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

Twentieth Meeting
Montreal, 16-18 October 1996

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 Panisol — UNDP

Refrigeration

- Elimination of CFC-11/12 in the manufacture of domestic refrigerators and freezers at Multibras — UNDP
- Phasing out of CFC-12 by HFC-134a as refrigerant and CFC-11 by cyclopentane as foam blowing agent in commercial refrigeration equipment for supermarkets at Eletrofrio S/A — UNIDO
- Elimination of CFC-12 in the production of refrigeration equipment (drinking water fountains and coolers) at Industria Brasileira de Bebedouros Ltda. (IBBL) — World Bank
- Elimination of CFC-11 and CFC-12 in the production of commercial refrigeration equipment at Gelopar — World Bank

PROJECT EVALUATION SHEET
BRAZIL

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

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

Project Title:
Conversion to CFC-free technology in the manufacture of polyurethane foam at Panisol

Project Data	**Rigid**
	Panisol
ODS phase-out (ODP tonnes)	60.0
Proposed project duration (Yrs)	1
Incremental capital cost (US$)	110,000
Contingency (%)	10
Incremental operational cost (US$)	253,170
Total project cost (US$)	363,170
Local ownership (%)	87
Export component (%)	0
Amount requested (US$) {Original	315,958
{Revised	
Cost effectiveness (US$/kg)	5.80
National Coordinating Agency	Ministry of Industry & Trade
Implementing Agency	UNDP
Technical review completed?	Yes

Secretariat's Recommendations	
Amount recommended (US $)	315,958
Project impact (ODP tonnes)	54.4
Cost effectiveness (US $/kg)	5.80
Implementing Agency support cost (US$)	41,075
Total cost to Multilateral Fund	357,033

PROJECT DESCRIPTION

Conversion to CFC-free technology in the manufacture of polyurethane foam at Panisol

1. Panisol produces metallic face insulating panels for roofing, walls and other applications. It operates both continuous and dis-continuous production lines. The company will convert its production to use HCFC-141b. However, the option for the final stage of conversion has not been determined.

2. Existing processing equipment and storage tanks will be used. Capital costs include retrofit of pumps, connecting hoses and tank form to avoid corrosion, as well as validation testing, technology transfer and trials. Incremental operational costs will be incurred due to the high cost of substitute chemicals and material increase to compensate for increase in density resulting from the use of HCFC-141b.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

1. The project was discussed by the Secretariat and the UNDP foam expert and the costs agreed to.

Reasons for Using HCFCs

2. The implementing agency listed the range of available technologies and advised that fully water-based systems are proposed as the permanent technology. However, until the commercial introduction of mature water-based systems, (which is expected in up to 2-3 years) a combination of water and HCFC-141b based systems will need to be used to maintain product standards and acceptability. No additional investments are foreseen to be needed to convert to fully water-blown technology after this interim period. In regards to the interim use of HCFC-141b, the implementing agencies advised that it met the following requirements:

- Proven and reasonably mature technology.
- Cost effective conversion.
- Easy availability of pre-blended systems at favorable pricing.
- Enables critical properties to be obtained in the end product (thermal conductivity, dimensional stability, closed cell content, surface properties and strength).
- Facilitates compliance with (local and international) standards on safety and environment.
- Provide the most acceptable insulation value and energy efficiency, and the lowest investment and operating costs vis-à-vis other options.
- No major changes in the auxiliary equipment/tooling, such as mold redesign are needed

3. The agency noted that pentane based systems require extensive safety related provisions/investments that may only be justified for large scale users.

4. UNDP was reminded of the Executive Committee Decision requiring a declaration from the companies using transition phase-out technologies. It is understood that the enterprises will indeed not request funding for the second stage conversion.

RECOMMENDATIONS

1. The Fund Secretariat recommends blanket approval of the project with associated support costs at funding levels shown below.

	Project Cost US $	Support Cost US $	Implementing Agency
Conversion to CFC-free technology in the manufacture of polyurethane foam at Panisol	315,958	41,075	UNDP

PROJECT EVALUATION SHEET
BRAZIL

SECTOR: **REFRIGERATION** ODS use in sector (1994): 7,000 ODP tonnes

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

Project Titles:

(a) Elimination of CFC-11 and CFC-12 in the manufacture of domestic refrigerators and freezers at Multibras

(b) Elimination of CFC-12 in the production of commercial refrigeration equipment at Industria Brasileira de Bebedouros Ltda (IBBL)

(c) Elimination of CFC-11 and CFC-12 in the production of commercial refrigeration equipment at GELOPAR

(d) Phasing out of CFC-12 by HFC-134a as refrigerant and CFC-11 by cyclopentane as foam blowing agent in commercial refrigeration equipment for supermarkets at Eletrofrio S/A

Project Data	Domestic	Commercial		
	Multibras	IBBL	GELOPAR	Eletrofrio
ODS phase-out (ODP tonnes)	1,234	5.9	12.7	47.0
Proposed project duration (Yrs)	3	1.5	1.5	2
Incremental capital cost (US$)	4,107,300	82,500	200,200	565,356
Contingency (%)	10	10	10	10
Incremental operational cost (US$)	9,159,862	507,616	323,347	113,660
Total project cost (US$)	13,267,162	589,616	523,547	679,016
Local ownership (%)	59.79	100	100	100
Export component (%)	0	0	0	0
Amount requested (US$) {Original	7,932,436	82,500	200,200	679,016
{Revised	5,498,289	82,500	193,167	610,650
Cost effectiveness (US$/kg)	6.42	13.98	15.21	12.99
National Coordinating Agency	PROZON	PROZON	PROZON	PROZON
Implementing Agency	UNDP	World Bank	World Bank	UNIDO
Technical review completed?	Yes	Yes	Yes	Yes

Secretariat's Recommendations				
Amount recommended (US $)	4,899,790	82,500	89,100	610,650
Project impact (ODP tonnes)	1,235	5.9	12.7	47.0
Cost effectiveness (US $/kg)	4.45	13.98	7.01	12.99
Implementing Agency support cost (US$)	636,972	10.725	11,583	79,384
Total cost to Multilateral Fund	5,536,762	93,225	100,683	690,034

PROJECT DESCRIPTION

(a) Elimination of CFC-11 and CFC-12 in the manufacture of domestic refrigerators and freezers at Multibras s.a.

1. The project was submitted at the 19th Meeting of the Executive Committee but was not discussed. The project is resubmitted in accordance with Decision 19/22.

2. Consumption of CFCs in the refrigeration sector in Brazil is estimated at 7,000 tonnes. ODS consumption in manufacturing and installation of domestic, commercial and air-conditioning equipment is about 2,205 tonnes ODP.

3. Six major enterprises are engaged in the manufacture of domestic refrigerators and freezers. Multibras is the largest manufacturer of domestic appliances in Brazil accounting for approximately 62% of total production of domestic refrigerators and freezers. Multibras manufactures domestic appliances in three separate factories with ten independent production lines. ODS consumption was 911 tonnes of CFC-11 and 423 tonnes of CFC-12 in 1995.

4. Initial plans made in 1994 were based on conversion of one chest freezer production line. Thereafter, other refrigerator and freezer production lines were to be converted to non-CFC technology on line-by-line basis, based on the experience gained from the conversion of the chest freezer line. A project for the conversion of this production line was approved at the 17th Meeting of the Executive Committee. After careful study by Multibras, a new integrated project covering total ODS phase-out was prepared by UNDP. Because of the scale of its operations Multibras adopted a phased strategy for ODS replacement. ODS consumption will be eliminated at three production lines by 1997. The next four lines will be converted in 1998. The remaining four production lines will be converted to non-CFC technology in 1999.

5. The company opted for HCFC-141b to replace CFC-11 blowing agent and HFC-134a as a substitution of the CFC-12 refrigerant. Whilst recognizing the environmental benefits of cyclopentane versus HCFC-141b, Multibras selected HCFC-141b as a first stage, interim, replacement of CFC-11 as it provides the best energy efficiency, and the lowest investment and operational costs. The energy efficiency factor is strongly emphasized in the Governmental policy in the refrigeration industry in Brazil. Cyclopentane and water blown foam formulation do not meet the Multibras standards on energy efficiency. Liquid HFC technologies do not meet the criteria on maturity of the technology and availability. The company stated that additional costs needed for the transition to non-ODS technologies in the future will be totally covered by the company itself.

6. For conversion to HFC-134a, Multibras is requesting replacement and retrofit of charging and evacuation equipment, and leak detectors. New brazing work stations are also requested for the conversion, to reduce the exposure of hydroscopic lubricant in the compressor to the humid environment. The company recognized that the introduction of new brazing equipment is

associated with substantial technological upgrades. Therefore, only 10 per cent of the cost of new equipment is requested.

7. For conversion to HCFC-141b, Multibras is requesting new pre-mixing and foam injecting equipment.

8. The costs of trials, testing, technology transfer and training are included in the requested budget.

9. Operating costs are calculated for a 6 month period, and are determined on a plant-by-plant basis. UNIDO indicated that "the incremental operating costs will be requested one year after activities in the plant start".

10. As indicated in paragraph 3 above, Multibras will implement the project in stages. However, the company is requesting approval of the project at the 19th meeting. The approved funds could be paid on three installments, one each in 1996, 1997 and 1998. The first installment would be offset against the amount approved for Multibras at the 17th Meeting

(b) Elimination of CFC-12 in the production of commercial refrigeration equipment at Industria Brasileira de Bebedouros Ltda (IBBL).

11. IBBL operates in the Brazilian commercial juice dispenser/drink, water fountain/special dispenser segment. It commands approximately 28% of the market with an annual production of about 60,000 units.

12. IBBL made the conversion from CFC-11 to HCFC-141b blowing agent in January 1994. This conversion has not required any investment costs. No incremental costs are requested in the project for the insulation foam part.

13. The conversion from CFC-11 to HFC-134a refrigerant will involve replacing the existing charging boards and leak detectors with equipment suitable for HFC-134a, retrofitting vacuum pumps and prototype testing.

14. Incremental operating costs are calculated for a 2 year duration, but not requested for funding.

15. The Brazilian commercial refrigeration sector accounts for about 400 small and medium enterprises. The Executive Committee approved at its 18th and 19th Meeting three projects phasing out about 125 MT of CFCs. These two projects will eliminate 18.6 MT of CFC-12 in manufacturing commercial refrigeration equipment.

(c) Elimination of CFC-11 and CFC-12 in the production of commercial refrigeration equipment at GELOPAR.

16. GELOPAR operates in the Brazilian commercial display cabinets segment. The annual production is about 25,000 units.

17. The conversion from CFC-12 to HFC-134a refrigerant will involve replacing the existing charging boards, leak detectors with equipment suitable for HFC-134a, retrofitting vacuum pumps and prototype testing.

(d) Phasing out of CFC-12 by HFC-134a as refrigerant and CFC-11 by cyclopentane as foam blowing agent in commercial refrigeration equipment for supermarkets at Eletrofrio S/A

18. Eletrofrio manufactures different models of showcases and refrigerated chambers mainly used in supermarkets. Eletrofrio also install non-unitary supermarket refrigeration equipment using centralized refrigeration units. About 6,000 units of unitary and 120 units of non-unitary equipment are produced annually.

19. The company will convert its production from CFC-11 to cyclopentane blowing agent and from CFC-12 to HFC-134a refrigerant.

20. Conversion to cyclopentane will involve replacement of existing low pressure machine with a high pressure machine, installation of cyclopentane storage facility and pre-mixing unit, modifications of foaming jigs, training, prototyping and testing. Conversion to cyclopentane will necessitate also implementing a stringent safety programme to ensure personnel and plant safety owing to the flammable nature of cyclopentane.

21. Conversion to HFC-134a refrigerant entails the replacement of refrigerant charging boards, leak detectors, refitting of vacuum pumps, model redesign and testing.

22. Operating costs associated with higher cost of materials are requested for 9 month duration.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

(a) Elimination of CFC-11 and CFC-12 in the manufacture of domestic refrigerators and freezers at Multibras s.a.

1. UNDP and the Fund Secretariat agreed on outstanding eligibility and incremental issues under the project. As a result, eligible total incremental capital costs were determined as US $1,571,300 and eligible incremental operational costs were determined at US $7,624,702, compared to initial amounts of US $4,107,300 and US $9,159,862, respectively. The total eligible incremental cost was thus determined to be US $9,196,002.

2. Taking into account the 59.79% local ownership share, the eligible grant total would be US $5,498,289. Since US $598,499 was approved for MULTIBRAS at the 17th Executive Committee, the amount remaining to be approved under the project (excluding project support costs) would be US $4,899,790. The overall project cost-effectiveness would be US $4.45/kg ODP. Recommended support cost would be US $559,168 taking into account support cost approved at the 17th Meeting.

3. The company confirms that the incremental operating costs do not include costs associated with the production of refrigerators which are more energy efficient than those produced with CFC technology. The company will also, following established procedures, implement the project as one integrated project to be completed over a 3-year period eliminating a total of 1,235 ODP tonnes.

4. The project was submitted at the 19th Meeting of the Executive Committee. Since inclusion of the total amount remaining to be approved would have increased UNDP's programme to a value greater than the allocation agreed for submission to the 19th Meeting, UNDP resubmitted the project and seek approval of the project at the 20th Meeting.

(b) Elimination of CFC-12 in the production of commercial refrigeration equipment at Industria Brasileira de Bebedouros Ltda (IBBL).

5. The Fund Secretariat has discussed with the World Bank the eligibility and incrementality of capital costs associated with refrigerant component.

(c) Elimination of CFC-11 and CFC-12 in the production of commercial refrigeration equipment at GELOPAR.

6. The GELOPAR company introduced the CFC-11 foaming blowing process in 1995 starting regular production in October 1995. CFC-11 based technology has replaced the fiberglass insulation process in several production lines. The company requested funding to convert from CFC-11 to HCFC-141b blowing agent. Requested costs have not been recognized as eligible. Some ODS-based capacity was installed after 25 July 1995 (UNEP/OzL.Pro/ExCom/17/7).

7. The Fund Secretariat has discussed with the World Bank the eligibility and incrementality of capital costs associated with foam and refrigerant components. Adjustments in capital costs have been made regarding cost of vacuum pumps, leak detectors and the foam component of the project.

8. Operating costs for GELOPAR have been calculated for two years duration at US $334,257, but have not been requested due to the cost-effectiveness threshold value. The World Bank claims partial operating costs at US $104,067 to match exactly the threshold value established for the commercial refrigeration sub-sector. The Secretariat seeks advice from the Executive Committee regarding acceptability of such action.

(d) Phasing out of CFC-12 by HFC-134a as refrigerant and CFC-11 by cyclopentane as foam blowing agent in commercial refrigeration equipment for supermarkets at Eletrofrio S/A

9. The Fund Secretariat has discussed with UNIDO the eligibility and incrementality of capital and operating costs associated with foam and refrigerant components. Adjustments in capital and operating costs have been made regarding cost of foaming machine, leak detectors, vacuum pumps and cost of material.

RECOMMENDATIONS

1. The Fund Secretariat recommends blanket approval for the Multibras project submitted by UNDP with associated support costs at the funding level shown in the table below:

2. The Fund Secretariat recommends blanket approval for IBBL project submitted by the World Bank with associated support costs at the funding level shown in the table below.

3. The Fund Secretariat recommends blanket approval for Eletrofrio project submitted by UNIDO with associate support costs at the funding level shown in the table below.

4. The Fund Secretariat recommends approval of the GELOPAR project, submitted by the World Bank with associated support costs at the funding level shown in the table below, subject to the decision of the Executive Committee on the issue of operating costs for GELOPAR enterprise as discussed in paragraph 8 above.

	Project Cost US $	Support Cost US $	Implementing Agency
(a) Elimination of CFC-11 and CFC-12 in the manufacture of domestic refrigerators and freezers at Multibras s.a.	4,899,790	636,972	UNDP
(b) Elimination of CFC-12 in the production of commercial refrigeration equipment at Industria Brasileira de Bebedouros Ltda (IBBL).	82,500	10,725	World Bank
(c) Elimination of CFC-11 and CFC-12 in the production of commercial refrigeration equipment at GELOPAR.	89,100	11,583	World Bank
(d) Phasing out of CFC-12 by HFC-134a as refrigerant and CFC-11 by cyclopentane as foam blowing agent in commercial refrigeration equipment for supermarkets at Eletrofrio S/A	610,650	79,384	UNIDO