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PROJECT PROPOSALS: ALGERIA

This document includes the following project proposals which have been grouped by project sector:

Aerosol

- Investment project for phasing out CFCs at Entreprise Nationale des Detergents (ENAD) — UNIDO

Solvent

- Investment project for phasing out CFCs at Entreprise Nationale des Detergents (ENAD-LAMES) — UNIDO

PROJECT COVER

Country/Region:	ALGERIA
Project title:	Investment Project for Phasing out CFCs at Entreprise Nationale des Detergents (ENAD)
Sector Covered:	Aerosols
ODS Consumption in this Sector:	In 1991 ODS consumption in this sector was 559 MT.
Project impact:	Phase out of annual consumption of 400 MT of CFC 11, CFC 12 and CFC 114
Project duration:	18 months
Project economic lifetime:	10 years
Total proposed project cost:	US $1,590,853
Project investment cost:	US $1,407,835
Implementing Agency's overheads:	US $ 183,018
Proposed MF financing:	US $1,590,853
Cost effectiveness:	See Annex C: Threshold: 3,51 US$/kg
Counterpart enterprise:	ENAD - Entreprise Nationale des Detergents (Rouiba/Algeria)
Implementing Agency:	UNIDO
Coordinating Ministry:	National Commission for Ozone, Ministry of Interior and Environment

PROJECT SUMMARY

This project will phase out 100% of the use of CFC aerosol propellants (CFC 11, CFC 12 and CFC 114) in ENAD aerosol plant at Rouiba, Algeria.

The chosen replacement alternative propellant is hydrocarbon (butane/propane mixture). The project will include the conversion of the 2 CFC filling lines to hydrocarbon propellants, and the installation of hydrocarbon gas storage and treatment.

The installed capacity is 800 MT and due to economic constraints, this capacity has not been fully utilized. In the course of the conversion and due to higher demand for a new product, this production can be exceeded.

In consultation with UNIDO, ENAD has selected the use of the hydrocarbon technology for conversion.

LPG is largerly abundant in Algeria and adequate for the use in this industry. The national company for industrial gases ENGI offers reliable services and ensure continuous production which would grant permanent availability of LPG.

BACKGROUND

Sector Background

The Algerian Country Programme, as approved in September 1993, identifies aerosol production representing 26 per cent of the national consumption of ODS. This percentage represents 559 MT of CFCs consumed in 1991.

In this sector there are two major aerosol fillers, ASMIDAL and ENAD both are public enterprises. There are also 90 smaller private companies filling aerosols.

Without the implementation of the Montreal Protocol the use of CFCs in the aerosol sector is projected at 10,914 MT by the year 2010.

Some companies have already converted to LPG and other gas, and have not have sufficient expertise regarding conversion and safety. This has resulted in one of the companies (ASMIDAL, in MASCARA) which experienced a serious fire in their plant.

ENAD'S BACKGROUND

The company was formed in 1953 to manufacture personal care products. In 1981, ENAD installed its first automatic aerosol filling line with capacity of 20,000 units per 8 hour shift per day. ENAD fill a wide range of aerosol personal care products including body sprays, EDT products, hair sprays and shaving foams. They also produce some household products such as room sprays. Aerosol products represent 39 per cent to 42 per cent of total sales.

The second aerosol production line was installed in 1987.

ENAD, Rouiba produces 5 million aerosol cans per year. In 1989, ENAD achieved a production out put of 7 million cans. The nominal capacity for the two filling lines working on a single shift basis is 10 million cans per year, and 20 million based on a double shift system. The difference between the actual production and the capacity available in recent years can be explained as follows:

- Difficulties in obtaining finance for raw materials etc.
- Since 1991 the purchase of CFC propellants became difficult.
- Economic crisis in Algeria and market downturn.

The economic situation has started to improve and the conversion to hydrocarbon propellants will eliminate the need to obtain CFCs, and ENAD will then be able to increase its market share. This new favourable situation allows ENAD to project an increase in production to 10 million units over the next 2 to 3 years, and then to increase 15 million units over the next period.

ENAD operates two aerosol filling lines each supplied by Coster Machinery Company of Italy. The main filling machines on each line are Coster Type 6 AVG/M and these are rotary indexing machines. Other equipment on filling line 1 include:

- Can unloading table
- Valve sorter
- Conveyor system
- Automatic test bath
- Drying tunnel
- Spray actuator placer
- Cappi ng machines
- End of the line case packing area.

Filling line 2 is identical but does not have a water test bath.

In addition to the two filling lines there is some laboratory equipment for quality control work, including pressure test gauges, crimp dimension gauges, manual test bath, balances, and equipment for stability tests.

PROJECT OBJECTIVE

The objective of the project is to completely phase-out the use of 400 MT of CFC aerosol propellants per year by converting to hydrocarbons.

PROJECT DESCRIPTION

ENAD is prepared to phase-out ODS in the aerosol section as soon as they obtain both technical and financial assistance. ENAD has chosen to replace CFCs with hydrocarbon aerosol propellants. These are used more than any other propellant as the main replacement for CFCs. Advantages of hydrocarbon aerosols propellants are that they have similar spray patterns to CFCs, they are very stable and do not affect the ozone layer.

One of the main disadvantages of the hydrocarbons is that they are extremely flammable, and need special care in handling and storage.

At present the aerosol cans at ENAD are product filled and gassed on the Coster 6 AVG/M machines. Then the filled cans travel along the conveyor system through the test bath, then through the drying tunnel, and then through the actuator placer and capping machines to the end of the line where they are case packed.

The safest operation when filling with LPG is for ENAD to continue to use the Coster rotary indexing machines for product filling, valve inserting and crimping, and then to send the cans to an outside gassing room for filling with hydrocarbon propellant. The gassed cans will then automatically return inside the factory for water test bathing, drying, actuator and cap placing.

To install outside gassing rooms ENAD will need to re-locate their existing filling lines. The lines are installed at present in the same production department that produces alcohol based perfumery products, creams and shampoos.

The alcohol storage is also next to the aerosol production area. It is therefore, essential that the aerosols lines are re-located if they are to be converted to LPG.

The area needed is 3000m^2 for both aerosol production and storage of gas. This land, which has a value of US \$15,000, was previously reserved for another cosmetic project. This land will now be re-allocated to the conversion project which has greater priority.

Assistance through the project is sought for:

(a) Procurement of new filling machinery and safety control systems.
(b) LPG bulk storage, purification and delivery to filling machines.
(c) LPG delivery tanker.
(d) Installation, commissioning and training.

The two major parts of the project are (i) the conversion of each filling line; and (ii) the bulk storage and supply of LPG. The following machinery and equipment are needed:

A. New filling machinery and safety control system.

A.1 A new separate rotary indexing gassing machine is required for each filling line. This machine should be explosion proof and preferably .... operated, and properly earthed. It should be fitted with three propellant filling heads. The machine must be suitably guarded to act as a primary enclosure for the ventilation system. This machine would be delivered to the site readily installed in its gas house.

A.2 New water test bath for line 2.

A.3 The hydrocarbon filling (gassing) room comes complete with its ventilation and gas detector systems. The recommended size of rotary indexing machine for the house is 3m long x 2m wide x 2.9m high. The gas house is delivered to the side with the internal propellant pipe work between the gassing machine and the inlet flange fully installed.

A.4 Primary and secondary ventilation systems are provided and each equipped with a 2-speed explosion proof fan. The height of the stacks will be designed to suit the site.

A.5 A hydrocarbon gas manager is required for each filling line and should be located in a "safe area" of the factory close to the production line and near the access door to go out of the factory to the gas house. This gas manager, houses the gas detection controllers and controls the hydrocarbon filling operation. It is fully interlocked system and operates and controls the ventilation and LPG shut off valve.

A.6 Additional laboratory equipment will be required to test flammable propellant type aerosols.

A.7 Additional fire extinguishers suitable for LPG products will be required as well as an adequate and efficient firefighting network.

B. LPG bulk storage and purification

B.1 2 additional LPG storage tanks each of 20 MT capacity complete with pipe work and valves (all civil work and tank supports to be supplied by ENAD).

B.2 1 off loading pump (butane/propane) capacity 200 litres per minute.

B.3 1 transfer pump capacity 30 litres per minute.

B.4 1 multi-stage centrifugal process pump (30 liters per minute).

B.5 1 LPG purification plant comprising three absorber columns 18" diameter having bottom support grids with 250 micron stainless steel mesh, sandwiched between 6mm thick perforated plate grids. Manufactured in accordance with BS 5500 Category II requirements for a throughput of 30 litres per minute. The coloumns are 3 meters long and designed to meet sieve velocity limits and holding 15 cu.ft. sieve. Upper and lower stream feed points have fine mesh baskets to prevent carryover.

B.6 1 gas detector system and motor control panel for the bulk storage plant. This will include 5 gas sensors and starter controls for off-loading, transfer and process pumps, and cabling to these items and to the deluge pump house.

B.7 1 automatic deluge protection system for LPG bulk storage plant comprising:

- To comply with the Loss Prevention Council Tentative rules for medium and high velocity water spray systems, pumps to provide calcuated flow based on open nozzles throughout system and rated at 100% duty. Minimum design density of $10mm/m^2$ of surface area/minute.

- A total storage capacity of approximately $400m^3$ will be required, split into 2 to 3 tanks. The present capacity is $150m^3$ is not sufficient. A $400m^3$ storage capacity will give 90 minutes of protection. From these tanks the supplier will supply and install all mechanical equipment to provide complete working installation.

- The areas protected are:

2 Gantries for LPG tanks - dimensions 2.4m diameter x 6.39m long.
1 Tanker off-loading gantry.
3 Branch pipes and nozzles for tanker off-load pump, transfer pumps and process pumps.

- The equipment supply will include:
(Loss Prevention Council approved items will be used).

1 Electrically driven main deluge pump.
1 Diesel Driven standby deluge pump of same rated output.
1 Jockey pump to maintain system water pressure.
1 Main deluge valve.
1 Compressor for air detection system pressurisation.
1 Flow providing system.
1 Feed main length 15 meters.
3 Pipe work gantries for 2 x tanks and 1 x tanker bay constructed in galvanized med quality pipe work to BS 1387 having screwed joints and pre-erected at suppliers premises prior to despatch.
1 set Spare heads plus three spares.
1 set Detector nozzles plus three spares.
1 set Control and isolating valves.
2 Manual "dump" valves.
1 Solenoid "dump" valve.
1 Control panel for electric and diesel pump sets.
1 MCB Distribution Board for pump house power users (excluding main pump set).
1 set Cabling for pump house items (excluding mains supplies to pump controller and MCB).

Some of the existing piping is to be renovated.

C. LPG delivery Tanker

C.1 1 LPG delivery tanker to give ENAD autonomy due to the difficulties in Algeria with LPG delivery and transportation, and to guarantee the regular supplies.
LPG may be available at ENGI plant without possibility of delivery by ENGI.

D. Installation, commissioning and training

D.1 To include an installation and commissioning visit by two mechanical engineers for a period of 15 days to install the additional aerosol filling equipment.

D.2 To include an installation and commissioning visit by two electrical engineers for a period of 20 days to cable and connect the quipment to the hydrocarbon gas managers. During the above commissioning visits, some training will be given.

D.3 Additional training must be provided for the employees of ENAD in safety procedures.

In addition to the above list of equipment and services required, the project requires other services and equipment ENAD agreed to cover these costs. These include:

- Suitable land for the storage and production areas.
- New building for re-locating the lines.
- Water storage tank for the deluge system.
- Pump house for the deluge system.
- Electricity main supply to the pump house.
- Civil engineering and preparation of foundations for pumps, tanks and gantries.
- Local consulting engineer to manage the project during all stages.
- Costs of re-locating exiting filling lines.
- Modifications to laboratory test areas.

Justification for Selection of Alternative Technologies

Hydrocarbon aerosol propellents are used more than any other propellant as main replacement for CFCs. They are readily available, give good spray patterns, and do not affect the ozone layer. ENAD have experimented with compressed gases such as nitrogen and nitrous oxide and the results have proved negative. They have concluded that these propellants are not suitable substitutes for their CFC aerosol products, and in agreement with UNIDO has selected the hydrocarbon technology.

PROJECT IMPLEMENTATION

The project will be implemented by UNIDO in close cooperation with The National Commission For Ozone. Local coordination will be carried out by ENAD.

The project will include supply of equipment, installation, commissioning, training abroad and on-the-job training of ENAD's staff. In order to guarantee a proper transfer in particular of the new aerosol technology using the highly flammable hydrocarbon propellants, the selected contractor is requested to issue an "Operational Safety Statement".

For the operation of such technology using highly inflammable and explosive materials, a local authorization for the operation is needed and such lines have to be regularly controlled by the responsible local authority. The local authorities should be already involved in the stage of engineering of the plant to avoid that an installed expensive plant is not allowed to be started.

The final equipment specification, the work plan and consequently the "Operational Safety Statement" can only be elaborated after approval of the basic approach for the project implementation by the relevant local authorities.

Any construction work needed to accommodate the equipment for the new aerosol technology using hydrocarbons will have to be carried out by ENAD and is not reflected in the project budget. The specification for construction work will be elaborated by the selected contractor after project approval and as an outcome of his necessary site inspection.

The proposed tentative work plan for the project implemenation is as follows:

TIME SCHEDULE

S Q1 Q2 Q3 Q4 Q5 Q6

General:
1. Sign the project receive funding
2. Make detailed project work plan

Civil work:
3. Construction study
4. Build new aerosol factory
5. LPG storage area
6. Deluge tank site

LPG storage:
7. Selection of equipment
8. Authorization by local authorities
9. Purchase, supply and installation/ commissioning of equipment.

Aerosol filling equipment:
10. Selection of equipment
11. Purchase, installation and commissioning
12. Re-location of existing lines

Training:
13. Additional to commissioning.

It is estimated that after 18 months the complete conversion of the factory will have been carried out.

PROJECT COSTS

I. INVESTMENT COSTS

The investment costs will cover capital investment costs for modification of manufacturing facilities, new machinery, materials, testing equipment, training, installation and consultancy services for modifications. Capital investment costs are shown in Annex A: "Equipment Specification and Cost Breakdown".

II. INCREMENTAL OPERATING COSTS

LPG (low quality grade for aerosols) is lower price than CFC's used in aerosol industry and quality needed in the formulation to fill the aerosol cans is reduced by a factor of about 2,4. These savings are, however, offset by the higher cost to maintain the aerosol quality, the cost of operation, and maintenance and the annual safety training required to educate personnel in the safe handling of LPG. Additional maintenance cost for the purification plant will be higher.. These costs are difficult to calcuate in advance as individual formulation changes and operating conditions. Aerosol tend to be specific to each plant. The expected annual savings, over a 3 years period, will be in the range of 1,125 the first year, 1,189 the second year and 1,487 the third year.

III. CONTINGENCY FUND

A contingency fund (10% of the total budget) is included in the funding requested from the Multilateral Fund.

IV. TOTAL COSTS

- Investment cost, (Annex A: "Equipment Specification and Cost Breakdown").
- The net incremental operating cost as above.
- Executing agency's overhead cost .
- For the complete cost breakdown (Annex B: "Project Budget").
- For the calculation of the unit abatement cost (Annex C: "Unit Abatement Cost").
- Requested funding by the MFMP: **US$ 1,590,853**

Annex A: Investment with Equipment Specification and cost Breakdown

	Description	Qty.	Unit cost US$	Total cost US$
A.	**New Filling Machinery**			
A.1	Rotary indexing machine with saety guard and 3 gassing heads and in feed/out feed conveyors	2	83,700	167,400
A.2	Water test bath fully automatic with drying tunnels	1	85,250	85,250
A.3	Hyrocarbon filling room size 3mx2mx2.9m high with 2 doors and roof acting as explosion proof fans	2	79,050	158,100
A.4	Primary and secondary ventillation systems fan above filling room each with 2 speed explosion proof fans.	2	23,250	46,500
A.5	Hydrocarbon gas manager with 5 channel gas detection system	2	38,750	77,500
A.6	Additional laboratory equipment	4	6,250	25,000
A.7	Additional fire extinguisher	10	680	6,800
	Sub-total			**566,550**
B.	**LPG Bulk Storage and Purification:**			
B.1	20 MT capacity LPG storage tank complete with pipework and fittings	2	77,500	155,000
B.2	Off-loading pump (200 l/min)	1	10,850	10,850
B.3	Transfer pump (200 l/min)	1	9,750	9,750
B.4	Multi-stage centrifugal pump (30 l/min)	1	11,950	11,950
B.5	LPG purification plant throught (30 l/min)	1	66,650	66,650
B.6	Gas detection system and motor control panel for LPG plant	1	89,250	89,250
B.7	Automatic deluge protection system	1	114,700	114,700
	Sub-total			**458,150**
C.	**LPG Delivery Tanker:**			
C.1	LPG delivery tank suitable for transfering butane/propane in bulk	1	182,000	182,000
	Sub-total			**182,000**
	Subtotal (groups A+B+C)*			**1,206,700**

Annex B: Project Budget

Budget line	Description		Budget US$
A.	**New Filling Machinery**		
	- Rotary indexing machines (2)	167,400	
	- Water test bath (1)	85,250	
	- Hydrocarbon filling room (2)	158,100	
	- Ventillation system (2)	46,500	
	- Hydrocarbon gas manager (2)	77,500	
	- Laboratory equipment (4)	25,000	
	- Fire extinguishers (10)	6,800	
			566,550
B.	**LPG Bulk Storage**		
	- Storage tank (2)	155,000	
	- Off-loading pump (1)	10,850	
	- Tranfer pump (1)	9,750	
	- Multi-stage pump (1)	11,950	
	- Purification plant (1)	66,650	
	- Gas detection system (1)	89,250	
	- Deluge system (1)	114,700	
			458,150
C.	**LPG Delivery Tanker (1)**	182,000	
			182,000
D.	Installation, Commissioning and Training		
	- Filling line mechanical installation and commissioning	23,250	
	- filling line electrical installation and commissioning	27,900	
	- Additional training	22,000	
			73,150
		Sub-total	**1,279,850**
	Miscellaneous:		
	Contingency Fund (10% of the costs of all equipment, services)		**127,985**
Subtotal I			**1,407,835**
Agency's Overheads (13% of all)			**183,018**
TOTAL		US$	**1,590,853**

Notes:

1. Tax and custom duty are not included in the prices for the machinery and will not be covered by this project.

2. There are some parts of this project which ENAD have agreed to cover the cost. These include:

- Cost of 3000 m^2 area of land for new building	US $	75,000
- New building for aerosol production	US $	1,380,000
- Water tank and pump house for deluge system	US $	135,000
- Project management costs using local consultant	US $	30,000
- Re-location of existing filling lines	US $	24,000
Total	US $	1,644,000

<u>Total cost of the project:</u>

1. Total requested funding	US $	1,590,853
2. Contribution by ENAD	US $	1,644,000
Total cost	US $	3,234,853

Annex C: Calculation of Unit Abatement Cost:

A	ODS Phase out		Total Project
A1	Average use of CFC 11 per year	MT	100
A2	ODP of CFC 11		1
A3	ODP-weighted CFC 11 phased out (A1xA2)	MT	100
A4	Average use of CFC 11 per year	MT	220
A5	ODP of CFC 12		1
A6	ODP weighted CFC 12 phased out (A4xA5)	MT	220
A7	Average use of CFC 114 per year	MT	80
A8	ODP of CFC 114 capitial cost		1
A9	ODP weighted CFC 114 phase out	MT	80
A10	Total ODP - weighted phase out	MT	400
B	Annualized capital cost		
B1	Total investment cost (model redefinition + production conversion)	US $	1,590,85 3
B2	Equipment life	Year	10
B3	Discount rate	%	10
B4	Annualized capital cost (B1x0.1627)	US $	258,853
C	Annual incremental recurrent cost (1/2)	US $	--
D	Unit abatment cost		
D1	Annualized capital cost per kg ODS phased out (B4/(A10x1000)	$/kg	0.647
D2	Annual 1/2 incremental recurrent cost per ODP phased out (C/A7x1000)	S/kg	--
D3	Unit abatement cost (D1+D2)	S/kg	0.647

TECHNICAL REVIEW

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1. **Country of origin:** **ALGERIA**

2. **Project title:** **Investment Project for phasing out CFCs at ENTERPRISE NATIONALE DES DETERGENTES (ENAD)**

3. **Sector covered:** **Aerosols**

4. **Relationship to Country programme:** **The programme was prepared in line with the Algerian Country Programme of Sept. 1993.**

5. **Technology:**

   5.1 The chosen alternatives of Propan-Butan (HAPS) as Aerosol Propellants are the only alternative of this project.

   5.2 The technologies in formulating Propan-Butan Aerosols have been known since a long time.
   Most of the products can be reformulated without problems.

   5.3. Regarding safety there is a lot of general knowledge available throughout the world.

6. **Environmental Impact:**

   6.1 HAPs have zero ODS.

   6.2 The appropriate measures to minimize Health and Safety impact are dealt within the project.

Cont/...

7. Project costs:

7.1 The machines are presently located in the main factory. This was ok when working with CFCs. To work with HAPs the filling lines have to be relocated. This means that they have to be installed i a new building which has all safety measures. The existing buildings cannot be adapted to adequate safety. A new tankfarm has to be errected, which contains bulk storage, purification and delivery to filling machine. The project is issued due to latest technology and safety recommendations.

7.2 The relocation costs of the existing equipment of of US$ 24'000.-- seems to be very low.

7.3 Fire extinguishers at US$ 6'000.-- are probably available locally when a periodical service is guaranteed.

7.4 A LPG delivery tanker is included in the project. This provides autonomy to ENAD. The autonomy is important to ENAD because aerosol grade LPG can only be transported with absolutely odourfree tanks, which never transported any LPG with Mercaptane (fuel gas). So therefore a tanker is absolutely justified.

7.5 Cost of equipment

7.5.1 The baseline of equipment will not be replaced. There are certain modifications.

7.5.2 There is no request for additional equipment. All equipment asked for is justifiable.

7.5.3 There has been no equipment which cannot be integrated into the new project.

7.5.4 The modification of the existing equipment will only slightly increase the production capacity, better and safer handling of cans.

7.5.5 The modification of the two filling lines will not increase the overall output.

Cont/...

7.6 Start up / Commissioning costs
The level of installation commissioning and training costs on site seem to be appropriate. Additional training in safety procedures is very important.

7.7 Operating costs
The operating costs of the filling station working with HAPs will be slightly higher. This is due to more frequent maintenance work.
The increased operating costs of the filling operation will be compensated by lower costs of HAP's compared with CFCs.

7.8 Other costs
A contingency of 10% of all equipment services and incremental operative costs is included. This is appropraite and justifiable.
Implementing agency overhead costs are reasonable.

7.9 Cost effectiveness
The unit abatement cost of US$ 0.647/kg is low. The project includes a relatively good level of cost effectiveness over the lifetime of the project. The investment is relatively high per ODP tonne phased out.

7.10 Implementation time
The proposed implementation time is realistc. 18 months is sufficient for planning manufacturing and installation.

8. Recommendations:

The overall project is realistic. The costs are kept to the necessary level to guarantee a trouble free operation.
If the fire extinguishers can be obtained locally, the costs can be reduced only minimal (see 7.3.).

Joe Walker Raymond Margot

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PROJECT COVER

Country/Region:	ALGERIA
Project title:	Investment Project for Phasing out CFCs at Entreprise Nationale des Detergents (ENAD-LAMES)
Sector Covered:	Solvent
ODS Consumption in this Sector:	In 1991 ODS consumption in this sector was 140 MT CFC
Project impact:	Phase out of annual consumption of 15 MT of CFC 113 for production of Razor Blades (Total ODP=12 T)
Project duration:	12 months
Project economic lifetime:	10 years
Total proposed project cost:	US $230,457
Project investment cost:	US $227,500
Implementing Agency's overheads:	US $ 2,957
Proposed MF financing:	US $230,457
Cost effectiveness:	See Annex C: Unit Abatement cost
Threshold:	15.16 US$/kg
Counterpart enterprise:	ENAD - Entreprise Nationale des Detergents (Rouiba/Algeria)
Implementing Agency:	UNIDO
Coordinating Ministry:	National Commission for Ozone, Ministry of Interior and Environment

PROJECT SUMMARY

This project will phase out 100% of the use of CFC 113 as solvent used in the coating of razor blades at the factory of ENAD in Rouiba, Algeria.

The chosen replacement alternative is pure ISO propyl alcohol (IPA) which will be used to dilute the vydax (PTFE) dispersion.

The project will include the redesign of the razor blade coating area making it flameproof with the installation of two completely enclosed spraying machines and booths, as there are two coating lines involved.

BACKGROUND

Sector Background

The ODS consumption in the Algerian solvent sector is estimated to have reached at least 140 MT of CFC 113 + CTC + MTC. This quantity represents only 6.5 per cent of the total national consumption of ODS.

The solvent sector has not been sufficiently investigated, there are a large number of small private sector users of solvents as cleaning agents.

ENAD is an established enterprise and exact consumption figures are known. In 1991 ODS consumption in this sector was 140 MT of CFC.

ENAD'S BACKGROUND

The razor blade factory of ENAD at Rouiba started the first production of carbon steel razor blades in 1964. In 1973, they changed to the manufacture of stainless steel blades.

There are two production lines at ENAD. The original line has an annual capacity of 180 million blades, the second line which has just been installed and commissioned has a capacity of 200 million blades per year.

Actual production from both lines at present is 185 million blades per year at the new line is 185 million blades per year as the new line is on pilot production. The projection for the year 2000 is 360 million blades per year. It is estimated that ENAD had a 58 per cent share of the domestic market in 1994.

The consumption of CFC 113 for the first line is 7 MT per year and for the second line 8 MT per year. This represents a total of 15 MT for both lines.

PROJECT DESCRIPTION

ENAD is prepared to phase out ODS in the razor blade section by eliminating the use of CFC 113. New technology has been acquired and this will involve the installation of new spraying equipment.

CFC 113 is used for diluting the polytetrafluoroethylene (PTFE) and as a pulverizing agent for the PTFE on the blade. ENAD are currently coating razor blades with vydax 1000 which is a 7.5 per cent dispersion of fluorotelomer solids in freon which is further diluted with CFC 113 to give good solids of 1 to 2 per cent before being applied to the edges of the razor blade stack.

The alternative technology which has now been adopted by major razor blade manufacturers is to use vydax 2000/IPA which is a 20 per cent dispersion of fluorotelomer solids in ISO-propyl alcohol (IPA), which is then diluted to the required coating concentration with IPA.

In many parts of the world pure IPA is difficult to obtain and distributors of vydax can now offer it ready blended with IPA to customers requirements. If a low quality wet IPA is used then this could cause rusting of the blades during coating.

The new equipment will include one fully automatic single head spraying machine, complete with flame proof booth extraction, and control panel, for each production line.

Justification for Selection of Alternative Technologies

All major manufacturers of razor blades have agreed to replace CFC 113 with IPA as the solvent for vydax. At this time there is no alternative technology available.

PROJECT IMPLEMENTATION

The project will be implemented by UNIDO in close cooperation with The National Commission For Ozone. Local coordination will be carried out by ENAD.

The project will include supply of equipment, installation, training of ENAD's staff. In order to guarantee a proper transfer of technology the selected contractor is requested to issue full documents on safe operation of the plant.

Any re-location and modification to existing lines in order to accommodate the new spray booths will be carried out by ENAD.

The proposed tentative work plan of the project implementation is as follows:

TIME SCHEDULE

		Q1	Q2	Q3	Q4
1.	Sign the project, receive funding	X			
2.	Make detailed project work plan	X			
3.	Order equipment	X			
4.	Process modification		X		
5.	Installation			X	
6.	Trial runs			X	
7.	Compatibility test for customers			X	X
8.	Training			X	

It is estimated that the project can be completed in 12 months.

PROJECT COSTS

I. INVESTMENT COSTS

The investment costs will cover capital investment costs for modification of manufacturing facilities, new machinery, materials, testing equipment, training, installation and consultancy services for modifications. Capital investment costs are shown in Annex A: "Equipment Specification and Cost Breakdown".

II. INCREMENTAL OPERATING COSTS

There is no incremental operating costs.

III. CONTINGENCY FUND

A contingency fund (10% of the total budget) is included in the funding requested from the Multilateral Fund.

IV. TOTAL COSTS

- Investment cost, (Annex A: "Equipment Specification and Cost Breakdown").
- Executing agency's overhead cost are (13%).
- For the complete cost breakdown (Annex B: "Project Budget").
- For the calculation of the unit abatement cost (Annex C: "Unit Abatement Cost").
- Requested funding by the MFMP:

US $ 230,457

Annex A: Investment with Equipment Specification and cost Breakdown

	Description		Total cost US$
2	1 TW Ransburg Gema Electrostic System Custom Built Flame Proof Spray Booths each of dimensions 3.10m x 2.13m x 2.6m high and fitted with 1.52m x 0.96m exhaust units with flame proof fans. Each booth is equipped with a reciprocating spray gun material pump and control panel. The process is fully automatic.	US$	201,820

Annex B: Project Budget

Budget line	Description		Budget US$
A.	Machinery - Spray with automatic reciprocating spray guns (2)		191,820
B.	Installation and commissioning - To cover erection of spray booth and installation and commissioning.		10,000
C.	Training - Additional training in safety procedures		5,000
		Sub-total	**206,820**
	Miscellaneous: Contingency Fund (10% of above costs)		**20,680**
Subtotal I			**227,500**
Agency's Overheads (13% of all)			**2,957**
TOTAL		US$	**230,457**

Annex C: Calculation of Unit Abatement Cost:

A	ODS PHASE OUT		Total Project
A1	Average use of CFC 113 per year	MT	12
A2	ODP of CFC 113		0.8
A3	Total ODP - weighted phase-out	MT	9.6
B	ANNUALIZED CAPITAL COST		
B1	Total investment cost	US $	365,750
B2	Equipment life	Year	10
B3	Discount rate	%	20
B4	Annualized capital cost	US $	59,507
C	ANNUAL INCREMENTAL RECURRENT COST	US $	--
D	UNIT ABATEMENT COST		
D1	Annualized capital cost per kg ODS phased out (B4/A3x1000)	$/kg	6.29
D2	Annual incremental recurrent cost per ODP hase out (C/A3x1000)	$/kg	--
D3	Unit abatement cost (D1+D2)	$/dkg	6.20