



**United Nations
Environment
Programme**



Distr.
LIMITED

UNEP/OzL.Pro/ExCom/26/25
15 October 1998

ORIGINAL: ENGLISH

Executive Committee of
the Multilateral Fund for the
Implementation of the Montreal Protocol
Twenty-sixth Meeting
Cairo, 11-13 November 1998

PROJECT PROPOSALS: BRAZIL

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

Foam

- Phaseout of CFC-11 by conversion to HCFC-141b technology in the manufacture of flexible integral skin foam furniture components, and conversion from CFC-11 to methylene chloride & additives in the manufacture of flexible polyurethane boxfoam at Cantegril UNDP
- Phaseout of CFC-11 by conversion to HCFC-141b technology in the manufacture of insulation panels at Cunha UNDP
- Phaseout of CFC-11 by conversion to HCFC-141b technology in the manufacture of insulation panels at Isoblock UNDP
- Phaseout of CFC-11 by conversion to HCFC-141b technology in the manufacture of insulation panels at P.F.I. UNDP
- Phasing out of CFC-11 with cyclopentane at Tecpur Ltd. And HCFC-141b at its foam raw material customers (umbrella project) UNIDO

Refrigeration

- Phaseout of CFC-11 by conversion to HCFC-141b technology, and CFC-12 by conversion to HFC-134a in the manufacture of small commercial freezers and coolers at Bebber UNDP

PROJECT EVALUATION SHEET BRAZIL

SECTOR: FOAM ODS use in sector (1996): 2,363 ODP tonnes

Sub-sector cost-effectiveness thresholds: Flexible US \$6.23/kg
Integral Skin US \$16.86/kg
Rigid US \$ 7.83/kg

Project Titles:

- (a) Phaseout of CFC-11 by conversion to HCFC-141b technology in the manufacture of flexible integral skin foam furniture components, and conversion from CFC-11 to methylene chloride and additives in the manufacture of flexible polyurethane boxfoam at Cantegril.
- (b) Phaseout of CFC-11 by conversion to HCFC-141b technology in the manufacture of insulation panels at Cunha.
- (c) Phaseout of CFC-11 by conversion to HCFC-141b technology in the manufacture of insulation panels at Isoblock.
- (d) Phaseout of CFC-11 by conversion to HCFC-141b technology in the manufacture of insulation panels at P.F.I.
- (e) Phasing out of CFC-11 with cyclopentane at Tecpur Ltda and HCFC-141b at its foam raw material customers (Umbrella Project)

Project Data	Flexible	Integral Skin	Rigid			
	Cantegril		Cunha	Isoblock	P.F.I.	Tecpur (Umbrella)
ODS (CFC-11) phase out (ODP tonnes)	18	10	10	15	9.0	68.7
Proposed project duration (months)	24	24	24	24	24	24
Incremental capital cost (US\$)	128,700	33,000	60,500	22,000	27,500	320,000
- including contingency (%)	10	10	10	10	10	10
Incremental operational cost (US\$)	79,900	9,600	9,600	112,750	67,650	205,000
Total project cost (US\$)	208,600	42,600	70,100	134,750	95,150	525,000
Local ownership (%)	100	100	100	100	100	100
Export component (%)	0	0	0	0	0	0
Amount requested (US\$) {Original}	208,600	42,600	70,100	106,500	64,200	641,366
{Revised}	112,140	42,600				525,000
Cost effectiveness (US\$/kg.)	6.23	4.68	7.70	7.83	7.83	7.82
National Coordinating Agency	Ministry of Environment MMA/PROZON					Ministry of Environment
Implementing Agency	UNDP					UNIDO
Technical review completed?	Yes					Yes
Secretariat's Recommendations						
Amount recommended (US \$)	112,140	42,600	70,100	106,500	64,200	525,000
Project Impact (ODP tonnes)	18	9.1	9.1	13.6	8.2	67.17
Cost effectiveness (US \$/kg)	6.23	4.68	7.70	7.83	7.83	7.82
Implementing Agency support cost (US\$)	14,579	5,538	9,113	13,845	8,346	68,250
Total cost to Multilateral Fund	126,719	48,138	79,213	120,345	72,546	593,250

PROJECT DESCRIPTION

- (a) **Phaseout of CFC-11 by conversion to HCFC-141b technology in the manufacture of flexible integral skin foam furniture components, and conversion from CFC-11 to methylene chloride and additives in the manufacture of flexible polyurethane boxfoam at Cantegril.**
- (b) **Phaseout of CFC-11 by conversion to HCFC-141b technology in the manufacture of insulation panels at Cunha.**
- (c) **Phaseout of CFC-11 by conversion to HCFC-141b technology in the manufacture of insulation panels at Isoblock.**
- (d) **Phaseout of CFC-11 by conversion to HCFC-141b technology in the manufacture of insulation panels at P.F.I.**
- (e) **Phasing out of CFC-11 with cyclopentane at Tecpur Ltda and HCFC-141b at its foam raw material customers (Umbrella Project)**

General

1. CFC consumption in the Brazilian foam industry was reported to be 2,363 tonnes in 1996. CFC-11 was the dominant substance. The sector consumption data provided is for user sectors for 1993 only. This indicates that the automotive industry was the predominant sector with 41% of the consumption, while building construction and commercial refrigeration accounted for 19% and 18% respectively. 51 projects amounting to US \$13.6 million have been approved to phase out 1314 ODP tonnes. 332 ODP tonnes have been phased out. Four projects including one umbrella project have been submitted to phase out 98 ODP tonnes in the rigid foam sub-sector, while one project has been submitted to phase out 27 ODP tonnes in the integral skin foam sub-sector. These projects “will contribute to Brazil meeting its obligations towards the Montreal Protocol”.

2. Brazil’s consumption of CFC-11 and CFC-12 in 1996 was reported to be 10,974 ODP tonnes.

3. All five projects are being submitted by 100 % Brazilian companies. Tecpur together with 14 small-scale enterprises make up the largest project, phasing out 67 tonnes of CFC-11.

4. All the companies will convert to the interim use of HCFC-141b except Tecpur which will use cyclopentane.

Integral Skin and Flexible Slabstock

(a) Cantegril

5. Cantegril consumed 10 tonnes of CFC-11 in the manufacture of flexible integral skin foam and 18 tonnes in flexible boxfoam for mattresses in 1997. The integral skin foam production is to be converted to HCFC-141b technology. The company will retrofit two low pressure dispensers (US \$10,000). The flexible boxfoam production will be converted to methylene chloride technology with additives and will consist of improvements in ventilation for

process and curing area (US \$50,000), methylene chloride metering and storage system (US \$35,000) and 2 additive metering systems (US \$12,000). Other costs include trials (US \$20,000), technology transfer (US \$20,000) and incremental operating costs (US \$89,000) of 2 years for the integral skin application and 4 years for the flexible boxfoam application.

Rigid Foam

(b) Cunha

6. Cunha specialises in building construction (rigid foam for roofs) and packaging foam. It operates two Sulpol low pressure machines with static mixing head, both installed in 1994. One dispenser is used for the panel production while the other is used for packaging foam production using methylene chloride as blowing agent. Cunha will phase out the use of CFC-11 through the conversion to HCFC-141b technology. For this conversion it is proposed to replace one of the low-pressure machines by one with a mechanical mixing head, allowing automated production of the insulation panels in such a manner that insulation value can be maintained without having to increase panel thickness (and consequently system usage), at the cost of US\$ 40,000. The other machine from 1994 will either be kept for spare parts or destroyed. Technology transfer, training, and trial (TTA) costs amount to US\$ 15,000. The incremental operating costs for two years amount to US\$ 9,600, and no increase in panel thickness is expected.

(c) Isoblock

7. Isoblock produces rigid foam insulation panels. It uses one low pressure machine, Transtecnica T-60 (1997). The company will phase out the use of the 15 tonnes of CFC-11 by converting to HCFC-141b technology. The costs will cover the retrofitting of the low-pressure dispenser at US\$ 5,000. Production trials, training, and technology transfer costs amount to US\$ 20,000. The incremental operating costs for two years amount to US\$ 112,750. The cost of 8 % increase in foam density is claimed as part of the operational cost.

(d) P.F.I.

8. P.F.I. Ind. E. Com. Refrogeracao Ltda manufactures insulation panels for commercial refrigeration applications. It currently uses one Transtecnica T-60 low pressure machine purchased in 1998. It will phaseout the use of CFC-11 through conversion to HCFC-141b technology. The project capital costs include the retrofit of the low-pressure dispenser at US\$ 5,000. Training, technology transfer and trials amount to US\$ 20,000. The project also includes incremental operating costs (US\$ 67,650) for two years, including an 8% increase in system use due to increase in panel thickness.

(e) Tecpur

9. Tecpur specialises in the manufacture of sandwich panels and shell-type insulation elements for pipes. Approximately 40 % of the production is premixed polyol (28 tonnes of CFC-11) sold to other companies. The company operates one low pressure dispensing unit with two mixing heads without a premixer, Sintenor Poliuretanos 7-30/2 (1989) with a capacity of 35 kg/min. It will phaseout the use of CFC-11 at its plant through conversion to cyclopentane,

while its customers will convert to interim use of HCFC-141b. The 14 companies (including one dealer) that buy the system components from Tecpur are small users of CFCs, and the technology available to manufacture foam does not need to be modified. Consequently, no investment funds are requested for these 14 companies. Capital costs include the replacement of the low-pressure dispenser by a high pressure one and other modifications at Tecpur for safe use of cyclopentane at a total cost of US\$ 366,740. The replaced equipment will be scrapped. No technology transfer and training costs are requested. The project includes incremental operational cost for two months for Tecpur and two years for the customers (a total of US\$ 180,646). The incremental operational cost for the customers is distributed pro rata among them based on their CFC consumption.

Justification for the use of HCFC-141b

10. The following justification is provided in the project document:

- (a) The interim (HCFC) solutions provide the energy efficiency required. The liquid HCFC-141b offers the lowest investment costs, as the other HCFC's are gaseous and requires significant investments to deal with frothing.
- (b) From the permanent solutions, HFC-245fa and HFC-365 is less energy efficient and expensive compared to the other technologies. Pentane meets the selection criteria and is a preferred solution where feasible from a safety and cost-effectiveness standpoint. The relatively high investments for safety costs tend to limit pentane use to relatively large CFC users. In addition, the use of pentane is limited to those enterprises whose facilities can be adapted to meet safety requirements and can be relied on to maintain safe operations. In cases where pentane is not feasible due to safety concerns or cost efficiency, water blown is an acceptable alternative technology. Water-based systems are frequently more expensive than other CFC-free technologies due to reductions in insulation value, and higher densities required by lower cell stability. Water-based formulations tend to be most applicable in relatively less critical applications, such as in-situ foams and thermoware.
- (c) The companies have chosen to use HCFC-141b as the best alternative to maintain the thermal quality of the panels at the lowest cost impact.

11. Each project document includes a list of equipment to be replaced and destroyed. The UNDP projects (Cantegril, Cunha, Isoblock and PFI) in addition include a note signed by the company indicating its agreement with the project and technology as well as disposal of equipment to be replaced.

COMMENTS AND RECOMMENDATIONS

COMMENTS

Integral Skin and flexible slabstock Foams

Cantegril

1. The project cost for the boxfoam component as well as the total project cost exceeded the eligible levels. UNDP was requested to recalculate the costs of the integral skin foam and boxfoam components separately, since they belonged to different sub-sectors and to ascertain the eligible cost of each component. Thus, the capital costs for the integral skin foam and the boxfoam components were determined to be US \$33,000 and US \$128,700 respectively, while the incremental operational costs were US \$9,600 and US \$79,900. These figures resulted in total project costs of US \$42,600 and US \$208,600. The eligible project cost of the boxfoam (flexible slabstock) component would be US \$112,140 with cost-effectiveness US \$6.23/kg.

Rigid Foam

Cunha

2. UNDP was requested to clarify the status of counterpart funding from the company in line with Decision 22/63. It confirmed that a letter of commitment had been received from the company.

Isoblock

3. The Secretariat and UNDP discussed the eligibility of the project costs associated with the new equipment installed in 1997. It was agreed that the retrofit cost of US \$5,000 associated with this equipment was not an eligible incremental cost. The deduction of that amount, however, did not affect the grant amount since the project cost exceeded the threshold amount.

P.F.I.

4. The costs of the project were agreed.

Tecpur (Umbrella) Project)

5. The Secretariat and UNIDO discussed the project and agreed that it should be classified as a rigid foam project.

6. Based on expert advice received UNIDO was informed that in the production of sandwich panels using pentane derivatives, n-pentane offers the most economic option. However, since the total project cost would exceed the threshold and the incremental operational cost was not claimed by the company, the issue of the choice of blowing agent as it impacts the Multilateral Fund did not arise.

7. The project costs were recalculated, resulting in a total cost of US \$525,000, made up of US \$320,000 incremental capital cost and US \$205,000 incremental operational cost to be distributed pro rata among the downstream enterprises based on their CFC consumption.

RECOMMENDATIONS

1. The Fund Secretariat recommends blanket approval of the five projects (Cantegril, Cunha, Isoblock, P.F.I. and Tecpur) with the level of funding and associated support costs as indicated in the table below:

Project Title	Project Cost US \$	Support Cost US \$	Implementing Agency
Phaseout of CFC-11 by conversion to HCFC-141b technology in the manufacture of flexible integral skin foam furniture components, and conversion from CFC-11 to methylene chloride and additives in the manufacture of flexible polyurethane boxfoam at Cantegril.	154,740	20,116	UNDP
Phaseout of CFC-11 by conversion to HCFC-141b technology in the manufacture of insulation panels at Cunha.	70,100	9,113	UNDP
Phaseout of CFC-11 by conversion to HCFC-141b technology in the manufacture of insulation panels at Isoblock.	106,500	13,845	UNDP
Phaseout of CFC-11 by conversion to HCFC-141b technology in the manufacture of insulation panels at P.F.I.	64,200	8,346	UNDP
Phasing out of CFC-11 with cyclopentane at Tecpur Ltda and HCFC-141b at its foam raw material customers (Umbrella Project)	525,000	68,250	UNIDO

2. The grant approved for Cantegril is made up of US \$112,140 and US \$42,600 for the conversions of the flexible boxfoam production and integral skin/flexible molded foam production respectively.

PROJECT EVALUATION SHEET BRAZIL

SECTOR: REFRIGERATION ODS use in sector (1996): 5,748 ODP tonnes

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

Project Title:

Phaseout of CFC-11 and CFC-12 by conversion to HCFC-141b technology (foam) and HFC-134a technology (refrigerant) in the manufacture of small commercial freezers and coolers at Bebber

Project Data	Commercial
	Bebber
ODS phase-out (ODP tonnes)	9.5
Proposed project duration (months)	24
Incremental capital cost (US \$)	133,000
- including contingency (%)	10
Incremental operational cost (US \$)	38,850
Total project cost (US \$)	171,950
Local ownership (%)	100
Export component (%)	-
Amount requested (US \$) {Original}	144,500
{Revised}	144,500
Cost effectiveness (US \$/kg)	15.21
National Coordinating Agency	Ministry of Environment – MMA/PROZON
Implementing Agency	UNDP
Technical review completed?	Yes

Secretariat's Recommendations:	
Amount recommended (US \$)	144,500
Project impact (ODP tonnes)	9.5
Cost effectiveness (US \$/kg)	15.21
Implementing Agency support cost (US \$)	18,785
Total cost to Multilateral Fund (US \$)	163,285

PROJECT DESCRIPTION

Bebber - Phaseout of CFC-11 and CFC-12 by conversion to HCFC-141b technology (foam) and HFC-134a technology (refrigerant) in the manufacture of small commercial freezers and coolers

1. The latest consumption figure (1996) was reported to the Secretariat to be 10,684 tonnes, including 5,748 ODP tonnes in the refrigeration sector.
2. The Executive Committee previously approved 16 projects in the commercial refrigeration sub-sector to phase-out 624 ODP tonnes, and four projects in the domestic refrigeration sector to phase-out 1,308 ODP tonnes.
3. Bebber was founded in 1990; it is a 100% Brazilian owned company that manufactures small commercial freezers and milk coolers for use on dairy farms. 8,864 units were produced from mid-1997 to mid-1998.
4. It is stated in the proposal that “this project will contribute to Brazil meeting its obligations towards the Montreal Protocol.”
5. The ODS use at the enterprise was 10.2 ODP tonnes in 1997. The project impact will be the removal of 9.5 ODP tonnes, by replacing CFC-12 with HFC-134a as refrigerant and replacing CFC-11 with HCFC-141b.
6. The proposal includes the following justifications for the selection of HCFC technology:

“The investment costs to convert to pentane are prohibitive, based on the relatively small level of production. The company will use either water based or HFC systems as the permanent technology when they become commercially available. Until the commercial availability of one of the permanent solutions (expected time 3-5 years), the company will employ HCFC-141b as an interim technology to maintain product standards. The enterprise has been informed of the available technical options. They have also been informed that HCFC’s are transitional substances, and that under present Multilateral Fund rules, they will not be able to seek additional funding from the Multilateral Fund later to convert to zero-ODP technologies.”
7. The baseline equipment includes one low pressure foam dispenser (1994), one vacuum pump, and an electronic scale for refrigerant charge which will be destroyed.
8. The requested replacement equipment includes a new semi-automatic HFC-134a charging board, a vacuum pump, three vacuum pump retrofits, and two refrigerant leak detectors. Funding for foam trials, refrigerant prototype trials, and technology transfer/training for both foam and refrigeration systems are included.
9. Incremental operating cost including cost arising from a 10% increase in foam density due to the use of HCFC-141b for two years is requested at \$123,000.

10. The grant requested corresponds to the maximum funding allowed under the threshold, the company will provide funding for the difference in the cost as the project cost exceeds the maximum allowable grant.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

1. The Secretariat discussed with UNDP incremental cost associated with increase in foam density and cost of new HFC-134a compressors. The total project cost was reduced by US \$76,550.

RECOMMENDATIONS

1. The Fund Secretariat recommends blanket approval of the project with the funding level and associated support cost as indicated below.

Project Title	Project Cost US \$	Support Cost US \$	Implementing Agency
Bebber - Phaseout of CFC-11 and CFC-12 by conversion to HCFC-141b technology (foam) and HFC-134a technology (refrigerant) in the manufacture of small commercial freezers and coolers	144,500	18,785	UNDP