UNITED
NATIONS

EP

United Nations
Environment
Programme

Distr.
LIMITED

UNEP/OzL.Pro/ExCom/17/28/Add.2
12 July 1995

ORIGINAL: ENGLISH

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

Seventeenth Meeting
Montreal, 26-28 July 1995

PROJECT PROPOSAL: ARGENTINA

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

• Conversion to non CFC technology in the manufacture of flexible foam (slabstock) at Piero S.A.I.C.	UNDP

PROJECT EVALUATION SHEET

COUNTRY OR REGION:	Argentina
PROJECT TITLE:	Piero SAIC: Conversion to non-CFC Technology in the Manufacture of Flexible Foam (Slabstock)
BUDGET:	Capital Costs: US $380,000 Operating Costs: US $4,000
INCREMENTAL COSTS:	US $380,000[1]
ODS PHASE-OUT:	64 MT
COST EFFECTIVENESS[2]:	US $5.94 per kg. ODP saved
PROJECT DURATION:	One year
IMPLEMENTING AGENCY:	UNDP
NATIONAL COORDINATING AGENCY:	OPROZ-INTI
TECHNICAL REVIEW COMPLETED:	YES __X__ NO _____

SECRETARIAT'S COMMENTS

1. This project will phase out CFC-11 by converting to water blown technology.

2. The ensuing reaction is highly exothermic which results in foam of poor quality and also leads to substantial scorching. Therefore, a forced cooling system is requested to mitigate the negative effects of the technology.

3. In addition, a standby generator and fire fighting equipment are being requested. These items of equipment are not considered as incremental and therefore the capital costs were accordingly adjusted.

4. There is no request to change existing foaming equipment.

---

[1] Including contingency (15 per cent) and Financial Agent Fee (3 per cent)

[2] Determined as the ratio of incremental costs to the estimated annual saving of ODP ($/ODPkg). For CFC-11, ODS=ODP.

SECRETARIAT'S RECOMMENDATION

5. The Fund Secretariat recommends approval of the project in the sum of US $341,000 (cost-effectiveness US $5.33/kg./yr.) and US $44,330 in support costs to UNDP.

PROJECT COVER SHEET

Country:	**ARGENTINA**
Project Title:	**PIERO S.A.I.C.: Conversion to non CFC technology in the manufacture of flexible foam (slabstock).**
Sector Covered:	**Foam**
ODS used in Sector	**1585 tons CFCs (ODP-base year 1992)**
Project Impact:	**64 Tons of CFC-11 (base year 1994)**
Project Duration:	**One (1) year**
Project Economic Life:	**Ten (10) years**
Total Project Costs:	**US$ 380,000**
Proposed MLF Grant:	**US$ 380,000 (reflects 100 % local ownership)**
Cost Effectiveness:	**5.94 US$/kg/year**
National Coordinating Body:	**OPROZ - INTI**
Implementing Agency:	**UNDP**
Appraisal Date:	**April, 1995**

PROJECT SUMMARY

Under this project, PIERO S.A.I.C. will phase out the use of CFCs in the manufacture of flexible slabstock foam by all water blown technology. The project includes a forced cooling system, additives system, retooling of the production lines, costs for trials, training and technology transfer.

Project prepared by: INTI - Eng. Maria Lucia Gomez
UNDP - Mr. Bert Veenendaal

Independent Technical Review: Dr. Hubert Creyf

PROJECT OF THE GOVERNMENT OF ARGENTINA

PIERO S.A.I.C. CONVERSION TO NON CFC TECHNOLOGY IN THE MANUFACTURE OF FLEXIBLE SLABSTOCK FOAM

1. GENERAL BACKGROUND.

The country program of the Government of Argentina for the protection of the ozone layer was presented and approved at the 13th Executive Committee Meeting of the Multilateral Fund of the Montreal Protocol. This country program contains the intention of the Government and the industry to reduce and phase out the consumption of ozone depleting substances (ODS).

This country program calls for a total phase out of the ODS in year 2006, and reductions in advance to the scheduled data established for the Montreal Protocol and their amendments. Reasons for such a policy are the environmental impact as well as future international restrictions to the product that contains this substances.

The ODS consumption in Argentina was 1,338 ton of CFC-11 and 2,408 ton of CFC-12 during the year 1992, base of the country program. Due to the growth of the sectors that use ODS, the consumption has increased approximately 7% during 1993 and would increase 6% during 1994.

2. SECTOR BACKGROUND

In 1992, the Argentine foam industry consumed 1,484 tons of CFCs (1484 tons ODP). CFC 11 was the dominant substance (1,275 tons) followed by CFC 12 (209 tons). The sector can be functionally divided into:

* Non-insulating foams
  - flexible foams (slabstock)
  - flexible and semirigid foams (molded)
  - extruded foams

* Insulation foams
  - domestic refrigeration
  - commercial refrigeration

CFC use per category is indicated in the following table:

Table 1: CFC use per foam category (ton, 1992)

CATEGORY	CFC 11	CFC 12
Rigid insulation - commercial & domestic refrigerators	343	
Rigid insulation - panels, vehicles	274	
Flexible - slabstock	431	
Flexible/semirigid - molded	135	
Other PUF applications	42	
Extruded foams (XPS/PE foams)	50	209
TOTAL	1,275	209

The country program calls for a phase out of CFCs in the non insulating foams in or before 1998. Insulating foams are scheduled to be phased out in or before the year 2000.

Insulation foams for domestic and commercial refrigeration will be phased out jointly with the corresponding refrigerant.

Insulating foam manufacture for panels is dominated by a few large manufacturers, which manage from 80 to 90% of the market and many small producers. The CFCs consumption in this sector was, in 1992, 141 tons. Insulating foam panels are widely used for modular and fixed cold stores, such as for common warehouses and large buildings (roof and top). The strategy calls for a combination of individual (about five) projects and one or two group projects. An early project (particularly in this case, with cyclopentane) will serve as demonstration project, taking into account all the safety measurements required for an hydrocarbon project and will encourage other enterprises to come forward and to present their own projects.

PUR insulating rigid foams are also used in the construction of vehicles (trucks), refrigerated trucks and isothermic box (containers) for transport. In this subsector there are also a few large manufacturers and some small producers.

Molded foams are predominantly used in the automotive and furniture industry. Products include seat cushions, steering wheels, arm rests and chair legs. The strategy calls for the preparation of a few early phase out projects to demonstrate the technical and economic feasibility of CFC replacement.

There are only a few enterprises producing extruded foams (polyethylene and polystyrene foam sheet). Products are used in the fast food industry and for packaging purposes. CFC phase out will be addressed through individual projects.

In the flexible foam (slabstock) category are eight manufacturers operating continuous production lines. In addition,

there are about 25 producers using "single block" production equipment, of which about 7 have considerable foam production (leading to considerable CFCs consumption), while the remaining companies are very small producers. Products are aimed at the bedding industry, with smaller applications in furniture and miscellaneous industrial uses as packaging, household. The ODS phase out strategy calls for individual projects for the large producers (since lay out and machinery allocated in each company require different solutions for each one) and a joint project for the small scale producers.

The flexible foam sector generally uses CFC-11 as an auxiliary blowing agent. Some companies have begun to introduce methylene chloride (MC), mainly because of the higher cost of CFC-11, but the methylene chloride emissions are regulated by federal laws. In Argentina, methylene chloride concentration in exhaust gases, introduced in the atmosphere have to be less than 0.17 ppm, which effectively rules out the use of MC in foam operations. The Secretary of the Human Environmental and Natural Resources (Secretaría de Recursos Naturales y Ambiente Humano) is presently working on additional regulations for this substance since it is also considered a hazardous waste.

3. OBJECTIVE

The objective of this project is to phase out the use of CFC-11 in the manufacture of flexible slabstock foam at PIERO S.A.I.C. plant, through the introduction of all water blown foam technology.

4. ENTERPRISE BACKGROUND

PIERO S.A.I.C. is one of the larger flexible foam manufacturers in Argentina. The company is 100% Argentinean owned and has been working for 12 years. It presently represents about 17% of the local market.

Piero produces slabstock, (densities between 15,5 and 21,5 kg/m3) for foam mattresses, box-spring, pillows, bedding and furniture. It is considered the most modern plant in the country. Present foam production is 1500 tons/year

The following table shows the production equipment.

EQUIPMENT	OUTPUT
HENNECKE UBT 350	350 kg/min
URETECH for cylinder block	150 kg/min

The following table shows the CFCs consumption during the last years:

YEAR	PRODUCTION (TON)	CFC-11 (TON)
1.992	1.160	40 Ton
1.993	1.430	55 Ton
1.994	1.500	64 Ton

5. TECHNOLOGY SELECTION CRITERIA AND IMPACT

5.1. Overview and Selection

There are several options to replace CFCs in the manufacture of flexible polyurethane slabstock. They are described and reviewed in the Multilateral Fund's document UNEP/OZ L.Pro/Ex.Com./16/Inf3: Flexible Polyurethane foams options to reduce/eliminate the use of CFCs. The use of methylene chloride is one of them, but the Argentine Government does not accept this option, because:

a) during foaming process the M.C. concentration in exhaust gases are higher than allowed as per pertinent federal regulations.

b) in the future this substance will be submitted to even stricter controls and regulations on that are currently being drafted.

Methylene Chloride is therefore not feasible as a replacement technology for CFC-11 in the argentine flexible foam sector, but it could be allowed for a restricted interim period, in those projects where transition periods are needed to adjust all the formulations. Such is the case of all water system / forced cooling process / additives, as well as for the "low index technology".

It should also be noted that PIERO produces a lot of different slabstock densities and qualities, and the use of methylene chloride in some of them causes severe scorching.

To phase out CFC-11 consumption PIERO has decided to replace CFC-11 by water, using a forced cooling system to dissipate excess process energy and additives to achieve the required softness.

4.2. Impact on Production Process.

The installation of a forced cooling system (FC) will reduce the need for curing space, but will increase the required space in the production area to allocate this system. A backup generator has

to be installed to avoid fire risk in case of a power outing. The technology requires an additional polyol and an systems for the use of additives.

Fire fighting equipment has to be adjusted to the new lay-out. Safety and production training is required following installation, prior and during start-up. The start-up will be supervised by UNDP experts.

5.3. Description of the Proposed Reconversion

Maintaining present facilities, the following is required:

* provision and installation of a FC system
* provision and installation of additive system and the corresponding polyol system
* additional ventilation.
* a back up generator
* improvement of the fire fighting system

6. PROJECT COSTS

6.1. Capital Costs

The following is a summary of the expected costs of investments and related activity, including equipment, training, testing, and technology transfer:

Item	US$
Forced cooling system	265,000 *
Installation of a polyol system	35,000
Emergency Power Generator	25,000
Fire fighting	10,000
Technology Transfer	10,000
Contingency	35,000
Total	380,000

*Note: should be suitable for round blocs and square blocks. Originally a higher amount was foreseen for this item. However, PIERO does not need the full cost for installation and for attachment conveyors, so that the reduced amount should be sufficient.

6.2. Operating Costs

The introduction of additives combined with the use of all water blown technology will be a comprehensive process and the operating cost after conversion are highly dependent on the final choice of the formulation, which will be determined during process trials.

Annex I provides a consolidation of the effect of the various changes on the operating costs. The incremental operational cost per annum per years amounts to US$ 1,200. Even small fluctuations in prices can change this figure and/or turn it into an operational benefit, so that the company does not request operational costs.

6.3. Cost Effectiveness

Item	Units	Value
a) Capital costs	US$	**380,000**
b) Operating Costs / year	US$/year	**0**
c) Operating Costs, NPV (four years)	US$	**0**
d) ODS Reduction/year	kg	**64,000**
e) Capital recovery factor		**0.16275**

Unit abatement costs **(a x e + b)/d**	US$/kg/yr	**0.97**

Cost effectiveness **(a + c)/d**	US$/kg/yr	**5.94**

7. PROJECT FINANCING

PIERO S.A.I.C. request the donation of 100% of the project capital costs, reflecting the 100 % local ownership, amounting to: **US$ 380,000**

8. PROJECT TIMETABLE

Activity	Trim 1	Trim 2	Trim 3	Trim 4
1. Preparation:				
License Agreement	x			
Procurement	x			
Vendor Selection	x			
2. Installation:				
Arrival. customs		x x x	x	
Installation			x x x	
Training (safety)				x
3. Start-up:				
Machine Start Up				x x
Trials				x
Training (in process)				x x
Certification				x

9. REGULATORY ACTION

This project will not require regulatory actions.

10. PROJECT IMPACT

This project will eliminate the use of, at least, 64 tons of CFC-11 in the first year of implementation. The projects uses commercially and environmentally acceptable technology .

ANNEX I - Incremental Operational Costs

Before:	64 t. CFC-11	US$ 2.4	US$ 153,600
After:	64 t. TDI (see note 2)	US$ 2.1	US$ 134,400
	2 t . softener	US$ 7.5	US$ 15,000
	More energy (30,000 kwh)	US$ 0.1	US$ 3,000
	Total		US$ 152,400
Incremental operating costs per year			US$ 1,200
NPV, 4 years, 10% per year			US$ 4,000

Note 1: The introduction of special polyol will reduce the use of the additive. The net financial impact is thought to be about neutral.

Note 2: The additional TDI needed, reacts with water, which replaces CFC with an approximate 1:1 ratio.

ANNEX II: Comparison between existing and required equipment.

CFC-11	WATER BLOWN TECHNOLOGY
Foaming unit: HENNECKE UBT 350, output 350 kg min	Same foaming unit. Incorporation of additive and other polyol systems.
Foaming unit: URETECH for cylinder blocks, output 150 kg/min	Same foaming unit, without further modifications
	Force cooling tunnel appropriate for cooling production of the two units.

(SX)

TECHNICAL REVIEW.

1.Country:

Argentina.

2.Project Title:

PIERO S.A.I.C. : Conversion to non CFC technology in the manufacture of flexible foam (slabstocks).

3.(Sub)Sector:

Foamed plastics.

4.CP-Relationship:

The CP for the Argentine Government for the ozone layer protection was approved at the 13th Executive Committee Meeting of the MLF of the Montreal Protocol.It contained the intention of the Gouvernment and Industry to phase out the use of ODS by 2006 in general, and before 1998 in the non-insulating foams.

5.Technology:

The technology to substitute CFCl1 with water, and additional foreced cooling, in the production of flexible slabstock PUF, is fully acceptable. It has been developed in the US and is particularly suitable for foams with a thin skin.
Compared to the methylenechloride process, this technology will generate higher chemical costs (different polyol and softening agents) but provides space savings.
The fire risk is slightly increased.
It is suggested that PIERO S.A.I.C. considers whether the CarDio process is not mature enough to be considered seriously.

(39)

6.Environmental Impact:

CFC11 is replaced by water, generating carbondioxide.
The GWP of CO_2 is only 0.025 % of the GWP of CFC11.

7.Project Costs:

The costs represented in he project can be accepted, but it is unclear why the existing polyol equipment cannot be used for the new project. If it were the case, the costs could be reduced by USD 34,000 .
It must be checked whether local firms cannot provide a forced cooling system for a lower price (eg + USD 250,000 - 300,000)
The incremental operational costs are not requested by the company.
Based on the data given, the cost for elimination of 1 kg of ODS is:
USD (399,000 / 64,000) or USD 6.23.

8.Implementation:

Can be accepted as proposed.

9.Recommendation:

It is recommended to check whether the costs can be reduced by USD 34,000 by using the existing polyol equipment.
It is further proposed to look for other possible cost reductions as mentioned in chapter 7 of this review.
Hereafter it is recommended to accept the project.

Prepared by Hubert Creyf, UNDP Foam Sector Reviewer.
Date:060395.

After discussion with Mr B. Veenendaal, Foam Sector Expert, the raised technical questions were solved, and project costs were agreed upon.
It is hence recommended to accept the project.

Hubert Creyf, Foam Sector Technical Reviewer.
Date, 061195.