UNITED NATIONS

EP

United Nations Environment Programme

Distr.
Limited

UNEP/OzL.Pro/ExCom/32/30/Libya
9 November 2000

ORIGINAL: ENGLISH

EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Thirty-second Meeting
Ouagadougou, 6-8 December 2000

PROJECT PROPOSALS: LIBYA

This document consist of the comments and recommendations of the Fund Secretariat on the following project proposals:

Foam:

• Phaseout of CFC-11 by conversion to methylene chloride (MC) in the manufacture of flexible polyurethane foam at Ben Ghazi Unit	UNDP
• Phaseout of CFC-11 by conversion to methylene chloride (MC) in the manufacture of flexible polyurethane foam at Garabouli Unit	UNDP
• Phaseout of CFC-11 by conversion to methylene chloride (MC) in the manufacture of flexible polyurethane foam at Sebha Unit	UNDP
• Phasing out of CFC-11 in the manufacture of rigid polyurethane foam at Electrical Household Appliance-Tajura by conversion to a combination of water + HCFC-141b based systems	UNDP

Refrigeration:

• Phasing out ODS in the production of refrigerators and freezers at Electrical Household Appliances Manufacturing	UNIDO

PROJECT EVALUATION SHEET
LIBYA

SECTOR: Foam ODS use in sector (1999): 758.5 ODP tonnes

Sub-sector cost-effectiveness thresholds: Flexible slabstock US $6.23/kg
Rigid US $7.83/kg

Project Titles:

(a) Phaseout of CFC-11 by conversion to methylene chloride (MC) in the manufacture of flexible polyurethane foam at Ben Ghazi Unit
(b) Phaseout of CFC-11 by conversion to methylene chloride (MC) in the manufacture of flexible polyurethane foam at Garabouli Unit
(c) Phaseout of CFC-11 by conversion to methylene chloride (MC) in the manufacture of flexible polyurethane foam at Sebha Unit
(d) Phasing out of CFC-11 in the manufacture of rigid polyurethane foam at Electrical Household Appliance-Tajura by conversion to a combination of water + HCFC-141b based systems

Project Data	**Flexible slabstock**			**Rigid**
	Ben Ghazi Unit	**Garabouli Unit**	**Sebha Unit**	**EHA-Tajura**
Enterprise consumption (ODP tonnes)	31.40	40.30	26.00	16.60
Project impact (ODP tonnes)	31.40	40.30	26.00	15.30
Project duration (months)	36	36	36	36
Initial amount requested (US $)	142,120	141,970	161,980	119,802
Final project cost (US $):				
Incremental capital cost (a)	133,000	136,000	139,000	95,000
Contingency cost (b)	13,300	13,600	13,900	9,500
Incremental operating cost (c)	-21,440	-39,790	-24,803	30,110
Total project cost (a+b+c)	124,860	109,810	128,097	134,610
Local ownership (%)	100%	100%	100%	100%
Export component (%)	0%	0%	0%	0%
Amount requested (US $)	124,860	109,810	128,097	119,802
Cost effectiveness (US $/kg.)	3.98	2.72	4.93	7.83
Counterpart funding confirmed?			Yes	Yes
National coordinating agency	Ministry of Environment and Climate Changes			
Implementing agency	UNDP	UNDP	UNDP	UNDP

Secretariat's Recommendations				
Amount recommended (US $)	124,860	109,810	128,097	119,802
Project impact (ODP tonnes)	31.40	40.30	26.00	15.30
Cost effectiveness (US $/kg)	3.98	2.72	4.93	7.83
Implementing agency support cost (US $)	16,232	14,275	16,653	15,574
Total cost to Multilateral Fund (US $)	141,092	124,085	144,750	135,376

PROJECT DESCRIPTION

Sector Background

- Latest available total ODS consumption (1997)	1,234.0 ODP tonnes
- Baseline consumption of Annex A Group I substances (CFCs)	716.7 ODP tonnes
- Consumption of Annex A Group I substances for the year 1997	647.5 ODP tonnes
- Baseline consumption of CFCs in foam sector	Not Available ODP tonnes
- Consumption of CFCs in foam sector in 1999*	758.5 ODP tonnes

*Based on data from the Libya country programme

1. The preparation of Libya's country programme has just been completed and is being submitted to approval by the Executive Committee at this 32nd Meeting. The country programme indicates a total 1999 Annex A ODS consumption of 947.45 ODP tonnes. The country programme indicates that the foam sector (including use in refrigeration) accounts for 758.45 ODP tonnes or 80% of Libya's ODS consumption in 1999.

2. However as of the time of dispatch of documentation information available to the Fund Secretariat showed that Libya had not reported its ODS consumption data for 1998 and 1999 to the Ozone Secretariat.

3. Based on data reported by Libya to the Ozone Secretariat, the country is in compliance with the CFC freeze. In order to meet the 50% CFC reduction by 2005, an additional 289.15 ODP tonnes of CFC must be phased out.

(a) Phaseout of CFC-11 by conversion to methylene chloride (MC) in the manufacture of flexible polyurethane foam at Ben Ghazi Unit

(b) Phaseout of CFC-11 by conversion to methylene chloride (MC) in the manufacture of flexible polyurethane foam at Garabouli Unit

(c) Phaseout of CFC-11 by conversion to methylene chloride (MC) in the manufacture of flexible polyurethane foam at Sebha Unit

Flexible Slabstock Foam

Ben Ghazi, Garabouli, Sebha

4. Three companies (Ben Ghazi, Garabouli and Sebha) are 100% Libyan companies manufacturing flexible slabstock polyurethane foam for the furniture industry using equipment and quantities of CFC-11 (1999) indicated in the table below. All three companies will convert the foam production to the use of methylene chloride.

Table 1: Profile of the flexible slabstock foam producing enterprises

Name of Enterprise	Date Established	ODS Consumption OPD tonnes	Baseline Equipment[1]	Year*	ICC** US $	IOS*** US $
Ben Ghazi	1994	31.4	LP Hyma conventional 100 kg/min	1994	157,300	21,440
Garabouli	1994	40.3	LP Viking Maxfoam 250 kg/min	1994	160,600	39,790
Sebha	1984	26.0	LP Viking Maxfoam 250 kg/min	1984	163,900	24,803

***Year – year of purchase and/or installation of equipment**

**ICC – incremental capital cost, including 10% contingency.
***IOS – incremental operational savings
[1] LP – Low pressure

5. The existing foam equipment at the enterprises will be retrofitted to use methylene chloride. This includes replacement of the CFC storage tanks and metering systems with new storage stank and metering systems for use with methylene chloride, encapsulation of parts of the production lines, metering system for stabilizer additive, methylene chloride monitor. The incremental capital costs of the projects include the following:

	Incremental capital costs in US $		
	Ben Ghazi	**Garabouli**	**Sebha**
MC storage tank and metering system	25,000	29,000	25,000
Machine enclosure including extractor fans	67,000	60,000	67,000
Ventilation in curing room	14,000	20,000	20,000
MC detectors	8,000	8,000	8,000
Trials, technology transfer and training	19,000	19,000	19,000

6. The projects are expected to accrue incremental operational savings as indicated in table 1 above.

Rigid Foam

(d) Phasing out of CFC-11 in the manufacture of rigid polyurethane foam at Electrical Household Appliance – Tajura unit by conversion to a combination of water + HCFC-141b based systems

Electrical Household Appliance (E.H.A.) - Tajura

7. E.H.A.- Tajura produces rigid polyurethane foam for insulated water heaters. It operates OMS 40 kg/min low pressure dispenser. Its CFC-11 consumption average of the last twelve months (1999 / 2000) was 16.6 tonnes. The production will be converted to a combination of HCFC-141b and water. The incremental capital cost of the project conversion amounts to US $110,000 (including 10% contingency). This includes the cost of replacement of the low pressure machine with an equivalent high pressure machine at US $80,000 and trials, technology

transfer and training for US $20,000. The project costs also include incremental operating cost of US $30,110.

Justification for the use of HCFC-141b

8. Justification for the use of HCFC-141b by E.H.A. has been provided in the project document and as an annex to the document, including projected "techno-economic" impact of zero ODP technologies as well as estimated cost of conversion to zero ODP technology. The Government of Libya has also provided a letter endorsing the use of HCFC-141b by the company consistent with Decision 27/13.

9. A copy of the justification (additional justification) annexed to the project and the letter of the Government of Libya supporting the choice of HCFC-141b are attached to this evaluation.

Impact of the projects

10. A total of 114.3 ODP tonnes will be phased out from the three foam projects. This will eliminate 12% of Libya's 1999 consumption of Annex A Group I substances. There will be residual ODS consumption of 1.3 tonnes as a result of the use of HCFC-141b conversion technology.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

1. The Fund Secretariat and UNDP discussed the projects and agreed on the eligible grants.

RECOMMENDATIONS

1. The Fund Secretariat recommends blanket approval of the Ben Ghazi, Garabouli, Sebha and E.H.A.-Tajura projects with the funding levels and associated support costs indicated below.

	Project Title	Project Funding (US$)	Support Cost (US$)	Implementing Agency
(a)	Phaseout of CFC-11 by conversion to methylene chloride (MC) in the manufacture of flexible polyurethane foam at Ben Ghazi Unit	124,860	16,232	UNDP
(b)	Phaseout of CFC-11 by conversion to methylene chloride (MC) in the manufacture of flexible polyurethane foam at Garabouli Unit	109,810	14,275	UNDP
(c)	Phaseout of CFC-11 by conversion to methylene chloride (MC) in the manufacture of flexible polyurethane foam at Sebha Unit	128,097	16,653	UNDP
(d)	Phasing out of CFC-11 in the manufacture of rigid polyurethane foam at Electrical Household Appliance-Tajura by conversion to a combination of water + HCFC-141b based systems	119,802	15,574	UNDP

Annex

Additional Justification for Using HCFC-141b Technology

UNDP technical expert appraised the enterprise in June 2000, prior to the preparation of this project document, and had discussions with the company's representatives about the choice of technology for replacing the existing CFC-based technology. The enterprise was briefed in detail about the following:

(a) An overview of the available interim (low ODP) and permanent (zero ODP) replacement technologies.
(b) The "techno-economic impact" of each technology on the products manufactured, and the processes and practices employed.
(c) Possible implications of each technology, in terms of its known impact on environment, health and safety, such as ozone depleting potential, global warming potential, occupational health, etc.
(d) It was emphasized to the enterprise that HCFC technologies are interim technologies due to their residual ODP and therefore may continue to adversely affect the environment, although at a lower rate than CFCs.
(e) It was further explained that HCFCs may become controlled substances under present or future international conventions and will therefore also need to be phased out at a future date, and any investments required for their phase-out and for conversion to a permanent technology will have to be borne by the enterprise themselves.

The main conclusions reached by the enterprise through discussions with technical expert were:

1. HCFC-141b will maintain the insulation properties required by the enterprise's customers.

2. All Water based formulations do not provide sufficient insulation properties for the application and would require a significant cost increase to the enterprise.

3. Hydrocarbon technology was seen as not a feasible option due to the layout of the plant operations. The use of hydrocarbons in this environment would be risky and very expensive.

In view of the above, the technology selected is HCFC-141b based systems in the interim, until permanent technology (either water based of HFC-based systems) is available and can provide the required physical properties.

Projected Techno-economic Impact of Zero-ODP Technologies

The projected impact of applying various zero-ODP technologies with respect to the selected technology (HCFC-141b) in this project is summarized as below:

Water based technologies are not sufficiently developed to meet the needs of this application (insulated water heater tanks) which has stringent insulation/thickness requirements. Therefore, they can not be considered.

HFC-134a based systems are not offered in the applicable regional area and are not a feasible zero-ODP option.

Hydrocarbons cannot be used for safety reasons related to the plant layout.

Thus, the selection of HCFC-141b based systems, as the preferred conversion technology, is justified taking into account all the technical, commercial and cost factors.

Estimated Cost of Future Conversion to Zero-ODP Technology

At the present time, there are no zero-ODP technology options, which can be applied cost-effectively for this project (refer to Annex 7).

The following possibilities exist for a future conversion to zero-ODP technology, based on information available presently:

- Water based systems
- HFC based systems

If and when liquid HFC or water-based systems become technically mature and commercially available, the capital investments required to apply this technology are expected to be negligible. The equipment installed/retrofit under this project will be suitable for processing either of these systems. Future costs are expected to be in the area of incremental operating costs, related to higher isocyanate usage (in the case of water based) or higher costs of the HFCs. It is assumed that by the time water-based systems become available, no further density increase will be required.

Before:	12,1 t HCFC-141b	@ US$ 3,20=	38 573
After:	20,1 t MDI increase	@ US$ 2,50=	50 235
Incremental Operating Costs/y			11 662

It is unknown what the price would be of the HFCs in the future; therefore, IOCs related to a potential conversion to HFC technology are not quantifiable at this point.

المؤسسة الوطنية للنفط

NATIONAL OIL CORPORATION

ENTERED

Mr. Frank Pinto
Principal Technical Advisor and Chief
Montreal Protocol Unit, UNDP
New York - USA

Dear Mr. Pinto

As Coordinating office for matters related to the Montreal Protocol in Libya, this office requests UNDP-New York to send the following three projects to the 32nd Meeting of the Executive Committee which will be held in Ouagadougou in December 2000. Please note that the documents must be sent to the Multilateral Fund Secretariat in Montreal before the deadline of 11th October 2000.

Company Name	Applications	City	ODP	US$
BENGHAZI UNIT	Flexible Slabstock PU Foam for Bedding and furniture	BENGHAZI	34 t	158,985
GARABOULI UNIT	Flexible Slabstock PU Foam for Bedding and furniture	GARABOULI	37 t	158,818
SEBHA UNIT	Flexible Slabstock PU Foam for Bedding and furniture	SEBHA	26 t	182,091
ELECTRICAL HOUSE-HOLD APPLIANCE	Rigid PU Foam for insulated water heater tanks	TAJURA	16.6 t	135,376

As you are aware, these projects were prepared by UNDP's International Consultant – Dr. Allal Jnioui.

I would also like to refer to the Executive Committee Decision 27/13 regarding the use of HCFC's in these foam projects and would like the following points noted:

- The companies have received full information concerning the various technologies that are available to phase out CFC's, and were fully briefed about the existing options for their specific subsectors. They realize that HCFC's constitute an interim solution, but they feel that this transitional step will assist them to switch to a non-ODP solution at a later date.
- The use of HCFC-141b is justified at this moment because it will allow to maintain critical insulation values for the panels and spray foam applications. The HCFC-141b option requires minimum change at the manufacturing plant and is commercially available and economically feasible in Libya.
- As for other technological solutions, it was found that:
  - Systems for water-blown technology are not yet available in Libya
  - Hydrocarbons would result in safety concerns due to the flammability of the end-product. Some plants would have to relocate, resulting in delays.

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- HFC-245fa and others are not commercially available at this time.

As indicated in the documents, the consumption of ODS in Libya for the foam sector may have been underestimated. We will follow up on this issue and will correct data that was previously submitted to the Ozone Secretariat in Nairobi in due course.

Yours sincerely

ABDULLATIF SALEM BENRAGEB
Manager
Office of National Committee for Climate Change

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PROJECT EVALUATION SHEET
LIBYA

SECTOR: Refrigeration ODS use in sector (1999): 137.4 ODP tonnes

Sub-sector cost-effectiveness thresholds: Domestic US $13.76/kg

Project Titles:

(a) Phasing out ODS in the production of refrigerators and freezers at Electrical Household Appliances Manufacturing

Project Data	**Domestic**
	Household appliances
Enterprise consumption (ODP tonnes)	57.00
Project impact (ODP tonnes)	53.40
Project duration (months)	30
Initial amount requested (US $)	705,627
Final project cost (US $):	
Incremental capital cost (a)	336,400
Contingency cost (b)	30,140
Incremental operating cost (c)	191,573
Total project cost (a+b+c)	558,113
Local ownership (%)	100%
Export component (%)	0%
Amount requested (US $)	558,113
Cost effectiveness (US $/kg.)	10.45
Counterpart funding confirmed?	Yes
National coordinating agency	National Committee for Climate Change
Implementing agency	UNIDO

Secretariat's Recommendations	
Amount recommended (US $)	558,113
Project impact (ODP tonnes)	53.40
Cost effectiveness (US $/kg)	10.45
Implementing agency support cost (US $)	71,392
Total cost to Multilateral Fund (US $)	629,505

PROJECT DESCRIPTION

Sector background

- Latest available total ODS consumption (1999)	947.32 ODP tonnes
- Baseline consumption of Annex A Group I substances (CFCs)	788.43 ODP tonnes
- Consumption of Annex A Group I substances for the year 1999	845.90 ODP tonnes
- Baseline consumption of CFCs in refrigeration sector	Not available ODP tonnes
- Consumption of CFCs in refrigeration sector in 1999	137.40 ODP tonnes
- Funds approved for investment projects in refrigeration sector as of July 2000 (31st Meeting)	US $0
- Quantity of CFC to be phased out in investment projects in refrigeration sector as of end of 1999	0 ODP tonnes

1. The country programme for Libya has been submitted for consideration by the Executive Committee at the 32nd Meeting. The 1999 CFC consumption exceeds 1995-1997 CFC baseline consumption.

(a) Phasing out ODS in the production of refrigerators and freezers at Electrical Household Appliances Manufacturing

2. Electrical Household Appliances Manufacturing (EHAM) which is the only producer of domestic refrigerators and freezers in Libya operates four production plants. Two domestic refrigerator plants in Tripoli and Rujban and the freezer plant in Muserat are using CFC-11 and CFC-12 as a blowing agent and refrigerant respectively. The proposal covers all three production plants mentioned above. In addition to these three plants, a new production plant was installed in 1999 in Tripoli using HCFC-141b and HFC-134a. This plant is not included in the proposal.

3. The company consumed 48 ODP tonnes of CFC-11 and 9.0 ODP tonnes of CFC-12 in the production of domestic refrigeration appliances (double-door refrigerators and deep freezers) in 1999. The enterprise operates three low-pressure dispensers and one high-pressure dispenser for foaming operations in the baseline.

4. The proposal will phase-out the current consumption of 58.5 ODP tonnes by converting EHAM from CFC-11 to HCFC-141b as the foam blowing agent and from CFC-12 to HFC-134a as the refrigerant. Under the current project, the existing low-pressure foam dispensers will be replaced by three high-pressure foam dispenser (US $255,000). The enterprise will require refrigerant charging units (US $60,000), vacuum pumps (US $56,000) and leak detectors (US $21,000). Other costs include redesign, trials, technical assistance (US $8,000), installation, testing and training (US $15,000). Incremental operating costs are requested for a period of six months by the enterprise reflecting the higher cost of chemicals and an increase in foam density.

Justification for the use of HCFC-141b

5. The enterprises have selected HCFC-141b technology to replace CFC-11 in foam blowing operations. It is an interim solution until HFC systems are commercially available. A letter of justification from the agency is attached. As at the time of preparation of this document a letter advising the Government decision to use HCFC technology has not been received by the Secretariat, however information received from UNIDO indicates that the letter will be submitted shortly. The Sub-Committee on Project Review will be advised accordingly.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

1. The Secretariat has discussed with UNIDO the possibility of rationalization of the conversion of the foaming lines in the Tripoli plant. Subsequently, it was agreed that one high pressure foaming machine equipped with two mixing heads would replace two low pressure dispensers used in the baseline. The Secretariat also discussed with UNIDO the equivalent replacement and retrofitting of existing vacuum pumps. The capital costs have been adjusted accordingly.

2. The Secretariat has questioned the incremental operating costs associated with foam density. Subsequently, UNIDO adjusted these costs.

RECOMMENDATIONS

1. The Fund Secretariat recommends blanket approval of the commercial refrigeration project from UNIDO with the level of funding and associated support costs as indicated below, subject to receipt of the letter from the Government of Libya concerning HCFC use.

	Project Title	Project Funding (US$)	Support Cost (US$)	Implementing Agency
(a)	Phasing out ODS in the production of refrigerators and freezers at Electrical Household Appliances Manufacturing	558,113	71,392	UNIDO

Annex

Justification for the use of HCFC-141b

CFC-141b technology

Although a tentative solution, HCFC-141b foam blowing technology is used as an alternative to CFC-11 in domestic refrigerator factories in order to facilitate CFCs phase out, particularly at small industry or factories located in the residential area where storage of inflammable substances is not allowed.

For the HCFC-141b foam blowing technology, it is required to operate with high pressure foaming machines to ensure same foam quality with satisfactory insulation and mechanical performances as those given by the CFC-11 foaming mainly due to the reduced flow ability of the PU formulation with HCFC-141b

Alternative for the company

As described in the company background, it has two manufacturing sites of FB30 refrigerators due to the product distribution and social reasons. These two lines have relatively small production capacity (ca. 50 units per day). The factory in Tripoli is located in the residential area and has no extra space to install a cyclopentane storage tank. The Rujban factory is smaller and located also in the residential area of the small town in the mountain side, far from the company headquarter in Tripoli. It would not be suitable to operate cyclopentane foaming in both factories, since this technology would require permission of the local administration for the operation as well as very careful operation after the intensive training of workers in terms of safety operation.

The freezer factory at Muserat is located in the industrial area and has daily production of more than 100 units. It may be possible to operate cyclopentane foaming at the Muserat factory for freezer production. However, the expansion of this factory to incorporate domestic refrigerator production is not possible at the moment, since the existing production line has no extra space to accommodate additional refrigerator production of more than 100 units per day.

The company management should keep the current operation at three sites as the company strategy. In this circumstance, it is impossible to apply the cyclopentane foam blowing technology in the company. Also the grants available from the Multilateral Fund would not be satisfactory to provide three foaming systems adequate for cyclopentane foaming technology for existing three production lines, and the company has no financial resources to invest for reconstruction of the factories to apply the cyclopentane foaming technology.

After the extensive consideration, it has been decided that the company takes HCFC-141b foam blowing technology as an alternative to CFC-11 technology. This transitional technology is only the one to facilitate the CFC phase out at Electrical Household Appliances. However, the company is committed to convert the appliances production lines to a long-term solution (liquid HFCs blowing agents and new insulation technology) when it will become commercially viable, or to convert to the hydrocarbon technology in the future by their own expenses,.