Secretariat that it had not received validation of the CFC consumption to be phased out in the projects and/or commitment of the Government of India as required under Decision 33/2 (c) of the Executive Committee. It indicated that the Government had expressed concerns about some of the requirements of the decision and their ramifications for national governments.

Project duration

27. Following discussion with UNDP consistent with Decision 33/2 (b), UNDP proposed a reduction of the duration of the rigid foam projects (except group projects) and flexible molded/integral skin foam projects from 36 to 30 and 33 months respectively. The group projects and multiple sub-sector foam projects will remain as 36 months.

Technology transfer costs

28. The Secretariat raised the issue of technical assistance and technology transfer costs of the India projects with UNDP. UNDP indicated that technical assistance is key to successful implementation of the foam projects in India. Following the discussion the technical assistance was reduced by US $1,000-US $2,000 in some of the projects in line with a formula proposed by UNDP.

RECOMMENDATIONS

29. The Fund Secretariat recommends blanket approval of:

(a) Flexo foam, Malvika, Oto Industries and Sutlej Coach with the funding levels and associated support costs as indicated in the table below for implementation by the Government of Italy.

(b) Nu-Foam Rubber, Viking Engineers, Apollo Steelcrafts, Bhatia Plastics, Caryaire, Essa Aircons, Umbrella fourteen enterprises, Lear Insulation, Nandadeep, Poly Glass Fibre, Polyrub, Prince Plastoware, Roome Plastics, Umbrella seventeen SMEs, Solvay Moulding, SR Polymers and UNC Plast projects with the funding levels and associated support costs as indicated in the table below for implementation by UNDP.

	Project Title	Project Funding (US$)	Support Cost (US$)	Implementing Agency
(a)	Conversion from CFC-11 to water-blown technology in the manufacture of flexible molded polyurethane foam at Flexo Foam P. Ltd.	185,291	24,081	Italy
(b)	Conversion from CFC-11 to water-blown technology in the manufacture of flexible molded polyurethane foam at Malvika Polymers	196,610	25,559	Italy
(c)	Conversion from CFC-11 to water-blown technology in the manufacture of flexible molded polyurethane foam at Oto Industries P. Ltd.	139,716	18,163	Italy
(d)	Conversion from CFC-11 to water-blown technology in the manufacture of flexible molded polyurethane foam at Sutlej Coach Products P. Ltd.	187,500	24,362	Italy
(e)	Conversion from CFC-11 to water-blown technology in the manufacture of flexible molded polyurethane foam at Nu-Foam Rubber Industries P. Ltd.	160,150	20,820	UNDP
(f)	Conversion from CFC-11 to water-blown technology in the manufacture of flexible molded polyurethane foam at Viking Engineers P. Ltd.	144,900	18,837	UNDP
(g)	Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam insulated thermoware at Apollo Steelcrafts	76,925	10,000	UNDP
(h)	Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam insulated thermoware at Bhatia Plastics	87,070	11,319	UNDP
(i)	Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at Caryaire Equipments India P. Ltd.	133,509	17,356	UNDP
(j)	Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at Essa Aircons Ltd.	108,837	14,149	UNDP
(k)	Conversion from CFC-11 to HCF-141b technology in the manufacture of rigid polyurethane foam spray and insitu insulation at fourteen enterprises	759,165	93,508	UNDP
(l)	Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at Lear Insulation Engineering P. Ltd.	82,567	10,734	UNDP
(m)	Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at Nandadeep Fibrotech P. Ltd.	88,526	11,508	UNDP
(n)	Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at Poly Glass Fibre Industries P. Ltd.	134,238	17,451	UNDP
(o)	Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at Polyrub Industries	97,953	12,734	UNDP
(p)	Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam insulated thermoware at Prince Plastoware Ltd.	74,010	9,621	UNDP
(q)	Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam insulated thermoware at Roome Plastics P. Ltd.	100,546	13,071	UNDP
(r)	Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at seventeen small and	417,740	54,306	UNDP

	medium-sized enterprises			
(s)	Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam insulated thermoware at Solvay Moulding P. Ltd.	196,885	25,595	UNDP
(t)	Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam insulated thermoware at SR Polymers and Printers	95,002	12,350	UNDP
(u)	Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at UNC Plast Industries	89,607	11,649	UNDP

30. The Fund Secretariat recommends that the total costs of the projects in paragraph 29 (a) above when approved be offset against the contribution of the Government of Italy for the years 2000 and 2001.

PROJECT EVALUATION SHEET
INDIA

SECTOR: Process Agent ODS use in sector (1998): 3689 ODP tonnes

Sub-sector cost-effectiveness thresholds: n/a

Project Titles:

(a) Conversion of chlorinated rubber manufacture from carbon tetra chloride to non-ODS process at Rishiroop Organics Pvt. Ltd. and Rishiroop Polymers Pvt. Ltd.
(b) Conversion of carbon tetrachloride (CTC) as process agent to ethylene dichloride at Chiplun Fine Chemicals Ltd., Ratnagiri
(c) Conversion of carbon tetrachloride (CTC) as process agent to monochlorobenzene at M/S Benzo Chemical Industries, Tarapore
(d) Conversion of carbon tetrachloride (CTC) as process agent to monochlorobenzene at FDC Limited, Roha
(e) Conversion of carbon tetrachloride (CTC) as process agent to monochlorobenzene at GRD Chemicals Ltd., Indore, M.P.
(f) Conversion of carbon tetrachloride (CTC) as process agent to monochlorobenzene (MCB) at Pradeep Shetye Ltd., Alibagh

Project Data	**Process conversion**					
	Rishiroop	**Chiplun**	**Benzo**	**FDC**	**GRD**	**Pradeep**
Enterprise consumption (ODP tonnes)	497.00	16.72	23.00	34.10	17.93	133.87
Project impact (ODP tonnes)	497.00	16.72	23.00	34.10	17.93	133.87
Project duration (months)	36	24	24	24	24	24
Initial amount requested (US $)	4,957,246	291,107	136,786	274,552	127,667	332,971
Final project cost (US $):						
Incremental capital cost (a)	4,066,100	225,799	114,600	219,790	107,700	224,530
Contingency cost (b)	406,610	22,580	11,460	21,979	10,770	22,453
Incremental operating cost (c)	484,536	8,305	10,726	23,088	9,197	32,018
Total project cost (a+b+c)	4,957,246	256,684	136,786	264,857	127,667	279,001
Local ownership (%)	100%	100%	100%	100%	100%	100%
Export component (%)	0%	10%	10%	20%	0%	10%
Amount requested (US $)	3,319,990	155,830	136,786	238,371	127,667	279,001
Cost effectiveness (US $/kg.)		9.32	5.95	6.99	7.12	2.08
Counterpart funding confirmed?		Yes	Yes	Yes	Yes	
National coordinating agency	Ministry of Environment & Forest					
Implementing agency	IBRD	UNIDO				

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

PRODUCTION OF CHLORINATED RUBBER

PROJECT DESCRIPTION

Conversion of chlorinated rubber manufacture from carbon tetra chloride to non-ODS process at Rishiroop Organics Pvt. Ltd. and Rishiroop Polymers Pvt. Ltd.

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

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

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

CR Manufacturers in India

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

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

35. Conversion of RIL and ROL will make use of an aqueous process developed by the third Rishiroop Group company, Rishiroop Rubber International (RRIL) The conversion of

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

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

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

38. The technical requirements of the new process require that much of the existing equipment be replaced. The main capital cost items requested are six glass-lined reactors (US$ 512,000), a photochemical system (US$ 184,000), glass-lined stirred tanks (US$ 240,000), FRP belt filter (US$ 370,000), two-stage fluidised bed dryer system (US$ 334,000), effluent treatment facility (US$ 55,700), process utility and piping (US$ 310,400). Incremental operating costs arising mainly from increased power consumption and additional quantities of chemicals are requested for four years at a level of US$ 484,536.

39. A technology transfer fee of US$ 238,000 is requested, to be paid to RRIL as the developer of the technology. "Pre-operative" costs are also sought for insurance, travel, training and project team salaries (US $133,000) fixed overheads for a six month changeover period (US $71,500) and costs of amalgamations of ROL and VAPI (US $199,000) as well as start up and commissioning costs (US $71,500)

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

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

SECRETARIAT'S COMMENTS

Executive Committee Decisions

42. This project was first considered by the Executive Committee at its 32nd Meeting, at which, in Decision 32/59, the Committee decided to :

(a) Defer the above project proposal, pending the provision of further information on plans for conversion of Rishiroop Rubber International Limited;
(b) Note that there was a preference to consider the conversion of all plants in the sub-sector at the same time;
(c) Decide that if a project for conversion of Rishiroop Rubber International Limited was submitted later, the cost benefits arising from industrial rationalisation in the sub-sector should be taken into account in determining the cost of the project;
(d) Decide that the above project proposal would remain in the World Bank's 2000 business plan.

43. At its 33rd Meeting, in Decision 33/14 the Executive Committee decided:

(a) To request the implementing agencies to provide the Secretariat with all the information it required to complete its review of projects proposed for submission to the Executive Committee while safeguarding, as appropriate, information considered by governments or enterprises to be commercially sensitive;

(b) Noting that the Secretariat is utilizing standard United Nations contracts which contain clauses requiring ongoing confidentiality, to request the Secretariat to resume its review of the Rishiroop project on the basis of the guidance provided in paragraph (a) above, for submission to, and consideration by, the Executive Committee at its Thirty-fourth Meeting;

(c) Noting that the funding of technology which was not in the public domain raises issues never dealt with by the Executive Committee in the past, to request the Secretariat to consult relevant international agencies and prepare a paper on this issue to be submitted to the Thirty-fifth Meeting of the Executive Committee.

44. Prior to the 33rd Meeting, and in response to Decision 32/59 the World Bank provided the following information:

"Schedule for submission of projects for CR Manufacturers in India

Serial No.	Enterprise	Start of commercial production	Planned submission of project proposal and request for funding:)
1.	Rishiroop Polymers Pvt. Ltd. (RPL)	1973	Submitted to the 28th meeting
2.	Pauraj Chemicals Pvt. Ltd.	1980	To be submitted to the 35th meeting
3.	Rishiroop Organics Pvt. Ltd. (ROL)	1991	Submitted to the 28th meeting*
4.	Rishiroop Rubber International Ltd. (RRIL)	1993	To be submitted to the 35th meeting
5.	Tarak Chemicals Ltd.	1998	Not eligible for funding as production started after July 1995

* Based on the review and comments from the Secretariat, the project for Rishiroop Organics Pvt. Ltd. will have to be resubmitted when CTC consumption data for 12 months prior to the data of submission is available. As the production restarted in 2000 after the court settlement, 12 month data will be available by the end of 2001 and the project will be resubmitted to the 35th ExCom meeting.

Ad (b) ExCom preference to consider the conversion of all plants in the CR sub-sector at the same time is noted. However, the present project is submitted fully consistent with the Framework Guidelines/Broad principles for Process Agent Projects, ExCom Decision 27/78. India requests that the process agent project, submitted in May 1999, be considered at the 33rd ExCom meeting. A new deferral of the project for RPL and ROL would result in additional delay of one year.

Ad (c) Projects for Pauraj Chemical Pvt. and Rishiroop International Ltd. will be submitted to the 35th Meeting of the ExCom. Based on the discussions with the Secretariat of the Multilateral Fund, Rishiroop Organics Pvt. Ltd. might need to be resubmitted at the same time. Tarak Chemical Ltd. will have to convert at own costs. In accordance with ExCom guidelines for the process agent sector, industrial rationalisation shall be considered. As the CR sub-sector in India consists of four independent companies, (PRL and ROL have the same ownership), industrial rationalisation should be considered for the entire sector and not only in relation to one of the companies. How to consider industrial rationalisation would, however, depend on agreement between India and the ExCom."

45. The Secretariat views the discussion about conversion of RRIL as cursory, indicating only when a project can be expected. No information was provided about total production capacity of chlorinated rubber proposed to be funded, how this is related to the current level of production in the country and what total level of industrial rationalisation, if any, is planned, taking into account that the current total production of all the plants in the Rishiroop Group including RRIL, is less than 1100 tonnes per annum (TPA) which is equal to the capacity originally requested in the present project proposal. RRIL has a nominal capacity of an additional 4500 TPA. Compliance of the proposal with Decision 27/78 (c) on guidelines for process agent projects is marginal. The Executive Committee might consider whether it wishes

to see information on industrial rationalisation at the time the RRIL project is submitted, or in conjunction with this project submission.

Technology transfer fee

46. As previously advised to the Executive Committee, the proposal indicates that the technology has been developed in-house by RRIL and that a patent application has been filed with the Indian authorities. A number of international patents exist for aqueous processes for production of CR, mainly originating in Japan where one company, Asahi-Denka, is producing CR commercially using an aqueous process. It is understood that this process is patented in a number of countries but not in India. The Bank provided advice from the Government of India which stated, inter-alia, that "The process of Rishiroop does not infringe on any Patent rights of any company within the territorial jurisdiction of India.".

47. A technology transfer fee of US $238,000 has been requested. Documentation for the 32nd Meeting addressed technology development. A patent for the process proposed for funding has not yet been issued. If funding is approved for the project, consideration might be given to withholding approval of the technology transfer fee until such time as a patent has been issued, thus confirming that the technology is indeed, new and that rights to it are vested in RRIL.

Project Review

48. The Secretariat resumed its technical review of the project on the basis of Decision 33/14. While the project itself is considered to be eligible and while the eligibility and cost of many of the capital equipment items have been agreed, there are a number of significant items about which the Secretariat has doubts as to eligibility. This is because the process has been developed by the industrial group that owns the beneficiary enterprise, and Rishiroop is the only entity with complete knowledge of what can and what cannot be achieved with certain equipment. The Secretariat's experts have expressed doubts about whether certain items involve more complex technology than is either essential or desirable, and whether some other items are essential to implement production by the new process. However despite these doubts the enterprise, through the World Bank, maintains that all specified equipment is essential. With the information and expertise currently available to it, the Secretariat is not in a position to corroborate these claims. Discussions are continuing to attempt to refine the capital equipment list and reduce the number of items about which uncertainty remains.

Examples of equipment items and activities not agreed or uncertain

Item	Number	Requested cost (US $)	Comments
Slurry tanks	2	120,000	Not agreed. Secretariat advised only one is essential for the conversion.
Conveyor	1	29,000	Not agreed. Not in baseline, Secretariat advised not essential.
Dryer feed bins	2	16,000	Not agreed. Secretariat advised that manual operations in baseline could continue. Proposed system may not operate successfully.
Pumps	20	99,900	Uncertain. Secretariat is advised that up to 6 may not be essential.
Belt Filter	1	185,000	Uncertain. Item is necessary, but involves substantial technological upgrade over baseline.
Fluid bed dryer	1	167,000	Uncertain. Complex, high technology solution. Secretariat advised that normal vacuum rotary dryers (new) would likely perform required function. Enterprise disagrees.
Fume system	1	31,000	Uncertain. A system is essential. Little information to judge whether proposal is over-specified.
Acid storage tanks	2	42,000	Uncertain. Secretariat advised acid quantities do not change significantly
Effluent treatment plant	1	56,000	Uncertain. Budget estimate only since system has not yet been designed. 70 % increase in volume; 200 and 300% increases in tanks and ponds.
Larger back up generator	1	90,000	Baseline does not have full back up power. This amounts to upgrade.
Technology transfer costs		599,000	Tech transfer fee 238,000 discussed above. Additionally 83,000 for drawings: 133,000 for insurance, travel, admin training, salaries, communications; 71,500 for fixed overheads; 71,500 for trials and start-up.
TOTAL		**1,434,900**	

49. While many projects contain technology transfer costs, the Fund has never provided reimbursement for the so-called "pre-operative" costs, fixed overhead costs and drawings. These components of the requested technology transfer costs amount to US $290,000

50. The Secretariat and the World Bank are continuing to discuss incremental operating costs, which will be affected by the final selection of eligible capital equipment.

51. Finally, the Secretariat and the World Bank are discussing the level of technological upgrade associated with the project as defined by Decisions 18/25 and 26/37. Technological

upgrade, as defined, occurs because the enterprise is able to defer financing the replacement of baseline plant and equipment reaching the end of its operational life, since most of the equipment is being replaced under the project. The Secretariat has provided to the World Bank a detailed calculation of this financial benefit, using information provided on the age of equipment currently used and estimation of its lifetime and replacement cost and discussions are continuing. Completion will only be possible when the eligible capital equipment list is finalised.

52. Further information will either be provided within the specified two–week deadline, or as a brief to the Sub-Committee on Project Review.

PRODUCTION OF IBUPROFEN

53. A profile of the sub-sector for the manufacture of ibuprofen was submitted to the 32nd Meeting. In the profile it was indicated that in addition to the four projects approved at that meeting, there was one further project, Chiplun, which would be submitted to a future meeting. In Decision 32/60. the Executive Committee agreed that:

(a) Data would be provided on the current operations of the Chiplun plant;

(b) If the Chiplun plant was confirmed as operating and consuming CTC, a project for its conversion could be submitted, with consumption capped at 75 tonnes of CTC and a cost-effectiveness at a level no worse than that presented in the projects currently being approved;

(c) Incremental operating costs would be considered for one year.

PROJECT DESCRIPTION

Conversion of carbon tetrachloride (CTC) as process agent to ethylene dichloride at Chiplun Fine Chemicals Ltd., Ratnagiri

54. Chiplun is a wholly Indian-owned company that manufactures the pharmaceutical drug ibuprofen. In the financial year from May 2000 to April 2001, Chiplun consumed 16.7 ODP tonnes of CTC in the manufacture of 60.4 tonnes of ibuprofen. The plant was established in 1992 with a production capacity of 90 tonnes per year of ibuprofen which was expanded to 180 tonnes per year by 1995. It produced 18, 54, 70 and 22 tonnes per year of ibuprofen between 1992 and the end of 1995 when production ceased. Production was resumed in late 1999. Exports to Article-5 countries comprise less than 10 percent of production.

55. The project proposes the replacement of CTC as the process agent with ethylene dichloride (EDC). As for other ibuprofen projects, it is indicated that a larger quantity of the new solvent is required for the chemical reactions to proceed. New equipment is needed to permit the conversion without loss in production capacity and to separate the end product. Energy requirements for heating and cooling in the new process are increased.

56. The main items of capital equipment and their costs are: new reactor vessels (US $53,000); new distillation equipment (US $38,000); effluent treatment equipment (US $48,000); Fire protection equipment (US $24,000); pipes, installation and civil works (US $33,000) and training and testing (US $15,000). Incremental operating costs for one year are US $11,647).

SECRETARIAT'S COMMENTS AND RECOMMENDATION

COMMENTS

57. The production figures supplied by UNIDO indicate that the enterprise re-started production in year 2000 and consumed 15.2 metric tonnes of CTC in the production of 60.4 metric tonnes of ibuprofen in the financial year from April 2000 to March 2001. The level of consumption of CTC was less than the limit of 75 tonnes specified in Decision 32/60.

58. UNIDO provided information to establish that the production capacity of the enterprise had been increased from 90 to 180 tonnes before July 1995. As first presented, the cost effectiveness of the project was US $17.41/kg. Decision 32/60(c) specified that the cost effectiveness was to be no worse than the projects in the sub-sector approved at the 32nd Meeting. The project for Satya Deeptha Pharmaceuticals was approved at a cost effectiveness of US $9.32/kg. UNIDO amended the funding request to conform to this requirement. UNIDO also confirmed that the project would be implemented as indicated in the project document and that the enterprise had committed to provide the counterpart funding.

RECOMMENDATION

59. The incremental cost agreed between the Secretariat and UNIDO is indicated in the table below. Consistent with practice for the process agent sector, the project is referred for individual consideration by the Sub-Committee on Project Review.

	Project Cost (US $)	Support Cost (US $)
Chiplun	155,830	20,258

PRODUCTION OF BROMOHEXINE

60. In response to the requirements of the framework guidelines for process agent projects, the Government of India, through UNIDO, submitted a report on the production of the pharmaceutical product bromohexine in the process agent sector in India. The contents of the report is reproduced below.

SUB – SECTOR PROFILE : BROMOHEXINE

61. "In the course of a study conducted in the year 2000 to review knowledge on the Bromohexine sub-sector and to prepare project documents for individual industries in this sub-sector to phase out carbon tetrachloride (CTC) used as process agent in the manufacture of Bromohexine, the existing data base has been expanded and revised.

62. Bromohexine is a mucolytic and expectorant drug used for treatment of cold and cough. In India there were seven manufacturers of Bromohexine during the nineties. To have first hand information about Bromohexine production in India, UNIDO started interacting with drug manufacturer associations. As per the information available from the Directories of Bulk Drug Manufacturers Association (BDMA) and Indian Drug Manufacturers Association (IDMA) the following 7 companies were stated to be engaged in the manufacture of Bromohexine in India during the nineties. However recent survey showed that one unit (M/s Ven Petrochemicals) has shifted to alternative solvent in 1992-93 and two other units (M/s IPCA and Camlin) have discontinued production of bromohexine some time in 1996-97. The remaining four companies shown in Table-1 are in actual production of bromohexine using CTC as the process agent solvent.

Company	Bromohexine Production (MT/year)		CTC consumption (MT/year)		Remarks
	Installed Capacity	Current	Installed Capacity	Current	
Pradeep Shetye P. Ltd.	48	40	140	120	
Ven Petrochemicals Ltd.	50	30	150	--	CTC Phased out
Benzo Chemicals Industries	25	7	75	13	
GRD Chemicals P. Ltd.	10	5	30	16	
IPCA Laboratories P. Ltd.	25	--	65	--	Production stopped
FDC Ltd.	42	13	120	31	
Camlin Ltd.	20	--	60	--	Production stopped
Total	**220**	**94**	**640**	**180**	

63. Bromohexine is manufactured by these companies starting from ortho nitro toluene which is brominated in the first step with NBS or DDH in carbon tetrachloride as inert solvent/process agent. The product o-nitro benzyl bromide (ONBB) is then processed through six steps to bromohexine. Only the first step of bromination requires use of CTC which will be phased out. Other steps remain unchanged.

64. A total of 180 MT of CTC is currently used by these four companies. It will be replaced through these projects by Monochloro benzene (MCB). The replacement has been developed indigenously and found to be most suitable. However it requires changes in plant and some process parameters.

65. The major part of CTC in the manufacture of Bromohexine will be replaced (phased out) by 2002-2003. The total budget for this phase out process would require approx. US $ 1,000,000 (one million)."

PROJECT DESCRIPTION

Conversion of carbon tetrachloride (CTC) as process agent to monochlorobenzene at M/S Benzo Chemical Industries, Tarapore
Conversion of carbon tetrachloride (CTC) as process agent to monochlorobenzene at FDC Limited, Roha
Conversion of carbon tetrachloride (CTC) as process agent to monochlorobenzene at GRD Chemicals Ltd., Indore, M.P.
Conversion of carbon tetrachloride (CTC) as process agent to monochlorobenzene (MCB) at Pradeep Shetye Ltd., Alibagh

66. The four companies have an annual consumption of 23, 34.1, 17.9. and 133.9 tonnes of carbon tetrachloride (CTC) respectively. The CTC is used as a process agent in the first stage of manufacture of bromohexine. No ODSs are used in subsequent manufacturing stages.

67. The projects propose the replacement of CTC with monochlorobenzene (MCB). As for other process agent applications, the processes are similar but a greater quantity of MCB is needed, the reactions take longer and separation of the product requires more complex equipment. For these reasons some additional process equipment and modifications to heating and cooling systems are needed to produce the bromohexine and maintain the capacity of the baseline installations. The main capital cost items requested are as follows:

	Benzo (US $000)	FDC (US $000)	GRD (US $000)	Pradeep Shetye (US $000)
Reactors (glass lined)	25	79.44	25	61
Vacuum distillation equipment	25	15	21	36.7
Centrifuge/filter	10	15.5	10	20
Fire protection	12	24	12	24
Piping fittings and civil works	19.9	75.1	18	63
Trials, testing and training	15	25	12	40.4
Refrigeration	-	17.5	-	17.5

68. Incremental operating costs for one year are requested based mainly on an increase in quantity and cost of process agent and increased costs for energy. The IOC requested are:

Benzo	US $10,726
FDC	US $23,088
GRD	US $9,197
Pradeep Shetye	US $32,018

SECRETARIAT'S COMMENTS AND RECOMMENDATION

COMMENTS

69. The sub-sector profile indicates that UNIDO has not located any additional manufacturers using CTC for the production of bromohexine. The Government of India has confirmed that it will not seek funding for any additional projects for the conversion of bromohexine production. In each project the option of reducing consumption through emission controls has been addressed with a brief analysis concluding that it would be a more costly option. The information on the sub-sector appears to satisfy the requirements of the framework guidelines for process agent projects (Decision 27/78).

70. The Secretariat noted that costs for much of the new equipment were requested on the basis of the need to increase the physical capacity of the equipment so that the overall production capacity of the plant would not be reduced after conversion. The Secretariat was advised that CTC was used in the baseline process because of its efficiency and low cost and it was to be expected that a replacement solvent would not be as efficient or as economical.

71. The Secretariat discussed with UNIDO the details of the sizes (and thus cost) of proposed replacement equipment, noting that capacity increases were not eligible for funding. Certain items including distillation systems and effluent treatment systems involved technological upgrade over the baseline conditions. Some of the installation and civil works costs were either not eligible or were not consistent with costs sought in similar projects. Capital costs were adjusted accordingly for FDC and Pradeep Shetye.

72. One enterprise (FDC) exported 20 percent of its production to non-Article-5 countries. This was taken into account in the calculation of incremental costs for the project.

RECOMMENDATION

73. Incremental costs were agreed between the Secretariat and UNIDO and are indicated in the table below. Because this is a new sub-sector, the projects are referred for individual consideration by the Sub-Committee on Project Review.

Project Title	Project Cost (US $)	Support Cost (US $)
Conversion of carbon tetrachloride (CTC) as process agent to monochlorobenzene at M/S Benzo Chemical Industries, Tarapore	136,786	17,782
Conversion of carbon tetrachloride (CTC) as process agent to monochlorobenzene at FDC Limited, Roha	238,371	30,988
Conversion of carbon tetrachloride (CTC) as process agent to monochlorobenzene at GRD Chemicals Ltd., Indore, M.P.	127,667	16,597
Conversion of carbon tetrachloride (CTC) as process agent to monochlorobenzene (MCB) at Pradeep Shetye Ltd., Alibagh	279,001	36,270

PROJECT EVALUATION SHEET
INDIA

SECTOR: Refrigeration ODS use in sector (1999): 2,297 ODP tonnes

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

Project Titles:

(a) Conversion from CFC-11 to HCFC-141b and from CFC-12 to HFC-134a technology in the manufacture of commercial refrigeration equipment at five enterprises

Project Data	**Commercial**
	Five enterprises
Enterprise consumption (ODP tonnes)	23.26
Project impact (ODP tonnes)	21.96
Project duration (months)	36
Initial amount requested (US $)	323,627
Final project cost (US $):	
Incremental capital cost (a)	295,000
Contingency cost (b)	29,500
Incremental operating cost (c)	122,056
Total project cost (a+b+c)	446,556
Local ownership (%)	100%
Export component (%)	0%
Amount requested (US $)	323,627
Cost effectiveness (US $/kg.)	14.73
Counterpart funding confirmed?	Yes
National coordinating agency	Ministry of Environment & Forests
Implementing agency	UNDP

Secretariat's Recommendations	
Amount recommended (US $)	323,627
Project impact (ODP tonnes)	21.96
Cost effectiveness (US $/kg)	14.73
Implementing agency support cost (US $)	42,072
Total cost to Multilateral Fund (US $)	365,699

PROJECT DESCRIPTION

Sector Background

- Latest available total ODS consumption (1999)	24,978.40 ODP tonnes
- Baseline consumption of Annex A Group I substances (CFCs)	6,681.00 ODP tonnes
- Consumption of Annex A Group I substances for the year 1999	8,217.90 ODP tonnes
- Baseline consumption of CFCs in refrigeration sector	2,770.50 ODP tonnes
- Consumption of CFCs in refrigeration sector in 2000	2297.33 ODP tonnes
- Funds approved for investment projects in refrigeration sector as of end of 2000	US $24,129,819.00
- Quantity of CFC to be phased out in investment projects in refrigeration sector as of end of 2000	2,225.36 ODP tonnes

74. The total consumption of CFCs in the refrigeration sector in 2000, according to information from the Government of India, was 2,225.36 ODP tonnes. This figure is sub-divided into consumption in the manufacturing of new refrigeration equipment (690.33 ODP tonnes) and consumption for servicing (1,607 ODP tonnes).

75. The Executive Committee has approved about US $24,129,819 for 53 projects to phase out 2,225.36 ODP tonnes of CFC for enterprises manufacturing refrigeration equipment in the refrigeration sector.

Project description

76. The five enterprises (Ahmedabad Low Temp, Kalkura Cooling Machines, Mechelec Steel Products, Polfrost Aircon and Shri Ambica Engineering) consumed 17.76 ODP tonnes of CFC-11 and 5.5 ODP tonnes of CFC-12 in the production of commercial refrigeration equipment in the year 2000. The enterprises operate low and high pressure dispensers in the baseline and are involved in the manufacture of various models of water coolers, bottle coolers and chest freezers.

77. The current project will phase-out 17.76 ODP tonnes of CFC-11, 5.5 ODP tonnes of CFC-12 in the production of commercial refrigeration equipment at five enterprises (Ahmedabad Low Temp, Kalkura Cooling Machines, Mechelec Steel Products, Polfrost Aircon and Shri Ambica Engineering). This will be achieved by converting from CFC-11 to HCFC-141b as the foam blowing agent and from CFC-12 to HFC-134a as the refrigerant. The enterprises operate low and high pressure dispensers in the baseline and are involved in the manufacture of various models of water coolers, bottle coolers and chest freezers.

78. The project includes incremental capital costs covering the replacement of two low-pressure dispensers at Kalkura and Polfrost and the retrofit of three high-pressure dispensers at Ahmedabad, Mechelec and Shri Ambica. In the refrigeration operation, existing charging, evacuation and leak detecting equipment will be replaced at all five enterprises. Other costs

include re-design, testing, trials, technical assistance and training. Incremental operating costs are requested for a period of one year.

Justification for the use of HCFC-141b

79. Justification for the use of HCFC-141b has been provided and is available in the Secretariat. The Government of India has also provided a letter endorsing the use of HCFC-141b by enterprises.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

80. The components of the project are in line with similar projects approved and implemented in India and other Article 5 countries.

RECOMMENDATIONS

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

	Project Title	Project Funding (US$)	Support Cost (US$)	Implementing Agency
(a)	Conversion from CFC-11 to HCFC-141b and from CFC-12 to HFC-134a technology in the manufacture of commercial refrigeration equipment at five enterprises	323,627	42,072	UNDP

PROJECT EVALUATION SHEET
INDIA

SECTOR: Solvents ODS use in sector (1998): 7346 ODP tonnes

Sub-sector cost-effectiveness thresholds: n/a

Project Titles:

(a) Conversion of carbon tetrachloride (CTC) as cleaning solvent to trichloroethylene at Engineer Industries, Mazgaon
(b) Conversion of carbon tetrachloride (CTC) as cleaning solvent to trichloroethylene at Sapna Coils Ltd., Palghar
(c) Conversion of carbon tetrachloride (CTC) as cleaning solvent to trichloroethylene at Sapna Engineering, Mazgaon

Project Data	**CTC**	**CTC**	**CTC**
	Engineer Industries	**Sapna Coils**	**Sapna Engineering**
Enterprise consumption (ODP tonnes)	20.16	22.76	14.47
Project impact (ODP tonnes)	20.16	22.76	14.47
Project duration (months)	24	24	24
Initial amount requested (US $)	341,114	405,624	288,285
Final project cost (US $):			
Incremental capital cost (a)	202,300	213,300	210,800
Contingency cost (b)	20,230	21,330	21,080
Incremental operating cost (c)	16,246	10,394	8,555
Total project cost (a+b+c)	238,776	245,024	240,435
Local ownership (%)	100%	100%	100%
Export component (%)	0%	0%	0%
Amount requested (US $)	238,776	245,024	240,435
Cost effectiveness (US $/kg.)	11.84	10.76	16.62
Counterpart funding confirmed?	Yes	Yes	Yes
National coordinating agency	Ministry of Environment & Forest		
Implementing agency	UNIDO	UNIDO	UNIDO

Secretariat's Recommendations			
Amount recommended (US $)	238,776	245,024	240,435
Project impact (ODP tonnes)	20.16	22.76	14.47
Cost effectiveness (US $/kg)	11.84	10.76	16.62
Implementing agency support cost (US $)	31,041	31,853	31,257
Total cost to Multilateral Fund (US $)	269,817	276,877	271,692

SECTOR BACKGROUND

82. The total consumption of carbon tetrachloride (CTC)) in India as reported to the Fund Secretariat for the year 2000 was 11,043 ODP tonnes. Of this amount 7346 ODP tonnes was reported as being consumed in the solvent sector. Up to March 2001 the Executive Committee has approved 3 projects to phase-out 11 ODP tonnes of CTC in the solvent sector in India.

PROJECT DESCRIPTION

Conversion of carbon tetrachloride (CTC) as cleaning solvent to trichloroethylene at Engineer Industries, Mazgaon
Conversion of carbon tetrachloride (CTC) as cleaning solvent to trichloroethylene at Sapna Coils Ltd., Palghar
Conversion of carbon tetrachloride (CTC) as cleaning solvent to trichloroethylene at Sapna Engineering, Mazgaon

83. Engineering Industries, Sapna Coils and Sapna Engineering consume 22.8, 14.5 and 20.2 ODP tonnes of CTC annually in metal cleaning associated with the manufacture of sub-assemblies for refrigerators, freezers, water coolers and air conditioners. The enterprises were established and the relevant equipment installed prior to July 1995.

84. The enterprises all use a pressure flushing system to clean the interior of the cooling coils, after which the used CTC is discarded. The external surfaces of smaller components are cleaned in existing vapour degreasing machines at Sapna Coils and Sapna Engineering. All products at Engineering Industries and the larger assemblies at Sapna Coils and Sapna Engineering are cleaned externally by either hand spraying or dipping in tanks of cold CTC.

85. UNIDO proposes to phase out the consumption of CTC by replacing it with trichloroethylene (TCE). Internal cleaning systems will be modified to capture the used solvent for re-use. The vapour degreasers are proposed to be replaced with new machines designed to reduce the emissions of TCE to acceptable levels and to recycle used solvent internally. The cold-dipping tanks are also proposed to be replaced with new vapour degreasing machines with a 50 per cent allowance for technology upgrade since there were no machines in the baseline.

86. The main capital costs are for vapour degreasers as indicated below:

	Engineering Industries	Sapna Coils	Sapna Engineering
New vapour degreasers (US $)	225,000	270,000	195,000

87. Four year incremental operating costs vary between US $9,000 and US $30,000. They are based mainly on increased energy costs offset by decreases for the cost of solvent arising from reduced consumption.

SECRETARIAT'S COMMENTS AND RECOMMENDATION

COMMENTS

88. The safety standards applicable to use of the replacement solvent, TCE, are the subject of debate among experts. While less toxic than CTC, a European Union working group has re-classified it under a category of substances which "may cause cancer". UNIDO advises that the likely future regulatory implication of this re-classification in EU countries is that TCE limits for operator safety and for air emissions will be set at levels which cannot be obtained other than by providing new equipment designed to reduce emissions by closure of the machines and by recycling the solvent. Other experts advise that on scientific grounds the EU reclassification is not justified and that current emission limits for worker safety of about 50 parts per million can be met in many cases by retrofitting existing degreasing machines provided they are not too old, and in good condition. Retrofitting would be less costly but would not reduce emissions or reduce solvent use as much as a new machine.

89. The Secretariat has been discussing with UNIDO options for implementing CTC solvent phase-out projects that are based on retrofit instead of new equipment. However, at the present time it has not been confirmed that retrofits meeting the necessary emission criteria are feasible for locally manufactured equipment found in these projects. Accordingly the projects have been reviewed on the basis of replacing the two existing vapour degreasers at Sapna Coils and Sapna Engineering. However the proposed capital costs were reduced after consideration of the cost of equipment available on the market. The issue of retrofit versus replacement will be kept under review for future projects.

90. Where there are no cleaning machines in the baseline a 50 per cent counterpart contribution for technological upgrade has been included, consistent with the practice to date in other CTC solvent projects. This was not included by UNIDO for the Sapna Coils project and the cost was adjusted accordingly. After discussion of cleaning capacity and hand spraying now in place at Engineer Industries it was determined that only two new cleaning machines were eligible not three as originally proposed. Capital and incremental operating costs were amended to reflect this.

RECOMMENDATION

91. Blanket approval of the three projects is recommended with project and support costs as indicated in the table below:

	Project Title	Project Funding (US$)	Support Cost (US$)	Implementing Agency
(a)	Conversion of carbon tetrachloride (CTC) as cleaning solvent to trichloroethylene at Engineer Industries, Mazgaon	238,776	31,041	UNIDO
(b)	Conversion of carbon tetrachloride (CTC) as cleaning solvent to trichloroethylene at Sapna Coils Ltd., Palghar	245,024	31,853	UNIDO
(c)	Conversion of carbon tetrachloride (CTC) as cleaning solvent to trichloroethylene at Sapna Engineering, Mazgaon	240,435	31,257	UNIDO
