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EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Thirty-second Meeting
Ouagadougou, 6-8 December 2000

PROJECT PROPOSALS: BRAZIL

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

Foam:

• Phaseout of CFC-11 by conversion to water-based technology in the manufacture of integral skin foams (shoesoles) at Megaflex	UNDP
• Phaseout of CFC-11 by conversion to water-blown technology in the manufacture of rigid integral skin foam and to HCFC-141b for rigid polyurethane foam at Poliumetka	UNDP
• Conversion from CFC-11 to HCFC-141b technology in the manfuacture of rigid polyurethane foam at Jose Sola	UNDP
• Conversion from CFC-12 to isobutane technology in the manufacture of extruded polyethylene foam at Thermo-flex	UNDP
• Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at Refri-Leste	UNDP
• Phaseout of CFC-11 by conversion to water-blown technology in the manufacture of rigid foam at Plastiron	UNDP
• Conversion from CFC-11 to HCFC-141b and water technology in the manufacture of rigid polyurethane foam at Ser Therm	UNDP

• Phaseout of CFC-11 by conversion to water-blown technology in the manufacture of rigid foam at Rytpak	UNDP
• Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at Frigs	UNDP
• Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at Termobras	UNDP

PROJECT EVALUATION SHEET
BRAZIL

SECTOR: Foam ODS use in sector (1998): 2,286 ODP tonnes

Sub-sector cost-effectiveness thresholds: Polystyrene/polyethylene US $8.22/kg
Rigid US $7.83/kg

Project Titles:

(a) Phaseout of CFC-11 by conversion to water-based technology in the manufacture of integral skin foams (shoesoles) at Megaflex
(b) Phaseout of CFC-11 by conversion to water-blown technology in the manufacture of rigid intergal skin foam and to HCFC-141b for rigid polyurethane foam at Poliumetka
(c) Conversion from CFC-12 to isobutane technology in the manufacture of extruded polyethylene foam at Thermo-flex
(d) Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at Frigs
(e) Conversion from CFC-11 to HCFC-141b technology in the manfuacture of rigid polyurethane foam at Jose Sola

Project Data	**Integral Skin**	**Multiple Subsector**	**Polystyrene/ polyethylene**	**Rigid**	**Rigid**
	Megaflex	**Poliumetka**	**Thermo-flex**	**Frigs**	**Jose Sola**
Enterprise consumption (ODP tonnes)	41.50	25.50	15.00	90.00	38.70
Project impact (ODP tonnes)	41.50	24.50	15.00	64.90	34.90
Project duration (months)	36	36	36	36	36
Initial amount requested (US $)	211,068	136,183	123,300	368,332	150,369
Final project cost (US $):					
Incremental capital cost (a)	77,000	57,500	126,000	270,000	70,000
Contingency cost (b)	7,700	5,750	12,600	27,000	7,000
Incremental operating cost (c)	126,368	72,933	3,400	71,332	73,369
Total project cost (a+b+c)	211,068	136,183	142,000	368,332	150,369
Local ownership (%)	100%	100%	100%	100%	100%
Export component (%)	0%	0%	0%	0%	0%
Amount requested (US $)	211,068	136,183	123,300	368,332	150,369
Cost effectiveness (US $/kg.)	5.08	5.61	8.22	5.68	4.31
Counterpart funding confirmed?	Yes				
National coordinating agency	PROZON				
Implementing agency	UNDP				

Secretariat's Recommendations					
Amount recommended (US $)	211,068	136,183	123,300	335,568	150,369
Project impact (ODP tonnes)	41.50	24.50	15.00	64.90	34.90
Cost effectiveness (US $/kg)	5.08	5.61	8.22	5.17	4.31
Implementing agency support cost (US $)	27,439	17,704	16,029	43,624	19,548
Total cost to Multilateral Fund (US $)	238,507	153,887	139,329	379,192	169,917

PROJECT EVALUATION SHEET
BRAZIL

SECTOR: Foam ODS use in sector (1998): 2,286 ODP tonnes

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

Project Titles:

(f) Phaseout of CFC-11 by conversion to water-blown technology in the manufacture of rigid foam at Plastiron
(g) Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at Refri-Leste
(h) Phaseout of CFC-11 by conversion to water-blown technology in the manufacture of rigid foam at Rytpak
(i) Conversion from CFC-11 to HCFC-141b and water technology in the manufacture of rigid polyurethane foam at Ser Therm
(j) Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at Termobras

Project Data	**Rigid**	**Rigid**	**Rigid**	**Rigid**	**Rigid**
	Plastiron	**Refri-Leste**	**Rytpak**	**Ser Therm**	**Termobras**
Enterprise consumption (ODP tonnes)	32.40	30.00	27.00	72.00	77.00
Project impact (ODP tonnes)	32.40	27.00	27.00	57.10	60.90
Project duration (months)	36	36	36	36	36
Initial amount requested (US $)	131,768	136,840	211,410	377,391	256,845
Final project cost (US $):					
Incremental capital cost (a)	30,100	70,000	120,000	218,000	156,000
Contingency cost (b)	3,010	7,000	12,000	21,800	15,600
Incremental operating cost (c)	98,658	59,840	82,215	137,591	155,715
Total project cost (a+b+c)	131,768	136,840	214,215	377,391	327,315
Local ownership (%)	100%	100%	100%	100%	100%
Export component (%)	0%	0%	0%	0%	0%
Amount requested (US $)	131,768	136,840	211,410	377,391	327,315
Cost effectiveness (US $/kg.)	4.07	5.07	7.83	6.61	5.37
Counterpart funding confirmed?	Yes				
National coordinating agency	PROZON				
Implementing agency	UNDP				

Secretariat's Recommendations					
Amount recommended (US $)	131,768	136,840	211,410	377,391	327,314
Project impact (ODP tonnes)	32.40	27.00	27.00	57.10	60.90
Cost effectiveness (US $/kg)	4.07	5.07	7.83	6.61	5.37
Implementing agency support cost (US $)	17,130	17,789	27,483	49,061	42,551
Total cost to Multilateral Fund (US $)	148,898	154,629	238,893	426,452	369,866

PROJECT DESCRIPTION

Sector Background

- Latest available total ODS consumption (1999)	13,166.60 ODP tonnes
- Baseline consumption of Annex A Group I substances (CFCs)	11,050.90 ODP tonnes
- Consumption of Annex A Group I substances for the year 1999	11,615.00 ODP tonnes
- Baseline consumption of CFCs in foam sector	2,337.00 ODP tonnes
- Consumption of CFCs in foam sector in 1999	1,780.00 ODP tonnes
- Funds approved for investment projects in foam sector as of end of 1999	US$18,171,629.00
- Quantity of CFC to be phased out in investment projects in foam sector as of end of 1999	2,488.27 ODP tonnes
- Quantity of CFC phased out in investment projects in foam sector as of end of 1999	946.80 ODP tonnes
- Funds approved for investment projects in the foam sector in 2000	US$5,951,817.00
- Quantity of CFC to be phased out in investment projects in foam sector approved in 2000	488.9 ODP tonnes

(a) Phaseout of CFC-11 by conversion to water-based technology in the manufacture of integral skin foams (shoesoles) at Megaflex

(b) Phaseout of CFC-11 by conversion to water-blown technology in the manufacture of rigid integral skin foam and to HCFC-141b for rigid polyurethane foam at Poliumetka

(c) Conversion from CFC-12 to isobutane technology in the manufacture of extruded polyethylene foam at Thermo-flex

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

(e) Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at Jose Sola

(f) Phaseout of CFC-11 by conversion to water-blown technology in the manufacture of rigid foam at Plastiron

(g) Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at Refri-Leste

(h) Phaseout of CFC-11 by conversion to water-blown technology in the manufacture of rigid foam at Rytpak

(i) Conversion from CFC-11 to HCFC-141b and water technology in the manufacture of rigid polyurethane foam at Ser Therm

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

Integral Skin Foam

Megaflex

1. Megaflex was established in March 1995. It produces polyester-based shoe soles of different colours using polyester polyol and MDI quasi-polymer at 1:1 ratio with 7% CFC-11 in the polyol. It operates three Transtecnica low pressure dispensers made in 1986 and an open-top mixer for blending pigments into the polyol.

2. The production will be converted to fully water-blown technology. The requested incremental capital costs include retrofit of the three Transtecnica low pressure dispensers with refrigerated cooling at US $30,000 and replacement of the open-top mixer with a closed top one at US $20,000 (to avoid evaporative losses and maintain the integrity of the water-based system). Trial cost and technology transfer and training cost of US $7,000 and US $15,000 respectively are also requested. Incremental operating cost due mainly to increased use of isocyanate amounting to US $126,368 is also requested.

Multiple Sub-Sector

Poliumetka

3. Poliumetka manufactures polyurethane rigid integral skin foam (ISF) (Density: 400 kg/m^3) for display shelves and rigid foam (FPF) for pipe insulation. Poliumetka was established in May 1995. The company operates a Transtecnica low pressure dispenser for the manufacture of the integral skin foam and hand mixing operation for the rigid foam.

4. The integral skin foam production will be converted to water-blown technology, and the rigid foam production to the use of HCFC-141b. The incremental capital cost of conversion includes the cost of mold heating oven (US $15,000), retrofit of the Transtecnica dispenser with a cooling system (US $10,000) and procurement of a new 15 kg/min portable high pressure dispenser at US $25,000 with US $12,500 deduction for technology upgrade. Other costs include, trials, technology transfer ad training costs at US $20,000. Incremental operating cost amounting to US $72,933 is requested.

Polyethylene/Polystyrene Foam

Thermo-flex

5. Thermo-flex is a 100% Brazilian owned enterprise founded in 1989. It produced extruded polyethylene foam tubing for pipe insulation in air-conditioning, freezers, etc. In 1998, the enterprise sold its production facilities to Polipex Industria e Commercial Ltda. The company maintained its sales force under the name TTP S.A. (Transformacion Technical Plastiques) and is selling products manufactured by Polipex under the name Termo-flex on the equipment previously owned by Thermo-Flex.

6. A CFC-phase out project for conversion to isobutane which was approved for Polipex at the 22nd Meeting is being implemented by UNDP. This project is proposed as complimentary to the Polipex project and will make use of the infrastructure – tanks, piping, general safety features-already approved for Polipex.

7. The project will phase out the use of 15 tonnes of CFC-12 with the conversion of the manufacturing of the extruded polyethylene tubing to isobutane technology. The project costs include the cost of connection to the Polipex isobutane storage tank at US $10,000, low and high pressure pump systems at US $10,000 and US $20,000 respectively, retrofit of the extruder (US $30,000), ventilation (US $10,000), cutting machine US $10,000 and inkjet printer US $21,000. Technology transfer, training and trial cost of US $10,000 is also requested. The incremental operating cost requested is US $3,400.

Rigid Foam

Frigs, Jose Sola, Plastiron, Refri-Leste, Rytpak, Ser Therm, Termobras

8. All seven companies are 100% Brazilian owned. Six of them were established before 25 July 1995. The Seventh, Jose Sola was established in June 1996 as an independent company to take over the foam production operations of an already existing family-run company Ind. E. Co. De Refrigeracion Elvi Ltda which was founded in 1977.

9. Five of the companies produce rigid insulation foam for various applications including pipe insulation, display cabinets, panels, door frames and doors for cold rooms, sprayfoam for roof, pipes, tanks and cold chambers. Two companies manufacture semi-rigid foam for bumpers (Plastiron) and for packaging (Rytpak). Frigs produces foam of density 42 Kg/ m^3 for pipe insulation.

10. All the companies producing insulating foams will convert their production to interim use of HCFC-141b while, those producing non-insulating semi-rigid foams will convert to water-blown technology.

11. The cost of conversion includes the replacement of low pressure machines with high pressure machines and hand-mixing operations with high pressure or low pressure machine depending on whether the company's foam product has critical insulation requirements or not. Where hand-mixing is replaced with a machine a deduction for technology upgrade has been made in the incremental capital cost calculation. Also appropriate deductions have been made for replacement of machines rearing the end of their useful lives. Other incremental capital costs include trials (US $5,000-US $10,000) depending on the number of product lines), technology transfer and training (US $5,000- US $15,000) depending on the number of machines and product lines. Each project incurs incremental operating cost which in the case of the insulating foams includes, where applicable, the cost associated with increase in foam density following conversion. The summary of the incremental capital and the operating costs is provided in table 1.

Table 1: Profile of the rigid foam-producing enterprises

Name of Enterprise	Date Established	ODS Consumption OPD tonnes	ODS Phase out ODP tonnes	Baseline Equipment[2]	Year*	ICC** US $	IOC*** US $
Frigs	1983	90.0	64.9	8 12 kg/min self-made LPD spray 6 12 kg/min self-made LPD spray 2 Self-made open-top premixers	1993-94 1998 1993	297,000	71,332
Jose Sola	June 1996[1]	38.7	34.9	2 15 kg/min self-made LPD	1994	77,000	73,369
Megaflex		41.5	41.5	15 kg/min Transtecnica	1986	79200	126368
Plastiron	1985	2.4	32.4	None (hand mix)	--	33,407	98,658
Refri-Leste	1981	30.0	27.0	None (hand mix)	--	77,000	59,840
Rytpak	1991	27.0	27.0	3 7 kg/min Olin pressure transfer dispensers (PTD) 1 7 kg/min self-made PTD	1991 1991	132,000	82,215
Ser Therm	1974	72.0	571.0	7 kg/min Transtecnica LPD spray-pour 3 self-made 12 kg/min LPD spray/pour Viking LPD Self-made premixer	1993 1993 (2) 1994 (1) 30+ years 1993	222,200	137,591
Termobras	1975	77.0	60.9	2 self-made LPD spray None (for boxfoam operation)	1992	138,875	155,715

***Year – year of purchase and/or installation of equipment**

**ICC – incremental capital cost including 10% contingency
***IOC – incremental operating cost
1 Jose Sola took over the foam production of an already existing Brazilian Company.
2 LPD – Low pressure dispenser
PTD – pressure transfer dispenser

Justification for the use of HCFC-141b

12. Justification for the use of HCFC-141b, including projected "techno-economic" impact of zero ODP technology and estimated cost of future conversion to zero ODP technology as well as the Government's letter of agreement provided in line with Decision 27/13 for the enterprises converting to HCFC-141b have been provided in each project document by UNDP. It is stated that the enterprises were briefed in detail on issues associated with the use of HCFC in Multilateral Fund projects prior to the preparation of the projects, and this informed their choice of technology.

13. Since the texts of the justification are similar in all the projects submitted by UNDP, a sample of the justification together with a copy of the Government letter are attached as annexes to this evaluation.

Impact of the projects

14. When all the projects are implemented, 385.2 ODP tonnes will be phased out. This represents 3.3% of Brazil's 1999 consumption of Annex A Group I substances. There will be residual ODS consumption of 63.9 ODP tonnes due to the conversion to HCFC-141b.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

1. The Fund Secretariat and UNDP discussed various issues relating to the projects, where necessary, including replacement or retrofit of foam equipment and related costs, cost-effectiveness etc. The eligible grants of all the projects have been agreed except that of Frigs. Where necessary, the project documents have been revised to reflect the agreed changes.

2. Frigs produces foam of density 42kg/ m^3 which is already higher than the density range for HCFC-141b foam in the relevant application as specified in the recommendations of the technical study on foam density adopted in Decision 31/44, to be used in the calculation of incremental operational costs. On this basis, the density increase in the calculation of incremental operational cost of the project is not eligible for funding.

3. Based on the data provided in the project document, the Secretariat has recalculated the eligible incremental operational cost taking out the cost associated with the density increase, as well as the eligible grant as follows:

(a) Total incremental operational cost: US$ 71,332
(b) Incremental operational cost due to increase in density of foam: US$29,764
(c) Eligible incremental operational cost (a) - (b): US$41,568
(d) Incremental capital cost (including contingency) : US$ 297,000
(e) Eligible project cost (c) + (d): US$ 335.568

4. The Secretariat has recommends the amount of US$ 338,568 as the eligible grant of the Frigs project and has included it in the list of Brazil projects recommended for blanket approval.

RECOMMENDATIONS

1. The Fund Secretariat recommends blanket approval of the Frigs, Megaflex, Poliumetka, Thermo-flex, Jose Sola, Plastiron, Refri-Leste, Rytpak, Ser Therm and Termobras projects with the levels of funding and associated support costs as indicated in the table below.

	Project Title	Project Funding (US$)	Support Cost (US$)	Implementing Agency
(a)	Phaseout of CFC-11 by conversion to water-based technology in the manufacture of integral skin foams (shoesoles) at Megaflex	211,068	27,439	UNDP
(b)	Phaseout of CFC-11 by conversion to water-blown technology in the manufacture of rigid integral skin foam and to HCFC-141b for rigid polyurethane foam at Poliumetka	136,183	17,704	UNDP
(c)	Conversion from CFC-12 to isobutane technology in the manufacture of extruded polyethylene foam at Thermo-flex	123,300	16,029	UNDP
(d)	Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at Frigs	335,568	43,624	UNDP
(e)	Conversion from CFC-11 to HCFC-141b technology in the manfuacture of rigid polyurethane foam at Jose Sola	150,369	19,548	UNDP
(f)	Phaseout of CFC-11 by conversion to water-blown technology in the manufacture of rigid foam at Plastiron	131,768	17,130	UNDP
(g)	Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at Refri-Leste	136,840	17,789	UNDP
(h)	Phaseout of CFC-11 by conversion to water-blown technology in the manufacture of rigid foam at Rytpak	211,410	27,483	UNDP
(i)	Conversion from CFC-11 to HCFC-141b and water technology in the manufacture of rigid polyurethane foam at Ser Therm	377,391	49,061	UNDP
(j)	Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at Termobras	327,315	42,551	UNDP

Annex

Additional Justification for Using HCFC-141b Technology

The UNDP technical expert appraised the enterprise in July 2000, prior to the preparation of this project document, and had discussions with the company's representatives about the choice of technology for replacing the existing CFC-based technology. The enterprise was briefed in detail about the following:

(a) An overview of the available interim (low ODP) and permanent (zero ODP) replacement technologies.
(b) The "techno-economic impact" of each technology on the products manufactured, and the processes and practices employed.
(c) Possible implications of each technology, in terms of its known impact on environment, health and safety, such as ozone depleting potential, global warming potential, occupational health, etc.
(d) It was emphasized to these enterprises that HCFC technologies are interim technologies due to their residual ODP and therefore may continue to adversely affect the environment, although at a lower rate than CFCs.
(e) It was further explained that HCFCs may become controlled substances under present or future international conventions and will therefore also need to be phased out at a future date, and any investments required for their phase-out and for conversion to a permanent technology will have to be borne by the enterprises themselves.

The main conclusions reached by the enterprise through discussions with the UNDP technical expert were:

1. HCFC-141b will maintain the insulation properties required by the enterprise's customers.

2. Water based formulations do not provide sufficient insulation properties for the application. Use of water based formulations could require an increase in foam thickness at higher densities (significant cost increases to the enterprise).

3. Hydrocarbon technology was seen as not a feasible option due to the fact that hydrocarbon technology is not recommended for field applications based on the lack of control of the operational conditions (presence of ignition sources, etc).

In view of the above, the technology selected is HCFC-141b based systems in the interim, until permanent technology (either water based of HFC-based systems) is available and can provide the required physical properties.

Estimated Cost of Future Conversion to Zero-ODP Technology

At the present time, there are no zero-ODP technology options, which can be applied cost-effectively for this project (refer to Annex 7).

The following possibilities exist for a future conversion to zero-ODP technology, based on information available presently:

- Water based systems
- HFC based systems

The equipment installed under this option would allow future conversion with no additional capital investments. Other future costs are expected to be in the area of incremental operating costs, related to higher isocyanate usage (in the case of water based) or higher costs of the HFCs.

Before:	64.8 t HCFC-141b	@ US$ 3.00	=	194,400
After:	108 t MDI	@ US$ 2.50	=	270,000
IOC/y			=	75,600

It is unknown what the price would be of the HFCs in the future; therefore, IOCs related to a potential conversion to HFC technology are not quantifiable at this point.

FAX

MINISTRY OF ENVIRONMENT
BRAZIL

TO:	**Mr. Frank J. Pinto** – Principal Technical Advisor and Chief Montreal Protocol Unit
Organization:	UNDP
FAX Number	001 212 906 6947 **DATE:** 05/10/2000
FROM:	**Mr. Fernando Vasconcelos de Araújo** Brazilian Ozone Unit
PHONE:	55-61-317-1225 **FAX:** 55-61-226 8050
N° of PAGES: (including this one)	01

MESSAGE

Dear Mr. Pinto,

In reference to the project submissions to the 32 ª ExCom Meeting, I authorize you to submit for approval the investment projects of the following enterprises: FRIGS, TRANSEN, TERMOBRAS, JUNTAFACIL, JOSE SOLA, SER THERM, MEGAFLEX, PLASTIRON, POLIUMETKA, REFRI-LESTE, RYT PAK, and THERMO-FLEX.

In line with the Decision 27/13 of the Executive Committee and in recognition of Article 2F of the Montreal Protocol, the Government of Brazil:

1. Verifies that it has reviewed the specific situation involved at the enterprise presented above as well as its commitments under the Article 2F;
2. States that, based on prevailing circumstances at the said enterprises, at present time the conversion of these enterprises requires the use of HCFC-141b for the interim period as stipulated in the Montreal Protocol;
3. Confirms that the Government and the recipient enterprises understood that no funding would be available from Multilateral Fund for the conversion from HCFCs for the said enterprises whenever such conversion to other alternatives will be required.

Best regards,

Fernando V. Araujo
Manager
Brazilian Ozone Unit
Ministry of Environment