United Nations
Environment
Programme

Distr.
LIMITED

EP

UNEP/OzL.Pro/ExCom/8/20/Add.1
9 October 1992

ORIGINAL: ENGLISH

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

Eighth Meeting
Montreal, 19-21 October 1992

Addendum

PROJECT PROPOSALS: EGYPT

PROJECT COVER SHEET

COUNTRY OR REGION :	EGYPT
SECTOR COVERED :	Primary Sector : Foam
ODS CONSUMPTION IN AFFECTED SECTORS	722 metric tonnes of CFCs used to make foams in 1991
PROJECT TITLE :	Elimination of CFC-12 in Foam Manufacturing at Al Sharif Plastic Factories
PROJECT DURATION :	One year from funding availability
PROJECT IMPACT: ODS REDUCTION	75 tonnes per year reduced CFC-12
PROPOSED BUDGET :	US $1.752 million
IMPLEMENTING AGENCY:	UNDP
NATIONAL COORDINATING AGENCY:	Egyptian Environment Affairs Agency (EEAA)

PROJECT SUMMARY

Egypt has developed a national programme for the phase out of ozone-depleting substances. Two key sectors are CFC foam manufacturing and refrigeration. Al Sharif Plastic Factories, a private sector company, is a large consumer of CFC-12 in the manufacture of polystyrene foam sheet. Under this project, the Company will phase out CFC-12 in the manufacture of this foam, using hydrocarbon technology with appropriate safety measures.

PROJECT OF THE GOVERNMENT OF EGYPT

ELIMINATION OF CFCS IN FOAM MANUFACTURING

1. Sector Data

Two major types of foams used in Egypt are polyurethane for insulation, cushioning, packaging and automotive applications; and polystyrene foam for insulation and food packaging. In 1991, an estimated 722 metric tonnes of CFCs were used for foam manufacture. This project will eliminate the use of 75 tonnes per year of CFC-12 by replacing the CFC as a blowing agent with acceptable substitutes and process modifications to insure that foam quality and process safety are maintained.

2. Background

A major use of CFCs in Egypt is the manufacture of foamed plastics. The Government of Egypt, in its country programme for the phaseout of ozone-depleting substances, includes the reduction and recovery of CFC's from foam manufacture as a key element in its action strategy.

Al Sharif is the largest plastics manufacturer in Egypt. Begun in 1958 as an industrial supplier, Al Sharif thirty years later is a conglomerate of 52 companies (19 are joint stock companies) worth an estimated $2 billion L.E. Its various business opertions include the following: investments; trade; housing and development; agriculture, reclamation,and land management; public service (25% of company profits are invested in hospitals, schools, and other social services); and industries such as plastics manufacturing, building and construction materials, and foodstuffs and chemical products.

Al Sharif currently consumes 75 tonnes/yr of CFC-12 in the manufacture of extruded polystyrene and polyethylene foam sheet. This is significantly greater than 1989, in which the company consumed only 30 tonnes. The company will reach a consumption level of 105 tonnes/yr before the end of 1992. Elimination of CFCs, at one of the major CFC consumers in Egypt, will reduce national consumption in the foam sector.

3. Project Objectives

Short term : Phase out 75 tonnes per year of CFC-12 used in polystyrene and polyethylene foam sheet at Al Sharif Factories.

Long term : a) Prevent future use of CFC-12 in Al Sharif's polystyrene foam manufacturing by modification of an expansion project.

b) Act as a training, information, and demonstration center for CFC phaseout in the Middle East under the direction of EEAA.

4. Project Description

In order to achieve reduction of the country usage in the foam sector and to act as a CFC elimination information center for the Middle East, Al Sharif will conduct the following:

a) eliminate the use of CFC-12 in the manufacture of polystyrene foam sheet by replacement with hydrocarbon (i. e, butane). This technology is available through Japanese or original equipment manufacturers. The technology incorporates relocation of the supply tank for the foamant, explosion proof electrical equipment and spark protectors within the manufacturing area.

b) modify the specifications for an expansion project to allow application of the "butane technology".

c) prepare a video showing the steps to be taken to successfully implement CFC-free technology in the manufacture extruded polystyrene and polyethylene foams and make the extrusion part of the plant available for instruction purposes.

5. Technology Discussion

The foam factory at Al Sharif Factories in El Khanka, Egypt, has a production of polystyrene and polyethylene foams use of CFC-12 in production of its formed food packaging products.

There are several options to replace this ozone-depleting compound by an alternative blowing agent:

a) Nitrogen gas: inert, nontoxic and noncombustible, but asphyxiant. The use as a blowing agent is burdened by the relatively density of the end product.

b) Carbon dioxide gas: asphyxiant, high energy consuming and moderately toxic. The use of this gas also results in a relative high density although lower than nitrogen blown foams.

c) Hydrocarbons: toxic, flammable. N-Pentane, butane, isopentane and isobutane are proven replacements. The technology is very economical and offers good quality products, however, the flammability requires severe safety precautions in the manufacturing process.

d) Berstroff technology: based on a mixture of nitrogen and alcohol. Toxicity , fire risks, and explosion limits are unknown. The resulting product has a higher density.

e) HCFC-22: non-flammable, low in toxicity, high chemical and thermal stability. This technology has been proven effective, particularly in the American food packaging industry. The compound, however, has an ODP, and could only qualify as a transition solution.

f) HFC-134A: non-flammable, low toxicity and no ODP. This technology is not yet commercially available. Pricing is expected to be high and would prevent utilization in the cost sensitive food industry.

g) HFC-152A: low toxicity, moderately flammable, and no ODP. This material may be a likely long term alternative blowing agent for extruded polystyrene sheet. However, the product is not currently cleared for food packaging uses and is expected to have higher cost than CFC 12 or hydrocarbons.

h) HCFC - 142b: (Alone or in combination with HCFC-22) represents a practical option to CFC-12 in extruded polystyrene board insulation. HCFC-142b, however, is not a technical "drop in" for any of the manufacturing process currently installed.

i) Liquified petroleum gases (LPG): toxic, flammable, no ODP. This blowing agent is currently not accepted for food packaging uses.

The currently preferred replacement technology constitutes the usage of butane. This technology is commercially available through the manufacturers of production equipment. Because of the high flammability, safety will be a major consideration. Storage facilities will be generally located outside, or in a separate building, all electrical equipment in the extrusion area has to be explosion proof, the area itself has to be separated from other production areas, spark arrestors must be utilized, and VOC monitoring is highly recommended. In addition, a safety and awareness program will have to be implemented for all workers involved. A major portion of the conversion cost is associated with these safety measures. The lower price of butane will generally more than compensate for the additional production and warehose cost related to the hydrocarbon technology.

*	Cost of One Kg of CFC-12	$ 3.4/kg.
	While the price of butane is about	$ 2 /kg.

6. Project requirements for Blowing Agent conversion to Hydrocarbons.

A list of necessary items to meet the Incremental requirements for the conversion to hydrocarbons as blowing agent follows :

6.1 Civil works: Pump room installation - explosion proof wall - mezzanine closure - leak proof roof sealing - access lane - butane tank foundation - coated floors. US$ 101,000

6.2 Mechanical works: Pumping system - explosion proof pipes installation - gas detectors - instrumentation.

US$ 95,000

6.3 Safety Systems: Gas leak detectors - alarms - fire extinguishing devices - fire and smoke detection - instrumentation - extrusion line interlock with gas sensors - control panels - explosion proof fittings - emergency and remote shut down devices.

US$ 235,000

6.4 Mechanical Ventilation: Ceiling metal duct work - under floor concrete duct - inlet and exhaust fans - installation - instrumentation - control and power panels.

US$ 56,000

6.5 Materials Handling System: Electrically operated lift truck - roll conveyors - silos - electric fans - duct work - instrumentation - control panel.

US$ 74,000

6.6. Electrical Installations: Wiring - conduits - explosion proof firings - wiring support - explosion proof lighting - power supply and distribution - transformers - control panels - instrumentation - grounding - static eliminators.

US$ 132,000

6.7. Construction Management: The company would contract an experts firm to take care of construction, payment is calculated as a percentage of the total cost.

US$ 72,000

6.8. New Equipment:

6.8.1.	Complete dual winder	US$	43,000
6.8.2.	Antistatic solution aplication system	US$	15.000
6.8.3.	Two pottable antistatic eliminators	US$	15,000
6.8.4.	Pre-repelletizing shradder unit	US$	90,000
6.8.5.	Repelletizing unit	US$	285,000
	Total New Equipment	US$	448.000

7. Engineering Services:

7.1.	Original Project designed by Modulor C.A.	US$	40,000
7.2.	Engineering services for changes in the project	US$	8,500
7.3.	Handbook of Plant Operation	US$	9,500
	Total Engineering Services	US$	58,000

8. Expertise requirements:	Cost/year	Time	Total
Project Leader (1)	US$ 30,000	1 year	US$ 30,000
Production Supervisors (4)	US$ 40,000	6 months	US$ 20,000
Total Project Expertise requirements			US$ 50,000

9. Technology Transfer Expenses:

9.1. Travelling requirement:

	to/from Japan	days
Al Sharif technical Experts		
Project leader (1)	1	7
Production Manager (1)	1	15
Production supervisors (4)	4	15
Project Manager (1)	1	7
Japanese Technical Experts		
Project leader	1	15
Engineer	1	15
Total Number of Trips	9	

9.2. Cost of trips to and from Japan	Cost per unit US$	Total Cost US$
Air flight per person	2,000	18,000
Daily expenses Al Sharif team	300	26,700
Daily expenses Japanese team	300	9,000
Total		53,700

As Al Sharif has no technical licence agreement between Al Sharif Company and Japanese Company, It is expected that the Japanese Company may ask of the price of Know-How Transfer of about US$ 150,000

and the exact price will depend on the final negotiation, but it will be rounded about this figure and any change can be covered by contingency.

10. Total Project Cost

Summary of all incremental costs related to the conversion of CFC to hydrocrabons as blowing agent. An estimated 15% has been allocated in case a contingency arises.

10.1.	Civil Works	US$	101,000
10.2.	Mechanical Works	US$	95,000
10.3.	Safety Systems	US$	235,000
10.4.	Mechanical Ventilation	US$	56,000
10.5.	Materials Handling System	US$	74,000
10.6.	Electrical Installations	US$	132,000
10.7.	Construction Management	US$	72,000
10.8.	New Equipment	US$	448,000
10.9.	Engineering Services	US$	58,000
10.10.	Project Expertise requirements	US$	50,000
10.11.	Technology transfer expenses	US$	203,000
10.12.	Contingency (15%)	US$	228,450
	Total Project Cost	US$	1,751,450

11. Project Execution Schedule

According to our schedule, Al Sharif could be producing CFC free EPS after the second quarter of 1993, but this time frame could be improved depending on funds availability.

12. Financial Schedule

Since full project will need a whole year from starting date to commercial production, the financial schedule we are devising is that the total amount will be needed in the first six months on two similar disimbursements, one, at the begining of the project on a second one 3 months later.