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EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
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PROJECT PROPOSALS: BRAZIL

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

Foam

• Phaseout of CFC-11 by conversion to water-blown technology in the manufacture of integral skin foam and flexible molded foam at Fabbrini	UNDP
• Phaseout of CFC-11 by conversion to water-blown technology in the manufacture of integral skin foams at Mach-Plast	UNDP
• Phaseout of CFC-11 by conversion to water-blown technology in the manufacture of flexible molded foam at Massimo	UNDP
• Phaseout of CFC-11 by conversion to water-blown technology in the manufacture of rigid integral skin foam at Menaf	UNDP
• Phaseout of CFC-11 by conversion to water-blown and HCFC-141b technology in the manufacture of integral skin and flexible molded foam at PPU	UNDP
• Phaseout of CFC-11 by conversion to water-based technology in the manufacture of integral skin (shoesoles) at Prosola	UNDP
• Phase-out of CFC-11 consumption by conversion to water-blown and HCFC-141b technology at Sector Co. in the manufacture of polyurethane integral skin and flexible moulded polyurethane foam	UNIDO

• Phaseout of CFC-11 by conversion to water-blown technology in the manufacture of integral skin foam and rigid foam at Injepol	UNDP
• Phaseout of CFC-11 by conversion to water-blown and HCFC-141b technology in the manufacture of integral skin foam, flexible molded foam and rigid foam at Jetpol	UNDP
• Phaseout of CFC-11 by conversion to water-blown technology in the manufacture of integral skin and rigid foam at Montreal	UNDP
• Conversion from CFC-11 to methylene chloride/LIA technology in the manufacture of flexible polyurethane boxfoam, from CFC-11 to water-blown foam in flexible molded foam, and from CFC-11 to HCFC-141b in flexible integral skin foam at Multispuma	UNDP
• Conversion from CFC-11 to HCFC-141b and water based technology in the manufacture of rigid polyurethane foam and flexible molded/integral skin foam at 50 small enterprises and 10 distributors centered around their systems house, Plastquim	UNDP
• Phaseout of CFC-11 by conversion to water-blown technology in the manufacture of flexible molded foam and rigid foam at Trantor	UNDP
• Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at Packo Plurinox	UNDP
• Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at Politermo	UNDP
• Conversion from CFC-11 to HCFC-141b and water-based technology in the manufacture of rigid polyurethane foam at Polyfoam	UNDP
• Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at Refripor	UNDP

<u>Refrigeration</u>

• Conversion from CFC-11 to HCFC-141b, and from CFC-12 to HFC-134a and from R-502 to R-404a in the manufacture of freezer rooms and panels, and rigid foam at Schmit	UNDP
• Phasing out CFC-12 with HFC-134a and CFC-11 with HCFC-141b at Domnick Hunter Ltda.	UNIDO
• Phasing out CFC-12 with HFC-134a and CFC-11 with HCFC-141b at Ingecold Ltda.	UNIDO
• Phasing out CFC-12 and R-502 with HFC-134a and HFC-404A as well asof CFC-11 with HCFC-141b at Kalten Ltda.	UNIDO
• Phasing out CFC-12 with HFC-134a and CFC-11 with HCFC-141b at Klima Ltda.	UNIDO
• Phasing out CFC-12 with HFC-134a and CFC-11 with HCFC-141b at Metalplan Ltda.	UNIDO
• Phasing out CFC-12 with HFC-134a and CFC-11 with HCFC-141b at Tecnigel Ltda.	UNIDO
• Implementation of a national programme for recovery and recycling of CFC12 refrigerant in mobile air conditioning	UNDP

PROJECT EVALUATION SHEET
BRAZIL

SECTOR:	Foam	ODS use in sector (1999):	1,919.7 ODP tonnes
Sub-sector cost-effectiveness thresholds:		Integral skin	US $16.86/kg

Project Titles:

(a) Phaseout of CFC-11 by conversion to water-blown technology in the manufacture of integral skin foam and flexible molded foam at Fabbrini
(b) Phaseout of CFC-11 by conversion to water-blown technology in the manufacture of integral skin foams at Mach-Plast
(c) Phaseout of CFC-11 by conversion to water-blown technology in the manufacture of flexible molded foam at Massimo
(d) Phaseout of CFC-11 by conversion to water-blown technology in the manufacture of rigid integral skin foam at Menaf

Project Data	**Integral skin**			
	Fabbrini	**Mach-Plast**	**Massimo**	**Menaf**
Enterprise consumption (ODP tonnes)	29.00	29.50	8.00	10.70
Project impact (ODP tonnes)	29.00	29.50	8.00	10.70
Project duration (months)	36	36	36	36
Initial amount requested (US $)	124,887	188,951	52,279	80,994
Final project cost (US $):				
Incremental capital cost (a)	50,000	80,000	30,000	50,000
Contingency cost (b)	5,000	8,000	3,000	5,000
Incremental operating cost (c)	69,887	100,951	19,279	25,994
Total project cost (a+b+c)	124,887	188,951	52,279	80,994
Local ownership (%)	100%	100%	100%	100%
Export component (%)	0%	0%	0%	0%
Amount requested (US $)	124,887	188,951	52,279	80,994
Cost effectiveness (US $/kg.)	4.31	6.40	6.53	7.57
Counterpart funding confirmed?	N/A	Yes	N/A	N/A
National coordinating agency	PROZON			
Implementing agency	UNDP			

Secretariat's Recommendations				
Amount recommended (US $)	124,887	188,951	52,279	80,994
Project impact (ODP tonnes)	29.00	29.50	8.00	10.70
Cost effectiveness (US $/kg)	4.31	6.40	6.53	7.57
Implementing agency support cost (US $)	16,235	24,564	6,796	10,529
Total cost to Multilateral Fund (US $)	141,122	213,515	59,075	91,523

PROJECT EVALUATION SHEET
BRAZIL

SECTOR: Foam | ODS use in sector (1999): 1,919.7 ODP tonnes

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

Project Titles:

(e) Phaseout of CFC-11 by conversion to water-blown and HCFC-141b technology in the manufacture of integral skin and flexible molded foam at PPU
(f) Phaseout of CFC-11 by conversion to water-based technology in the manufacture of integral skin (shoesoles) at Prosola
(g) Phase-out of CFC-11 consumption by conversion to water-blown and HCFC-141b technology at Sector Co. in the manufacture of polyurethane integral skin and flexible moulded polyurethane foam

Project Data	**Integral skin**		
	PPU	**Prosola**	**Sector Co.**
Enterprise consumption (ODP tonnes)	10.00	18.10	18.25
Project impact (ODP tonnes)	9.40	18.10	17.74
Project duration (months)	36	36	30
Initial amount requested (US $)	64,568	214,118	179,088
Final project cost (US $):			
Incremental capital cost (a)	45,000	155,000	99,000
Contingency cost (b)	4,500	15,500	9,900
Incremental operating cost (c)	15,068	43,618	21,590
Total project cost (a+b+c)	64,568	214,118	130,490
Local ownership (%)	100%	100%	100%
Export component (%)	0%	0%	0%
Amount requested (US $)	64,568	214,118	130,490
Cost effectiveness (US $/kg.)	6.87	11.83	7.50
Counterpart funding confirmed?	N/A	Yes	Yes
National coordinating agency	PROZON		Ministry of Environment
Implementing agency	UNDP		UNIDO

Secretariat's Recommendations			
Amount recommended (US $)	64,568	214,118	130,490
Project impact (ODP tonnes)	9.40	18.10	17.74
Cost effectiveness (US $/kg)	6.87	11.83	7.50
Implementing agency support cost (US $)	8,394	27,835	16,964
Total cost to Multilateral Fund (US $)	72,962	241,953	147,454

PROJECT EVALUATION SHEET
BRAZIL

SECTOR: Foam   ODS use in sector (1999): 1,919.7ODP tonnes

Sub-sector cost-effectiveness thresholds: Multiple subsectors *Various US $/kg

Project Titles:

(h) Phaseout of CFC-11 by conversion to water-blown technology in the manufacture of integral skin foam and rigid foam at Injepol
(i) Phaseout of CFC-11 by conversion to water-blown and HCFC-141b technology in the manufacture of integral skin foam, flexible molded foam and rigid foam at Jetpol
(j) Phaseout of CFC-11 by conversion to water-blown technology in the manufacture of integral skin and rigid foam at Montreal
(k) Conversion from CFC-11 to methylene chloride/LIA technology in the manufacture of flexible polyurethane boxfoam, from CFC-11 to water-blown foam in flexible molded foam, and from CFC-11 to HCFC-141b in flexible integral skin foam at Multispuma
(l) Conversion from CFC-11 to HCFC-141b and water based technology in the manufacture of rigid polyurethane foam and flexible molded/integral skin foam at 50 small enterprises and 10 distributors centered around their systems house, Plastquim
(m) Phaseout of CFC-11 by conversion to water-blown technology in the manufacture of flexible molded foam and rigid foam at Trantor

Project Data	**Multiple-subsectors**					
	Injepol	**Jetpol**	**Montreal**	**Multispuma**	**Plastquim**	**Trantor**
Enterprise consumption (ODP tonnes)	23.00	29.60	11.80	24.20	165.40	19.60
Project impact (ODP tonnes)	23.00	29.00	11.80	24.05	153.40	19.60
Project duration (months)	36	36	36	36	36	36
Initial amount requested (US $)	107,678	234,400	93,117	123,929	1,354,835	102,234
Final project cost (US $):						
Incremental capital cost (a)	47,500	139,000	120,000	60,000	721,500	50,000
Contingency cost (b)	4,750	13,900	12,000	6,000	69,650	5,000
Incremental operating cost (c)	55,428	61,700	28,437	57,929	440,946	47,234
Total project cost (a+b+c)	107,678	214,600	160,437	123,929	1,232,096	102,234
Local ownership (%)	100%	100%	100%	100%	100%	100%
Export component (%)	0%	0%	0%	0%	0%	0%
Amount requested (US $)	107,678	214,600	83,117	123,929	931,599	102,234
Cost effectiveness (US $/kg.)*	4.68	7.40	7.04	5.15	6.08	5.22
Counterpart funding confirmed?	Yes	Yes	Yes	N/A	Yes	N/A
National coordinating agency	PROZON					
Implementing agency	UNDP					

Secretariat's Recommendations						
Amount recommended (US $)	107,678	214,600	83,117	123,929	931,599	102,234
Project impact (ODP tonnes)	23.00	29.00	11.80	24.05	153.40	19.60
Cost effectiveness (US $/kg)	4.68	7.40	7.04	5.15	6.08	5.22
Implementing agency support cost (US $)	13,998	27,898	10,805	16,111	112,476	13,290
Total cost to Multilateral Fund (US $)	121,676	242,498	93,922	140,040	1,044,075	115,524

* The amounts represent composite cost-effectiveness. The cost-effectiveness values in US $/kg for ISF and RPF of the enterprises are, respectively: 1) Injepol: 4.67; 4.70. 2) Jetpol: 9.79; 5.32. 3) Montreal: 6.64; 7.83. 4) Multispuma: 4.13; 5.63. 5) Plastquim: 3.18; 6.98. (The amount of US $27,500 to Plastquim Systems House is not included in the CE calculation) 6) Trantor: 10.87; 4.35.

PROJECT EVALUATION SHEET
BRAZIL

SECTOR: Foam ODS use in sector (1999): 1,919.7 ODP tonnes

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

Project Titles:

(n) Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at Packo Plurinox
(o) Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at Politermo
(p) Conversion from CFC-11 to HCFC-141b and water-based technology in the manufacture of rigid polyurethane foam at Polyfoam
(q) Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at Refripor

Project Data	**Rigid**			
	Packo Plurinox	**Politermo**	**Polyfoam**	**Refripor**
Enterprise consumption (ODP tonnes)	14.80	56.40	64.50	12.00
Project impact (ODP tonnes)	13.40	50.20	41.90	10.90
Project duration (months)	36	36	36	36
Initial amount requested (US $)	39,750	393,066	285,958	85,350
Final project cost (US $):				
Incremental capital cost (a)	60,000	110,000	195,150	70,000
Contingency cost (b)	6,000	11,000	19,515	7,000
Incremental operating cost (c)	13,500	98,136	-35,792	10,858
Total project cost (a+b+c)	79,500	219,136	178,873	87,858
Local ownership (%)	50%	100%	100%	100%
Export component (%)	0%	0%	0%	0%
Amount requested (US $)	39,750	219,136	178,873	85,350
Cost effectiveness (US $/kg.)	2.97	4.37	4.27	7.83
Counterpart funding confirmed?	Yes	Yes		Yes
National coordinating agency	PROZON			
Implementing agency	UNDP			

Secretariat's Recommendations				
Amount recommended (US $)	39,750	219,136	178,873	85,350
Project impact (ODP tonnes)	13.40	50.20	41.90	10.90
Cost effectiveness (US $/kg)	2.97	4.37	4.27	7.83
Implementing agency support cost (US $)	5,168	28,488	23,253	11,096
Total cost to Multilateral Fund (US $)	44,918	247,624	202,126	96,446

PROJECT DESCRIPTION

Sector Background

- Latest available total ODS consumption (1999)*	9,460.50 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	8,209 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
- Quantity of CFC to be phased out in investment projects in foam sector approved in 1999	895.70 ODP tonnes
- Funds approved for investment projects in the foam sector in 1999	US$5,951,817.00

*Based on data reported to the Fund Secretariat in May 2000.

Integral Skin and Flexible Molded Foam

Fabbrini, Mach Plast, Massimo, Menaf, PPU and Sector

1. The six companies produce flexible molded and/or integral skin foams for various applications including flexible molded foam cushions for office furniture (density 53 kg/m^3), automotive seat cushions, arm rests (density 45 kg/m^3), flexible and rigid integral skin such as decorative exterior molding, wear plates, infant incubators, etc. All the companies operate low-pressure dispensers. They will convert the production to fully water-based systems, with the exception of Multispuma, PPU and Sector, which will convert the integral skin component to HCFC-141b technology. The costs of these projects vary between companies depending on the baseline conditions. The incremental capital costs are based on retrofit of the existing low pressure dispensers except Mach Plast where it is proposed to replace one old low pressure dispenser with a new one and Sector where it is proposed to replace two low pressure dispensers with high pressure ones. The incremental capital costs include retrofit or replacement costs, technology transfer, trials and training. Incremental operating cost is requested for each project consistent with the amount of CFC-11 to be phased out.

2. Table 1 below provides a profile of the six companies.

Table 1: Profile of the integral skin/flexible moldedfoam producers

Name of enterprise	CFC Phase out	Baseline dispensers*	Total I.C.C.** (US$)	Contingency (US$)	I.O.C.*** (US$)
Fabbrini	29.00	L.P. Equifiber, L.P. 15kg/min Transtecnica 1974	50,000.00	5,000.00	69,887.00
Mach-Plast	29.50	L.P. 15kg/min Equifiber 1993, L.P. 30kg/min Ransburg 1994	80,000.00	8,000.00	100,951.00
Massimo	8.00	L.P. 15kg/min Transtecnica 1988	30,000.00	3,000.00	19,279.00
Menaf	10.70	L.P. Sintenor 1988	50,000.00	5,000.00	25,994.00
PPU	9.40	L.P. 7 kg/min Sulpol 1995	45,000.00	4,500.00	15,068.00
Sector	17.74	L.P. 15 kg/min Sintenor 1985. L.P. 30 kg/min Sintenor 1988	132,000.00	13,200.00	33,888.00

*L.P. low-pressure
**I.C.C.: Incremental capital cost
***I.O.C.: Incremental operating cost

Prosola

3. Prosola which was established in 1994 is a joint venture with 30% Brazilian and 70% Uruguayan ownership. It produces mainly polyester-based (95% of the systems used) shoe soles. The foam systems are higher density water-blown, to which Prosola adds CFC-11 to increase the pack in the molds and produce a durable, water resistant skin. It adds 1.8% CFC-11 to the systems for this purpose. Its average consumption of CFC-11 (1996-1998) was 18.1 tonnes. It operates three low pressure dispensers, a BMG installed in March 1995, a 1980 Transtecnica purchased in 1994 and a 1997 Sulpol.

4. Prosola is reported to have evaluated fully water-blown systems, both polyether and polyesther, on the basis of which it has chosen to convert to fully water-blown polyether systems. The trials have indicated that in order to maintain current production rates, self-cleaning mixheads will be required. Without the self-cleaning mixheads, flushing frequency has to be increased to deal with increased catalysis rates, required to avoid the 25% longer demold times.

5. The company's BGM dispenser will be retrofitted with a self-cleaning mixhead at the cost of US $30,000. The Transtecnica low pressure dispenser will be replaced with a self-cleaning high pressure open pour dispenser for US $95,000. The Sulpol dispenser will be the responsibility of the enterprise to replace or retrofit as necessary.

6. No increase in density is expected as a result of the change, since the principal purpose of using the CFC-11 was to develop the thick, durable skin, rather than to decrease the density. Other costs include trials (3 machines, US $15,000) technology transfer and training

(US $15,000), and incremental operating costs based on the difference in price and increased usage of isocyanate when using fully water-blown foams (US $43,618). The total project cost amounts to US $214,118.

Multiple Sub-Sector

Injepol, Jetpol, Montreal and Trantor

7. The four companies (Injepol, Jetpol, Montreal and Trantor) manufacture polyurethane flexible molded foam (FMF), integral skin foam (ISF) and rigid foam (FPF) for various applications indicated in the table below. All the companies were established before 25 July 1995, except Injepol which is reported to have been established in March 1997 as a subsidiary of a company called Corsico to undertake Corisco's ongoing foam operations as a separate venture. The Injepol plant shares the same site with Corisco and 100% of the foam production is used by Corisco for assembly of its products. The profile of the companies in Table 1 shows the CFC consumption, baseline equipment and other relevant information on the companies.

8. All the companies will convert their molded foam as well as integral skin foam production to water-blown technology except Jetpol which will convert the integral skin production to the use of HCFC-141b. The cost of conversion includes mainly retrofit costs except in the case of Jetpol where replacement of two low pressure dispensers (at US $40,000 each) is proposed. The cost of conversion of the rigid packaging foam production is also based on retrofit of the existing low pressure dispensers. Other costs include, trials, technology transfer and training costs at US $10,000 - US $20,000 depending on the number of product lines. Incremental operating costs as shown in Table 2 below are requested.

9. Table 2 provides relevant information on the integral skin and rigid foam production components of the four companies.

Table 2: Profile of the companies in the multiple sub-sector

		CFC Use (ODP tonnes)		Products			ICC US $		IOC US $		
Enterprise	Total CFC Use ODP Tonnes	FMF/ ISF	RPF	ISF/ FMF	RPF	Production Equipment	FMS/ ISF	RPF	FMS/ ISF	RPF	Total Project Cost
Injepol	23	N/A	N/A	Rigid IS for electrical housing D=600 kg/m^3	Packaging D=25 kg/m^3	(1) 30 kg LP Sulpol (199)	N/A	N/A	N/A	N/A	107,678
Jetpol	29.6	14.1	15.5	Flex. IS, D= 150-250kg/m^3 , D=400-600 kg/m^3 , HR molded foam D=45-60kg/m^3	Packaging foam, D= 15-20 kg/m^3	(2) 7.5 kg/min LP Equifiber (1988) (3) 15 kg/min Sintenor 1988 (2), 1986 (1)	140,800	49,500	13,992	21,468	234,300
Montreal	11.8	7.8	4	Flexible ISF for wear plates in fuel tanks, D=200 kg/m^3	Semi rigid packaging D=18 kg/m^3	15 kg/min LP Transtechnica (1985) 60 kg/min HP Hennecke (1979)	33,000	99,000	18,797	9,640	160,437
Trantor	19.6	2.6	17		Semi-rigid packaging foam	7.5 kg/min LP Sulpol (1994) 15 kg/min LP Transtechnica (1991)	22,000	33,000	6,266	40,968	102,234

1. Injepol produces all parts on one machine. It could not provide a breakdown of CFC use per sub-sector, therefore composite cost-effectiveness has been used. Analysis shows that the project costs would be within the respective cost-effectiveness allowances.
2. Jetpo has two plants, one in Rio de Janeiro (using one machine) and the other in Sao Paolo using four machines.
D: density

<u>Multispuma</u>

10. Multispuma which was established in 1985 produces flexible slabstock boxfoam, flexible molded and integral skin foams. Multispuma also produces water-blown flexible molded foams with chemical systems supplied by Plastquim. The company used 24.2 ODP tonnes of CFC-11 in its production in the last 12 months (May 1999-April 2000). 16 tonnes was used for the boxfoam production, while 6.6 tonnes and 1.6 tonnes were used for flexible molded and integral skin foams respectively. The boxfoam production is to be converted to methylene chloride/LIA technology. The flexible molded foam will be converted to a water-based system, while the integral skin foam production is to be converted to HCFC-141b technology as an interim solution. The project includes the retrofit of the two existing boxfoam dispensers with a softening agent and metering system (US $30,000). Due to the relatively recent age of the baseline dispensers (1997 and 1998), the only costs requested for the conversion of the flexible molded and integral skin foams are incremental operating costs. Other costs include trials (US $15,000), technology transfer and training (US $15,000). Incremental operating costs for four years for boxfoam (US $40,576) and two years for flexible molded and integral skin foam (US $17,353) are requested.

<u>Plastquim, Group project</u>

11. Plastquim, a Systems House that sells chemical components as well as foam systems to foam producers was established in March 1990. Many of the large customers of Plastquim have already participated in ODS phase out projects. In this project 50 of its small regular customers are to convert their production through the assistance of the company. 14 of the enterprises were established after 25 July 1995. 35 enterprises produce rigid foam products while 15 produce flexible molded and/or integral skin foam products. The enterprises consumed a total of 184 tonnes made up of 128 tonnes by the rigid foam producers and 56 tonnes by the flexible molded and integral skin foam producers. The production is to be converted to HCFC-141b as an interim step for the rigid insulating foam and flexible integral skin foam applications, with a likely permanent solution being water based or liquid HFC formulations. For the flexible molded foam, non-insulating rigid foam and rigid integral skin foam applications, water-based formulations are to be used.

12. It is proposed to replace existing low pressure dispensers by high pressure dispensers for the rigid foam applications (12 dispensers = US $360,000), and purchase 17 small HP dispensers in cases where the enterprises do not currently use equipment, with a 25% enterprise contribution (net US $382,500). For the flexible integral skin foam applications, two LP dispensers will be retrofitted for use with HCFC 141b (US $20,000) and one new dispenser will be procured for a rigid integral skin foam customer currently handmixing with a 25% enterprise contribution (net US $26,250). For the flexible molded foam (FMF) customers, two LP dispensers will be procured (net US $60,000). It is also proposed to procure two prototype dispensers (US $30,000 each) and a field K-factor tester (US $6,000) for Plastquim. Other costs include trials (US $110,000) and technology transfer (US $90,000) and incremental operating costs (US $654,991). The grant requested calculated individually per enterprise applying the applicable category threshold. A table provides relevant information on the 50 customer enterprises.

13. In addition to the 50 enterprises it has been proposed that an amount of US $169,400 be paid to 10 distributors of chemicals for supply of systems to very small-scale producers with consumption of 0.1-1 tonne/year and for whom it would not be possible to provide dispensing equipment.

Table 3: Profile of Beneficiary Enterprises in Plastquim Group

COMPANY	Date Established	CFC Used	Impact ODP Eliminated (t/y)*	ICC** US $	IOC*** US $	Total Project Costs US $	Amount Requested US $	Cost Effectiveness US $/kg
GROUP I – RIGID FOAM CUSTOMERS								
AUDEN	1994	4	3.6	69,960	12,320	82,280	28,188	7.83
BULCHOLZ	1992	2	1.8	36,960	6,160	43,120	14,094	7.83
FURGÕES CAMBÉ	1996	3	2.7	36,210	9,240	37,950	21,141	7.83
FURGÕES CASCAVEL	1981	4	3.6	35,960	12,320	38,280	28,188	7.83
M.V.C	1993	7	6.4	3,960	21,560	25,520	25,520	3.99

POLYPLASTIC	1996	2	1.8	3,960	6,160	10,120	10,120	5.62
REFRICOL	1982	6	5.4	36,210	18,480	47,190	42,282	7.83
REFRIGERAÇÃO FRIOLAR	1960	4	3.6	3,960	12,320	16,280	16,280	4.52
SATIERF	1972	4	3.6	36,210	12,320	41,030	28,188	7.83
THERMOTOTA	1982	4	3.6	3,960	12,320	16,280	16,280	4.52
NAVAL FIBRAS	1996	4	3.6	36,460	12,320	43,780	28,188	7.83
BERNAUER	1994	4	3.6	36,210	12,320	41,030	28,188	7.83
MEGA BRASIL	1996	2	1.8	36,210	6,160	34,870	14,094	7.83
FAPER	1970	2	2.0	36,210	4,820	33,530	15,660	7.83
ZERO GRAU	Sept. 1995	4	3.6	3,960	12,320	16,280	16,280	4.52
BISELLI	1960	3	2.7	36,660	8,316	41,976	21,141	7.83
SEIKAN	1974	4	3.6	36,210	12,320	41,030	28,188	7.83
ISOMIL	1989	5	4.5	36,210	15,400	44,110	35,235	7.83
FUNIBRÁS	1988	2	1.8	35,960	6,160	32,120	14,094	7.83
FURGÃO ALVORADA	1984	3	2.7	36,210	8,316	37,026	21,141	7.83
TRUKAN	1996	4	3.6	36,210	12,320	41,030	28,188	7.83
H.W.	1998	6	6.0	36,210	14,460	43,170	43,170	7.20
INDREL	1966	3	2.7	36,960	8,316	45,276	21,141	7.83
ISOFORMA	1992	4	3.6	3,960	12,320	16,280	16,280	4.52
CLIMA	1987	5	4.5	36,210	15,400	44,110	35,235	7.83
MAMPLAST	1985	4	3.6	36,210	12,320	41,030	28,188	7.83
ANCEL	1974	3	2.7	3,960	8,316	12,276	12,276	4.55
COSMOPLAST	1987	3	2.7	36,960	8,316	45,276	21,141	7.83
BLUMENGLAS	1985	3	2.7	36,960	8,316	45,276	21,141	7.83
LEANDRO	1993	5	5.0	36,210	12,050	40,760	39,150	7.83
POLIUMETKA		4	3.6	35,960	12,320	38,280	28,188	7.83
OESTE	1960	2	1.8	35,960	6,160	32,120	14,094	7.83
RACKS	Apr. 1995	2	1.8	36,210	6,160	34,870	14,094	7.83
TREVISAN	1987	5	1.8	36,210	6,160	34,870	14,094	7.83
A ATUAL	1991	2	4.5	36,210	15,400	44,110	35,235	7.83
SUB-TOTAL		***128***	***116.6***	***1,078,050***	***379,986***	***1,282,536***	***824,105***	***7.07***

*tonnes/year
**Incremental capital cost
***Incremental operational cost

COMPANY	Date Established	CFC Used	Impact ODP Eliminated (t/y)*	ICC** US $	IOC*** US $	Total Project Costs US $	Amount Requested US $	Cost Effectiveness US $/kg
GROUP II – FMF/ISF CUSTOMERS								
DAUD	1936	5	5.0	3,960	12,050	16,010	16,010	3.20
MANCHESTER FIBRAS.	1992	3.8	3.8	3,960	9,158	13,118	13,118	3.45
V.M Tec	1992	8	8	3,960	19,280	23,240	23,240	2.90
ODISSÉIA	1993	4	3.6	3,960	3,420	7,380	7,380	2.05
BRUDDEN	1980	3.6	3.3	14,960	3,135	18,095	18,095	5.48
FIBERBRAS	1996	4.2	3.8	3,960	3,610	7,570	7,570	1.99
LUCARELI	1992	3	3.0	3,960	7,230	11,190	11,190	3.73
SCHWANZER	1991	1.3	1.3	41,585	3,133	35,968	21,918	16.86
JOINT	1992	2.4	2.4	3,960	5,784	9,744	9,744	4.06
AIR MICRO	Feb. 1995	3.6	3.3	3,960	3,135	7,095	7,095	2.15
ECOR	1988	5	5.0	3,960	12,050	16,010	16,010	3.20
INJEFOX		3.6	3.3	14,960	3,135	18,095	18,095	5.48
QUISPUMA	1988	3	3.0	46,960	7,230	44,190	44,190	14.73
BARBRA	1993	1.5	1.5	3,960	3,615	7,575	7,575	5.05
SONHOS	Dec. 1995	4	4.0	46,960	9,640	46,600	46,600	11.65
SUB-TOTAL		***56.0***	***54.3***	***205,025***	***105,605***	***281,880***	***267,830***	***4.93***

Rigid Foam

Packko Plurinox, Polithermo and Refripor

14. The three companies produce rigid foam for various insulation applications, including cold storage, food freezers, milk storage, morgue coolers, etc. All the companies were established before 25 July 1995. They all operate low-pressure dispensers. The production will be converted to HCFC-141b based technology at all three enterprises.

15. The cost of conversion includes the replacement of the low pressure Olin and Sulpol dispensers at Packko Plurinox and Refripor with high pressure ones at US $45,000 each, and retrofit of the Transtecnica low pressure dispensers at Polithermo for US $50,000. The other costs include technology transfer and training (US $10,000) and trials (US $5,000-US $10,000). Incremental operational costs are requested. No increase in density is claimed, however there is a claim of US $227,940 for Polithermo for increase in thickness of the foam on account of continued use of low pressure dispenser.

16. Table 4 below gives a profile of the four companies.

Table 4: Profile of rigid foam enterprises

Name of enterprise	CFC Phase out	Baseline Dispensers	Total I.C.C. (US$)	I.O.C./I.O.S. (US$)	I.O.C. Due to density increase (US$)
Packo Plurinox	14.80	L.P. 15 kg/min Sulpol 1997, L.P.16 kg/min Olin 1989	60,000.00	13,500.00	not applicable
Polithermo	50.20	(2) L.P. 30 kg/min Transtecnica 1994	70,000.00	326,250.00	227,940.00
Polyfoam	41.90	None, hand-mixing	195,150.00	(35,792.00)	(150,423.00)
Refripor	10.90	L.P. 15 kg/min Sulpol 1993	70,000.00	7,000.00	not applicable

*L.P. low-pressure

Polyfoam

17. Polyfoam was founded in 1987. The enterprise manufactures polyurethane surfboard blanks, as well as rigid polyurethane boxfoam and panels for insulation applications. The company's main business, surfboard blanks, was originally conducted under a license of Bennet Foam, Australia (therefore the company's brand name, Bennett) and there are still close contacts with this company. The average consumption of CFC-11 (1997-1999) is stated to be 64.5 tonnes, of which 21.2 tonnes was used in the panels and boxfoam production and 43.3 tonnes was used in the surfboard production. The company operates a refurbished Viking dispenser installed in 1990 for the boxfoam operation and the rest of the production, i.e. panels and surfboards is done manually.

18. Chemicals for the rigid panel and rigid boxfoam production are purchased premixed from Plastiquiim, with 30% CFC-11 premixed into the polyol. The enterprise then adds an additional 20% CFC-11. For the density of the products manufactured (40 kg/m^3 for both panels and boxfoam), the additional CFC-11 was considered unnecessary by the expert visiting the factory, and was likely lost to evaporation.

19. The chemical system for the surfboard production is purchased from Dion Chemicals of Australia, owner of Bennett Surfboard Ltd company of Australia. The system is purchased without CFCs, and Polyfoam adds 50% CFC-11 to the resin component. The CFC-11 is kept cold and premixed into the polyol, which is also kept cold. The isocyanate is then mixed by an open drill-press-type mixer in a bucket. The chemical mixture is then poured directly into the fiberglass and resin hydraulically operated molds and allowed to react.

20. It is thought likely by the expert that no evaporative losses occur because of the cold components, although it is also likely that the cold temperatures inhibit the complete foaming efficiency of the CFC-11. Polyfoam also adds pigment pastes, $Ti0_2$ pigment and UV stabilizer to the polyol.

21. The surfboard manufacturing will be converted to water-blown system to be supplied by Dion chemicals. For this conversion the following are requested: a blender at the cost of US $25,000 to blend the pigment and UV stabilizer; 40 kg/min high pressure dispenser with a lance and cylinder metering pumps at the cost of US $100,000 and monorail for US $30,000 for a total cost of equipment of US $185,000.

22. The panel production will be converted to HCFC-141b technology. For this a 40 kg/min high pressure dispenser is requested for US $70,000. The rigid boxfoam production will also be converted to HCFC-141b technology for which the Viking dispenser will be replaced with a semi-automatic boxfoam unit, also at US $70,000.

23. 25% of the cost of the dispensers is deducted as enterprise contribution where there is no equipment in the baseline. There are incremental operational savings of US $35,792 when the evaporative losses are taken into account.

Justification for the use of HCFC-141b

24. Justifications for the use of HCFC-141b, including projected "techno-economic" impact for the enterprises converting to HCFC-141b have been provided in each project document and as annexes to the document by UNDP all relevant projects except Sector Co. and UNIDO for Sector Co. It is stated that detailed discussions on issues associated with the use of HCFC in Multilateral Fund projects were held with the enterprises prior to the preparation of the projects, and this informed their choice of the technology.

25. Since the texts of the justification and techno-economic impact are similar in all the projects submitted by UNDP, a sample of the justification and the tecno-economic impact from UNDP and the justification from UNIDO as well as the Government letters are attached as annexes to this evaluation.

Impact of the projects

26. When all the projects are implemented, 462.34 ODP tonnes will be phased out. This represents 5.6% of Brazil's 1999 consumption of Annex A Group I substances.

27. There will be residual consumption of 39.51 ODP tonnes due to the use of HCFC-141b.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

1. The Fund Secretariat and the implementing agencies (UNIDO for Sector Co. and UNDP for the rest of the projects) discussed various issues relating to the projects where necessary, including replacement or retrofit of foam equipment and related costs, prices of chemicals, cost-effectiveness etc. The project costs were agreed as indicated in the project evaluation sheets. Where necessary, the project documents have been revised to reflect the agreed changes.

2. In projects where companies produced foam belonging to two or more sub-sectors, it was ensured that the cost associated with each production sub-sector met the threshold funding limit of that sub-sector.

3. There is no request for density increase except in the Plastquim Group project where the cost of systems to account for 7.5% increase in density for the rigid foam producers is requested.

Plastquim Group Project

4. The group project included 12 enterprises whose dates of establishment were not known or they were reported to have been established after 25 July 1995. UNDP had also requested an amount of US $169,400 to be paid to 10 distributors of chemicals for supply of systems to very small-scale foam producers. Following discussion of the project it was agreed that the requested amount to be allocated to the distributors is not an eligible incremental cost. UNDP also subsequently sought further information on the backgrounds of the participating enterprises. Consequently, it revised the project excluding the amount requested for allocation to the distributors as well as five enterprises whose eligibility could not be confirmed, namely Zero Grace, Polimolita, Injefox, Quispuma and Sonhos.

5. Revised dates of the other eight enterprises were also provided as follows:

Fuergoes Cambe	May 1995
Polyplastic	May 1995
Naval Fibres	March 1995
Truker	May 1995
HW	April 1995
Clima	May 1995
Fiberbras	March 1995

6. Taking account of the baselines of the companies, including the system house (Plastquim), and applicable rules, particularly regarding umbrella projects, the project costs were agreed.

7. The cost associated with the participation of the Systems House (Plastquim) in the project was agreed as US $27,500 (including 10% contingency). This is made up of:

Field K-value tester:	5,000
Trials, technology transfer and training	20,000

8. The agreed incremental costs for the customers of Plastquim are as follows:

	US $
Total incremental capital cost:	847,000
Deduction due to age or lack of baseline equipment:	(150,000)
Contingency:	69,650
Incremental operational cost:	440,946

Total project cost:	1,207,096
Eligible grant to RPF enterprises:	764,197
Eligible grant to FMF/ISF enterprises:	139,902

9. The total grant for the project including the Systems House will be US $931,599.

Sector Strategy

10. A similar group project (Pulsol Group Project) was approved at the 28th Meeting. The condition of approval was that "further approval of projects to phase out the foam sector SME's in Brazil will be subject to the submission by the Government of Brazil of a strategy paper or a plan for phasing out the use of ODS by eligible enterprises in the sub-sector."

11. UNDP submitted a paper entitled Updated Sector Strategy – The Foam Sector, as annex to the Plastquim Group Project document in compliance with the conditions of approval of the Polsul group project.

12. The paper identifies the SMEs by foam application as well as by sector and the scope of their activity. It identified 605 ODS-consuming foam sector SMEs whose consumption of 1,765 ODP tonnes accounted for 49% of Brazil's foam sector consumption in 1998. This portion is expected to rise to 90% in 2000.

13. The mode of funding of SME projects in Brazil was proposed in the strategy paper, the principal approach being the use of systems houses as in the Plastquim project. Another approach proposed is allocation of funds to distributors to provide systems to small enterprises. This approach was discussed between the Secretariat and UNDP in connection with the Plastquim project and agreed as ineligible.

14. The paper concludes that the Brazilian Government expects most projects to be prepared during the year 2000-2001 and implementation to be completed about two years after approval. Of course, funds available for the implementing agencies and their business plan will impact on the timeline planned by the Government. However, their planned timelines will be impacted by implementing agencies' business plans and available funds.

15. The strategy paper is submitted as Annex II to this document for consideration of the Executive Committee.

RECOMMENDATIONS

1. The Fund Secretariat recommends blanket approval of the Fabbrini, Mach-Plast, Massimo, Menaf, PPU, Prosola, Sector, Injepol, Jetpol, Montreal, Multispuma, Plastquim, Trantor, Packo Plurinox, Politermo, Polyfoam and Refripor projects with the funding level and associated support costs indicated in the table below.

2. To note with appreciation the strategy paper submitted by UNDP on behalf of the Government of Brazil.

	Project Title	Project Funding (US$)	Support Cost (US$)	Implementing Agency
(a)	Phaseout of CFC-11 by conversion to water-blown technology in the manufacture of integral skin foam and flexible molded foam at Fabbrini	124,887	16,235	UNDP
(b)	Phaseout of CFC-11 by conversion to water-blown technology in the manufacture of integral skin foams at Mach-Plast	188,951	24,564	UNDP
(c)	Phaseout of CFC-11 by conversion to water-blown technology in the manufacture of flexible molded foam at Massimo	52,279	6,796	UNDP
(d)	Phaseout of CFC-11 by conversion to water-blown technology in the manufacture of rigid integral skin foam at Menaf	80,994	10,529	UNDP
(e)	Phaseout of CFC-11 by conversion to water-blown and HCFC-141b technology in the manufacture of integral skin and flexible molded foam at PPU	64,568	8,394	UNDP
(f)	Phaseout of CFC-11 by conversion to water-based technology in the manufacture of integral skin (shoesoles) at Prosola	214,118	27,835	UNDP
(g)	Phase-out of CFC-11 consumption by conversion to water-blown and HCFC-141b technology at Sector Co. in the manufacture of polyurethane integral skin and flexible moulded polyurethane foam	130,490	16,964	UNIDO
(h)	Phaseout of CFC-11 by conversion to water-blown technology in the manufacture of integral skin foam and rigid foam at Injepol	107,678	13,998	UNDP
(i)	Phaseout of CFC-11 by conversion to water-blown and HCFC-141b technology in the manufacture of integral skin foam, flexible molded foam and rigid foam at Jetpol	214,600	27,898	UNDP
(j)	Phaseout of CFC-11 by conversion to water-blown technology in the manufacture of integral skin and rigid foam at Montreal	83,117	10,805	UNDP
(k)	Conversion from CFC-11 to methylene chloride/LIA technology in the manufacture of flexible polyurethane boxfoam, from CFC-11 to water-blown foam in flexible molded foam, and from CFC-11 to HCFC-141b in flexible integral skin foam at Multispuma	123,929	16,111	UNDP
(l)	Conversion from CFC-11 to HCFC-141b and water based technology in the manufacture of rigid polyurethane foam and flexible molded/integral skin foam at 50 small enterprises and 10 distributors centered around their systems house, Plastquim	931,599	112,476	UNDP
(m)	Phaseout of CFC-11 by conversion to water-blown technology in the manufacture of flexible molded foam and rigid foam at Trantor	102,234	13,290	UNDP

(n)	Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at Packo Plurinox	39,750	5,168	UNDP
(o)	Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at Politermo	219,136	28,488	UNDP
(p)	Conversion from CFC-11 to HCFC-141b and water-based technology in the manufacture of rigid polyurethane foam at Polyfoam	178,873	23,253	UNDP
(q)	Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at Refripor	85,350	11,096	UNDP

ANNEX I

Additional Justification for Using HCFC-141b Technology (UNDP)

The UNDP technical expert appraised the enterprise in March 1999, 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. For the flexible molded foam, water-based formulations are available and applicable.

2. For the flexible integral skin formulations, permanent technologies are not yet available in Brasil; therefore, use of HCFC-141b is necessary in the interim.

3. Water based formulations are not yet available for this application in Brasil.

4. Pentane is technically possible to use for the integral skin foam application, but not economically practical due to the relatively small amount of ISF production. The enterprise is not comfortable with the use of flammable substances, and the expert agreed.

In view of the above, the technology selected for the flexible integral skin application 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.

Projected Techno-economic Impact of Zero-ODP Technologies (UNDP)

The projected impact of applying various zero-ODP technologies with respect to the selected technology (HCFC-141b) in this project is summarized as below:

Water based technologies are not available locally. Therefore, the costs associated with water-based technology are not considered.

HFC-134a based systems are not offered in the applicable regional area and are not a feasible zero-ODP option.

Pentane could be used, but would result in significant incremental capital costs as a result of purchase of a new high pressure pentane dispenser, installation of a pentane premixing system, and ventilation and other safety related improvements to the production area. These costs are conservatively estimated at $350,000. These costs are significantly higher than the alternative.

Thus, the selection of HCFC-141b based systems, as the preferred conversion technology, is justified taking into account all the technical, commercial and cost factors.

<u>Justification for Selection of HCFC-141b in Integral Skin Production</u> (UNIDO)

The following criteria were considered while evaluating the alternatives:

Environmental acceptability
Location of the company
Physical properties of end products
Maturity of the technology
Safety and applicability in the enterprise factory environment
Price, product availability, and cost-effectiveness
Energy efficiency impact
CFC-11 replacement technology selected by competitors
MLF ExCom decisions relating to HCFC and hydrocarbon technologies

To assist the enterprises in the selection of a CFC-11 replacement technology, separate project budgets were prepared for the HCFC-141b, and n-pentane technology options.

Whilst recognising the environmental benefits of n-pentane versus HCFC-141b, Sector Co. selected HCFC-141b as a first stage, interim, replacement for CFC-11. The decision in favour of HCFC-141b was based on the lower investment cost, and the fact that it is more appropriate to the existing skill level of the work forces at the enterprise.

Sector Co. understands the implications of the selection of HCFC-141b technology, and the potential cost of subsequent replacement of HCFC-141b at an undetermined future date. They accept and commit to a future change from HCFC-141b to a zero-ODP technology, and that they will have to bear all associated costs.

Other factors also influenced the enterprise decisions in favour of HCFC-141b technology:

- HCFC-141b is the technology adopted by most of their existing, or potential, competitors in Brazil and Latin America. With no local supplies, no other local demand, and its own small requirements, the enterprise was concerned about both product availability, and the price of pentanes in Brazil.

- Whilst MLF ExCom decisions relating to CFC-11 replacement technology selection may "presume" against the use of HCFCs, such HCFC based technologies are not prohibited and may still be considered eligible for MLF assistance. The Brazilian Ministry of Environment, the responsible Government counterpart, supports the selection of HCFC-141b as an Ainterim@ CFC replacement technology at Sector Co.

- The company is located in a residential area**.** Sector Co. expressed concern regarding the longer term safety issues related to the introduction of a flammable blowing agent technology into their factory environment and their choice *at the present time* is a non-flammable HCFC replacement.

The selection of HCFC-141b technology by the enterprise in this project as the immediate replacement of CFC-11 is a realistic and sensible choice under the prevailing circumstances. *The enterprise understands that HCFC-141b is an interim solution* that will require a change to an appropriate zero-ODP technology at some future date. Based on the present status of non-flammable zero-ODP technologies, *they expect to utilize HCFC-141b* ***technology until approximately 2005***.

FAX

RECEIVED MAY 05 2000

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:** 04/May/2000
FROM:	**Mrs. Izabella M. Teixeira** Secretaria de Qualidade Ambiental nos Assentamentos Humanos Director
PHONE:	55-61-317-1225 **FAX:** 55-61-226 8050
N° of PAGES: (including this one)	01

Doc. 040

MESSAGE

Dear Mr. Pinto,

In reference to the project submission to the 31th ExCom Meeting, I previously authorize you to submit for approval the investment projects of the following enterprises: EVEREST-MASTER FRIO, FABBRINI, INJEPOL, JETPOL, MACH PLAST, MASSIMO, MENAF, POLITHERMO, POLYFOAM, PPU, PROSOLA and SCHMIT.

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,

Izabella M. Teixeira
Director
Ministry of Environment
Brazil

FAX

RECEIVED MAY 0 8 2000

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:**	08/May/2000
FROM:	**Mr. Fernando Vasconcelos de Araujo**		
PHONE:	55-61-317-1225	**FAX:**	55-61-226 8050
Nº of PAGES: (including this one)	01		

MESSAGE

Dear Mr. Pinto,

On behalf of Mrs. Teixeira and in reference to the projects submission to the 31th ExCom Meeting, I previously authorize you to submit for approval the investment projects of the following enterprises: PACKO PLURINOX, REFRIPOR and TRANTOR.

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

FAX

RECEIVED MAY 10 2000

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:** 09/May/2000
FROM:	**Mr. Fernando Vasconcelos de Araújo**
	Secretaria de Qualidade Ambiental nos Assentamentos Humanos
PHONE:	55-61-317-1225 **FAX:** 55-61-226 8050
N° of PAGES: (including this one)	01

MESSAGE

Dear Mr. Pinto,

On Behalf of Ms. Teixeira and in reference to the project submission to the 31th ExCom Meeting, I authorize you to submit for approval the investment projects of the following enterprises: MONTREAL, MULTIESPUMA and PLASTIQUIM.

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

ANNEX II

UPDATED SECTOR STRATEGY

(a) THE FOAM SECTOR

1. INTRODUCTION

The foam industry, including domestic refrigeration, with 35.08% of the total ODP consumption is the second largest sector in Brazil. The sector can be divided by type of application and by type of foam. The tables below show the applications per foam type in percentage and tons, following the categories established by the MLF's Executive Committee:

Use of Foam Types by Application 1998 (%)

Application	Flexible	Molded/ Integral skin	Rigid	Thermoplastic
Automotive	--	98	2	--
Construction	--	10	90	--
Furniture/Bedding	46	54	--	--
Refrigeration	--	0.3	99.7	--
Miscellaneous	--	45	46	9

Use of Foam Types by Application 1998 (tons)

Application	Flexible	Molded/ Integral skin	Rigid	Thermo-Plastic	Total
Automotive	--	280	6	--	286
Construction	--	34	300	--	334
Furniture/Bedding	200	233	--	--	433
Refrigeration *	--	7	2248		2255
Miscellaneous		125	127	25	277
Total	**200**	**679**	**2681**	**25**	**3585**

* including domestic refrigeration

The SME study identified 605 ODS-consuming enterprises in this sector, 535 of which meet the MLF's criteria for an SME—an ODS consumption of less than 10 or 25 t ODP/y, depending on the subsector[1]:

1 The study did not actually include the flexible slabstock/boxfoam (FPF) producing enterprises. These are relatively large enterprises but, as most enterprises have to a large extent converted to non-ODS technologies, they only use small amounts of CFCs. They are, therefore, according to the MLF definition, SMEs. The FPF data has been included based on information from the revised Country Programme and ABRIPUR.

Number of Identified Enterprises by Application (1998)

Application	Enterprises	Flexible	FMF/ISF	Rigid	Thermo-Plastic	Total
Automotive	Total	--	83	2	--	85
	SMEs	--	69	1	--	70
Construction	Total	--	6	59	--	65
	SMEs	--	5	50	--	55
Furniture/ Bedding	Total	30	95	--	--	125
	SMEs	30	85	--	--	115
Refrigeration	Total	--	--	245	--	245
	SMEs	--	--	220	--	220
Miscellaneous	Total	--	42	42	1	85
	SMEs	--	37	37	1	75
Total	Total	**30**	**226**	**348**	**1**	**605**
	SMEs	**30**	**196**	**308**	**1**	**535**

SMEs accounted for 49.2% of the identified sector consumption in 1998. The survey shows that they are expected to be responsible for almost 90% of the consumption in 2000.

ODS Consumption in the Foam Sector (ODP tons)

Enterprises	1997	1998
Total	4291	3585
SMEs	2185	1765

Including domestic refrigeration

Following is a short description of each application.

1.1 Automotive

Foam use for automotive applications includes molded and integral skin polyurethane foams for seats, backs, steering wheels, headrests, armrests lever, carpet backing, headliners sound insulation and various smaller applications. It is responsible for 7.9% of the ODP consumption in the foam sector. The survey identified 85 companies, 70 of which are SMEs.

ODS Consumption for Automotive Applications (ODP tons)

Enterprises	1997	1998
Total	333	286
SMEs	300	272

1.2 Construction

Applications in this segment include rigid polyurethane foams for thermal and acoustical insulation (panels, pour-in-place or sprayfoam systems). It accounts for 9.3% of the ODP consumption in the foam sector. The survey identified 65 companies, 55 of which are SMEs.

ODS Consumption in Construction Applications (ODP tons)

Enterprises	1997	1998
Total	388	334
SMEs	349	317

1.3 Furniture/Bedding

Companies in this sector manufacture flexible/integral skin polyurethane foams for upholstery and bedding. It accounts for 12.1% of the ODP consumption of the Foams sector. The survey identified 95 companies, 85 of which are SMEs.

ODS Use in Furniture Applications (ODP tons)

Enterprises	1997	1998
Total	471	433
SMEs	444	422

1.4 Refrigeration

Rigid polyurethane foams are used in thermal insulation applications in refrigerators, freezers, display cabinets/counters, walk-in-coolers, industrial cold storage, refrigerated trucks etc. There is also some minor use of integral skin foam for protection of the cabinets/counters. It is responsible for 62.9% of the ODP consumption in the manufacture of foams. The survey identified 245 companies, 220 of which are SMEs.

ODS Use in Refrigeration Applications (ODP tons)

Enterprises	1997	1998
Total	2776	2255
SMEs	702	628

Including domestic refrigeration

1.5 Miscellaneous Applications

Companies that cannot be classified in any of the previous applications are included under "miscellaneous applications". These include bicycle and motorcycle seats, ornamentals, surfboards, packaging and thermoware. They account for 7.7% of the ODP consumption of the foam sector. The survey identified 85 companies, 75 of which are SMEs.

ODS Use in Miscellaneous Applications (ODP tons)

Enterprises	1997	1998
Total	322	277
SMEs	290	263

2. PHASEOUT STRATEGY

As mentioned above, there are 605 enterprises in the Brazilian foam industry still consuming CFCs. Following is a breakdown per application and size, based on the foam survey:

ODS Consuming Enterprises per Application

Application	Enterprises, Total	Small/Medium Sized (SME)	Large/Medium Sized (LME)
Automotive	85	70	15
Construction	65	55	10
Furniture	125	115	10
Refrigeration	245	220	25
Miscellaneous	85	75	10
Total	**605**	**535**	**70**

2.1 Medium/Large Sized Enterprises

The aim of this report is to provide information and propose a phaseout strategy for SMEs, the latter defined as using less than 10/25 t ODP/year. However, the related market survey provided some unexpected information on larger consumers ("LMEs") as a "fringe benefit". Expected phaseout costs for these companies is detailed in the following table:

Phaseout Costs for Identified Large/Medium Sized Enterprises (LMEs)

Application	ODP (tons)	Foam type	Threshold (US$/kg/y)	Phaseout Costs (US$)
Automotive	14	Flexible molded, integral skin	16.86	236,000
Construction	17	Rigid	7.83	133,000
Furniture	11	Flexible molded, integral skin	16.86	185,000
Refrigeration (not including domestic refrigeration)	441 5	Rigid Integral skin	7.83	3,453,030 84,000
Miscellaneous	14	Miscellaneous	9.53	133,000
Total	**521**			**4,224,030**

Concurrent phaseout of residual CFC used in larger enterprises is important—and even critical to the SME program—to avoid competitive distortion.

Virtually all ODS phaseout projects in the Brazilian foam sector have been prepared for LMEs and on an individual basis. Most projects were initially identified through the National Plastics Institute (INP) and recently through the newly instituted Brazilian Polyurethane Association (ABRIPUR). As the chemical suppliers—critical in the identification of ODS users in the foam industry—participate in both organizations, there have been no problems in identifying potential projects—as a matter of fact, there is currently a considerable "pipeline" of projects, as following table shows:

Status of Project Preparation in the Foam Sector (ODP tons/ yr.)

Foam Type	Approved[1]	Completed	Pipeline[2]	Consumption[3]
	As of 11/99	As of 11/99	2000-2002	
Flexible	0	0	200	200
Integral Skin/Molded	746.5	204	557	1,099.5
Rigid Foam	1055.1	286	556	1,325.1
Rigid Foam (Refrigeration)	398.2	0	491	889.2
Polystyrene/ Polyethylene	163.5	0	0	163.5
Miscellaneous	124.3	0	101	225
(i) **Total**	**2,487.6**	**490**	**1,905**	**3,902.6**

[1]as per MLF Nov 1999 Inventory of approved project
[2]as per UNDP information
[3] (Estimated consumption = approved minus completed MLF projects) + (projects identified in UNDP Pipeline) in ODP tons

Implementation schedules have been favorable and the relatively large number of projects under implementation have kept support costs within the MLF constraints. As the system has worked well so far, there appears to be no reason to change it for this category of enterprises and the LME information derived from this survey should be consolidated with the current project pipeline.

2.2 Small/Medium Sized Enterprises (SMEs)

The survey shows that the overwhelming majority of SMEs (80%) are located in the South/Southeast:

Location of SME per Region

Region	Percentage of SMEs
Center West	2.5 %
Northeast	10.0 %
North	7.5 %
Southeast	52.5 %
South	27.5 %
Total	100%

It was further learned that:

- The average CFC-consumption per SME is 3.1 tons /year.
- Enterprises are well informed on ozone layer issues. 50% know about the need to phaseout CFCs and 37% participated in information dissemination seminars. Perceived phaseout problems are related to investment and technology.

- 70% of the companies have never tried to use alternative technologies and 30% have already carried out some evaluation, but none of these actually operate with alternatives.
- The most important obstacle to use alternatives was related to investment requirements (80%)[2], followed by technical problems perceived in changing in equipment and technology (73%).
- For 73%, suppliers are the source of technology, while 47% stated that they try to develop alternative technologies using their own resources. 3% are not free to choose their technology due to an association with other manufacturers and 8% intend to hire outside experts to access new technologies.
- 80% of the companies invest with their own resources; 15% rely on credit.
- 68% train their employees in the handling of CFCs, 50% internally and 25% using outside expertise.
- SMEs are looking to the government for initiatives to promote the phaseout of ODS, the financial means to do so, as well as for information and training on alternative technologies.
- 87% feel they need financial help to phaseout CFCs and 45% believe that they need technical support and training.

In sum, SME enterprises, while aware of the need to phaseout CFCs, are looking to the government for initiatives promoting ODS phaseout, the financial means to do so, as well as information/training on alternative technologies.

The MLF approved in July 1999 (28th ExCom) funds for the ODS phaseout in forty SMEs involving 137 tons of CFCs. The activities will be implemented through two system houses, dedicated suppliers to these enterprises. The—locally owned—system houses will be provided with the financial and technical means to adapt their systems. The system houses function as providers of baseline information and technical support for the recipients. Similar projects have been successfully pioneered in Mexico and preliminary results show that the same will be the case in Brazil.

Based on experience drawn from these projects, the following phaseout plan is proposed for the SME sector:

1. There are 535 SMEs identified in the Brazilian Foam Industry. The CFC-phaseout of forty of these has already been addressed through two approved projects. This leaves 495 SMEs to be addressed. The annual consumption is calculated to be (1905 – 137 =) 1,768 tons CFC/year (1998).
2. The 30 FPF manufacturers formulate in-house. A group project for these manufacturers is recommended, following examples from Indonesia, Malaysia, etc.
3. The "SME/System House" approach as used in Mexico and for the two approved Brazilian SME projects is recommended for about 210 of the remaining 455 SMEs. These are manufacturers that purchase their chemicals as systems from a consistent source in quantities representing more than one ton CFC-11/year. Indonesia, Malaysia etc.

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2 Please note that percentages do not always add to 100% as some questions allowed multiple choices.

4. The remaining SMEs are thought to be so called “spot buyers”—companies that buy too little and too infrequently to be considered regular customers. They are generally buying through distributors for local system houses. It is proposed to deal with these enterprises through the issuance of two years of IOC-compensation to the distributor in exchange of their commitment not to sell any CFC-containing chemicals anymore. This can be achieved by including distributors in a specific ODS phaseout project for the system house it represents.

5. There are in total thirteen significant system houses in Brazil. Six of these system houses include SMEs as well as distributors in their customer base. With two system houses already carrying out projects, four system houses are left to deal directly with 210 manufacturers (an average of 35 per system house). Indirectly, these system houses would also deal through their distributors with the “spot buyers”.

6. This phaseout effort should be followed by Government measures banning the use of CFCs. If all relevant projects have not been completed—or approved—at time of issuance, it is suggested to issue waivers to enterprises that can prove inclusion in a proposed or approved, but not completed, project.

7. The Government of Brazil intends to deal with the SMEs in the foam sector through one Implementing Agency, as the proposed approach requires close involvement in the selection of manufacturers per system house to avoid overlap. This would be difficult to manage when more Agencies are involved.

8. The implementation steps would be the following:
   - Meet with all system houses and ensure acceptance of the approach as well as cooperation;
   - Prepare participation lists per system house;
   - Address with input from the Secretariat reasonable compensation for the system house for appraisal and technical support as well as for their own conversion;
   - Identify with help of the system houses, distributors involved with “spot buyers”;
   - Prepare project proposals;
   - *Submit and reconcile with review bodies*;
   - Execute.
   - Conduct an awareness campaign through PROZON.
   - Prepare a terminal umbrella project for the sector covering any ODS consumers that have been *previously left out.*

9. To calculate the actual and eligible costs of phasing out the use of CFCs in foam-SMEs two approaches are offered:

   - The FPF phaseout costs are estimated at US$ 1,250,000.
   - From experience with the already approved group projects, it is calculated that the actual phaseout costs for the other SMEs will be around US$ 16.00/kg or around US$ 25,000,000. The eligible costs under standard MLF—no special SME window—would be US$ 9.50/kg or around US$ 15,000,000.
   - The total phaseout costs would be US$ 16,250,000

   Another way is to calculate, as for the LMEs, per application and per foam type using applicable MLF thresholds. The MLF contribution calculated in this way are detailed in the following table:

Phaseout Costs for Identified Small/Medium Sized Enterprises (SMEs)

Application	ODP (tons)	Foam type	Threshold (US$/kg/y)	Phaseout Costs
Automotive	272	Flexible molded, integral skin	16.86	4,586,000
Construction	317	Rigid	7.83	2,482,000
Furniture	211 200	Flexible molded, integral skin Flexible Slabstock	16.86 6.23	3,557,000 1,246,000
Refrigeration	500 2	Rigid Integral skin	7.83 16.86	3,915,000 34,000
Miscellaneous	263	Miscellaneous	9.53	2,506,000
Total	**1765**			**18,326,000**

Based on the previous calculations, eligible phaseout costs for SMEs in the foam industry are expected to amount to US$ 17,500,000

10. The Brazilian Government expects most projects to be prepared during the year 2000-2001 and implementation to be completed about two years after approval. Implementation date will depend on date of approval by the MLF. Of course, funds available for the Implementing Agencies and their Business Plan will impact on the timeline planned by the Government.

PROJECT EVALUATION SHEET
BRAZIL

SECTOR:	Refrigeration	ODS use in sector (1999):	6,272 ODP tonnes
Sub-sector cost-effectiveness thresholds:		Commercial	US $15.21/1kg

Project Titles:

(a) Conversion from CFC-11 to HCFC-141b, and from CFC-12 to HFC-134a and from R-502 to R-404a in the manufacture of freezer rooms and panels, and rigid foam at Schmit
(b) Phasing out CFC-12 with HFC-134a and CFC-11 with HCFC-141b at Domnick Hunter Ltda.
(c) Phasing out CFC-12 with HFC-134a and CFC-11 with HCFC-141b at Ingecold Ltda.
(d) Phasing out CFC-12 and R-502 with HFC-134a and HFC-404A as well as of CFC-11 with HCFC-141b at Kalten Ltda.

Project Data	**Commercial**			
	Schmit	**Domnick**	**Ingecold**	**Kalten**
Enterprise consumption (ODP tonnes)	45.50	1.20	1.70	8.60
Project impact (ODP tonnes)	43.30	1.20	1.70	8.10
Project duration (months)	36	36	36	36
Initial amount requested (US $)	332,720	17,971	25,320	122,151
Final project cost (US $):				
Incremental capital cost (a)	231,500	27,652	25,320	111,774
Contingency cost (b)	23,150	2,300		10,377
Incremental operating cost (c)	34,114			
Total project cost (a+b+c)	288,764	29,952	25,320	122,151
Local ownership (%)	100%	60%	100%	100%
Export component (%)	0%	0%	0%	0%
Amount requested (US $)	288,764	17,971	25,320	122,151
Cost effectiveness (US $/kg.)	6.67	15.15	15.02	15.14
Counterpart funding confirmed?	Yes	Yes	Yes	Yes
National coordinating agency	PROZON	PROZON		Ministry of Environment
Implementing agency	UNDP	UNIDO		UNIDO

Secretariat's Recommendations				
Amount recommended (US $)	288,764	17,971	25,320	122,151
Project impact (ODP tonnes)	43.30	1.20	1.70	8.10
Cost effectiveness (US $/kg)	6.67	15.15	15.02	15.14
Implementing agency support cost (US $)	37,539	2,336	3,292	15,880
Total cost to Multilateral Fund (US $)	326,303	20,307	28,612	138,031

PROJECT EVALUATION SHEET
BRAZIL

SECTOR: Refrigeration ODS use in sector (1998): 6,272 ODP tonnes

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

Project Titles:

(e) Phasing out CFC-12 with HFC-134a and CFC-11 with HCFC-141b at Klima Ltda.
(f) Phasing out CFC-12 with HFC-134a and CFC-11 with HCFC-141b at Metalplan Ltda.
(g) Phasing out CFC-12 with HFC-134a and CFC-11 with HCFC-141b at Tecnigel Ltda.

Project Data	**Domestic**		
	Klima	**Metalplan**	**Tecnigel**
Enterprise consumption (ODP tonnes)	5.20	1.80	2.40
Project impact (ODP tonnes)	5.70	1.90	2.50
Project duration (months)	36	36	36
Initial amount requested (US $)	86,464	28,885	34,000
Final project cost (US $):			
Incremental capital cost (a)	64,740	26,532	34,000
Contingency cost (b)	5,724	2,353	
Incremental operating cost (c)	16,000		
Total project cost (a+b+c)	86,464	28,885	34,000
Local ownership (%)	100%	100%	100%
Export component (%)	10%	0%	0%
Amount requested (US $)	86,464	28,885	34,000
Cost effectiveness (US $/kg.)	15.16	15.02	13.63
Counterpart funding confirmed?		Yes	Yes
National coordinating agency	PROZON		
Implementing agency	UNIDO		

Secretariat's Recommendations			
Amount recommended (US $)	86,464	28,885	34,000
Project impact (ODP tonnes)	5.70	1.90	2.50
Cost effectiveness (US $/kg)	15.16	15.02	13.63
Implementing agency support cost (US $)	11,240	3,755	4,420
Total cost to Multilateral Fund (US $)	97,704	32,640	38,420

PROJECT DESCRIPTION

Sector Background

- Latest available total ODS consumption (1999)*	11,039.00 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 1998	9,542.90 ODP tonnes
- Baseline consumption of CFCs in refrigeration sector	Not available ODP tonnes
- Consumption of CFCs in refrigeration sector in 1998	6,272.00 ODP tonnes
- Funds approved for investment projects in refrigeration sector as of March 2000 (30th Meeting)	US$15,477,975
- Quantity of CFC to be phased out in investment projects in refrigeration sector as of March 2000 (30th Meeting)	2,337.2 ODP tonnes

* The Government of Brazil informed the Secretariat that the 1999 data are preliminary.

1. The total 1999 ODP consumption in the refrigeration sector (6,272 ODP tonnes) is sub-divided into manufacturing of new refrigeration equipment (1,172 ODP tonnes) and servicing (5,100 ODP tonnes).

2. The conversion of domestic refrigeration manufacturers in Brazil is in its final stage. No more projects are left to be submitted in this sub-sector. In accordance with legislation adopted by the Government of Brazil, the conversion of this sub-sector to non-ODS technologies will have to be finalized by the end of 2000 leading to the phase of 1,633 ODP tonnes.

3. On the basis of 1998 figures the consumption for manufacturing of the new refrigeration equipment in the commercial refrigeration sub-sector is estimated to be about 1,000 ODP tonnes.

4. The Executive Committee has approved about US $15.5 million for twenty-four projects to phase out 2,337 ODP tonnes of CFC for enterprises manufacturing new refrigeration equipment in the refrigeration sector.

(a) Conversion from CFC-11 to HCFC-141b, CFC-12 to HFC-134a and R-502 to R-404a in the manufacture of freezer rooms and panels at Schmit

5. Schmit manufactures commercial refrigeration products consisting of freezer room panels and freezer cabinets using 44.8 ODP tonnes of CFC-11, 0.6 ODP tonnes of CFC-12 and 0.5 ODP tonnes of R-502. Currently, the enterprise operates two 10kg/min low-pressure dispensers and a pressure vessel system for foam applications. Baseline equipment for refrigeration includes three vacuum pumps, a charging unit, twelve manifolds and seven leak detectors.

6. This project will phase out 40.75 ODP tonnes by converting CFC-11 to HCFC-141b as the foam-blowing agent, and by the replacement of CFC-12 and R-502 with HFC-134a and R-402b refrigerants respectively. The project includes the replacement of the two low-pressure dispensers and the high pressure transfer system by two high-pressure dispensers (US $148,000) with a deduction based on the age of the baseline dispensers and a mobile spray foaming machines (US $25,000). For the refrigeration operations, a semi-automatic charging board (US $15,000) and vacuum pumps (one new and two retrofits) (US $4,500) are requested. Other costs include foam trials (US $15,000), prototyping (US $15,000), training and technology transfer (US $15,000 - foam, US $5,000 - refrigeration) and 10% contingency. This project also includes incremental operating costs for two years of US $41,770 reflecting the higher cost of chemicals.

Justification for the use of HCFC-141b

7. The enterprise has selected HCFC-141b technology to replace CFC-11 in foam blowing operations. A letter advising the Government decision to use HCFC technology has been received by the Secretariat and is attached to this evaluation together with the justification from the implementing agency.

(b) Phasing out CFC-12 with HFC-134a and CFC-11 with HCFC-141b at Domnick Hunter Ltda.

(c) Phasing out CFC-12 with HFC-134a and CFC-11 with HCFC-141b at Ingecold Ltda.

(d) Phasing out CFC-12 and R-502 with HFC-134a and HFC-404A as well as of CFC-11 with HCFC-141b at Kalten Ltda.

(e) Phasing out CFC-12 with HFC-134a and CFC-11 with HCFC-141b at Klima Ltda.

(f) Phasing out CFC-12 with HFC-134a and CFC-11 with HCFC-141b at Metalplan Ltda.

(g) Phasing out CFC-12 with HFC-134a and CFC-11 with HCFC-141b at Tecnigel Ltda.

8. These projects will phase out a total of 21.1 ODP tonnes in the manufacture of commercial refrigeration systems at six enterprises (Dominick Hunter, Ingecold, Klima, Kalten, Metaplan and Tecnigel) in Brazil. This will be achieved by converting CFC-11 to HCFC-141b as the foam blowing agent, and CFC-12 to HFC-134a as the refrigerant. All enterprises manufacture similar equipment (display cabinets, deep freezers, refrigerated buffet tables) with the exception of Dominick Hunter and Metaplan, which produce equipment for compressed air systems using refrigeration units for removing moisture from the compressed air. One enterprise (Kalten) also uses R-502 as a refrigerant, which will be replaced by HFC-404a. Three of the enterprises (Ingecold, Kalten and Klima) operate low-pressure dispensers for foaming applications in the baseline, while the three others (Metaplan, Dominick Hunter and Tecnigel) currently employ hand-mixing techniques. For refrigerant applications, all enterprises operate vacuum pumps, leak detectors and charging boards.

9. The current foaming equipment at Kalten and Klima will be scrapped and replaced by low-pressure machines (US $36,000 each). The companies that employ hand-mixing techniques (Metaplan, Dominick Hunter and Tecnigel) along with Ingecold will replace current foaming systems with low-pressure machines. For each of these companies, US $16,000 will be paid by the Fund while the remaining amount will be borne by the respective enterprises. All six enterprises will require charging, leak detection and evacuation equipment. Other costs include redesign, commissioning and trials. No incremental operating costs are requested by the enterprises due to the cost-effectiveness threshold, except in the case of Klima, where US $16,000 is requested to cover a period of nine months.

Justification for the use of HCFC-141b

10. The enterprises have selected HCFC-141b technology to replace CFC-11 in foam blowing operations. A sample letter from the implementing agency similar to that submitted for "Schmit" advising the Government decision to use HCFC technology has been received by the Secretariat.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

Schmit (UNDP)

1. The Secretariat discussed with UNDP the foam consumption and incremental operating cost associated with installation of cold rooms and piping. The Secretariat has also raised issues related to the capital cost of a spray foaming machine and refrigerant charging equipment. The issues have been resolved and related cost items have been adjusted accordingly.

Dominick Hunter, Ingecold, Kalten, Klima, Metaplan and Tecnigel (UNIDO)

2. The Secretariat has raised the issue of the duration of project implementation (3 years) in six small-sized companies and relevant milestones. The duration of implementation in these projects appears to the Secretariat to be too long given the size of the enterprises and the volume of work involved by the agency. UNIDO revised the duration of the Dominick Hunter project to 15 months and the other five projects to 24 months.

3. The Secretariat has discussed the cost of capital equipment such as vacuum pumps, the incremental cost of compressors and price of chemicals used in calculation of incremental operating costs. All the issues have been resolved and the project budgets have been adjusted accordingly.

RECOMMENDATIONS

1. The Fund Secretariat recommends blanket approval of the commercial refrigeration projects from UNDP and UNIDO with the funding levels 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 and from R-502 to R-404a in the manufacture of freezer rooms and panels, and rigid foam at Schmit	288,764	37,539	UNDP
(b)	Phasing out CFC-12 with HFC-134a and CFC-11 with HCFC-141b at Domnick Hunter Ltda.	17,971	2,336	UNIDO
(c)	Phasing out CFC-12 with HFC-134a and CFC-11 with HCFC-141b at Ingecold Ltda.	25,320	3,292	UNIDO
(d)	Phasing out CFC-12 and R-502 with HFC-134a and HFC-404A as well asof CFC-11 with HCFC-141b at Kalten Ltda.	122,151	15,880	UNIDO
(e)	Phasing out CFC-12 with HFC-134a and CFC-11 with HCFC-141b at Klima Ltda.	86,464	11,240	UNIDO
(f)	Phasing out CFC-12 with HFC-134a and CFC-11 with HCFC-141b at Metalplan Ltda.	28,885	3,755	UNIDO
(g)	Phasing out CFC-12 with HFC-134a and CFC-11 with HCFC-141b at Tecnigel Ltda.	34,000	4,420	UNIDO

ANNEX I

ADDITIONAL JUSTIFICATION FOR USING HCFC TECHNOLOGY (UNDP)

The UNDP technical expert appraised the enterprise in this project in fall 1998, prior to the preparation of this project document in May 1999, 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:

(f) An overview of the available interim (low ODP) and permanent (zero ODP) replacement technologies.
(g) The "techno-economic impact" of each technology on the products manufactured, and the processes and practices employed.
(h) 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.
(i) 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.
(j) 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:

5. Water based formulations are not locally available, and do not offer adequate insulating properties for the application. Maintenance of the insulating value of the finished product is extremely important to the enterprise.

6. The enterprise considered using pentane, but decided they did not want to accept the safety risks associated with using the flammable substance. It would also be a very expensive solution, since there are two distinct production areas, therefore, two complete pentane installations would be required, or a very expensive rearrangement of the production layout would have to be done to avoid two complete installations. The complexity of this solution is prohibitive. In addition, the use of pentane for the in-field pour-in-place applications is not desirable from a safety standpoint.

7. Liquid HFCs aren't available and therefore are not an option.

In view of the above, the technology selected is HCFC-141b based systems in the interim, until permanent technology (most likely HFC-based (HFC-245fa) systems) are available locally.

<u>Justification for Using HCFC Technology</u> (UNIDO)

Table 11 shows the CFC-11 alternatives for foam blowing and their ozone depleting potentials.

Table 11. Alternative blowing agents to replace CFC-11

Foaming Agent	*Ozone Depleting Potential (ODP)*
HCFC-141b	0.11
HCFC-142b	0.065
HCFC-142b + HCFC 22	0.06
HFC-134a	0
Cyclopentane	0

It can be seen that HCFC-141b, HCFC-142b and the blend of HCFC-142b/HCFC-22 all have some ODP and are therefore accepted only as transitional substances.

When considering long-term replacements the field is narrowed to HFC-134a and cyclopentane. In Europe, HFC-134a was used as a blowing agent for a short time, but it was abandoned because it is very expensive compared to CFC-11 and cyclopentane. It is very unlikely that HFC-134a will become a widely used ultimate blowing agent for polyurethane foam in the refrigeration sector.

Lately, all major European manufacturers have already started using cyclopentane to produce polyurethane foam and similar trend is seen in many other parts of the world except North America.

Cyclopentane is an explosive chemical. Since cyclopentane and polyol cannot be delivered premixed in drums or tanks as is the case with CFC-11 and polyol it is necessary to provide an expensive explosion proof mixing station. The same applies for the foaming machine. In order to ensure operational safety when using the highly flammable and explosive cyclopentane and to meet the relevant requirements of the local authorities, it is necessary to install a gas detector system in the foaming department around the foaming machine. Due to the current layout of the plants where several machines are installed next to each other installation of comprehensive automatic sprinkler fire protection systems is inevitable. In order to prevent hazards and achieve compliance with established safety rules for the machinery and the plant, a safety exhaust system is also necessary in the foaming department in all areas where cyclopentane is in use and could escape. All machinery and equipment which may come into contact with pure cyclopentane or cyclopentane/polyol must be explosion-proof and/or encapsulated.

To make the foaming jigs explosion-proof, it is necessary to replace electrical contacts, switches, motors etc. with specially designed explosion-proof ones. All foaming jigs and plugs must be fitted with a good earth connection to avoid sparks generated by static electricity. The workers' clothes and shoes must be made of antistatic material and the floor must be covered with antistatic paint. As a precaution against static induced explosions, it is also necessary to inject nitrogen into the foaming cavity, immediately prior to the injection of the polyurethane material into the cabinet. This requires installation of N_2 tank, ring line and injection nozzles. An emergency motor-generator must be provided to supply electric energy for the safety system even in case of black-outs. Following completion of the installation an international institution in cooperation with local authorities must certify the safe operation of the foaming installation.

These measures would increase the cost of the project by at least US $300,000 which would make the cost effectiveness of the project unacceptable. The enterprise has no financial means to complement the grant with the additional funds required for the implementation of the project with cyclopentane technology.

Moreover, the recipient company is very small enterprise with weak technical support staff especially in the field of maintenance and the present staff would be not able to run the plant and carry out the required maintenance procedures.

On the basis of these considerations the recipient company decided to adopt HCFC-141b as a long term replacement for CFC-11 for foam blowing. Formulations with this substance are already in use in Brazil, so various system houses can supply the necessary compounds.

The management of the company is aware that no funding will be made available from the Multilateral Fund for the Implementation of the Montreal Protocol in case of conversion from HCFC-141b to a final substitute at a later stage.

FAX

MINISTRY OF ENVIRONMENT
BRAZIL

TO:	**Ms. Seniz H. Yalcindag** Montreal Protocol Branch - Director
Organization:	UNIDO
FAX Number	43-1-26026 6804 **DATE:** 09/05/2000
FROM:	**Mrs. Izabella M. Teixeira** Secretaria de Qualidade Ambiental nos Assentamentos Humanos - Director
PHONE:	55-61-317-1225 **FAX:** 55-61-226 8050
N° of PAGES: (including this one)	01

MESSAGE

Dear Mrs. Yalcindag,

In reference to the project submission to the 31th ExCom Meeting, I authorize you to submit for approval the investment projects of the following enterprises: DOMNICK HUNTER, INGECOLD, KALTEN, KLIMA, METALPLAN, SECTOR and TECNIGEL.

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,

Izabella M. Teixeira
Director
Ministry of Environment
Brazil