



United Nations Environment Programme

Distr.
LIMITED



UNEP/OzL.Pro/ExCom/13/37
26 June 1994

ORIGINAL: ENGLISH

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

Thirteenth Meeting
Montreal, 25-27 July 1994

PROJECT PROPOSAL: URUGUAY

This document includes the following project proposal and the Fund Secretariat's Comments and Recommendations:

- Conversion to CFC-free Technology in the Manufacture of Rigid Polyurethane Foam (Spray) at 7 enterprises.

PROJECT EVALUATION SHEET

COUNTRY OR REGION: Uruguay

PROJECT TITLE: Conversion to CFC-Free Technology in the Manufacture of Rigid Polyurethane Foam (Spray) at seven companies

PROJECT COST: Incremental capital cost US \$530,000
Incremental operational cost US \$135,000

INCREMENTAL COST: US \$665,000

ODS PHASE-OUT: 70.8 tons of CFC-11 in 1993

COST EFFECTIVENESS: US \$9.39 per kg ODP saved

PROJECT DURATION: Nine months

IMPLEMENTING AGENCY: UNDP

NATIONAL COORDINATING AGENCY: Comision Tecnica Gubernamental de Ozono, Ministerio de Vivienda, Ordenamiento Territorial y Medio Ambiente

TECHNICAL REVIEW COMPLETED: YES X NO

SECRETARIAT'S COMMENTS

1. Uruguay plans a total phase out of CFC-11 use in the rigid polyurethane spray foam sub-sector through this project, which uses partial water and HCFC-141b technology.
2. Incremental capital costs cover high pressure dispensing units and central training workshop. Incremental operational costs are claimed because the cost of HCFC-141b is more expensive than CFC-11.
3. Cost-effectiveness of this project is relatively poor, due to the fact that some of the seven enterprises covered by this project consume very small amounts of CFC, yet they are requesting the same equipment as those consuming large amounts.

SECRETARIAT'S RECOMMENDATIONS

4. The Secretariat recommends final approval for the amount requested i.e., US \$665,000.
5. UNDP should be requested to develop a strategy on how to deal with enterprises with very low ODS consumption and requesting capital costs equivalent to those of large ODS consumers.

PROJECT COVER SHEET

COUNTRY:**URUGUAY**

PROJECT TITLE: Conversion to CFC-free Technology in the
Manufacture of Rigid Polyurethane Foam
(Spray)

SECTOR COVERED: Foam Plastics

ODS USE IN SECTOR: 88.2 tons (1993)

PROJECT ECONOMIC LIFE: 10 years

PROJECT IMPACT: Phaseout of the use of 70.8 t/y CFC-11
(1993) in the manufacture of rigid
polyurethane foam (spray)

TOTAL PROJECT COST: USD 530.000 Incremental Capital Cost
USD 135.000 Incremental Recurrent Cost

PROPOSED MLF FUND: USD 665.000

COST EFFECTIVENESS: 2.32 (Unit Abatement Cost)

IMPLEMENTING AGENCY: UNDP

COORDINATING

NATIONAL BODY: Comision Tecnica Gubernamental de Ozono,
Ministerio de Vivienda, Ordenamiento Territorial
y Medio Ambiente

PROJECT SUMMARY

Under this project, the Uruguayan PUF spray industry will convert to CFC-free systems. Seven insulation contractors and three chemical suppliers will cooperate in this conversion project that is environmentally friendly and cost effective in investment as well as in operating costs.

TECHNICAL ASSESSMENT

The project is reviewed and supported by Mr. Bert Veenendaal, UNDP's Foams Sector Expert. His comments are attached.

=====

Prepared by: Aristides A. Gabella, Foam Consultant
Reviewed by: Bert Veenendaal, UNDP Sector Expert (Foams)

PROJECT OF THE GOVERNMENT OF URUGUAY
CONVERSION TO CFC-FREE TECHNOLOGY IN THE MANUFACTURE
OF
RIGID POLYURETHANE FOAM (SPRAY)

1. PROJECT OBJECTIVE

The objective of this project is to phaseout the use of CFCs in the manufacture of Rigid Polyurethane Spray Foams (R-PUF) in Uruguay.

2. SECTOR BACKGROUND

The Uruguayan Polyurethane Foam industry consumed 88.2 tons of Freon 11 in 1993. The manufacture of Flexible PUF consumed 17.4 tons of Freon 11. The remaining 70.8 tons were used by the seven companies involved in spray applications.

3. BACKGROUND OF THE SPRAY FOAM INDUSTRY AND ENTERPRISES INVOLVED

The PUF-spray insulation contractors industry in Uruguay consumes annually 70.8 tons of Freon 11 annually. Two companies, Aislaciones de Uruguay and Metalizadora Uruguaya, are responsible for around 60% of the total production. All companies started business in the 1990's, with the exception of Aislaciones Uruguay that started in 1974. While 4 companies out of 7 are in Montevideo, others are located in Las Piedras, Colonia and Florida. The industry employs generally low pressure, fixed ratio (50/50) dispensing equipment and buys pre-blended systems. Profiles of the enterprises are provided in Annex-A.

4. PROJECT DESCRIPTION

It is intended to convert all the insulation contractors in Uruguay to a CFC-free systems. The companies names are:

- o Aislaciones de Uruguay
- o Metalizadora Uruguaya
- o ThermoPur
- o Kubal S.A.
- o Kalisay S.A.
- o J.C. Scarone
- o Eraton S.A.

Bayer S.A., Dow Chemical and ICI are the chemicals supplying companies in Uruguay. They have expressed their desire to fully cooperate in the execution of this project.

5. TECHNOLOGY

5.1 OVERVIEW AND SELECTION

There are numerous technologies to replace the use of Freon 11 in the manufacture of Spray Rigid PUF. We refer to publications by UNEP and documentation available through UNDP for summaries of these technologies.

Main technologies to replace Freon 11 in the production of Rigid PUF include:

- o Freon 11 > partial water/HCFE-141b > ???
- o Freon 11 > partial water/HCFE-22 & HCFE-142b > HFC-152a/HFC-134a
- o Freon 11 > partial water/Cyclopentane

The companies have selected the first option (partial water/HCFE-141b) which is an already proven technology and widely used in the USA and other countries. On the other hand, HCFE-22 is not recommended for spray foams because of rapid diffusion problems, HFC-142b is not readily available in Uruguay, and both HFC-152a and HFC-134a are too expensive to be considered. Finally, cyclopentane is not recommended for spray foams in view of inherent fire danger.

The companies involved in this project are aware that HCFE-141b is an interim replacement until a better product, with an ODP=0 will be found.

5.2 IMPACT ON THE PRODUCTION PROCESS

The system of choice requires foam dispensing units with variable gear ratios to cope with a different ratio than the presently used 50/50. These foam dispensing units also should be high pressure in order to be prepare for the next generation of non-ODS substances.

Trials and training will be needed under supervision of process experts from the company supplying the chemicals to assure suitable product quality.

6. PROJECT COSTS

6.1 CAPITAL COSTS

The following incremental capital costs are expected:

Aislaciones Uruguay

- o 5 medium output HP dispensing units @ 35.000
incl.freight, installation, start-up.....USD 175.000
 - o Trials, training, testing.....USD 2.000
-
- Total Aislaciones Uruguay.....USD 177.000

Metalizadora Uruguay

- o 3 medium output HP dispensing units @ 35.000
incl. freight, installation, start-up.....USD 105.000
 - o Trials, training, testing.....USD 2.000
-
- Total Metalizadora Uruguay.....USD 107.000

ThermoPur

o	1 medium output HP dispensing units @ 35.000		
	incl. freight, installation, start-up.....	USD	35.000
o	Trials, training, testing.....	USD	2.000
Total Thermo-Pur.....		USD	37.000

Kubal S.A.

o	1 medium output HP dispensing unit @ 35.000		
	incl. freight, installation, start-up.....	USD	35.000
o	Trials, training, testing.....	USD	2.000
Total Kubal S.A.....		USD	37.000

Kalisay S.A.

o	1 medium output HP dispensing unit @ 35.000		
	incl. freight, installation, start-up.....	USD	35.000
o	Trials, training, testing.....	USD	2.000
Total Kalisay S.A.....		USD	37.000

J.C. Scarone

o	1 medium output HP dispensing unit @ 35.000		
	incl. freight, installation, start-up.....	USD	25.000
o	Trials, training, testing.....	USD	2.000
Total J.C. Scarone.....		USD	27.000

Eraton S.A.

o	1 medium output HP dispensing unit @ 35.000		
	incl. freight, installation, start-up.....	USD	35.000
o	Trials, testing, training.....	USD	2.000
Total Eraton S.A.....		USD	37.000

All seven companies.....	USD	459.000
Workshop + Plant Visit.....	USD	25.000
Contingency.....	USD	46.000

TOTAL Capital Cost.....USD 530.000
=====

Information on the equipment selected was provided by Poly-Urethane Industria E Comercio LTDA, Brazil (Annex-B).

6.2 INCREMENTAL OPERATIONAL COSTS

In view of the fact that the price of HCFC-141b is higher than the price of Freon 11, there will be Incremental Operational Costs. The price of Freon 11 in Uruguay is actually USD 2.10 per kg. In spite of the fact that the suppliers of HCFC-141b in Uruguay are predicting a price of USD 5.20 per kg the operational costs are calculated based on an average international price of USD 4.00 per kg. Since the tendency of the Freon 11 price will be upward and the tendency of the HCFC-141b will be downward, the net present value of these cost will be based on a 2 years

period and with a 10% interest discount rate.

In the following calculation, it is also assumed that one part of Freon 11 will be replaced by 0.8 parts of HCFC-141b.

Aislaciones de Uruguay S.A.

26.000 kgs Freon 11 @ USD 2.10/kg.	USD	54.600
20.800 kgs HCFC-141b @ USD 4.00	USD	83.200
Increase Operational Cost/yr.....	USD	28.600
Net Present Value.....	USD	49.564

Metalizadora Uruguay

15.000 kgs Freon 11 @ USD 2.10/kg.....	USD	31.500
12.000 kgs HCFC-141b @ USD 4.00/kg.....	USD	48.000
Increase Operational Cost/yr.....	USD	16.500
Net Present Value.....	USD	28.595

ThermoPur

5.000 kgs. Freon 11 @ USD 2.10/kg.....	USD	10.500
4.000 kgs. HCFC-141b @ USD 4.00/kg.....	USD	16.000
Increase Operational Cost/yr.....	USD	5.500
Net Present Value.....	USD	9.532

Kubal S.A.

15.000 kgs. Freon 11 @ USD 2.10/kg.....	USD	31.500
12.000 kgs. HCFC-141b @ USD 4.00.....	USD	48.000
Increase Operational Cost/yr.....	USD	16.500
Net Present Value.....	USD	28.595

Kalisay S.A.

4.100 kgs. Freon 11 @ USD 2.10/kg.....	USD	8.610
3.280 kgs. HCFC-141b @ USD 4.00/kg.....	USD	13.120
Increase Operational Cost/yr.....	USD	4.510
Net Present Value.....	USD	8.716

J.C. Scarona

700 kgs. Freon 11 @ USD 2.10/kg.....	USD	1.470
560 kgs. HCFC-141b @ USD 4.00/kg.....	USD	2.240
Increase Operational Cost/yr.....	USD	770
Net Present Value.....	USD	1.334

Eraton S.A.

5.000 kgs. Freon 11 @ USD 2.10/kg.....	USD	10.500
4.000 kgs HCFC-141b @ USD 4.00/kg.....	USD	16.000
Increase Operational Cost/yr.....	USD	5.500
Net Present Value.....	USD	9.532

All seven companies

70.800 kgs. Freon 11 @ USD 2.10/kg.....	USD	148.680
56.640 kgs HCFC-141b @ USD 4.00/kg.....	USD	226.560
Increase Operational Cost/yr.....	USD	77.880
Net Present Value.....	USD	134.966

6.3 UNIT ABATEMENT COSTS

a)	Incremental Capital Costs.....	USD	530,000
b)	Project Life Time.....		10 years
c)	Annual Incremental Recurrent Costs/Savings.	USD	77,880
d)	CFC Consumption.....	kg	70,800
f)	Capital Recovery Factor.....		0.16275

UNIT ABATEMENT COST $\{[a(f) + c]/d\}$USD/kg/y 2.32
=====

7. FINANCING PLAN

The companies request a grant in the amount of
USD 665.000
=====

8. PROJECT IMPLEMENTATION

8.1 MANAGEMENT

UNDP will oversee the implementation of this project.

8.2 PROCUREMENT

It is proposed that UNDP will arrange the project procurement in close cooperation with the Uruguayan Government.

8.3 SCHEDULE

TASK	TIME FOR COMPLETION					
	Q1	Q2	Q3	Q4	Q5	Q6
1. Preparation MLF Approval Procurement preparation	x xx					
2. Installation Arrival Machine Installation		x x				
3. Start-up, Machine Start-up Trials, Training Certification		x x	xx x			

9. REQUIRED REGULATORY ACTION

The project requires no regulatory action.

10. PROJECT IMPACT

This project will eliminate the use of at least 70.8 tons of CFC-11 in the first year after implementation. The project employs commercially developed and environmentally acceptable technology.

11 ANNEXES

Annex-A: Company profiles

Annex-B: Specification for Equipment

Annex-C: Technical Assessment

ANNEX-A

PROFILES OF THE SEVEN COMPANIES INVOLVED IN THIS PROJECT

o Aislaciones Uruguay S.A. was founded in 1974 with 100% uruguayan capital. From the total of 20 employees 12 are directly working in the foam operations. Their product is spraying buildings for insulation purposes. They have 5 low pressure spraying units made in USA. The Freon 11 consumption during 1993 was 26 tons.

o Metalizadora Uruguay S.A. was founded in 1991 with 100% uruguayan capital. From the total of 65 employees, 7 are directly working in the foam operations. Their product is spraying buildings for insulation purposes. They have 3 low pressures spraying units: 2 are made by Graco and 1 by Gusmer. The Freon 11 consumption during 1993 was 15 tons.

o Thermo-Pur s.r.l. was founded in 1992 with 100% uruguayan capitals. From the total of 15 employees, 4 are directly involved in the foam operations. Their product is spraying buildings for insulation purposes. They have 2 low pressure spraying units made by Glass Craft and Gusmer. The Freon 11 consumption during 1993 was 5 tons.

o Kubal S.A. was founded in 1992 with 100% uruguayan capitals. From the total of 12 employees, 4 are directly working in the foam operations. Their product is spraying buildings for insulation purposes. They have 1 low pressure unit made by Aistec. The Freon 11 consumption during 1993 was 15 tons.

o Kalisay S.A. was founded in 1991 with 100% uruguayan capital. From the total of 8 employees, 3 are directly involved in the foam operations. Their product is spraying refrigerated trucks used for transportation of refrigerated goods. They have 1 low pressure unit made by Aistec. The Freon 11 consumption in 1993 was 4.1 tons.

o J.C. Scarone was founded in 1990 with 100% uruguayan capital. The number of employees was not reported. Their product is spraying buildings for insulation purposes. They have 1 low pressure unit homemade. The Freon 11 consumption in 1993 was 0.7 tons.

o Eraton S.A. was founded in 1983 with 100% uruguayan capital. From the total of 18 employees, 12 are directly involved in the foam operations. Their product is spraying buildings for insulation purposes. They have 2 low pressure units made by Gusmer and Gracco. The Freon 11 consumption in 1993 was 5 tons.

Note; For a more complete and detailed information about these companies please see additional information attached.

TECHNICAL REVIEW

PREPARED BY: Bert Veenendaal
UNDP Foam Sector Expert

DATE: June 11, 1994

1. COUNTRY OF ORIGIN: URUGUAY
2. PROJECT TITLE: Conversion to CFC-free Technology in the Manufacture of Rigid PUF (Spray
3. (SUB)SECTOR: Foamed Plastics
4. CP RELATIONSHIP: Not Known
5. TECHNOLOGY: The choice of technology is acceptable. HCFC-141b is transitional but the most feasible from cost and performance in spray foams. The companies should also look into technology applied in Brazil (water based) that is, however currently not offered in Uruguay
6. ENVIRONMENTAL IMPACT: HCFC-141b has an ODP (0.10), but much lower than the CFC-11 that is currently used. Companies should continuously evaluate more permanent solutions
7. PROJECT COSTS: UAC (unit abatement cost) not very applicable because of the large assistance component. Overall cost-effective
8. IMPLEMENTATION: Adequate (very fast!!)
9. RECOMMENDATIONS: See Environmental Impact and Technology for specific recommendations
Approval supported