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

Eighth Meeting
Montreal, 19-21 October 1992

PROJECT PROPOSALS: TUNISIA

THE MONTREAL PROTOCOL
ON SUBSTANCES THAT DEplete THE OZONE LAYER
PROJECT PRESENTATION TO THE MULTILATERAL FUND
OCTOBER 1992

PROJECT COVER SHEET

COUNTRY: Tunisia

PROJECT TITLE: Ozone Layer Protection through the Reduction of Consumption of Ozone Depleting Substances

SECTORS COVERED: All (Refrigeration, foams, aerosols and institutional support)

ODS CONSUMPTION IN
AFFECTED SECTOR(S):
Foam: 585 t/y
Refrigeration: 250 t/y
Aerosol: 230 t/y
Others: 10 t/y

PROJECT DURATION: 3 Years

PROJECT IMPACT: ODSs PHASED-OUT: 27,000 tons over allowable phaseout period

PROPOSED BUDGET: \$2.05 million
(\$0.8 million allocated at June 1992 meeting)
(\$1.25 million requested at October 1992 meeting to be added to Bank's Work Program)

IMPLEMENTING
AGENCY: World Bank

COORDINATING
NATIONAL AGENCY: Ministère de l'environnement (Agence nationale de protection de l'environnement)

NOTE:

This Project Presentation Package consists of the following elements which must not be separated from one another as each element provides valuable information:

- Project Cover Sheet
- Executive Summary of Project Presentation
- Project Sub-Component descriptions (4)

TUNISIA'S ODS PHASEOUT PROGRAM

EXECUTIVE SUMMARY OF PROJECT PRESENTATION - FACT SHEET

1.0 Background and Eligibility. Tunisia is a developing country for the purpose of the Montreal Protocol and given its per-capita ODS/ODP consumption of less than 0.3 kg is eligible for assistance from the Interim Multilateral Fund for the Implementation of the Montreal Protocol (Multilateral Fund). A Country Program has been prepared and is presently undergoing final review by the Government of Tunisia. A Draft copy of the Country Program is part of this project presentation and is to serve as reference for justification of project selection. Although Tunisia has a population of only 8 million people, it has a very active ODS-using sector which in 1991 consumed over 1000 tons of the ODS regulated by the Montreal Protocol.

2.0 Project Status and Strategy. The Project sub-components (there are 7 sub-components in all) outlined in Tunisia's ODS Phaseout Program form a comprehensive and integrated block of activities for ODS phaseout which must be implemented in a strategically sound manner and fully supported by policy and regulatory measures. The sub-components (those already approved and those being presented at the October 1992 meeting) are to be implemented as part of a coherent ODS phaseout program. Project implementation, hence ODS phaseout, will be most cost effective upon the undertaking of a national ODS Phaseout strategy that is fully funded and supported by an ODS Phaseout Committee. Tunisia was allocated \$800,000 (out of a \$2.2 million request) at the June 1992 meeting of the Multilateral Fund to undertake ODS phaseout projects in the foam and aerosol sectors. This request is intended to finalize the presently identified resource requirements for the National ODS phaseout program.

3.0 Purpose of Project Presentation. Each of the Project sub-components presented in this proposal (4 in all) are below \$500,000. It is therefore requested that \$1.25 million be added to the Bank's Work Program in order to allow the undertaking of the implementation of the Country's ODS phaseout Program. This would bring the total resources allocated to Tunisia to \$2.05 million (down from the \$2.2 million originally requested).

4.0 Rationale for IMLF Funding. All sub-component costs identified in the documentation have been deemed to be valid incremental costs and are therefore eligible for Multilateral Fund assistance. Each sub-component is a strategically significant undertaking which has been identified in the Country Program and essential to the efficient phaseout of ODS. The cost effectiveness of each project sub-components are excellent and well within generally acceptable ranges for their respective sectors.

August 31, 1992

5.0 Precedence. Similar project sub-components have been approved for other countries. There is no innovative or new aspect involved and the technology issues are not significant.

6.0 Project Sub-Components and Rational. The following sub-components are being presented for funding (values in brackets are the expected cost effectiveness per kilogram of ODS phased out over the allowable phaseout period of 1993-2010):

- a) Implementation of Government Actions \$450,000 (Not Applicable)
(to be added to WB work program)

As per the decision taken at the June 1992 meeting of the Executive Committee of the Multilateral Fund, activities relating to government support of ODS phaseout activities (referred to as institutional strengthening) were eligible for IMLF grants on a case by case basis. As per the guidance provided by the EC in document UNEP/OzL.Pro/ExCom/7/20, Tunisia would be classified as a category 2 country given its consumption of over 1000 t/y. The activities identified as part of this sub-component (also identified in the Country Program) are estimated to be the minimum required to carry out the full program of activities identified in the Country Program. It is the judgement of the Government of Tunisia and of the Bank, as implementing agency, that these activities are required to strengthen key ODS phaseout support mechanisms.

- b) Maintenance of Domestic, Commercial \$390,000 (\$0.25/kg ODS)
and industrial refrigeration systems (to be added to WB work program)

As was suggested by the Multilateral Fund Secretariat, the proposed project for domestic refrigeration maintenance and for commercial and industrial refrigeration maintenance have been combined into one project sub-component which is also to include the study on the servicing sector. The commercial and industrial sub-component has also been emphasized to a greater extent, therefore incorporating one of the comments provided by the OORG reviewer. Another OORG recommendation which has been adopted is the importance of a substantial training component in this area. The project will propose training through the country's technical schools and will have a good geographical coverage, with courses in Tunis, Sfax and Kairouan. The training component developed within the Tunisian educational system may also provide for substantial regional benefit as these course and instructor training could be undertaken on a regional basis. Resources for this sub-component will be utilized for developing training courses which will be added to the already existing curriculum and purchasing recovery/recycling equipment.

- | | |
|--|---|
| c) Engineering assistance for design,
testing and introduction of alternative
refrigeration technologies | \$360,000 (\$4.10/kg ODS)
(to be added to WB work program) |
|--|---|

The technical and financial risks of this project have been greatly reduced given that Tabrid (the company which would benefit from this project) had decided, at a strategic level, not to develop its own technology but to rely, as it does now, on the international suppliers of compressors and oil and to simply adapt its refrigerator designs to the new refrigeration systems which are now reaching the market. This applied engineering effort can be undertaken immediately with final production conversion to be completed by the end of 1995, about 2 years after anticipated full scale production will have been undertaken in most developed countries. The 1995-96 objective for production conversion will allow the company to continue its export of refrigerators to other mediterranean countries. The engineering set-up for these activities and testing procedure design and development will take over 1 year to finalize. The final choice of technologies will be based on the adopted international standards. Additional technical support will be sought from the suppliers of the new compressors.

- | | |
|---------------------------------------|--|
| d) ODS Phaseout in the aerosol sector | \$50,000 (\$0.13/kg ODS)
(to be added to WB work program) |
|---------------------------------------|--|

This project sub-component is to be added to the aerosol sector phaseout activities. These resources are required to carry out comprehensive in-plant audits and technology assessments in order to provide tangible and concrete recommendations on the availability and suitability of technologies and the cost implications. Each consultation will result in a technology options report which will guide the plant owner as to the most cost effective option for the conversion of the manufacturing operations. This is an important element in ensuring good cost-effectiveness of the ODS phaseout projects in Tunisia. This will not replace the seminar on alternative aerosol activities envisaged by UNDP but will complement it by introducing hands-on in-plant assessment.

Total: \$1,250,000

7.0 Project Implementation. Given the total value of the grant amount (less than \$2.5 million) for the ODS phaseout project in Tunisia, it will be possible to expedite both the Fund transfer and project implementation through the Bank's modified Operation Directive which requires Country Department Director approval for projects less than \$2.5 million.

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PROJECT PRESENTATION TO THE MULTILATERAL FUND
(OCTOBER 1992)

PROJECT SUB-COMPONENT COVER SHEET

COUNTRY:	Tunisia
PROJECT TITLE:	<u>Project Sub-Component(a): Implementation of Government Actions (Institutional)</u>
SECTORS COVERED:	Support to all ODS-using sectors
ODS CONSUMPTION IN AFFECTED SECTOR(S): (1991 data)	Not Applicable
PROJECT DURATION:	First 3 years of ODS Phaseout Program
PROJECT IMPACT:	Facilitation and coordination of ODS phaseout projects and policies
PROPOSED BUDGET:	\$450,000
IMPLEMENTING AGENCY:	World Bank
COORDINATING NATIONAL AGENCY:	Ministère de l'environnement (Agence nationale de protection de l'environnement)

PROJECT SUMMARY

PROJECT SUB-COMPONENT (a): IMPLEMENTATION OF GOVERNMENT ACTIONS (INSTITUTIONAL)

The following are the recommended institutional actions to be taken by the Tunisian Government in order to ensure an effective implementation of the Action Plan to phase out the use of ODSs in the country (early 1993). They comprise five key elements (estimated cost in brackets):

1. Creation of an Ozone Committee (as the main coordination body) for implementation of the Action Plan (\$240,000 for a 3-year period)
2. Monitoring system for ODS use by substance and end user sector. (\$60,000 for monitoring system implementation through Direction des Statistiques)
3. Introduction of regulatory measures. (\$60,000 for policy work and regulatory analyses)
4. Introduction of an ODS licensing system and accreditation system for refrigeration technicians. (\$60,000 for system implementation)
5. Information dissemination (\$30,000 for public awareness activities)

As the most important first step, the Government, in association with the ODS-using industry, should set up a committee for the implementation of the Action Plan. The overall objectives of the committee are to initiate and facilitate the implementation of the Action Plan. This implies that the committee shall be responsible for:

- monitoring of ODS use;
- identifying, evaluating and arranging for the implementation of projects in the key user sectors, namely refrigeration, foam and aerosols;
- administration of project support from the Interim Multilateral Fund;
- appointing consultants when appropriate;
- assisting the ANPE on preparation and formulation of regulatory measures and advising on adjustments hereto;
- negotiating agreements on ODS conservation, bans and other policies with the user industries, hosting seminars and distributing information on ODS issues and project results within the user sectors;
- arranging information dissemination and awareness campaigns for the general public.

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PROJECT SUB-COMPONENT COVER SHEET

COUNTRY:	Tunisia
PROJECT TITLE:	<u>Project Sub-Component (b): Maintenance of Domestic, Commercial and Industrial Refrigeration Systems</u>
SECTORS COVERED:	Refrigeration (Maintenance)
ODS CONSUMPTION IN AFFECTED SECTOR(S):	Refrigeration (Maintenance): 150 t/y
PROJECT DURATION:	Implementation: 3 Years Duration: 17 Years
PROJECT IMPACT:	ODS Reduction of 100 t/y
PROPOSED BUDGET:	\$490,000 (\$0.25/kg ODS phased out over allowable phaseout period) (\$100,000 allocated at June meeting) (\$390,000 requested at October meeting)
IMPLEMENTING AGENCY:	World Bank
COORDINATING NATIONAL AGENCY:	Ministère de l'environnement (Agence nationale de protection de l'environnement)

August 31, 1992

PROJECT SUMMARY
PROJECT SUB-COMPONENT (b):
Maintenance of Domestic, Commercial and Industrial Refrigerators

Purpose, Objectives and Benefits of the Project: The purpose of the project is to improve the servicing procedures for domestic refrigeration, to increase awareness of the ozone issue among service personnel, and to conserve the use of CFC-12 through recovery and recycling and by adopting nitrogen (or other inert gas) for flushing and purging (therefore eliminating a poor maintenance practice). The objective will be achieved through a study, training program, technical assistance, and investment in equipment. The project will be carried out over a three-year period at a cost of \$490,000. The expected benefits are in the order of 100 t/y reduction in ODS consumption and a significant reduction in the national incremental cost of ODS phaseout.

Project Elements: The project comprises the following elements:

- a) An initial study describing the present refrigeration service sector (domestic, commercial and industrial and evaluating the links between them) and giving a more detailed plan for the actual training, registration of service workshops, number and education of employees, type of repairs based on a series of interviews (number and age of units services, use of CFC, reason for recharging, where repairs take place, etc.). On the basis of the study, a detailed plan for the actual training shall be prepared.
- b) a training program comprising in the education of a number of Tunisian instructors (train the trainers) and in the development of three courses in Tunisia aimed at teaching adequate ODS handling skills (during maintenance, in-field and in-plant servicing and recovery/recycling). The training program should be coupled with the issuance of an ODS license/certificate as proposed under Government Actions. It is planned to employ two teams of instructors, each comprising one professional refrigeration technician and one skilled service worker. The instructors shall receive extensive training in servicing (especially leak testing, recharging and recycling techniques), partly at a technical school in Tunisia and partly during 1 month training abroad at the institution of the advisor or equivalent. The training programs will be incorporated into the Country's technical training schools for refrigeration technicians and service technicians for refrigerated fishing vessels.
- c) technical assistance from an institution which has already developed a program on proper servicing practices. The advisor shall prepare the preliminary study, propose a training plan, organize instruction abroad, suggest teaching materials, and monitor the project at regular intervals;
- d) investment in equipment and necessary training materials, including a number of CFC recovery and recycling machines to be placed at the larger service shops and used for demonstration during the training programs.

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PROJECT SUB-COMPONENT COVER SHEET

COUNTRY:	Tunisia
PROJECT TITLE:	<u>Project Sub-Component(c): Engineering Assistance for the Design, Testing and Introduction of non-ODS Technology in the Production of Domestic Refrigerators</u>
SECTORS COVERED:	Refrigeration (Production of domestic refrigerators)
ODS CONSUMPTION IN AFFECTED SECTOR(S): (1991 data)	60 t/y
PROJECT DURATION:	3 Years
PROJECT IMPACT:	Reduction of ODS consumption by 60 t/y
PROPOSED BUDGET:	\$360,000 (\$4.10/kg ODS Phased Out)
IMPLEMENTING AGENCY:	World Bank
COORDINATING NATIONAL AGENCY:	Ministère de l'environnement (Agence nationale de protection de l'environnement)

August 31, 1992

PROJECT SUB-COMPONENT (C)

Engineering Assistance For Design, Testing and Introduction of non-ODS Technology in the Production of Domestic Refrigerators (A New Technology Investment Project)

Purpose of the Project: The purpose of the project is to familiarize Tabrid, the largest Tunisian domestic refrigerator manufacturer, and refrigeration technicians with HFC-134a technology and allow testing of new refrigerator models in time for actual production. The objective is achieved through engineering assistance and an investment project. Today, several international manufacturers produce limited series of refrigerators employing HFC-134a as refrigerant, and it is generally foreseen that the major producers in developed countries will convert to HFC-134a technology within 1-2 years. As a consequence of this development, the refrigerants, lubricants and components for HFC-134a technology will become generally available. Regulations and market forces in Tunisia's primary export markets will force the Tunisian refrigerator producers to adopt ODS-free refrigeration circuit technology for the exported units by 1996 or perhaps even earlier. A period of 2-3 years will be required for redesign, prototype production and testing before full scale commercial production of the new refrigerators can be commenced. Hence, a project designed to support the testing of new refrigerators is recommended.

Project Elements: The project comprises the following elements:

- engineering support for review of the detailed project program, monitoring of progress and evaluation of the results obtained;
- an investment project to cover equipment and operational expenses for a development and test facility at Tabrid for new refrigerator models with HFC-134a refrigeration circuits.

The project will be carried out in the following phases:

- phase A: detailed planning: work plan, list of equipment, and detailed budget for investment and operational expenses to be prepared by Tabrid with support.
- phase B: design, development and procurement: development of new refrigeration circuit design for 2-3 refrigerator models with support from compressor manufacturer(s). Setting up of testing facility and procurement of testing equipment and refrigeration circuit components.
- phase C: prototype production and testing: testing of production of prototype (s) in small series (5-10 units), steady state performance testing, energy consumption and reliability testing, and adaptation for production. Quality monitoring of refrigerants, lubrication oil, and circuit components.

This project is proposed to start 1Q1993 in order for Tabrid to commence

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PROJECT PRESENTATION TO THE MULTILATERAL FUND
(OCTOBER 1992)

PROJECT SUB-COMPONENT COVER SHEET

COUNTRY: Tunisia

PROJECT TITLE: Project Sub-Component (d): Technical Seminars,
Consultations and ODS Phaseout Projects in the
Aerosol Sector

SECTOR COVERED: Aerosol

ODS CONSUMPTION IN
AFFECTED SECTOR(S): Aerosol: 230 t/y
(1991 data)

PROJECT DURATION: 1-2 Years

PROJECT IMPACT: Elimination of 230 t/y ODS.
Introduction of new/alternative technologies.

PROPOSED BUDGET: \$350,000 (\$300,000 allocated in June 1992)
(\$50,000 requested in October 1992)
(\$0.05/kg ODS phased out over allowable phaseout
period)

IMPLEMENTING
AGENCY: World Bank

COORDINATING
NATIONAL AGENCY: Ministère de l'environnement (Agence nationale
de protection de l'environnement)

August 31, 1992

PROJECT SUB-COMPONENT (D)

Technical Consultations and ODS Phaseout Projects in the Aerosol Sector

Purpose of the Project: The purpose of the project is to assist the aerosol products manufacturers in selecting the most appropriate CFC free technology.

Background: The aerosol industry in Tunisia used 230 tons of CFC in 1991 for the production of aerosol cans. This corresponds to 21% of total ODS consumption. The CFC serves as propellant for the active ingredient in the product.

Project Elements: The project comprises the following elements:

- technical support for individual in-plant consultations on CFC-free options for individual manufacturers;
- investment projects to finance the cost of aerosol plant conversions (there are 15 to 20 producers) where these cannot be shown to be paid back by operational cost savings within two years.

The project will be carried out in the following phases:

- phase A: consultations: an introductory seminar giving information on ODS-free aerosol product options. This will be supplemented with individual consultations with the manufacturers on the technical options that are most appropriate and cost-effective for their specific application.
- phase B: investment and conversion of production facilities: investment in new aerosol production facilities including safety or modification of existing facilities. The financing option is available for the existing duration of phase B.

The project shall be started immediately in order to maximize ODS phaseout early in the overall phaseout program. The planned duration of the project phases is in the order of 1-1.5 years. The project will enable complete elimination of the present consumption of 230 tons/year of CFC as aerosol propellant.

Country program TUNISIA
**RE -REVIEW OF THE EXECUTIVE PROJECT SUMMARY
TUNISIA - ODS PHASEOUT PROJECT**

Project Presentation to the Multilateral Fund, October 1992

1. Implementation of Government Actions
2. Maintenance of Refrigeration Equipment
3. Engineering Assistance Project on Switch to Alternative Technologies
4. ODS Phaseout in the Aerosol Sector

Kuijpers, LJM (OORG)
Eindhoven, 1992 08 31
RWR-570-LK-92420 -lk

RE -REVIEW OF THE PROPOSALS

1. Relevance

The material given in the Executive Summary and the separate Project Summaries presents a clear and concise description of the project strategy. In this review only the two refrigeration projects will be dealt with.

It is clear that the domestic refrigeration industry aims at a rapid conversion to HFC-134a, in particular for those products that are exported. However, for reliability of production, it should be asked whether it would make sense to produce two types of refrigerators in parallel, one on CFC-12 and one on HFC-134a, rather than to completely switch production to HFC-134a. After my opinion, this would be the only logical approach, which would avoid problems in production.

The estimates on the consumption of CFCs for refrigeration are that the majority of CFC-12 is used in OEM and servicing of domestic refrigerators, and a relatively small portion in commercial and small industrial refrigeration. However, taking into account the HCFC-22 consumption for refrigeration, being of equal magnitude compared to the one of CFC-12, the commercial/ industrial sector is important from a point of view of improving knowledge on retrofits, but also on recycle and recovery, actually comparable to the domestic refrigeration servicing sector.

2. Engineering assistance for design, testing and introduction etc.

The proposal on the conversion of the domestic refrigeration manufacturer has not been changed compared to the proposal submitted to the Fund earlier this year; this regards the project stages and the total financing involved (USD 360,000 defined in the specifications). It is a good proposal that it guarantees the development and testing of HFC-134a refrigerator designs. The support from a compressor manufacturer is stated to be required (which I agree to), although, so far, no concrete proposal for the support -and possible financial implications- are given. This should be worked out as soon as possible in the first phase of the project.

As stated in my earlier review, carrying out this project does not necessarily imply that commercial production can start directly after this stage. Additional changes in the production surroundings or in the production process might be necessary, which would require a certain financial investment.

However, for a rapid involvement in the HFC-134a production a first stage of testing and developing is necessary, so that this project should be considered a the first step required.

3. Maintenance of Domestic, Commercial and Industrial Refrigerators

The project has two windows, one for domestic and one for the other refrigeration sectors.

1. The high consumption in the domestic sector is mainly due to methods of bad practice, in particular when cleaning and charging serviced appliances. This implies that training the technicians (where the number of technicians mentioned in the detailed description may be somewhat high) is a very important aspect and I agree to the project concept. The 50 tons indicated which will be saved per year, mainly stem from improved practices and not so much from the use of recovery equipment. Recycle and recovery equipment will reduce CFC-12 emissions by an estimated 200-300 kg per piece of equipment (supposed that 25 recovery apparatus can cover 50% of the national service operations). It could be useful to use the recovery equipment also in those workshops that service commercial refrigeration (although a lot will be done on-site). However, more insight is then needed in the infrastructure.
2. Also in the commercial and small industrial sector the training of the service engineers is the most important aspect. It is difficult to decide whether there is a correlation between the servicing of domestic refrigerators and other refrigeration equipment. If this is so, efficient use of training schedules in recovery and recycling could be decided upon. It is not clear to me whether the commercial sector does not have a need for investments in additional recovery equipment, which could also be used for servicing HCFC-22 equipment, and how experienced they are in retrofitting (some of the firms must be experienced in HCFC-22 equipment).

After my opinion, it is correct that the project centers on the servicing sector as a whole. More efficient use of training material and recovery equipment might be possible, in case both the domestic and the commercial refrigeration sector are interlinked.

4. Concluding Remarks

After my opinion, both refrigeration projects proposed for Tunisia can effectively contribute to a reduction in CFC consumption, provided

1. that certainty is obtained about the support from a compressor manufacturer in the HFC-134a conversion, and that one realizes that it concerns a testing and development project here, which has to be followed by a next -commercializing- step (where commercial production might need additional investments).
2. that the study (which has already been approved) which aims at an investigation of the servicing structure, the practices etc. provides more clarity about the link between the domestic and commercial servicing sector (which might not be present) at short notice. In this way training resources and recovery equipment can be used as effectively as possible.

Knijpers, LIM
31 August 1992



P.S. This is a re-review of the Tunisia project proposals, the earlier review can be found as RWR-570-LK-92265-lk/2, dated 9 June 1992.

C O K P C R A T I O N

Administrative Offices • 200 Petroleum Square Two • 1922 N. Hawaii • Honolulu, HI 96817 • 808-221-6283 • FAX: 808-229-6739

Three visits of one week (audit) at a cost of \$20,000 USD for follow-up
 Comment--No follow-up should be necessary if the three one-week seminars were
 given in a conclusive fashion and if market conditions were discussed and
 allowed to bring the CFC conversion to completion.

Contingencies:

Present cost is \$70,000 USD; should be changed to \$50,000 USD. Expenses and personnel for the seminars/audit is predictable.

Summary

Cost Savings:

With more efficient planning of seminars and audits, time and money can be saved over present estimates. The savings from this recommendation would be \$60,000.

Recommendation:

The final budget allocation for the Tunisian aerosol sector should be \$350,000 USD.