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

Eighteenth Meeting
Vienna, 22-24 November 1995

PROJECT PROPOSALS: BRAZIL

This document includes the Comments and Recommendations from the Fund Secretariat on the following projects:

Foam

- Conversion to CFC-free technology in the manufacture of polyurethane foam at MADEF/ISOLTEC UNDP
- Conversion to CFC-free technology in the manufacture of polyurethane foam at Blitz UNDP
- Conversion to CFC-free technology in the manufacture of polyurethane foam at three enterprises (Brafer, Inicta and Therm-Jet) UNDP
- Substitution of CFC-11 by HCFC-141b in the manufacture of polyurethane foams at Sao Rafael Ind. Com. World Bank
- Substitution of CFC-11 by HCFC-141b in the manufacture of polyurethane foams at Randon Implementos World Bank
- Substitution of CFC-11 by HCFC-141b in the manufacture of polyurethane foams at Recrusul SEA World Bank
- Substitution of CFC-11 by HCFC-141b in the manufacture of polyurethane foams at M. Agostini S.A. World Bank
- Substitution of CFC-11 by HCFC-141b in the manufacture of polyurethane foams at Termolar S.A. World Bank

Refrigeration

- Elimination of CFC-11 and CFC-12 in the production of commercial refrigeration equipment at Everest Refrigeracao Ind. e Comercio Ltda World Bank
- Conversion of CFC-11 to Cyclopentane foam blowing agent and CFC-12 to HFC-134a refrigerant at Esmatec World Bank
- Elimination of CFC-11 and CFC-12 in the production of commercial refrigeration equipment at Geltec World Bank

Solvent

- Phase out of CFC113 at DMG used in medical equipment parts cleaning UNDP
- Elimination of CFC-113 from the precision cleaning and drying process at BRASIMET UNDP
- Conversion of ODS Cleaning Processes from 1,1,1 TCA to Aqueous Cleaning and Cleaning Using Trichloroethylene at Elgin Maquinas UNIDO
- Phase out of CFC-113 and of MCF used in vapor degreasers to clean aircraft parts at EMBRAER World Bank
- Phase-out of ODS consumption at Tecnobio; elimination of CFC-113 in medical parts cleaning and silicone deposition, and CFC-12 used in sterilization World Bank

**PROJECT EVALUATION SHEET
BRAZIL**

SECTOR: FOAM ODS use in sector (1993): 900 ODP tonnes

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

Project Title: Substitution of CFC-11 by HCFC-141b in the manufacture of rigid polyurethane foams at:

- (a) M. Agostini S.A.
- (b) Randon Implementos S.A.
- (c) Recrusul S.E.A.
- (d) Sao Rafael Ind. Com. Ltda
- (e) Termolar S.A.

Project Data	Rigid Foam				
	M. Agostini S.A.	Randon Implementos S.A.	Recrusul SEA	Sao Rafael Ind. Com. Ltda.	Termolar S.A.
ODS phase-out (ODP tonnes)	12	16	221	15	9
Proposed project duration (Yrs)	0.75	0.83	1	0.83	0.67
Incremental capital cost (US\$)	85,217	92,180	710,215	82,676	61,717
Contingency (%)	5	10	10	10	10
Incremental operational cost (US\$)	128,506	10,102	649,537	174,984	162,868
Total project cost (US\$)	213,723	193,201	1,366,552	257,660	224,584
Local ownership (%)	62	100	100	100	100
Export component (%)	0	0	0	0	0
Amount requested (US\$) {Original ¹	85,217	92,180	1,366,552	82,676	61,716
{Revised	85,217	92,180	1,384,750	82,676	61,716
Cost effectiveness (US\$/kg)	7.75	6.36	6.89	5.91	7.57
National Coordinating Agency	Brazilian Ministry of Trade and Industry				
Implementing Agency	WB	WB	WB	WB	WB
Technical review completed?	Yes	Yes	Yes	Yes	Yes

Secretariat's Recommendations					
Amount recommended (US \$)	85,217	92,180	1,075,650	82,676	61,716
Project impact (ODP tonnes)	11	14.5	201	14	8.15
Cost effectiveness (US \$/kg)	7.75	6.36	5.35	5.91	7.57
Implementing Agency support cost (US\$)	11,078	11,983	139,834	10,748	8,023
Total cost to Multilateral Fund	96,295	104,163	1,215,484	93,424	69,740

¹ This figure is based on the project document provided for the 18th Meeting. The initial requests submitted to the 17th Meeting were much higher: Agostini (\$86,130), Randon (\$113,535), Recrusul (\$1,573,830), Sao Rafael (\$109,620) and Termolar (\$127,629).

**PROJECT EVALUATION SHEET
BRAZIL**

SECTOR: FOAM ODS use in sector (1993): 900 ODP tonnes

Sub-sector cost-effectiveness thresholds: Rigid Foam US \$7.83/kg
Integral Skin Foam US \$16.86/kg

Project Titles:

- (f) Conversion to CFC-free technology in the manufacture of (rigid) polyurethane foam at Madef/Isoltec*
- (g) Conversion to CFC-free technology in the manufacture of (rigid) polyurethane foam at three enterprises (Brafer, Invicta and Therm-Jet) *
- (h) Conversion to CFC-free technology in the manufacture of integral skin polyurethane foam at Blitz. *

Project Data	Rigid Foam		Integral Skin
	Madef/ Isoltec	Brafer/ Invicta/ Therm-Jet	Blitz Ind. Com. De Plásticos
ODS phase-out (ODP tonnes)	72	38	10.5
Proposed project duration (Yrs)	1.5	1.5	1.5
Incremental capital cost (US\$)	308,000	275,000	120,000
Contingency (%)			
Incremental operational cost (US\$)	58,000	77,500	4,825
Total project cost (US\$)	356,000	352,500	124,825
Local ownership (%)	97	100	100
Export component (%)	0	0	0
Amount requested (US\$) { Original	413,000	285,000	140,000
{ Revised	346,000	275,000	120,000
Cost effectiveness (US\$/kg)	5.30	7.24	12.37
National Coordinating Agency	Brazilian Ministry of Trade and Industry		
Implementing Agency	UNDP	UNDP	UNDP
Technical review completed?			

Secretariat's Recommendations			
Amount recommended (US \$)	346,000	275,000	120,000
Project impact (ODP tonnes)	65.28	38	9.7
Cost effectiveness (US \$/kg)	5.30	7.24	12.37
Implementing Agency support cost (US\$)	44,890	35,750	15,600
Total cost to Multilateral Fund	390,890	310,750	135,600

* New proposals to 18th Meeting.

PROJECT DESCRIPTION

Projects on the Consolidated List

Rigid Foam: Substitution of CFC-11 by HCFC-141b in the manufacture of rigid polyurethane foam at M. Agostini S.A., Randon Implementos S.A., Recrusul S.E.A., Sao Rafael Ind. Com. Ltda., and Termolar S.A.

1. Four of the companies, M. Agostini, Randon, Sao Rafael and Termolar, are small rigid foam producing companies (CFC-11 consumption 9-16 tonnes), while the fifth, Recrusul, is a large one (CFC-11 consumption 210 tonnes and 11 tonnes CFC-12 used as frothing agent).

2. M. Agostini and Termolar produce insulated glass bottles and other thermoware while Sao Rafael produces sandwich panels for walk-in-coolers, freezers, large display units, refrigerated warehouses, etc. and Randon produces insulated trucks. Recrusul, the largest company, produces a wide range of products including refrigerated semi-trailers, insulated trailers and containers, refrigerated warehouses, insulated doors, ice making plants, modular panels for cold storage, etc.

3. The four smaller companies each has two to four small low pressure machines for its production activities while Recrusul has three small and one large low pressure foaming machines. The CFC-11 using equipment is generally old, requiring frequent repairs and in several cases requiring large quantities of methylene chloride or ethylene glycol for solvent flushing.

4. All the five enterprises will convert from CFC-11 to HCFC-141b requiring medium or high pressure foaming equipment. The capital cost of conversion includes the cost of replacement of the low pressure machines with those of higher pressure, trials and training. Equipment will be replaced as follows:

M. Agostini	Replacement of three low pressure with one medium pressure.
Randon	Replacement of three low pressure with one high pressure with two heads
Recrusul	Replacement of four low pressure with four high pressure
Sao Rafael	Replacement of two low pressure with one high pressure
Termolar	Replacement of four low pressure with two medium pressure

5. Incremental operational costs were calculated in all the projects based on transition period of four years. However only Recrusul is claiming the incremental operational cost.

6. Incremental operational cost was eventually calculated on the basis of the following prices of chemicals: CFC-11: US \$3.60/kg, CFC-12: US \$4.00/kg., HCFC-141b: US \$4.00/kg., MDI: US \$2.60/kg., Baseline Polyol: US \$2.40/kg., New polyol: US \$2.85/kg.

7. In the Recrusul project the incremental operational cost for four years net present value (NPV) was obtained as US \$665,735, resulting in a total project cost of US \$1,384,750 (including US \$710,215 total capital cost). However, the Secretariat drew the attention of the World Bank to the precedent set in approvals of all rigid foams, including those approved or submitted for approval for companies in Brazil, in which 2 year transition period is applied for the calculation of incremental operational cost, and requested that the same transition period be applied in the case of Recrusul. Two years NPV yields the amount of US \$365,434 resulting in a total project cost of US \$1,075,650.

8. All the companies recognize the interim nature of the use of HCFC-141b and accept to bear all costs associated with subsequent transfer to zero-ODP technology themselves.

Justification for the use of HCFC-141b

9. The following are the justifications provided by the companies for selecting HCFC-141b technology:

- Plant location that prevented use of flammable substitutes
- Lower capital requirement
- Fewer safety requirements
- No need to change process flow or plant layout
- No need to change product design
- Need to maintain existing international trade and industrial agreements/arrangements

Projects for the Eighteenth Meeting

Rigid Foam: Conversion to CFC-free technology in the manufacture of Polyurethane foam at Madef/Isoltec and at three enterprises

10. Madef and its subsidiary Isoltec, manufacture rigid foam blocks, molded pipe insulations and foam panels using one large and two small foam dispensers.

11. MADEF/ISOLTEC will phase-out the use of CFCs in its manufacturing operations through the use of HCFC-141b, following at a later stage by all water blown foams which is currently under development. This requires replacement of the existing low pressure dispensers. By relocation of the current production in two areas to one facility (Madef facility) and equipment rearrangement it will be possible to reduce the required production equipment to two dispensers, resulting in savings in investment. The capital cost of the project includes the cost of two high pressure foam dispensers (one large and one small), technology transfer, trials and training. The conversion will result in higher operational costs based on the use of HCFC-141b.

12. The project for Three Enterprises involves Brafer Industrial S.A. which manufactures insulated roofing panels, Sobral Invicta S.A. which manufactures thermoware and Therm-Jet Isolamentos Termicos Ltda which manufactures spray foam products and panels. The CFC phase-out of the spray foam activity is covered already under an earlier approved project.

13. The three participating enterprises are relatively small in their foam operations and require substantial technical support to implement the phase-out. The financial burden of implementing individual projects is reduced through the proposed employment of a local expert who has already shown proficiency in a sprayfoam project currently under implementation in Brazil, as well as through the use of low cost equipment that will be specially adapted for the intended purpose by the local expert.

14. All three enterprises will phase out CFC-11 through the use of full water blown systems. However, there could be interim partial use of HCFC-141b, as water based systems are currently not commercially available in Brazil. High pressure foam dispensers will be required and provided in an economical manner either through the use of locally made equipment, minimal retrofit of existing high pressure equipment or equipment rationalization. Trials, testing and training for all three enterprises will be consolidated. The companies are not seeking payment of incremental operational cost.

Integral Skin Foam: Conversion to CFC-free technology in the manufacture of integral skin polyurethane foam at Blitz

15. Blitz Inc. Com. de Plasticos Ltda produces automotive trim parts made from glass fiber/resin and different types of polyurethane foam, such as rigid and flexible integral skin, and reaction injection molded (RIM) foams. It operates four high pressure and two low pressure foam machines.

16. The company will phase out the use of CFC-11 through the use of all water blown technology with possible interim use of HCFC-141b. The capital cost of the project involves the replacement of low pressure foam dispensers with high pressure, retrofit of premixer, technology transfer, trials and training. By consolidating the production programme, the two low pressure dispensers are replaced by one high pressure dispenser. There is minimal incremental operational cost.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

Projects on the Consolidated List

1. The five project proposals were submitted for consideration at the 17th Meeting of the Executive Committee. However, consideration of the projects were deferred to enable issues raised on them to be addressed. These included request for partial funding and calculation of cost effectiveness. These issues have been addressed on the basis of pertinent decisions of the 17th Meeting of the Executive Committee
2. With regard to the incremental operational costs of the projects, particularly that of Recrusul which is requesting its payment, the Secretariat's recommendation that the calculation be made on the basis of two year transition period would ensure that the project is brought in line with precedent set by the approval by the Committee of all rigid foam projects in recent times. It would also, particularly, ensure parity with the rigid foam projects on the consolidated list which have all used two years transition period
3. The total project cost of M. Agostini based on 2 year NPV incremental operational cost is US \$142,845. Hence, with 62 per cent local ownership, the company's request for grant of US \$85,217 meets the criteria for funding of projects with participation of transnational corporations.
4. All the funding requests are below the cost-effectiveness threshold for the rigid foam sub-sector of US \$7.83/kg.

Projects for the 18th Meeting

5. The Fund Secretariat and the implementing agency (UNDP) have discussed and agreed on all elements of the projects. They included, for new projects, ensuring that the prices of capital items, particularly the high pressure foam dispensers conform to prices in similar projects and using international prices plus 20 per cent for prices of chemicals produced in Brazil.
6. The funds recommended are all below the relevant cost-effectiveness thresholds i.e. US \$7.83/kg. for rigid foams and US \$16.86/kg for integral skin foams.

RECOMMENDATIONS

1. The Fund Secretariat recommends approval of the projects with associated support costs at the funding levels shown in the table below:

Project	Project Cost US \$	Support Cost US \$	Implementing Agency
Rigid foam			
<u>Projects on the Consolidated List</u>			
(a) Substitution of CFC-11 by HCFC-141b in the manufacture of rigid polyurethane foams at M. Agostini S.A.	85,217	11078	World Bank
(b) Substitution of CFC-11 by HCFC-141b in the manufacture of rigid polyurethane foams at Randon Implementos S.A.	92,180	11,983	World Bank
(c) Substitution of CFC-11 by HCFC-141b in the manufacture of rigid polyurethane foams at Recrusul SEA	1,075,650	139,834	World Bank
(d) Substitution of CFC-11 by HCFC-141b in the manufacture of rigid polyurethane foams at Sao Rafael Ind. Com. Ltda	82,676	10,748	World Bank
(e) Substitution of CFC-11 by HCFC-141b in the manufacture of rigid polyurethane foams at Termolar S.A.	61,717	8,023	World Bank
<u>Projects for the 18th Meeting</u>			
(f) Conversion to CFC-free technology in the manufacture of (rigid) polyurethane foam at Madef/Isoltec	346,000	44,890	UNDP
(g) Conversion to CFC-free technology in the manufacture of (rigid) polyurethane foam at three enterprises (Brafer, Invicta and Therm-Jet)	275,000	35,750	UNDP
Integral skin			
(h) Conversion to CFC-free technology in the manufacture of integral skin polyurethane foam at Blitz. Ind. Com. de Plasticos	120,000	15,600	UNDP

The Fund Secretariat further recommends that projects (a), (b), (c), (d) and (e) be included in the Consolidated List.

**PROJECT EVALUATION SHEET
BRAZIL**

SECTOR: REFRIGERATION ODS use in sector (1994): 9,090 ODP tonnes

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

Project Titles:

- (a) Elimination of CFC-11 and 12 in the production of commercial refrigeration equipment at Everest Refrigeracao Ind.E.*
- (b) Elimination of CFC-11 and 12 in the production of commercial refrigeration equipment at Geltec*
- (c) Conversion of CFC-11 to cyclopentane blowing agent and CFC-12 to HFC-134a refrigerant at Tecnomecanica Esmaltec Ltd.*

Project Data	Commercial Refrigeration		
	Everest	Geltec	Esmaltec
ODS phase-out (ODP tonnes)	11.2	18.2	68.7
Proposed project duration (Yrs)	1.5	1.5	1.5
Incremental capital cost (US\$)	149,050	228,250	924,040
Contingency (%)	10	10	10
Incremental operational cost (US\$)	0	0	0
Total project cost (US\$)	149,050	228,250	924,040
Local ownership (%)	100	100	100
Export component (%)	0	0	0
Amount requested (US\$) { Original	150,150	241,450	1,027,792
{ Revised	149,050	228,250	924,040
Cost effectiveness (US\$/kg)	13.3	12.47	13.45
National Coordinating Agency	Brazil Industry and Trade Ministry		
Implementing Agency	WB	WB	WB
Technical review completed?	Yes	Yes	Yes

Secretariat's Recommendations			
Amount recommended (US \$)	149,050	228,250	924,040
Project impact (ODP tonnes)	11.2	18.3	68.7
Cost effectiveness (US \$/kg)	13.3	12.47	13.45
Implementing Agency support cost (US\$)	19,376	29,672	120,125
Total cost to Multilateral Fund	168,426	257,922	1,044,165

* New proposals to 18th Meeting

PROJECT DESCRIPTION

Commercial refrigeration

- (a) Elimination of CFC-11 and 12 in the production of commercial refrigeration equipment at Everest Refrigeracao Ind.E.
- (b) Elimination of CFC-11 and 12 in the production of commercial refrigeration equipment at Geltec

1. Everest operates in the Brazilian commercial chest freezer/ice maker segment. The project covers phasing-out of 8.4 MT of CFC-11 and 3.6 MT of CFC-12, by converting to HCFC-141b blowing agent and HFC-134a refrigerant.

2. Geltec manufactures commercial chest freezers and drink water fountains. The project covers phasing-out of 14.9 MT of CFC-11 and 8.3 MT of CFC-12 by converting to HCFC-141b blowing agent.

3. The conversion of these two companies will involve replacing the existing charging boards and leak detectors with the equipment suitable for HFC-134a and retrofitting vacuum pumps as well as prototype testing.

4. The available low pressure machines will be replaced with high pressure machines. Existing cabinet and door jigs will be rebuilt to accommodate new requirements in foaming operations.

5. These two companies recognize the transitional nature of HCFC technology. There are limitations in adapting the existing equipment to a safe operation with cyclopentane. Investments required to introduce cyclopentane technology are estimated at US \$1.2 million. Everest and Geltec's managements will accept that all future costs related to subsequent transition to zero-ODP technology will be borne by the companies themselves.

Domestic refrigeration

- (c) Conversion of CFC-11 to cyclopentane blowing agent and CFC-12 to HFC-134a refrigerant at Tecnomecanica Esmaltec Ltd.

6. There are six major companies manufacturing refrigerators and freezers in Brazil, mostly serving domestic market, but also exporting appliances to Latin America. About 400 smaller companies produce commercial and domestic refrigeration equipment for local regional markets.

7. Esmaltec manufactures refrigerators, freezers and drinking water coolers. The project covers phasing-out of 52.4 MT of CFC-11 and 164 MT of CFC-12 by converting to cyclopentane as a blowing agent and HFC-134a as a refrigerant.

8. Conversion to HFC-134a refrigerants involves the replacement of refrigerant charging boards, leak detectors, refitting existing vacuum system, model redesign and testing.

9. Conversion to cyclopentane entails the replacement of existing low pressure foam machines with high pressure machines, modifying fixtures, providing cyclopentane storage and delivery systems, and replacement of premixing station. Conversion to cyclopentane will necessitate also implementing a stringent safety programme to ensure personnel and plant safety owing to the flammable nature of cyclopentane and isobutane.

10. To supervise project implementation, Esmaltec will assign a qualified and experienced team that will be working under guidance of Esmaltec's plant engineering staff and supported by equipment, compressor and raw material suppliers. The foam equipment supplier will provide factory technicians for installation, commissioning, start-up and operating and safety training to Esmaltec personnel.

11. All the three companies do not request incremental operating costs.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

1. The chosen technologies are proven. The choice of interim HCFC technology in foaming operations is justified.

2. The Secretariat discussed with the World Bank the eligibility and incrementality of all cost items. The projects budgets have been adjusted accordingly.

RECOMMENDATIONS

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

Project	Project Cost US \$	Support Cost US \$	Implementing Agency
(a) Elimination of CFC-11 and 12 in the production of commercial refrigeration equipment at Everest Refrigeracao Ind.E.	149,050	19,376	World Bank
(b) Elimination of CFC-11 and 12 in the production of commercial refrigeration equipment at Geltec	228,250	29,672	World Bank
(c) Conversion of CFC-11 to cyclopentane blowing agent and CFC-12 to HFC-134a refrigerant at Tecnomecanica Esmaltec Ltd.	924,040	120,125	World Bank

PROJECT EVALUATION SHEET BRAZIL

SECTOR:	SOLVENT	ODS use in sector (1993)	897 ODP tonnes
Sub-sector cost-effectiveness thresholds:		CFC-113	US \$19.73/kg
		TCA (methyl chloroform)	US \$38.5/kg

Mixed

N/A

Project Titles:

- (a) Phase-out of CFC-113 used in medical equipment parts cleaning at DMG
- (b) Elimination of CFC-113 from the precision cleaning and drying process at BRASIMET
- (c) Conversion of ODS cleaning processes from TCA to aqueous cleaning and cleaning using trichloroethylene at Elgin Maquinas
- (d) Phase-out of CFC-113 and of MCF used in vapour degreasers to clean aircraft parts at EMBRAER
- (e) Phase-out of ODS; elimination of CFC-113 in medical parts cleaning and silicone deposition, and CFC-12 used in sterilization at Tecnobio*

Project Data	CFC-113		TCA	Mixed	
	DMG	Brasimet	Elgin Maquinas	Embraer	Tecnobio
ODS phase-out (ODP tonnes)	2.0	1.6	6.0	12.6	16.0
Proposed project duration (Yrs)	1	1	1.25	1.5	1.25
Incremental capital cost (US \$)	117,920	111,320	453,200	280,196	314,050
Contingency (%)	10	10	10	10	10
Incremental operational cost (US \$)	(73,300)	(57,800)	296,633	599,640	3,442
Total project cost (US \$)	44,600	53,500	156,567	879,836	317,492
Local ownership (%)	100	100	100	82.3	100
Export component (%)	-	-	5	57.3	-
Amount requested (US\$) {Original	38,000	30,400	220,703	315,921	339,492
{Revised	38,000	30,400	156,567	315,921	339,992
Cost effectiveness (US \$/kg)	19.0	19.01	36.78	24.45	21.21
National Coordinating Agency	MOE-HRLA	MOE-HRLA	IOWG-GTO	BITM	FINEP
Implementing Agency	UNDP	UNDP	UNIDO	World Bank	World Bank
Technical review completed?	Yes	Yes	Yes	Yes	Yes

Secretariat's Recommendations:

Amount recommended (US \$)	38,000	30,400	156,567	308,215	317,492
Project impact (ODP tonnes)	2.0	1.6	6.0	12.6	16.0
Cost effectiveness (US \$/kg)	19.0	19.0	26.1	24.45	19.84
Implementing Agency support cost (US \$)	4,940	3,952	20,354	40,068	41,273
Total cost to Multilateral Fund (US \$)	42,940	34,352	176,921	348,283	358,766

* New proposal to the 18th Meeting

PROJECT DESCRIPTION

(a) Phase-out of CFC-113 used in medical equipment parts cleaning at DMG

1. DMG will completely phase out the consumption of CFC-113 used in the cleaning of medical parts and devices by switching to an aqueous emulsion system. The proportion of the enterprise's products exported to non-Article 5 countries was not provided in the project document. However, the implementing agency advised that there is no export component.

(b) Elimination of CFC-113 from the precision cleaning and drying process at BRASIMET

2. This project will phase out the consumption of CFC-113 being used as a drying fluid in the final step of the precision cleaning of metal parts at Brasimet's heat treatment division. The technology to be used is a water rinse and purified hot air drying.

(c) Conversion of ODS cleaning processes from TCA to aqueous cleaning and cleaning using trichloroethylene at Elgin Maquinas

3. This project will phase out the use of 60 MT of TCA at the Elgin company. The cleaning process with TCA is primarily used for the production of compressors for refrigerators and air conditioners. The ODS solvent is utilized as a degreasing agent. Considering the cleaning requirements of the Elgin company a selection has been made in favour of an alternative aqueous cleaning process for three of the major manufacturing workshops. Batch operation immersion-type cleaning machines with a programmable transport system controlled by a microprocessor-based system will be purchased. However, one degreaser in the commercial-refrigerators workshop will be modified to allow the use of trichloroethylene. The project will employ commercially available technologies applicable to the refrigerator and air-conditioning industry in Brazil.

(d) Phase-out of CFC-113 and of MCF used in vapour degreasers to clean aircraft parts at EMBRAER

4. EMBRAER is an 82.3% Brazilian-owned company. Its main activities comprise the design, development, and manufacturing of a range of turboprop (jet boosted turbo) and jet aircraft for regional airline and military use and agricultural aviation, and the production of aviation parts related to mechanical and hydraulic systems. This project will phase out ODS by replacing 48 MT of TCA (ODP 0.1) used in metal degreasing with an aqueous process, and replacing 10 MT of CFC-113 (ODP 0.8) with 6.5 MT of HCFC-225 (ODP 0.03). The HCFC-225 will be used for difficult-to-clean parts (honeycombs, blind holes, etc.) where customer specifications preclude an aqueous process. The technical reviewer commented that HCFC-225 appears to be the best reasonably priced alternative available at this time (e.g. compared to perfluorocarbons).

5. EMBRAER is partially funding the projects, in addition to reductions for foreign ownership and exports. The cost-effectiveness of the grant is below the "weighted average"

threshold of US \$26.88/kg calculated on the basis of the proportions of CFC-113 and TCA being phased out.

- (e) Phase-out of ODS; elimination of CFC-113 in medical parts cleaning and silicone deposition, and CFC-12 used in sterilization at Tecnobio

6. This project at Tecnobio will phase out consumption of CFC-113 used in the cleaning and silicone deposition processes and consumption of CFC-12 used in combination with ethylene oxide in the final sterilization process in the production of medical parts. Substitution will be achieved by adopting HCFC-141b as the cleaning agent and carrier fluid for the antifoam silicon agent and CO₂ as the alternative to CFC-12, used as an explosion suppressant with the ethylene oxide.

7. The selection of an alternative for CFC-113 is difficult in the application: indications are that HCFC-141b is finding a 'niche' market in the production of medical equipment. The enterprise recognizes that transition to a non-ODS process will be required in the future. There is an HCFC technology available as a “drop-in” to replace CFC-12 in the sterilization component, however the CO₂ technology is now well established and was thus selected.

8. No cost-effectiveness threshold has been established for the phase-out of CFC-12 in solvent applications. It is unlikely that there will be a large number of projects of this nature and a separate threshold may not be appropriate. As adjusted, the project has an overall cost-effectiveness very similar to the threshold for CFC-113 i.e., US \$19.73/kg. The Fund Secretariat considers that this is a suitable basis for the project to proceed. The CFC-113 component is below its own cost-effectiveness threshold.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

1. Certain cost elements of the projects at Elgin Maquinas and Tecnobio were discussed with the relevant implementing agencies and agreement reached on adjustments to total project cost.
2. Projects (a) DMG, (b) Brasimet and (d) Embraer, include a financial contribution by each enterprise. In each case the Fund Secretariat considers that incremental costs to the level of grant sought are eligible. However, the Fund Secretariat makes no comment on the validity or otherwise of the total level of incremental costs included in each project submission.

RECOMMENDATIONS

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

Project	Project Cost US \$	Support Cost US \$	Implementing Agency
(a) Phase-out of CFC-113 used in medical equipment parts cleaning at DMG	38,000	4,940	UNDP
(b) Elimination of CFC-113 from the precision cleaning and drying process at BRASIMET	30,400	3,952	UNDP
(c) Conversion of ODS cleaning processes from TCA to aqueous cleaning and cleaning using trichloroethylene at Elgin Maquinas	156,567	20,354	UNIDO
(d) Phase-out of CFC-113 and of MCF used in vapour degreasers to clean aircraft parts at EMBRAER	308,215	40,068	World Bank
(e) Phase-out of ODS; elimination of CFC-113 in medical parts cleaning and silicone deposition, and CFC-12 used in sterilization at Tecnobio	317,492	41,273	World Bank

2. The Fund Secretariat further recommends that projects (a), (b) , (c) and (d) be included in the Consolidated List.