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PROJECT COVER SHEET

COUNTRY	:	**LIBYA**
IMPLEMENTING AGENCY	:	**UNIDO**
PROJECT TITLE	:	**The National CFC Phase-out Plan**
PROJECT IN CURRENT BUSINESS PLAN	:	**Yes**
SECTOR	:	**Refrigeration, Foam**
ODS USE IN THE SECTORS (2002) :	:	**838.6 ODP tonnes**
PROJECT IMPACT 2002-2004 (approved projects)	:	**367.4 ODP tonnes**
PROJECT IMPACT (The National CFC Phase-out Plan)	:	**450.5 ODP tonnes**
PROJECT DURATION	:	**2003 - 2009**
PROJECT COST	:	**USD 2,497,947 (incl. 150,000 management cost)**
LOCAL OWNERSHIP	:	**100%**
EXPORT COMPONENT	:	**Nil**
IMPLEMENTING AGENCY SUPPORT COST	:	**USD 187,345**
REQUESTED GRANT	:	**USD 2,685,292**
COST-EFFECTIVENESS	:	**USD 5.9 per kg ODP**
TOTAL COST OF PROJECT TO MULTILATERAL FUND	:	**USD 2,685,292**

FINANCING ARRANGEMENT	:	**Project cost**	**Grant with support cost**
2003 tranche	:	**USD 1,500,000**	**USD 1,612,500**
2004 tranche		**0**	**0**
2005 tranche	:	**USD 720,000**	**USD 774,000**
2006 tranche	:	**USD 277,947**	**USD 298,793**
STATUS OF COUNTERPART FUNDING	:	**N/A**	
PROJECT MONITORING MILESTONES INCLUDED	:	**Yes**	
NATIONAL COORDINATING AGENCY	:	**COMMITTEE ON CLIMATE CHANGE**	

1 ROJECT SUMMARY

The present National CFC Phase-out Plan aims at phasing-out all the remaining consumption of CFCs (excluding halons) in Libya over the period of 2002 – 2008. A series of investment, non-investment, and technical support activities are proposed to achieve this target in the foam, commercial and transportation refrigeration manufacturing and RM, sectors. The present phase-out plan will enable the Government of Libya to totally phase the remaining CFCs consumption by January 1, 2009 except the CFC usage in the refrigeration servicing. Considering this multi-phased approach it is crucial that flexibility be given to the Government of Libya to adapt or modify its strategies during implementation of this plan as the need arises.

The Government of Libya requests about US$ 2.7 million as the total funding from the Multilateral Fund for the total elimination of remaining CFC substances in the country. The funding will be paid out in installments as specified in the Agreement attached. Being a performance based Agreement, future payments will be conditioned to meeting the performance targets and conditions specified in the Agreement.

The approval of this project will result in the elimination of the remaining CFC consumption in the sectors addressed of Libya and will substantially contribute to the ability of the country to meet its Montreal Protocol obligations.

Prepared by: UNIDO Date: 5 September 2003

Reviewed by: Date: 5 September 2003

Executive Summary

The National CFC Phase-out Plan, Libya

Contents

Background

1.1 General information

The Libyan Arab Jamahiriya ratified the 1985 Vienna Convention and the 1987 Montreal Protocol on July 11, 1990 and qualifies as an Article 5 country. In order to comply with the provisions of the Protocol, the National Committee for Climate Change (NCCC) of Libya has carried out a national survey in 2000 and formulated its Country Programme with technical assistance of UNIDO funded by the Multilateral Fund.

The Country Programme was approved by 32nd ExCom in 2002 and provides data on import and use of ODS in Libya and expresses the commitment of the country to phase out consumption of ODS. An Action Plan has been defined, and steps will be taken to implement some or all of the action items, after scrutiny, to ensure a smooth phase out without causing undue economic hardship to the industrial, commercial and the domestic consumers.

Libya does not produce any ODS and all its requirements are met through imports. According to the Country Programme in 1999 CFCs consumption (Annex A) amounted to 947.32 ODP tonnes, resulting in a consumption of 0.18 kg/capita.

Under the Country Programme, Libya is committed to phase out the consumption of CFCs in a controlled and cost effective manner. Following the lifting of the embargo, production in the foam and refrigeration sector has begun picking up, and is yet to reach peak levels. As can be seen from the consumption figures, 1999 CFCs consumption was much higher than earlier years. It will take some or all of the steps outlined in the Action Plan to comply with the phase out schedule required by the Protocol. With timely assistance from the Multilateral Fund to phase out CFCs from the Foam and R&AC manufacturing enterprises, the NCCC was confident of meeting the 2005 compliance requirements of 50% reduction in consumption. However, the NCCC was concerned about availability of a supply of ODS to meet the service requirements of existing ODS based R&AC equipment to enable them operate to the end of their economic life. It is expected that by 2010, most equipment will have been retrofitted or replaced with ODS free technology, with some CFC-12 based equipment remaining. It will strongly encourage recovery and recycling to meet this requirement. Market forces such as rising prices and increasing availability of ozone friendly technology, along with phase-out in the manufacturing sector with assistance from the Multilateral Fund, will play a vital role in the shift by consumers to ODS free technology, particularly in the commercial and industrial sector.

The General Peoples' Committee has nominated the National Committee for Climate Change, which reports to the Secretary of the General Peoples' Committee, for the preparation of the Country Programme. The institutional strengthening project was submitted and approved by the 32nd ExCom (March 2001) for the creation of the National Ozone Unit. However, due to various reasons, the NOU was officially established in year 2002. The NOU is constituted within the Executive Office of the National Committee for Climate Change to coordinate and monitor activities towards a complete phase out of ODS.

1.2 Objectives

With the assistance of UNIDO Libya has prepared a National Phase out Plan (NPP) that will allow Libya to phase out all remaining CFC use in foam and refrigeration manufacturing and servicing sectors by 2010.

The objectives of the NPP are to:

- Characterize consumption and uses of the ozone-depleting substances (ODS) in Libya.
- Assess the market structure for CFC supply and consumption in the country;
- Develop documentation on distributors and consumers of CFCs;
- Identify and characterizes availability and usage of alternatives;
- Identify opportunities for conversions;

- Develop and implement a strong policy action program for ODS phase out;
- Develop a strategy, and an action plan for phasing out remaining ODS consumption; and
- Achieve the phase out of the ODS in 2010, through the implementation of the action plan.

Availability of CFC based equipment and remaining equipment inventories are encouraging continued demand on CFC. Consumption remains for servicing of domestic refrigerators, commercial and industrial refrigeration equipment, and for mobile air conditioning. It has been estimated that under the current conditions, consumption of CFC will increase, unless drastic actions are quickly taken through the implementation of investment and other non-investment activities.

2. Impact of the Proposal

2.1 Current consumption

When preparing the Country Programme, a national survey was carried out to estimate consumption of controlled substances in the country through questionnaires and discussions with importers and users. Reasonably accurate data were available from users in the formal sector. However, use in the informal sector (repair and maintenance of domestic refrigerators, air-conditioners and MAC applications) has been estimated, as the informal service sector is quite large.

Upon approval of the Country Programme, the Government of Libya in cooperation with UNDP and UNIDO has initiated formulation of respective investment projects in foam and domestic refrigeration manufacturing sector. During the period between the 32nd and 35th ExComs, 9 investment projects in the PU foam sector (flexible and rigid foam sub-sectors) and 1 project in domestic refrigerators and freezers manufacturing have been approved (see Annex 1).

Upon receipt of the government request by UNIDO to assist in formulation of the National CFC Phase-out Plan (NPP), it was found necessary to conduct a new national survey on the remaining ODS consumption by the country using the relevant preparatory assistance project.

Due to the time constrain, an additional fund for the Country Programme update was not requested.

The historical and current ODS consumption is given in Table 1 below.

Table 1: Consumption of ODS (ODP tonnes)

Chemical	Average 1995* 1997	1998	1999 *	2000	2001**	2002***
Annex A Group I						
CFC-11	**531.5**	650.3	769.95	766.0	*857.8*	701.5
CFC-12	**164.4**	8.90	110.90	171.3	157.7	121.2
CFC-114	**0.08**	0.13	10.37	10.0	10.9	10.9
CFC-115 (as R-502)	**5.77**	0.62	4.60	5.8	4.9	5.0
Sub-toal	**701.8**	**660.0**	**895.8**	**953.1**	**1020.4**	**838.6**
						Annex A Group II
Halon 1211	**1.5**	1.5.0	1.50	1.5	1.6	1.6
Halon 1301	**85.5**	140.00	50.00	50.0	52.8	52.8
Total Annex A	**788.8**	**801.50**	**947.32**	**1004.6**	**1074.8**	**893.0**
Annex C Group I						
HCFC-22	**8.88**	11.53	10.54	40.0	60.1	60.0
Annex E Group I						
Methyl Bromide	**60.66**	0	122.50	164.0	113.0	151.0

Note: * *Data taken from the Country Programme*
** *Data reported by NOU to the Ozone Secretariat (letter of 30 September 2002)*
*** *Data resulted from the national survey conduced in 2003 for the NPP preparation*

2.2. Forecast Consumption at per Country Programme

Growth in economic performance is expected to continue and will result in continued growth in the industrial sectors, particularly in the oil and gas sector, leading to growth in the commercial sector and strong demands in the consumer sector. Air conditioning is a necessity in Libya, and central air conditioning, split and individual air-conditioning units are all prevalent. Perishable goods need refrigeration for storage and distribution. Manufacture, imports and sales of consumer goods such as refrigerators, air-conditioners, and foam products are expected to continue increasing. Similarly, in the commercial sector, Libya's demand for chillers, freezers and air-conditioning units is expected to increase, particularly with the growth of the oil and gas industry.

The forecast of unconstrained consumption is given below in Table 2. A linear growth rate of 10.0% till the year 2005 and 5.0% from then till 2010 has been assumed for this exercise.

Table 2: Forecast of Unconstrained Consumption (ODP tonnes) *

Substance	1995	1997	1999	2001	2003	2005	2007	2009	2010
CFC-11	474.90	590.65	769.95	931.64	1.127.28	1.364.01	1.503.82	1.657.97	1.740.87
CFC-12	173.60	209.80	110.90	134.19	162. 10	196.47	216.60	238.81	250.75
CFC-114	0.13	0.10	10.37	0.16	0.19	0.23	0.25	0.28	0.29
CFC-1 15	6.74	9.93	4.60	5.57	6.73	8.15	8.98	9.91	10.40
Halon 1211	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
Halon 1301	150.00	56.50	50.00	60.50	73.21	88.58	97.66	107.67	113.05
TOTAL	**806.87**	**868.48**	**947.32**	**1.133.55**	**1.371.28**	**1.658.94**	**1.828.82**	**2.016.13**	**2.116.86**

Note: * *The table copied from the original Country Programme*

2.3. Assumption of consumption data and reduction schedule

In response to the Decision 35/37, the Option 2 was selected by Libya as a start point for phase-out residual CFCs and the following ODS consumption updated data have been established by the Multilateral Fund Secretariat following the 38th Meeting of the Executive Committee:

Due to the current non-compliance status of the country and its commitment to return to the compliance by 2003, it is suggested to use the ODS consumption data of the year 2002 as the lowest one in order to achieve the ODS phase-out targets (see table 3).

CFCs

-	Latest (year 2002) consumption	893.0 ODP tonnes
-	Baseline consumption	716.7 ODP tonnes
-	Consumption funded since the starting point	367.4 ODP tonnes

Halons

-	Latest (year 2002) installed	54.4 ODP tonnes
-	Baseline installed	633.1 ODP tonnes

HCFCs

-	Latest (year 2002) consumption	3.0 ODP tonnes

Methyl Bromide

-	Latest (year 2002) consumption	151,0 ODP tonnes
-	Baseline data	77.8 ODP tonnes

Bearing in mind the various objective difficulties and constrains that the country was facing during the last several years to meet the commitments under the Montreal Protocol, the Government of Libya took a decision to phase-out the reaming ODS consumption under the NPP using assistance of UNIDO.

Pursuant to Decisions XIV/25 and XV/36 , the Government of Libya submitted to the Implementation Committee at its 31st Meeting a plan of action with time-specific benchmarks to ensure a prompt return to compliance. As a result, the Implementation Committee noted with appreciation the plan of action submitted by Libya and the fact that it was working with UNIDO to finalize The National CFC Phase-out Plan. The draft recommendations of the Implementation Committee, listing the benchmarks and measures taken by the Government to ensure a return to compliance were accepted by the Parties. The highlights of the draft recommendation are as follows:

Under the plan, Libya specifically commits itself:

a) To reduce CFC consumption from 985 ODP tonnes in 2001 as follows:
   i) To 710.0 ODP tonnes in 2003;
   ii) To 610.0 ODP tonnes in 2004
   iii) To 303.0 ODP tonnes in 2005
   iv) To 107.0 ODP tonnes in 2007
   v) To phase out CFC consumption by 1 January 2010 as required under the Montreal Protocol except for essential uses that might be authorized by the Parties;

b) To establish, by (2004), a system for licensing imports and exports of ODS, including quotas;
c) To ban, by (2004), imports of ODS-using equipment.

Regarding ratification of the London and Copenhagen Amendments to the Protocol, the NOU has informed UNIDO that the London Amendment is already ratified and the ratification of the Copenhagen Amendment is in process as it is stated in the endorsement letter to the submitted NPP project document.

As a result of the survey, the following actual ODS consumption data have been identified and summarized in the Table 3 below:

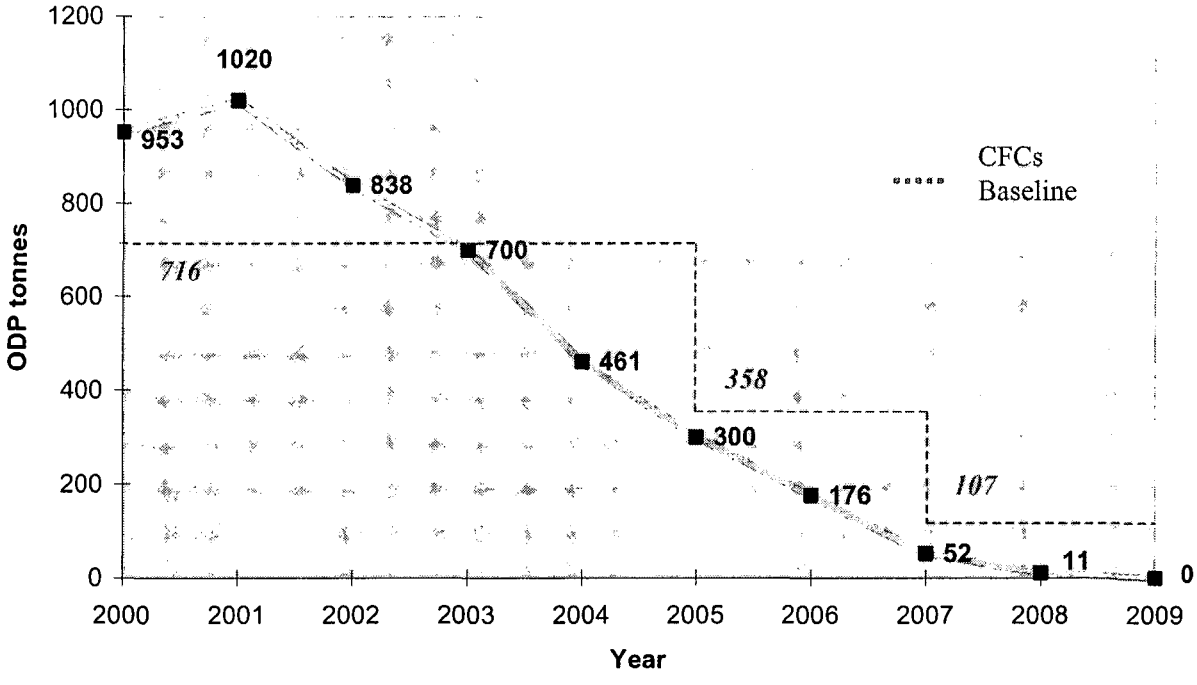
Table 3. Summary of ODS consumption by sector and sub-sectors during 1999-2002, (ODP tonnes)

Sector	1999	2000	2001	2002
Flexible foams (CFC-11)	642	623	608	575
Rigid foams (CFC-11)	60.5	58.3	53	52
Domestic refrigeration manufacturing				
CFC-11	44.4	44.4	44.4	44.4
CFC-12	9.0	9.0	9.0	9.9
CFC-114	10.4	10.0	10.9	10.9
CFC-115	4.6	5.8	4.9	5.0
Commerc./transportation refrigeration manufacturing				
CFC-11		40.3	35.5	30.1
CFC-12		22.8	20.5	10.6
Refr. servicing (CFC-12)	141.3	139.5	130.2	101.6
Halons	3.6	51.5	52	54.4
MeBr	175	164	113	151

Note: With regard to the tendency of CFC consumption in flexible foam sub-sector during 1999-2002, the table 3 above shows that the consumption has dropped from 642 tonnes in 1999 to 575 tonnes in 2003. This phenomenon was caused mainly because many small foam manufacturers are using methylene chloride as a cheaper blowing agent. The bigger manufacturers do not want to follow this practice with understanding that significant technical and safety modification are required to ensure proper operation of the converted facilities specially for flexible slabstock lines.

In order to achieve the relevant CFC phase-out targets, a detailed plan of implementation actions was elaborated and presented in Fig. 1

Figures 1. Reduction plan of CFC consumption (ODP tonnes) (excluding Halons)



3. Data collection and validation

As a result of thorough analyses of the Country Programme, discussions with the NOU staff and some project sites visits, it was found that a national survey of the remaining ODS consumption by the different sectors and sub-sectors of the country's economy is required.

For this purpose, a specialized national consulting company (Assalama Bureau) was sub-contracted by UNIDO to provide the required services specified in the respective Terms of Reference jointly prepared by UNIDO and NOU.

Prior to the contract award, the series of substantive meetings took place to interview, instruct and brief the team of national experts on the methodology and practice of the data collection, verification and reporting.

Following the Terms of reference requirements and discussions held with the sub-contractor's team, the following national public and private offices, institutions and companies as the sources of information have been contacted:

General Authority for Documentations and Information
General Authority for Environment
National Oil Corporation
Iron and Steel Complex
General Electricity Co. of Libya
Secretary of Production
Shabia Secretary of Industry
Air Conditioning and Refrigeration Syndicate

Chamber of Industry and Commerce
Sert Oil Co.
Brega Oil Marketing Co.
Veba Oil Co.
Ras Lanuf Chemical Industry Co.
Arabic Gulf Oil Co.
Industrial Research Centre
Agriculture Research Center
Faculty of Agriculture – Efatah University
Ahlia Stores and Cold Stores
General Co. for Chemical Industry

Importers of Chemicals:
Tripoli Gas Company (Public Company)
Ben ghazi Gas Company (Public Company)
Mr. Mostafa Ghannai
Mr. Adel Mariul

Prices of Chemicals:

CFC-11	2.1-2.5$/kg
CFC-12	2.5-2.7$/kg
HCFC-22	3.6-4.1$/kg
HCFC-141b	2.7-3.5$/kg
HCFC-134a	4.7-7.0$/kKg
MeCl	1.1-1.3$/kg
Polyol	1.28-1.40$/kg
TDI	2.10-2.40$/kg
MDI	1.35-1.50$/kg
MeBr	5.0 $/kg

4. Strategies and Plan of Implementation

After a long period of inactivity as a result of the UN sanctions, the key initiative taken by Libya has been to mandate the National Committee for Climate Change (NCCC) to formulate the Country Programme. At that stage, the Libyan Government conducted a thorough analyses of the current situation regarding import and usage of various ODS in order to compare the current ODS consumption, projected future demand and compliance targets and prepare an appropriate implementable strategy and policy taking into account the following conditions:

1. Compliance with freeze, from July 1999 consumption cannot exceed the baseline average of 1995-1997;
2. Compliance with Montreal Protocol requirements: 50% reduction of ODS of Annex A, Group I in January first 2005, 85 % reduction by January first 2007 and 100% reduction by 2010;
3. The projection of future demand was developed using 2000 base year consumption data assuming demand by the end of 2010.
4. The Projection of future demand was developed by the end of 2010, if import of ODS using equipment will be forbiden immediately.

The NCCC, designated by the General Peoples' Committee, is committed to phasing out the consumption of ODS in a controlled and cost effective manner. It will take the steps outlined in the Action Plan to meet the

freeze and phase out schedule required by the Protocol. The main thrust is in the conversion of the foam and refrigerator units in the public sector to ozone friendly technologies with funding from the Multilateral Fund in time to meet the 50% phase-out of 2005. For the R&AC service sector, the strategy is based on training, containment, recovery and recycling.

Development and implementation of control measures, public awareness campaigns and training activities are the main components of the action plan. Legislation will be put in place and enactment texts will be defined, where necessary, to meet the objectives described in the action plan. Technical monitoring capacity will be improved to ensure effective monitoring of the legal and technical provisions provided for under the Montreal Protocol.

The General Peoples' Committee has established the National Committee for Climate Change (NCCC), (reporting to the Secretary of the General Peoples' Committee), and entrusted it with duties to develop a strategy and action plan for phasing out Ozone Depleting Substances. In order to implement these duties the NCCC has developed an Action Plan as follows:

- Establish the Executive Office of the NCCC as a focal point for all activities related to the Montreal Protocol.
- Embark on a public awareness program with assistance of UNEP, UNIDO and funding from the Multilateral Fund
- Develop and implement control measures such as:
  - Prohibit imports of ODS using equipment
  - Prohibit new enterprises producing and/or assembling equipment, foams, or aerosols using ODS
  - Establish import quotas into the licensing system that is in place since January 2003.
  - Prohibit investments in building new plants using ODS
- Train Customs Department, National Information Center and NOU in monitoring and collection of data to meet the reporting requirements of the Protocol.
- Seek funding and monitor projects to convert refrigeration and foam manufacturing facilities
- Identify other investment projects not covered in this Country Programme and submit proposals for funding
- Implement a National Recovery and Recycling project.
- Identify key refrigeration installations and submit retrofitting proposals to the Multilateral Fund.

The following regulatory measures are being considered:

- Immediate application of ban of import of ODS-using and ODS-containing equipment (especially second-hand domestic refrigerators using CFC-12), etc.(approved in January 2003).
- Immediate prohibition of any new activity which aims the production of ODSs or ODS-using equipment;
- Application of strict control of import/export of all ODSs (including licensing, taxation and/or quotas as appropriate);
- Application of control on trade of ODSs (including licensing and taxation policy as appropriate);
- Application of an obligatory certification of technicians. Consideration of ban of illegal service of refrigerators, interlinkage of license on trade with certificate.
- Development of fiscal incentives/disincentives system to encourage the use of ODS alternatives and transitional substances.

Type of action	Specific action	Status

Programming general ODS management	A detailed list of regulatory acts	Done
Reporting of ODS consumption data as a part of environmental reporting system	Reporting system	Done
Consultation of policy makers with all interested parties	Discussion of policy measures in national workshops on ODS phase out	Ongoing
Establish legal framework for ODS phase out.	Incorporate provisions for ODS phasing out into the new law on environmental protection	Ongoing will require further assistance

Once the ODS regulations are finalized and the phasing out management plan is approved, several key results may be anticipated:

1. Import quotas will allow government and industry to ensure compliance with the protocol targets;
2. NCCC will promote phase out actions with all CFC users including MAC sector;
3. CFCs users will be provided with financial support under phase out management plan for recovery & recycling, retrofitting and conversion projects and these actions will lead to a rapid decline in demand for CFCs.

In addition to these initiatives described above, the following additional program will be implemented:

- Education of the main stakeholders and interested parties;
- Public awareness campaign;
- Dissemination of information in Arabic language.

5. Incremental Costs

The incremental conversion costs have been estimated based on the following documents and assumptions:

- Guidance document for preparation of NPP and NPP approved by the 38th ExCom;
- Guidance documents, decisions and recommendations related to the preparation of investment project documents for the particular individual or groups of enterprises of respective ODS consuming sectors;
- Analyses of the current baseline data collected during the recent national survey with regard to the remaining ODS consumption on the country level in light of the content of the Country Programme;
- Methodology, experience and practice of the ICC and IOC/IOS assessment accumulated so far and agreed between Implementing Agencies and the Multilateral

5.1. Sub-sector of flexible PU foam manufacturing

The sub-sector is represented by 20 factories established in the period 1969-1994 and operating in public and private sectors of industry.

Eight public PU slabstock-manufacturing enterprises located in different provinces of the country are being managed by the General Company for Plastic and Foam Industry (GSPFI).

The production programme of this enterprise (slabstock and box foam) is represented by foams with the range of densities of 15-24 kg/m3.

Eight enterprises including four factories of GSPFI are in process of conversion under UNDP projects (see Annex I). Seven enterprises will be converted to the methylene chloride and one to the LCD alternative blowing technologies.

It was expected that some of the remaining 12 enterprises (eight slabstock and four box foam) could also be converted to LCD technology (see table 5). However, in view of the recent decisions of the Executive Committee with regard to the LCD technology, it was decided that all remaining enterprises would be converted to the methylene chloride blowing technology as the most appropriate one for the conditions of the country.

5.1.1. Assessment of incremental investment cost (ICC) and operating costs/savings for conversion of PU slabstock manufacturing enterprises

The list of eligible enterprises and technical services required for the conversion to the methylene chloride blowing technology as well as the methodology for ICC estimation are well established based on the relevant guidelines, documents and practice of such investment project implementation.

The same is also relevant to the estimation (calculation of the potential savings) that could be accumulated due to the lower cost of methylene chloride in comparison to CFC-11.

Cost estimation of conversion for eight slabstock manufacturers, using the year 2002 consumption and production data is attached (see Annex II) and summarized below.

Table 4. List and baseline data for remaining flexible PU foam manufacturing sector

Company Name	Estab. date	Annual Production Mt, Year 2002	Equipment	CFC-11 Consumption, Mt		
				2000	2001	2002
Flexible foam slabstock						
Bayan at Green Square Unit GCPFI	1969	680	Viking Max Foam 500	85	60	40
Derma Unit -GCPFI	1985	540	Viking Max Foam 500	36	35	32
El Wahda Unit - GCPFI	1982	760	Hennecke 1200	82	64	43
Musrata Unit - GCPFI	1987	520	Viking Max Foam 500	50	45	30
Sons of Al Ozzi Foam Company – Tripoli	1970	280	Spaul . 531 B	28	25	15
Tasharoukia EL-Mehwaria	1993	270	CMC - 2C	20	15	13
Tasharoukia El-Tanmia El--Senaeia	1993	300	Tecmac	28	21	15
Tasharoukiate El-Kalij	1994	280	Tecmac	32	28	14
Sub-total		**3630**		**361**	**293**	**202**

Box foams						
Tasharoukiate Elabdali's sons	1988	350	1 LP locally made foaming unit	25	20	18
Tasharoukiate Garmud Janzur	1973	200	1 LP locally made foaming unit	54	32	10
Al Deliui Foam Company Benghazi	1990	210	1 LP locally made foaming unit	26	18	12
Tasharoukiate Ammar's sons	1994	420	1 LP locally made foaming unit	38	30	20
Sub-total		**1180**		**143**	**100**	**60**
Total		**4810**		**504**	**393**	**262**

Summary table

Company name	CFC-11 consumption in 2002 tonnes	ICC budget component US$	IOC/IOS budget comp. US$	Estimated budget US$	Request budget US$	Cost-effectiveness US$/kg
Flexible foam slabstock						
Bayan at Green Square Unit GCPFI	40	134,200	-16,370	117,830	117,830	2.94
Derma Unit -GCPFI	32	134,200	-7,650	126,550	126,550	3.95
El Wahda Unit - GCPFI	43	134,200	-15,830	118,370	118,370	2.75
Musrata Unit - GCPFI	30	134,200	-3,390	130,810	130,810	4.36
Sons of Al Ozzi Foam Company – Tripoli	15	134,200	16,080	150,280	93,450	6.23
Tasharoukia EL-Mehwaria	13	134,200	21,730	155,930	80,990	6.23
Tasharoukia El-Tanmia El--Senaeia	15	134,200	18,860	153,060	93,450	6.23
Tasharoukiate El-Kalij	14	134,200	19,600	153,800	87,220	6.23
Total	**202**	**1,073,600**	**33,030**	**1,106,630**	**848,670**	**5.24**

5.1.2. Assessment of incremental operating cost and operating cost/savings for the conversion of PU box foam manufacturing enterprises

The remaining four box foam manufacturers (see table 4) are equipped with the simple, locally made foaming units. The existing production premises do not have any safety precautions that require operating with methylene chloride.

Therefore, the enterprises should be provided with a package of required equipment and technical assistance to ensure safe operation of the converted units.

Cost estimation of conversion for these four enterprises using year 2002 consumption and production data is attached (see Annex III) and summarized below.

Summary table

Company name	CFC-11 consumption in 2002 tonnes	ICC budget component US$	IOC/IOS budget comp. US$	Project budget US$	Cost effectiveness US$/kg
Flexible PU box foam					
Tasharoukiate Elabdali's sons	18	48,500	1,660	50,160	2.78
Tasharoukiate Garmud Janzur	10	48,500	8,990	57,490	5.75
Al Deliui Foam Company Benghazi	12	48,500	3,340	48,500	4.1
Tasharoukiate Ammar's sons	20	48,500	4,330	51,840	2.6
Total	**60**	**194,000**	**18,320**	**207,990**	**3.8**

5.2. Sub-sector of rigid PU foam manufacturing for insulation of water heaters/boilers and water coolers

Four remaining enterprises of the sub-sector are manufacturing the water heaters/boilers, portable and stationary water coolers and insulated tanks for commercial and food processing industry (see table 6).

Thermo insulation of the products using rigid PU foam is a technological part of the overall production process. In order to operate with HCFC-141b blowing systems, selected as an alternative blowing technology, the existing low-pressure spray units and locally made low-pressure foaming machines are to be replaced by high-pressure units.

In addition, the existing moulds to be also modified or replaced to insure a smooth operation process and quality of foam.

The cost of the moulds modifications to be absorbed by the end-users.

The incremental conversion cost (ICC and IOC) for this group of enterprises were estimated based on similar, recently approved or completed projects (see annex IV).

The summary of the incremental costs estimation is presented below. Due to the cost effectiveness reason, the estimated IUC component will not be requested for funding. It is suggested that eight low-pressure spray units will be replaced with four high-pressure spray machines (one for each factory) with an output of 8-10 kg/min. and four locally made low-pressure foaming units will be replaced by high-pressure machines of 40-60 kg/min. output.

Table 5
List and baseline data for remaining rigid PU insulation foam manufacturing

Company Name	Establishment date	Annual Production Mt, 2002	Equipment	Consumption, Mt/y CFC-11		
				2000	2001	2002
Brothers Company (boilers/water heaters insulation)	1990	Insulation of boilers/heaters (80-200l) production - 22100 u/y 89 Mt foam	2 LP spray units 1 LP locally made foaming machine 12 moulds	12	14	14
Essourur Company (boilers/water heaters insulation)	1991	Insulation of boilers (40-180l) production - 13500 u/y 84 Mt foam	2 LP spray units 1 LP locally made foaming machine 10 moulds	10	12	11
Musrata Company (water coolers, cold tanks)	1994	Portable cold water containers (5-50 l); production - 11500 u/y Cold tanks (200-500l), production – 850 u/y 90 Mt foam	2 LP spray units 1 LP locally made foaming machine 16 moulds	10	12	12
Eshams Company (water coolers, cold tanks)	1992	Portable cold water containers (5-50 l); production - 15200 u/y 92 Mt foam	2 LP spray units 1 LP locally made foaming machine 20 moulds	13	14	15
Sub-total		**355 Mt**		**45**	**52**	**52**

Summary table

Company name	ICC budget component US$	IOC budget comp. US$	Project budget US$
Rigid PU foam			
Brothers Company (boilers/water heaters insulation)	88,700	66,195	154,895
Essourur Company (boilers/water heaters insulation)	88,700	62,476	151,176
Musrata Company (water coolers, cold tanks)	88,700	66,939	155,639
Eshams Company (water coolers, cold tanks)	88,700	68,427	157,127
Total	**354,800**	**264,037**	**618,837**

Note: The IOC budget component is not included in the total Sector Plan cost due to the thresholds limits

5.3. Sub-sector of transportation and commercial refrigeration equipment manufacturing

The list and baseline information of the enterprises operating in this sub-sector is provided in the table 6.

It should be noted that this sub-sector is not explicitly reflected in the Country Programme of Libya, and the enterprises were identified during a recent national survey on the remaining ODS consuming sectors.

The identified enterprises are manufacturing different sizes and volume of water coolers, upright refrigerators, chest freezers, commercial freezers, etc. One of the enterprises is producing different sizes of refrigerated trucks, mobile cold rooms and prefabricated modules for houses for civilians in desert areas using rigid PU foams for insulation. Due to the different volume sizes of the refrigerated trucks, the cooling capacity of the refrigeration units is also different and based on the respective capacities of the compressors.

The project document for this group of enterprises is attached as annex V.

The project will phase out 30.0 MT 0f CFC-11 and 10.6 MT of CFC-12 consumption annually in the production of commercial refrigeration equipment at the terminal umbrella group of Commercial and Transport refrigeration manufacturers (Tasharoukiat El-Nakla, Tasharoukiat Marwa, Tasharoukiat El-Jalid, Tasharoukiat El-Shami and Tasharoukiat El-Takadom), Libya by converting to HCFC-141b as a foam blowing agent in the production of polyurethane foam and HFC 134a as the refrigerant in the cooling circuit of equipment in the production of a range of commercial refrigeration equipment. The project will include incremental capital costs covering two low pressure foaming machine (US$ 70,000), two high pressure

foaming machines (US$ 160,000), production and portable refrigerant charging units (US$ 105,000), vacuum pumps (US$ 15,000), leak detectors (US$ 3,000), re-design, testing, trials (US$ 15,000), technical assistance (US$ 21,000) and training (US$ 21,000). Eligible incremental operating costs amount to US$ 91,909 resulting from conversion to the new technology.

Project cost summary

CFC consumption	40.6 ODP tonnes
Incremental Capital Cost	US$ 378,900
Incremental Operating Cost	US$ 33,157
Total Project Cost	US$ 412.057
Requested grant:	US$ 412,057
Cost effectiveness:	US$ 10,10/kg
Agency support cost:	US$ 30,9041
TOTAL COST:	**US$ 442,961**

Table 6
List and baseline data for remaining enterprises in the commercial and transportation refrigeration-manufacturing sub-sector

Company Name	Establ. Date	Annual Production 2002	Equipment	Consum., Mt/y CFC-11			Consum. Mt/y CFC-12		
				2000	2001	2002	2000	2001	2002
Tasharoukiat EL-Nakla	1992	Comm. Chest freezer – 130 u/y Water cooler –3250 u/y Comm. Freezer – 200 u/y Comm. Refrigerator – 300 u/y	2 L.P Foam machines 2 Universal jigs 3 Charging machines 3 Vacuum pumps 1 Leak detector 8 moulds	4.8	4.6	4.5	2.0	2.2	1.8
Tasharoukiat Marwa	1994	Comm. Freezer – 380 u/y Comm. refrigerator – 400 u/y	2 Charging units 2 Vacuum pumps 1 Leak detector	PS Foam	PS Foam	PS Foam	2.6	2.6	1.6
Tasharoukiat EL-Jalid	1993	Comm. Chest freezer – 480 u/y Water cooler - 1600 u/y Comm. Freezer – 700 u/y Upright refrigerator – 250 u/y	3 Charging units 5 Vacuum pumps 2 Leak detectors 10 moulds	PS Foam 5	PS Foam 4.8	 3.3	3.9	4.1	2.8
Tasharoukiat EL-shami	1975	Comm. Freezer – 450 u/y Comm. Refrigerator – 680 u/y	1 Universal jig 2 Charging units 3 Vacuum pumps 1 Leak detector	11.5	10.8	6.2	3.8	3.0	1.2
Tasharoukia EL-Takadom	1986	Comm. Freezer – 1,280 u/y Comm. Refrigerators. - 920 u/y Refrigerated trucks – 26 u/y Mobile cold rooms – 32 u/y Prefabricated Houses – 82 u/y	2 locally made L.P Foam units 2 Universal jigs 5 Charging units 5 Vacuum pumps 3 Leak detectors	19	15.1	16.1	10.5	8.6	3.2
Sub-total				**40.3**	**35.3**	**30.1**	**22.8**	**20.5**	**10.6**

5.4. Refrigeration management plan (RMP)

The first draft of RMP project document was prepared in the year 2000 as an integral part of the Country Programme reflecting the CFC-12 consumption in year 1999 at the level of 141.3 tonnes.

Subsequently, the NOU has reported the actual consumption of CFC-12 for servicing with clear tendency of the reduction of the consumption up to 120 tonnes in year 2001.

The above-mentioned draft of RMP was used as a basis for the preparation of this RMP project as a part of the Sector Plan reflecting the actual CFC-12 consumption identified during the national survey on the remaining ODS consuming sectors .

Through the extensive survey of the refrigeration service sector in Libya followed by the data analysis and a series of discussions with relevant stakeholders, actions required to reduce the CFC consumption in the sector have been identified. These actions are included in four project components of the refrigerant management plan (RMP), i.e., Institutional framework project, Customs offices empowerment project, National project for training service technicians and National recovery and recycling project. Selected workshops and service technicians would be upgraded and trained under the RMP.

The servicing sector in Libya is very complicated and diversified. In total, there are approximately 10,000 workshops distributed in all regions, which provide services of various electrical and electronic households and office equipments. Most of these workshops provide very limited services for refrigeration equipment. Therefore, only approximately 2,500 workshops specialized in refrigeration servicing will be included in the RMP related activities. Through implementation of the proposed project components, the significant amount of CFC consumption in the sector will have to be eliminated in the refrigeration service sector.

The list, technical specification and cost breakdown of required equipment, instrumentation and technical services of recently approved RMP projects were used for the cost estimation of this project (see annex VI).

Project cost summary	
CFC-12 consumption	101.6 ODP tonnes
Requested grant:	US$ 524.430
Cost effectiveness:	US$ 5.1/kg ODP
Agency support cost:	US$ 39,332
TOTAL COST	**US$ 563,762**

5.5. Non-investment activities

These activities include:
Enhancing local capacity through:

- Training of trainers in customs and good practices,
- Training of technicians in good practices regarding refrigeration servicing,
- Training of customers;
- Awareness campaigns through the institutional strengthening project.

In a detailed way, the training activities will be focused on:

1. Implement and monitor training of customs officers to ensure proper control of import and export of ODSs and information collection.
2. Implement and monitor training of refrigeration service technicians in good practices of refrigeration to minimise the use of CFCs and mitigate their emissions into the air during the service of refrigerators.

3. Implement and monitor Refrigerant Recovery and Recycling Programm, establish networks for CFC-12 recover, recycling centers and a bank of recycled CFC-12.
4. Develop preventive measures for preservation from re-introduction of use of CFCs by sectors concerned.
5. Conduct continuous public awareness campaign on necessity and means for protection of the ozone layer .

At the same time a strong capacity building will be necessary in order to monitor and manage the entire situation and to insure smooth overall implementation of the Plan.

The following actions will ensure that phase out measures will be successful:

1. Implement ODS import registration system and ODS import quota allocation system (2003-2008).
2. Implement annual reductions in allowable ODS imports according to phase out schedule as proposed in the NPP.
3. Develop and implement appropriate reporting requirements for ODS imports monitoring.
4. Develop overall approach to retrofit, recycling and recovery in all refrigeration/ air conditioning sectors, particularly recovery of CFCs when individual users install conversion projects.
5. Organize trainings of customs officers to enforce Import Licensing Regulations.

NOU will serve as the coordinating institution for this project. All local program management and oversight and international coordinating and reporting will be managed by Ministry of Environment, that will be responsible for signing and implementing its agreement with the implementing agencies.

5.6. Implementation Management and Cost

The overall management of the plan will be carried out by the Government of Libya with the assistance of UNIDO.

The NOU will be responsible for monitoring the implementation of the phase-out plan. It will be responsible for tracking the promulgation and enforcement of policy and legislation and will assist UNIDO with the preparation of annual implementation plans and progress reports to the Executive Committee.

The implementation of the phase-out plan will need to be closely aligned and coordinated with the various policy, regulatory, fiscal, awareness and capacity-building actions, which the Government of Libya is taking, to ensure that the implementation is consistent with the Government priorities.

The phase-out plan will be managed by a dedicated implementation team, consisting of at least four national experts. The team leader (coordinator) to be designated by the Government and supported by the implementing agency. The implementation team will assist the NOU in policy and management support components of the phase-out plan in order to synchronize the activities, which are being carried out by the NOU in frame of the institutional strengthening project. However, the implementation team will also provide various technical assistance and concentrate its activities on the following subjects:

a) Reassessment and analysis of the relevant sector after the approval of the NPP;
b) Determination of specification of equipment and technical services to be provided under the NPP;
c) Preparation of annual implementation plans including determining the sequence of enterprise participation in planned sub-projects;
d) Development and application of model documents such as:
   - Agreement between NOU and the project beneficiaries on technical, financial and reporting modalities of the conversion process and destruction of ODS related equipment;

- Individual project documents including specification and cost-estimation of equipment and services to be provided;
- Bidding document(s) for overseas or local procurement of equipment and services.

e) Verification of ODS phase-out in completed sub-projects within the NPP through plant visits and performance auditing;
f) Establishment and operation of a reporting system of usage of ODS/substitutes by users;
g) RMP related activities:

- Selection of trainers for training of technicians;
- Selection of service workshops to be trained;
- Awareness promotion at the regional level;
- A list of service workshops should be updated in terms of their CFC consumption, necessary recovery equipment, their readiness to recover CFC, commitment to CFC phase out activity, capability and other factors relevant to the recovery and recycling scheme project;
- Possible institutes and/or enterprises for centers for training and recycling should be surveyed;
- The business criteria of refrigerant recycling center should be developed;
- Recipient service workshops for recovery machine should be determined.

h) Reporting of implementation progress of the plan for the annual performance-based disbursement;

The NPP management implementation budget component estimated US$ 150,000 which correspondence to approx. 6.5%.

5.7. Cost of the National CFC Phase-out Plan

The estimated cost of relevant components of the National CFC Phase-out Plan is summarized in the Table 7 below.

Table 7
Summary of cost estimation of the National CFC Phase-out Plan

Sector	ODP tones*	ICC US$	IOC US$	Project cost US$	Support cost US$	Req. grant US$	Cost effective. US$/kg
Flexible PU foams	262	1,267,600	*-51,350***	1,056,660	79,249	1,135,909	4.5
Rigid PU foams	46.3	354,800	*-264,037***	354,800	26,610	381,410	7.5
Comm./Trans. Refrigeration manufacturing	40.6	378,900	33,157	412,057	30,904	442,961	10.1
RMP	101.6	524,430	0	524,430	39,332	563,762	5.1
Sub-total	**450.5**	**2,525,730**	**33.157**	**2,347,947**	**176,095**	**2,524,042**	
Management				**150,000**	**11,250**	**161,250**	
Total				**2,497,947**	**187,345**	**2,685,292**	**5.9**

*Note: * The actual ODP phase-out targets have been taken into account due to the substitution of CFC-11 by HCFC-141b in rigid foam and refrigeration manufacturing sub-sectors.*

*** The IOC for PU foam sub-sector not requested due to the cost effectiveness reason. In addition, the ICC component for 4 flexible foam enterprises was also adjusted to be in frame of threshold for this sector.*

It is suggested that the estimated grand will be requested in five tranches as indicated in the Table 8 below.

Table 8
Disbursement schedule

Activity	Total cost USD	2003	2005	2006
Technical assistance in accordance with the work programmes of individual project included in the NPP	2,347,947	1,450,000	670,000	227,947
Project management	150,000	50,000	50,000	50,000
Total project cost	2,497,947	1,500,000	720,000	277,947
IA support cost	187,345	112,500	54,000	20,846
Total Grant	**2,685,292**	**1,612,500**	**774,000**	**298,793**
Business Plan 2003-2005		1,613,000		

6. Monitoring and evaluation

Monitoring of the implementation and effectiveness of measures described in the National CFC Phase-out Plan (2003-2009) to reduce the ODS consumption levels as well as timely design and recommendation of adjustments if any is of crucial importance for speeding up the process of achieving compliance with the Montreal Protocol. As it has happened in many countries the improvements in the collection of data are expected to give a more accurate picture of the needs in the respective sector. The monitoring process will be covered by the Ministry of Environment through the NOU and Implementation team.

The consumption will be monitored through receiving the data from Customs Department and crosschecking it with the data to be permanently collected from the distributors and consumers. At the same time, NOU and Implementation team will also be responsible for preparing the national Monitoring Plan of the NPP implementation.

The reporting process will be responsibility of both NOU and Implementation team. They have to timely collect and analyze all information and regularly submit the following reports:

- Annual reports on ODS consumption to be submitted to the Ozone Secretariat (NOU);
- Annual reports on progress of implementation of NPP to be submitted to the Executive Committee of the Multilateral Fund;
- Project-related reports to UNIDO.

Concerning the evaluation process, the Ministry of Environment and UNIDO will select and hire an independent consultant who will work in close cooperation with the Implementation team to evaluate the progress, quality and performance of implementation of NPP implementation.

The consultant will have full access to all financial and technical data and information concerning the NPP implementation for reliable data collection and cross checking.

The consultant will prepare and submit to UNIDO reports of activities on a quarterly basis and the reports on NPP implementation status and ODS consumption figures on a half – yearly basis. After consideration by UNIDO the reports will be sent to NOU and Implementation team for consideration and follow up.

The responsibilities of the consultant will also include:

- Development of recommendations for improvements/adjustments of the National CFC Phase-out Plan;
- Take into consideration comments from UNIDO and the NOU and Implementation team to the reports and react accordingly;
- Assist in the organization and participate in possible evaluation visits by UNIDO or the Multilateral Fund Secretariat.

On the other hand, UNIDO should:

- Provide the independent consultant with all relevant information;
- Provide the consultant with necessary support and advice;
- Timely consider and comment the submitted reports and issue recommendations to Implementation Plan Unit;
- Control the performance of both the consultant and Implementation Plan Unit in a most suitable manner.

7. Performance targets and disbursement schedule.

Performance targets, indicators of achievements and fund disbursement schedule are presented in the Table 9 below.

Note: Taking into account that phase-out of halons (54.4 ODP tones) is not included in the NPP, the benchmarks of CFC consumption accepted by the 31st Meeting of the Implementation Committee, are reduced accordingly.

Table 9

Year	*Performance target (ODP/tonnes)*	*Consumption allowed under Montreal Protocol*	Indicators of achievement	*Disbursement (in US$)*
2003			▪ Implementation Unit in place	
Foam	190.4	509.2	▪ ODS related legislation in place and being reinforced	1,612,500
Refrig.	48.6	89.2	▪ Licensing system enhanced and import quotas established	
Service	0	101.6	▪ Code on Good practices developed ▪ Monitoring system in place	
CFC	**239.0**	**700.0**	▪ Partial completion of UNDP and UNIDO projects ▪ Implementation of sub-sectoral projects in accordance with the respective work programmes ▪ Preparation of Progress Report I	

Year	*Performance target (ODP/tonnes)*	*Consumption allowed under Montreal Protocol*	Indicators of achievement	*Disbursement (in US$)*
2004			▪ Completion of remaining UNDP ongoing projects	0
Foam	161.0	318.8	▪ Implementation of sub-sectoral projects in accordance with the respective work programmes	
Refrig.	0	40.6	▪ Partial CFC phase-out from new foam projects	
Service	0	101.6	▪ Monitoring of the NPP implementation	
CFC	**161.0**	**461.0**	▪ Preparation of Progress Report II	
2005				
Foam	36.4	157.8	▪ Implementation of sub-sectoral projects in accordance with the respective work programmes; partial phase-out of 162 ODP tonnes from foam sector under NPP	774,000
Refrig.	37.6	40.6	▪ Monitoring of the NPP implementation	
Service	50.0	101.6	▪ Preparation of Progress Report III	
CFC	**124.0**	**300.0**		
2006				
Foam	99.0	124.4	▪ Implementation of sub-sectoral projects in accordance with the respective work programmes	298,793
Refrig.	0	0	▪ Monitoring of the NPP implementation	
Service	25.0	51.6	▪ Preparation of Progress Report IV	
CFC	**124.0**	**176.0**		
2007				
Foam	25.4	25.4	▪ Implementation of sub-sectoral projects in accordance with the respective work programmes	0
Refrig.	0	0	▪ Monitoring of the NPP implementation	
Service	15	26.6	▪ Preparation of Progress Report V	
CFC	**40.4**	**52.0**		

Year	*Performance target (ODP/tonnes)*	*Consumption allowed under Montreal Protocol*	Indicators of achievement	*Disbursement (in US$)*
2008				
Foam	0	0	▪ Implementation of sub-sectoral projects in accordance with the respective work programmes ▪ Monitoring of the NPP implementation ▪ Preparation of Progress Report VI	0
Refrig.	0	0		
Service	11.6	11.6		
CFC	**11.6**	**11.6**		

8. Draft Agreement between Libya and the Executive Committee of the Multilateral Fund for the phase-out of ozone-depleting substances

1. This Agreement represents the understanding of Libya (the "Country") and the Executive Committee with respect to the complete phase-out of controlled use of the ozone-depleting substances in the sectors set out in Appendix 1-A (the Substances) prior to 1st January 2010 compliance with Protocol schedules.

2. The Country agrees to phase out the controlled use of the Substances in the commercial refrigeration manufacturing, flexible and rigid PU foams manufacturing and in refrigeration servicing sectors concerned in accordance with the annual phase-out targets set out in Appendix 2-A (the "Targets") and this Agreement. The annual phase-out targets will, at a minimum, correspond to the reduction schedules mandated by the Montreal Protocol, except to the extent that the performance targets conform to the response by the Meeting of the Parties to Decision 37/20(a) of the Executive Committee. The Country accepts that, by its acceptance of this Agreement and performance by the Executive Committee of its funding obligations described in paragraph 3, it is precluded from applying for or receiving further funding from the Multilateral Fund in respect to the Substances.

3. Subject to compliance by the Country with its obligations set out in this Agreement, the Executive Committee agrees in principle to provide the funding set out in Appendix 2-A (the "Funding") to the Country. The Executive Committee will, in principle, provide this funding at the Executive Committee meetings specified in Appendix 3-A (the "Funding Approval Schedule").

4. The Country will meet the consumption limits for each Substance as indicated in Appendix 2-A. It will also accept independent verification by the relevant Implementing Agency of achievement of these consumption limits as described in paragraph 8 of this Agreement.

5. The Executive Committee will not provide the Funding in accordance with the Funding Disbursement Schedule unless the Country satisfies the following conditions at least 30 days prior to the applicable Executive Committee meeting set out in the Funding Disbursement Schedule:

a. that the Country has met the Target for the applicable year;

b. that the meeting of these Targets has been independently verified as described in paragraph 8; and

c. that the Country has substantially completed all actions set out in the last Annual Implementation Programme;

d. that the Country has submitted and received endorsement from the Executive Committee for an annual implementation programme in the form of Appendix 4-A (the "Annual Implementation Programmes") in respect of the year for which funding is being requested.

6. The Country will ensure that it conducts accurate monitoring of its activities under this Agreement. The institutions set out in Appendix 5-A (the "Monitoring") will monitor and report on that monitoring in accordance with the roles and responsibilities set out in Appendix 5-A. This monitoring will also be subject to independent verification as described in paragraph 8.

7. While the Funding was determined on the basis of estimates of the needs of the Country to carry out its obligations under this Agreement, the Executive Committee agrees that the Country may have the flexibility to reallocate the approved funds, or part of the funds according to the evolving circumstances to achieve the

goals prescribed under this Agreement. Reallocations, which are considered as major changes, should be accounted for in the verification report and reviewed by the Executive Committee.

8. The Country agrees to assume overall responsibility for the management and implementation of this Agreement and of all activities undertaken by it or on its behalf to fulfill the obligations under this Agreement. UNIDO (the "Lead IA") has agreed to be the lead implementing agency in respect of the Country's activities under this Agreement. The Lead IA will be responsible for carrying out the activities listed in Appendix 6-A, including but not limited to independent verification. The Country also agrees to periodic evaluations, which will be carried out under the monitoring and evaluation work programmes of the Multilateral Fund. The Executive Committee agrees, in principle, to provide the Lead IA with the fees set out in row 10 of Appendix 2-A.

9. Should the Country, for any reason, not meet the Targets for the elimination of the Substances in the sectors listed in para 2 above or otherwise does not comply with this Agreement, then the Country agrees that it will not be entitled to the Funding in accordance with the Funding Disbursement Schedule. At the discretion of the Executive Committee, Funding will be reinstated according to a revised Funding Disbursement Schedule determined by the Executive Committee after the Country has demonstrated that it has satisfied all of its obligations that were due to be met prior to receipt of the next installment of Funding under the Funding Disbursement Schedule. The Country acknowledges that the Executive Committee may reduce the amount of the Funding by the amounts set out in Appendix 7-A in respect of each ODP tonne of reductions in consumption not achieved in any one year.

10. The Funding components of this Agreement will not be modified on the basis of any future Executive Committee decision that may affect the Funding of any other consumption sector projects or any other related activities in the Country.

11. The Country will comply with any reasonable request of the Executive Committee and the Lead IA to facilitate implementation of this Agreement. In particular, it will provide access by the Lead IA to information necessary to verify compliance with this
Agreement.

12. All of the agreements set out in this Agreement are undertaken solely within the context of the Montreal Protocol and do not extend to obligations beyond this Protocol. All terms used in this Agreement have the meaning ascribed to them in the Protocol unless otherwise defined herein.

Appendix 1-A

THE SUBSTANCES

The common names of the ozone-depleting substances to be phased out under the Agreement will be listed here.

Annex A:	Group I	CFC-11, CFC-12, CFC-113, CFC-114 and CFC-115

Appendix 2-A.

THE TARGETS, AND FUNDING

Year	2003	2004	2005	2006	2007	2008	2009
Montreal Protocol Reduction Schedule *	710.0	610.0	358		107		0
1. Max allowable total consumption of CFC **	700.0	461.0	300.0	176.0	52.0	11.6	0
2. Reduction from ongoing projects	239.0	10.5	0	0	0	0	0
3. New reduction under the plan	0	150.5	124.0	124.0	40.4	11.6	0
4. Total annual reduction of CFC	239.0	161.0	124.0	124.0	40.4	11.6	0
5. UNIDO agreed funding	1,500,000		720,000	277,947	0	0	
6. UNIDO support cost	112,500		54,000	20,846	0	0	
7. Total agreed funding	**1,612,500**		**774,000**	**298,793**		**0**	

Note: * *According to the baseline data and recommendations of the 31st Implementation Committee Meeting*

** *Halons consumption (54.4 ODP tones) not included*

Appendix 3-A.

FUNDING APPROVAL SCHEDULE

The fund schedule is specified by tranches in the Appendix 2.A.

Funding will be considered for approval at the last meeting of the year prior to the year of the annual plan.

Appendix 4-A

ANNUAL IMPLEMENTATION PROGRAMME FOR YEAR 2004

1. **Data**

Country	Libya
Year of plan	2004
Numbers of years completed	-
Numbers of years remaining under the plan	6 years
Target ODS consumption of the preceding year	838.6 tonnes
Target ODS consumption of the year of plan	710 tonnes
Level of funding requested	1,612,500
Lead implementing agency	UNIDO
Co-operating agency(ies)	none

2. **Targets**

Target:	CFC-11, CFC-12, CFC-13, CFC-14 and CFC-15			
Indicators		**Preceding Year**	**Year of Plan**	**Reduction**
Supply of ODS	Import	940 tonnes (year 2002)	720* tonnes (year 2004)	220 tonnes
	Total (1)			
Demand of ODS	Manufacturing	598.4 tonnes	498.4 tonnes	100.0 tonnes
	Servicing	101.6 tonnes	101.6 tonnes	0
	Stockpiling	10.0 tonnes	10.0 tonnes	0
	Total (2)	710 tonnes	610 tonnes	100.0 tonnes

* Estimated data

3. Industry Action for year 2004

Sector	Consumption Preceding Year (1)	Consumption Year of Plan (2)	Reduction within Year of Plan (1)-(2)	Number of Projects Completed	Number of Servicing Related Activities	ODS Phase-Out (in ODP tonnes
Manufacturing						
Foam	**509.2 tonnes**	**318.8 tonnes**	**190.4 tonnes**	**7**	**n.a.**	**190.4 tonnes**
Refrigeration	**89.2 tonnes**	**40.6 tonnes**	**48.6 tonnes**	**1**		**48.6 tonnes**
Other						
Total	**598.4 tonnes**	**359.4 tonnes**	**239 tonnes**	**8**		**239 tonnes**
Servicing						
Refrigeration	**101.6 tonnes**	**101.6 tonnes**	**0**	**0**		**0**
Total	**101.6 tonnes**	**101.6 tonnes**	**0**	**0**		**0**
GRAND TOTAL	**700 tonnes**	**461 tonnes**	**239 tonnes**	**8**		**239**

4. Technical Assistance

Proposed Activity: (see attached Annual Implementation Plan for year 2004)

Objective: _____

Target Group: _____

Impact: _____

5. Government Action (see attached Annual Implementation Plan for year 2004)

Policy/Activity Planned	Schedule of Implementation
Type of Policy Control on ODS Import: servicing, etc	
Public Awareness	
Others	

6. Annual Budget

Activity	Planned Expenditures (US $)
Technical assistance activities as indicated in the Annual Implementation Plan for year 2004	**600,000**
Management and policy related activities, reporting	**40,000**
TOTAL	**640,000**

7. Administrative Fees

Administrative fees to support activities specified in the attached Annual Implementation Plan for year 2004 will be established and reported in accordance with the relevant national rules and regulations as well as UNIDO's practice in implementation of non-investment activities related to the industrial sectors.

Appendix 5-A.

MONITORING INSTITUTIONS AND ROLES

The monitoring process will be covered by the Ministry of Environment through the NOU and Implementation team.

The consumption will be monitored through receiving the data from Customs Department and crosschecking it with the data to be permanently collected from the distributors and consumers. At the same time, NOU and Implementation team will also be responsible for preparing the national Monitoring Plan of the NPP implementation.

The reporting process will be responsibility of both NOU and Implementation team. They have to timely collect and analyze all information and regularly submit the following reports:

- Annual reports on ODS consumption to be submitted to the Ozone Secretariat (NOU);
- Annual reports on progress of implementation of NPP to be submitted to the Executive Committee of the Multilateral Fund;
- Project-related reports to UNIDO.

Concerning the evaluation process, the Ministry of Environment and UNIDO will select and hire an independent consultant who will work in close cooperation with the Implementation team to evaluate the progress, quality and performance of implementation of NPP implementation.

The consultant will have full access to all financial and technical data and information concerning the NPP implementation for reliable data collection and cross checking.

The consultant will prepare and submit to UNIDO reports of activities on a quarterly basis and the reports on NPP implementation status and ODS consumption figures on a half – yearly basis. After consideration by UNIDO the reports will be sent to NOU and Implementation team for consideration and follow up.

The responsibilities of the consultant will also include:

- Development of recommendations for improvements/adjustments of the National CFC Phase-out Plan;
- Take into consideration comments from UNIDO and the NOU and Implementation team to the reports and react accordingly;
- Assist in the organization and participate in possible evaluation visits by UNIDO or the Multilateral Fund Secretariat.

On the other hand, UNIDO should:

- Provide the independent consultant with all relevant information;
- Provide the consultant with necessary support and advice;
- Timely consider and comment the submitted reports and issue recommendations to Implementation Plan Unit;
- Control the performance of both the consultant and Implementation Plan Unit in a most suitable manner.

Appendix 6-A.

ROLE OF THE LEAD IMPLEMENTING AGENCY

1. UNIDO will be responsible for a range of activities to be specified in the project document along the lines of the following:

(a) Ensuring performance and financial verification in accordance with this Agreement and with its specific internal procedures and requirements as set out in the Country's phase-out plan;
(b) Providing verification to the Executive Committee that the Targets have been met and associated annual activities have been completed as indicated in the annual implementation programme
(c) Assisting the Country in preparation of the Annual Implementation Programme;
(d) Ensuring that achievements in previous Annual Implementation Programmes are reflected in future Annual Implementation Programmes;
(e) Reporting on the implementation of the Annual Implementation Programme commencing with the Annual Implementation Programme for the [year] year to be prepared and submitted in [year];
(f) Ensuring that technical reviews undertaken by the Lead IA are carried out by appropriate independent technical experts;
(g) Carrying out required supervision missions;
(h) Ensuring the presence of an operating mechanism to allow effective, transparent implementation of the Annual Implementation Programme and accurate data reporting;
(i) Verification for the Executive Committee that consumption of the Substances has been eliminated in accordance with the Targets;
(j) Co-ordinate the activities of the Coordinating IAs, if any;
(k) Ensuring that disbursements made to the Country are based on the use of the Indicators; and
(l) Providing assistance with policy, management and technical support when required.

Appendix 7-A.

REDUCTIONS IN FUNDING FOR FAILURE TO COMPLY

1. In accordance with paragraph 9 of the Agreement, the amount of funding provided may be reduced by US$ 2,000 ODP tonnes of reductions in consumption not achieved in the year.

9. Annual Implementation Plan for year 2004

In addition to the activities planned for year 2004 as described in general in the relevant part of the Chapter 7, table 9, the following milestones are established for this year.

Activity	1	2	3	4	5	6	7	8	9	10	11	12
Elaboration of coordination modalities of the NPP implementation and creation of National Implementation Team												
Selection of consultants and experts												
Formulation of work plans of technical support for the sub-sectors included in the NPP.												
Establishment and enhancement of working procedures with a relevant national partners and and bodies concerned												
Establishment and strengthening of operational mechanism for management and monitoring												
Elaboration of agreements on implementation procedures with the project beneficiaries and NOU												
Preparation of models of terms of references for the purchase of equipment and services												
Initiation of RMP related activities according to the individual programme												
Establishment of an operational mechanism for participation in the phase-out plan and for obtaining phase-out commitments from enterprises												
Preparation of the Progress Report 1												

Annex I

CODE	AGENCY	TYPE	SEC	PROJECT_TITLE	ODS 1	ODP1	ODS REPL.	ODS 2	ODP2	ODS REPL.2	IMPACT	DATE APPR.	TOTAL GRANT	COST EFF.	DATE COMPL.
LIB/SEV/27/CPG/01	UNIDO	CPG	SEV	Preparation of country programme		0.0			0.0		0.0	Mar-1999	$86,376		Dec-1999
		CPG Total											**$86,376**		
LIB/SEV/32/INS/04	UNIDO	INS	SEV	Creation of the National Ozone Unit		0.0			0.0		0.0	Dec-2000	$177,410		Jan-2004
		INS Total											**$177,410**		
LIB/FOA/32/INV/05	UNDP	INV	FOA	Phaseout of CFC-11 by conversion to methylene chloride in the manufacture of flexible polyurethane foam at Sebha Unit	CFC-11	26.0	Methylene chloride		0.0		26.0	Dec-2000	$144,750	4.93	Jan-2004
LIB/FOA/32/INV/06	UNDP	INV	FOA	Phaseout of CFC-11 by conversion to methylene chloride in the manufacture of flexible polyurethane foam at Garabouli Unit	CFC-11	40.3	Methylene chloride		0.0		40.3	Dec-2000	$124,085	2.72	Jan-2004
LIB/FOA/32/INV/07	UNDP	INV	FOA	Phasing out of CFC-11 in the manufacture of rigid polyurethane foam at Electrical Household Appliance-Tajura by conversion to a combination of water and HCFC-141b based systems	CFC-11	11.0	HCFC-141b	CFC-11	4.3	Water CO2	15.3	Dec-2000	$135,376	7.83	Jan-2004
LIB/FOA/32/INV/08	UNDP	INV	FOA	Phaseout of CFC-11 by conversion to methylene chloride in the manufacture of flexible polyurethane foam at Ben Ghazi Unit	CFC-11	31.4	Methylene chloride		0.0		31.4	Dec-2000	$141,092	3.98	Jan-2004

LIB/FOA/34/INV/12	UNDP	INV	FOA	Phase out of CFC-11 by conversion to methylene chloride in the manufacture of flexible polyurethane foam at Tasharoukiate Essadek	CFC-11	32.0	Methylene chloride		0.0		32.0	Jul-2001	$145,893	4.03	Aug-2004
LIB/FOA/34/INV/13	UNDP	INV	FOA	Phase out of CFC-11 by conversion to methylene chloride in the manufacture of flexible polyurethane foam at Hilal Africa	CFC-11	22.0	Methylene chloride		0.0		22.0	Jul-2001	$128,512	5.17	Aug-2004
LIB/FOA/35/INV/14	UNDP	INV	FOA	Phase out of CFC-11 by conversion to methylene chloride in the manufacture of flexible polyurethane foam at Tasharoukiate El Hani	CFC-11	28.0	Methylene chloride		0.0		28.0	Dec-2001	$127,057	4.02	Jan-2005
LIB/FOA/35/INV/15	UNDP	INV	FOA	Phase out of CFC-11 by conversion to liquid carbon dioxide (LCD) in the manufacture of flexible polyurethane foam at El Houria Unit Plant	CFC-11	96.0	Liquide carbone dioxydes		0.0		96.0	Dec-2001	$587,650	5.42	Jan-2005
LIB/FOA/35/INV/16	UNDP	INV	FOA	Phase out of CFC-11 by conversion to methylene chloride in the manufacture of flexible polyurethane foam at Tasharoukiate Ali Sannoga	CFC-11	23.0	Methylene chloride		0.0		23.0	Dec-2001	$141,973	5.46	Jan-2005
LIB/REF/32/INV/03	UNIDO	INV	REF	Phasing out ODS in the production of refrigerators and freezers at Electrical Household Appliances Manufacturing	CFC-11	44.4	HCFC-141b	CFC-12	9.0	HFC-134a	53.4	Dec-2000	$629,505	10.45	Jun-2003
		INV Total											**$2,305,893**		
LIB/FOA/32/PRP/09	UNDP	PRP	FOA	Project preparation in the foam sector		0.0			0.0		0.0	Dec-2000	$33,900		Dec-2001
LIB/FOA/33/PRP/10	UNDP	PRP	FOA	Project preparation in the flexible polyurethane foam sector		0.0			0.0		0.0	Mar-2001	$28,250		Apr-2002

LIB/FOA/36/PRP/17	UNDP	PRP	FOA	Project preparation for 4 projects in the rigid foam sector	0.0		0.0	0.0	Mar-2002	$14,125	Apr-2003
LIB/FOA/36/PRP/18	UNDP	PRP	FOA	Project preparation for 6 projects in the flexible slabstock foam sector	0.0		0.0	0.0	Mar-2002	$14,125	Apr-2003
LIB/FOA/36/PRP/19	UNDP	PRP	FOA	Project preparation for 3 projects in the flexible slabstock foam sector	0.0		0.0	0.0	Mar-2002	$22,600	Apr-2003
LIB/REF/30/PRP/02	UNIDO	PRP	REF	Preparation of investment project in the refrigeration sector	0.0		0.0	0.0	Mar-2000	$22,600	Apr-2001
LIB/REF/33/PRP/11	UNIDO	PRP	REF	Project preparation in the commercial refrigeration sector	0.0		0.0	0.0	Mar-2001	$16,950	Apr-2002
LIB/REF/36/PRP/20	UNIDO	PRP	REF	Preparation of an investment project in the commercial refrigeration sector	0.0		0.0	0.0	Mar-2002	$22,600	Apr-2003
LIB/SEV/38/PRP/21	UNIDO	PRP	SEV	Preparation of a national ODS phase-out plan	0.0		0.0	0.0	Nov-2002	$45,200	Dec-2003
		PRP Total						**367.4**		**$220,350**	
		Grand Total								**$2,790,029**	

Annex II

Calculation of incremental costs (ICC and IOC/IOS) for conversion of 8 manufacturers of flexible PU slabstock foam

Incremental capital cost was estimated based on the list of required equipment and services as well as the cost breakdown for similar ongoing and recently completed projects.

Investment cost summary

	Item	US$
1	Methylene chloride storage tank (1000l)*	10,000
2	Methylene chloride pumping system	15,000
3	Process ventilation	50,000
4	Cure area ventilation system	20,000
5	Electrical control system modification	5,000
6	Safety devices	7,000
7	Trials/Commissioning/Start-up/Training	15,000
8	Contingencies (10%)	12,200
	Total	**134,200**

* - *Currently the enterprises are not using pressurized CFC-11 storage tanks.*

In view of the specific features of a national execution and implementation modalities of the Plan, it is suggested that the above estimated ICC budget component will be the same for all 8 enterprises.

Incremental operating costs/savings have been calculated in accordance with the relevant guidelines documents using the actual production parameters of year 2002 and the current costs of chemicals.

The relevant calculations for the individual enterprises are attached.

Summary table

Company name	ICC budget component US$	IOC/IOS budget comp. US$	Project budget US$
Flexible foam slabstock			
Bayan at Green Square Unit GCPFI	134,200	-16,370	117,830
Derma Unit -GCPFI	134,200	-7,650	126,550
El Wahda Unit - GCPFI	134,200	-15,830	118,370
Musrata Unit - GCPFI	134,200	-3,390	130,810
Sons of Al Ozzi Foam Company – Tripoli	134,200	16,080	150,280
Tasharoukia EL-Mehwaria	134,200	21,730	155,930
Tasharoukia El-Tanmia El--Senaeia	134,200	18,860	153,060
Tasharoukiate El-Kalij	134,200	19,600	153,800

Total	1,073,600	33,030	1,106,630

Bayan at Green Square

Item	Price US$/ton	Consumption ton/year	
		Before	After
CFC-11	2100	40	0
MC	1100		36
Amines	7500	1	1.1
Tin	8000	1	1.25
Production	2700	680	680
Energy (kWh)	0.1		50
CFC/MC ratio	1.00 : 0.9		
Yield loss	3/2/1/0 %year on	100 %production	
Maintenance	US$	5 % of new mechanical equipment	134,200

CALCULATIONS

COST ITEM US$X1000	2002	2003	2004	2005
BASELINE				
CFC-11	84.00	84.00	84.00	84.00
Amines	7.50	7.50	7.50	7.50
Other additives	8.00	8.00	8.00	8.00
TOTAL	99.50	99.50	99.50	99.50
POST PROJECT*				
MC	39.60	39.60	39.60	39.60
Amines	8.25	8.25	8.25	8.25
Other additives	10.00	10.00	10.00	10.00
Incr.yield loss	55.08	36.72	18.36	0.00
Incr.energy	0.01	0.01	0.01	0.01
Incr. maintenance	6.71	6.71	6.71	6.71
TOTAL	119.65	101.29	82.93	64.57
Incr.Oper.Costs	20.15	1.78	-16.58	-34.94
Discount factor	0.91	0.83	0.75	0.68
N.P.V.*	18.33	1.48	-12.43	-23.76
Incremental Operational Costs			**-16.37**	

Derma

Item	Price US$/ton	Consumption ton/year	
		Before	After
CFC-11	2100	32	0
MC	1100		28.8
Amines	7500	1	1.1
Tin	8000	1	1.25
Production	2700	540	540
Energy (kWh)	0.1		50
CFC/MC ratio	1.00 : 0.9		
Yield loss	3/2/1/0 %year on	100 %production	
Maintenance	US$	5 % of new mechanical equipment	134,200

CALCULATIONS

COST ITEM US$X1000	2002	2003	2004	2005
BASELINE				
CFC-11	67.20	67.20	67.20	67.20
Amines	7.50	7.50	7.50	7.50
Other additives	8.00	8.00	8.00	8.00
TOTAL	82.70	82.70	82.70	82.70
POST PROJECT				
MC	31.68	31.68	31.68	31.68
Amines	8.25	8.25	8.25	8.25
Other additives	10.00	10.00	10.00	10.00
Incr.yield loss	43.74	29.16	14.58	0.00
Incr.energy	0.01	0.01	0.01	0.01
Incr. maintenance	6.71	6.71	6.71	6.71
TOTAL	100.39	85.81	71.23	56.65
Incr.Oper.Costs	17.69	3.10	-11.48	-26.06
Discount factor	0.91	0.83	0.75	0.68
N.P.V.*	16.09	2.58	-8.61	-17.72
Incremental Operational Costs			**-7.65**	

El Wahda

Item	Price US$/ton	Consumption ton/year	
		Before	After
CFC-11	2100	43	0
MC	1100		38.7
Amines	7500	1	1.1
Tin	8000	1	1.25
Production	2700	760	760
Energy (kWh)	0.1		50
CFC/MC ratio	1.00 : 0.9		
Yield loss	3/2/1/0 %year on	100 %production	
Maintenance	US$	5 % of new mechanical equipment	134,200

CALCULATIONS

COST ITEM	2002	2003	2004	2005
US$X1000				
BASELINE				
CFC-11	90.30	90.30	90.30	90.30
Amines	7.50	7.50	7.50	7.50
Other additives	8.00	8.00	8.00	8.00
TOTAL	105.80	105.80	105.80	105.80
POST PROJECT				
MC	42.57	42.57	42.57	42.57
Amines	8.25	8.25	8.25	8.25
Other additives	10.00	10.00	10.00	10.00
Incr.yield loss	61.56	41.04	20.52	0.00
Incr.energy	0.01	0.01	0.01	0.01
Incr. maintenance	6.71	6.71	6.71	6.71
TOTAL	129.10	108.58	88.06	67.54
Incr.Oper.Costs	23.30	2.77	-17.75	-38.27
Discount factor	0.91	0.83	0.75	0.68
N.P.V.*	21.20	2.30	-13.31	-26.02
Incremental Operational Costs			**-15.83**	

Musrata Unit

Item	Price US$/ton	Consumption ton/year	
		Before	After
CFC-11	2100	30	0
MC	1100		27
Amines	7500	1	1.1
Tin	8000	1	1.25
Production	2700	520	520
Energy (kWh)	0.1		50
CFC/MC ratio	1.00 : 0.9		
Yield loss	3/2/1/0 %year on	100 %production	
Maintenance	US$	5 % of new mechanical equipment	134,200

CALCULATIONS

COST ITEM US$X1000	2002	2003	2004	2005
BASELINE				
CFC-11	63.00	63.00	63.00	63.00
Amines	7.50	7.50	7.50	7.50
Other additives	8.00	8.00	8.00	8.00
TOTAL	78.50	78.50	78.50	78.50
POST PROJECT				
MC	29.70	29.70	29.70	29.70
Amines	8.25	8.25	8.25	8.25
Other additives	10.00	10.00	10.00	10.00
Incr.yield loss	42.12	28.08	14.04	0.00
Incr.energy	0.01	0.01	0.01	0.01
Incr. maintenance	6.71	6.71	6.71	6.71
TOTAL	96.79	82.75	68.71	54.67
Incr.Oper.Costs	18.29	4.24	-9.80	-23.84
Discount factor	0.91	0.83	0.75	0.68
N.P.V.*	16.64	3.52	-7.35	-16.21
Incremental Operational Costs			**-3.39**	

Sons of Al Ozzi

Item	Price US$/ton	Consumption ton/year	
		Before	After
CFC-11	2100	15	0
MC	1100		13.5
Amines	7500	1	1.1
Tin	8000	1	1.25
Production	2700	280	280
Energy (kWh)	0.1		50
CFC/MC ratio	1.00 : 0.9		
Yield loss	3/2/1/0 %year on	100 %production	
Maintenance	US$	5 % of new mechanical equipment	134,200

CALCULATIONS

COST ITEM	2002	2003	2004	2005
US$ 1000				
BASELINE				
CFC-11	31.50	31.50	31.50	31.50
Amines	7.50	7.50	7.50	7.50
Other additives	8.00	8.00	8.00	8.00
TOTAL	47.00	47.00	47.00	47.00
POST PROJECT				
MC	14.85	14.85	14.85	14.85
Amines	8.25	8.25	8.25	8.25
Other additives	10.00	10.00	10.00	10.00
Incr.yield loss	22.68	15.12	7.56	0.00
Incr.energy	0.01	0.01	0.01	0.01
Incr. maintenance	6.71	6.71	6.71	6.71
TOTAL	62.50	54.94	47.38	39.82
Incr.Oper.Costs	15.50	7.94	0.38	-7.19
Discount factor	0.91	0.83	0.75	0.68
N.P.V.*	14.10	6.59	0.28	-4.89
Incremental Operational Costs			**16.08**	

Tasharoukia El-Mehwaria

Item	Price US$/ton	Consumption ton/year	
		Before	After
CFC-11	2100	13	0
MC	1100		11.7
Amines	7500	1	1.1
Tin	8000	1	1.25
Production	2700	270	270
Energy (kWh)	0.1		50
CFC/MC ratio	1.00 : 0.9		
Yield loss	3/2/1/0 %year on	100 %production	
Maintenance	US$	5 % of new mechanical equipment	134,200

CALCULATIONS

COST ITEM US$X1000	2002	2003	2004	2005
BASELINE				
CFC-11	27.30	27.30	27.30	27.30
Amines	7.50	7.50	7.50	7.50
Other additives	8.00	8.00	8.00	8.00
TOTAL	42.80	42.80	42.80	42.80
POST PROJECT				
MC	12.87	12.87	12.87	12.87
Amines	8.25	8.25	8.25	8.25
Other additives	10.00	10.00	10.00	10.00
Incr.yield loss	21.87	14.58	7.29	0.00
Incr.energy	0.01	0.01	0.01	0.01
Incr. maintenance	6.71	6.71	6.71	6.71
TOTAL	59.71	52.42	45.13	37.84
Incr.Oper.Costs	16.91	9.62	2.33	-4.97
Discount factor	0.91	0.83	0.75	0.68
N.P.V.*	15.38	7.98	1.74	-3.38
Incremental Operational Costs			**21.73**	

Tasharoukia El-Tanmia

Item	Price US$/ton	Consumption ton/year	
		Before	After
CFC-11	2100	15	0
MC	1100		13.5
Amines	7500	1	1.1
Tin	8000	1	1.25
Production	2700	300	300
Energy (kWh)	0.1		50
CFC/MC ratio	1.00 : 0.9		
Yield loss	3/2/1/0 %year on	100 %production	
Maintenance	US$	5% of new mechanical equipment	134,200

CALCULATIONS

COST ITEM US$X1000	2002	2003	2004	2005
BASELINE				
CFC-11	31.50	31.50	31.50	31.50
Amines	7.50	7.50	7.50	7.50
Other additives	8.00	8.00	8.00	8.00
TOTAL	47.00	47.00	47.00	47.00
POST PROJECT				
MC	14.85	14.85	14.85	14.85
Amines	8.25	8.25	8.25	8.25
Other additives	10.00	10.00	10.00	10.00
Incr.yield loss	24.30	16.20	8.10	0.00
Incr.energy	0.01	0.01	0.01	0.01
Incr. maintenance	6.71	6.71	6.71	6.71
TOTAL	64.12	56.02	47.92	39.82
Incr.Oper.Costs	17.12	9.02	0.92	-7.19
Discount factor	0.91	0.83	0.75	0.68
N.P.V.*	15.57	7.48	0.69	-4.89
Incremental Operational Costs			**18.86**	

Tasharoukia El-Kalij

Item	Price US$/ton	Consumption ton/year	
		Before	After
CFC-11	2100	14	0
MC	1100		12.6
Amines	7500	1	1.1
Tin	8000	1	1.25
Production	2700	280	280
Energy (kWh)	0.1		50
CFC/MC ratio	1.00 : 0.9		
Yield loss	3/2/1/0 %year on	100 %production	
Maintenance	US$	5 % of new mechanical equipment	134,200

CALCULATIONS

COST ITEM US$X1000	2002	2003	2004	2005
BASELINE				
CFC-11	29.40	29.40	29.40	29.40
Amines	7.50	7.50	7.50	7.50
Other additives	8.00	8.00	8.00	8.00
TOTAL	44.90	44.90	44.90	44.90
POST PROJECT				
MC	13.86	13.86	13.86	13.86
Amines	8.25	8.25	8.25	8.25
Other additives	10.00	10.00	10.00	10.00
Incr.yield loss	22.68	15.12	7.56	0.00
Incr.energy	0.01	0.01	0.01	0.01
Incr. maintenance	6.71	6.71	6.71	6.71
TOTAL	61.51	53.95	46.39	38.83
Incr.Oper.Costs	16.61	9.05	1.49	-6.08
Discount factor	0.91	0.83	0.75	0.68
N.P.V.*	15.11	7.51	1.11	-4.13
Incremental Operational Costs			**19.60**	

Annex III

Calculation of incremental costs (ICC and IOC/IOS) for conversion of 4 manufacturers of flexible PU box foam

Incremental capital cost was estimated based on the list of required equipment and services as well as the cost breakdown for similar ongoing and recently completed projects.

Investment cost summary

	Item	US$
1	Methylene chloride pumping system	10,000
2	Process ventilation	20,000
3	Electrical control system modification	2,000
4	Safety devices	3,000
5	Trials/Commissioning/Start-up/Training	10,000
6	Contingencies (10%)	3,500
	Total	**48,500**

In view of the specific features of a national execution and implementation modalities of the Plan, it is suggested that the above estimated ICC budget component will be the same for all 4 enterprises.

Incremental operating costs/savings have been calculated in accordance with the relevant guidelines documents using the actual production parameters of year 2002 and the current costs of chemicals.

The relevant calculations for the individual enterprises are attached.

Summary table

Company name	ICC budget component US$	IOC/IOS budget comp. US$	Project budget US$
Flexible PU box foam			
Tasharoukiate Elabdali's sons	48,500	1,660	50,160
Tasharoukiate Garmud Janzur	48,500	8,990	57,490
Al Deliui Foam Company Benghazi	48,500	3,340	48,500
Tasharoukiate Ammar's sons	48,500	4,330	51,840
Total	**194,000**	**18,320**	**207,990**

Tasharoukaite

Item	Price US$/ton	Consumption ton/year	
		Before	After
CFC-11	2100	18	0
MC	1100		16.2
Amines	7500	1	1.1
Tin	8000	1	1.25
Production	2700	350	350
Energy (kWh)	0.1		50
CFC/MC ratio	1.00 : 0.9		
Yield loss	3/2/1/0 %year on	100 %production	
Maintenance	US$	5 % of new mechanical equipment	48,500

CALCULATIONS

COST ITEM US$X1000	2002	2003	2004	2005
BASELINE				
CFC-11	37.80	37.80	37.80	37.80
Amines	7.50	7.50	7.50	7.50
Other additives	8.00	8.00	8.00	8.00
TOTAL	53.30	53.30	53.30	53.30
POST PROJECT				
MC	17.82	17.82	17.82	17.82
Amines	8.25	8.25	8.25	8.25
Other additives	10.00	10.00	10.00	10.00
Incr.yield loss	28.35	18.90	9.45	0.00
Incr.energy	0.01	0.01	0.01	0.01
Incr. maintenance	2.43	2.43	2.43	2.43
TOTAL	66.85	57.40	47.95	38.50
Incr.Oper.Costs	13.55	4.10	-5.35	-14.80
Discount factor	0.91	0.83	0.75	0.68
N.P.V.*	12.33	3.40	-4.01	-10.06
Incremental Operational Costs			**1.66**	

Garmud

Item	Price US$/ton	Consumption ton/year	
		Before	After
CFC-11	2100	10	0
MC	1100		9
Amines	7500	1	1.1
Tin	8000	1	1.25
Production	2700	200	200
Energy (kWh)	0.1		50
CFC/MC ratio	1.00 : 0.9		
Yield loss	3/2/1/0 %year on	100 %production	
Maintenance	US$	5 % of new mechanical equipment	48,500

CALCULATIONS

COST ITEM	2002	2003	2004	2005
US$/1000				
BASELINE				
CFC-11	21.00	21.00	21.00	21.00
Amines	7.50	7.50	7.50	7.50
Other additives	8.00	8.00	8.00	8.00
TOTAL	36.50	36.50	36.50	36.50
POST PROJECT				
MC	9.90	9.90	9.90	9.90
Amines	8.25	8.25	8.25	8.25
Other additives	10.00	10.00	10.00	10.00
Incr.yield loss	16.20	10.80	5.40	0.00
Incr.energy	0.01	0.01	0.01	0.01
Incr. maintenance	2.43	2.43	2.43	2.43
TOTAL	46.78	41.38	35.98	30.58
Incr.Oper.Costs	10.28	4.88	-0.52	-5.92
Discount factor	0.91	0.83	0.75	0.68
N.P.V.*	9.35	4.05	-0.39	-4.03
Incremental Operational Costs			**8.99**	

Al Deliui

Item	Price US$/ton	Consumption ton/year	
		Before	After
CFC-11	2100	12	0
MC	1100		10.8
Amines	7500	1	1.1
Tin	8000	1	1.25
Production	2700	210	210
Energy (kWh)	0.1		50
CFC/MC ratio	1.00 : 0.9		
Yield loss	3/2/1/0 %year on	100 %production	
Maintenance	US$	5 % of new mechanical equipment	48,500

CALCULATIONS

COST ITEM US$X1000	2002	2003	2004	2005
BASELINE				
CFC-11	25.20	25.20	25.20	25.20
Amines	7.50	7.50	7.50	7.50
Other additives	8.00	8.00	8.00	8.00
TOTAL	40.70	40.70	40.70	40.70
POST PROJECT				
MC	11.88	11.88	11.88	11.88
Amines	8.25	8.25	8.25	8.25
Other additives	10.00	10.00	10.00	10.00
Incr.yield loss	17.01	11.34	5.67	0.00
Incr.energy	0.01	0.01	0.01	0.01
Incr. maintenance	2.43	2.43	2.43	2.43
TOTAL	49.57	43.90	38.23	32.56
Incr.Oper.Costs	8.87	3.20	-2.47	-8.14
Discount factor	0.91	0.83	0.75	0.68
N.P.V.*	8.07	2.66	-1.85	-5.54
Incremental Operational Costs		**3.34**		

Ammar`s

Item	Price US$/ton	Consumption ton/year	
		Before	After
CFC-11	2100	20	0
MC	1100		18
Amines	7500	1	1.1
Tin	8000	1	1.25
Production	2700	420	420
Energy (kWh)	0.1		50
CFC/MC ratio	1.00 : 0.9		
Yield loss	3/2/1/0 %year on	100 %production	
Maintenance	US$	5 % of new mechanical equipment	48,500

CALCULATIONS

COST ITEM US$X1000	2002	2003	2004	2005
BASELINE				
CFC-11	42.00	42.00	42.00	42.00
Amines	7.50	7.50	7.50	7.50
Other additives	8.00	8.00	8.00	8.00
TOTAL	57.50	57.50	57.50	57.50
POST PROJECT				
MC	19.80	19.80	19.80	19.80
Amines	8.25	8.25	8.25	8.25
Other additives	10.00	10.00	10.00	10.00
Incr.yield loss	34.02	22.68	11.34	0.00
Incr.energy	0.01	0.01	0.01	0.01
Incr. maintenance	2.43	2.43	2.43	2.43
TOTAL	74.50	63.16	51.82	40.48
Incr.Oper.Costs	17.00	5.66	-5.68	-17.02
Discount factor	0.91	0.83	0.75	0.68
N.P.V.*	15.47	4.70	-4.26	-11.57
Incremental Operational Costs			**4.33**	

Annex IV

Calculation of incremental costs (ICC and IOC) for conversion of 4 manufacturers of rigid PU insulation foam.

Incremental capital cost was estimated based on the list of required equipment and services as well as the cost breakdown for similar ongoing and recently completed projects using the following data.

Investment cost summary

	Item	US$
1	Spray foam machine unit 8-10 kg/min	12,000
2	High Pressure Foam Machine 40-60 kg/min	65,000
3	Trials	2,000
4	Technology transfer and training	2,000
5	Contingencies (10%)	7,700
	Total	**88,700**

In view of the specific features of a national execution and implementation modalities of the Plan, it is suggested that the above estimated ICC budget component will be the same for all 4 enterprises.

Incremental operating costs have been calculated in accordance with the relevant guidelines documents using the actual production parameters of year 2002 and the current costs of chemicals and calculation methodology for similar project.

The relevant calculations for the individual enterprises are attached.

Summary table

Company name	ICC budget component US$	IOC budget comp. US$	Project budget US$
Rigid PU foam			
Brothers Company (boilers/water heaters insulation)	88,700	66,195	154,895
Essourur Company (boilers/water heaters insulation)	88,700	62,476	151,176
Musrata Company (water coolers, cold tanks)	88,700	66,939	155,639
Eshams Company (water coolers, cold tanks)	88,700	68,427	157,127
Total	**354,800**	**264,037**	**618,837**

INCREMENTAL OPERATING COSTS

Brothers Company

Before Conversion				After Conversion			
Chemicals	Ratio	Price ($/kg)	Cost	Chemicals	Ratio	Price($/kg)	Cost
Polyol*	100	1.32	0.47	Polyol	100	2.15	0.73
CFC-11	40	2.10	0.30	HCFC-141b	34	3.50	0.40
MDI	140	1.45	0.73	MDI	160.8	1.45	0.79
Unit Cost ($/kg)			1.50	Unit Cost ($/kg)			1.92
Foam Production (kg)		89,000					89,000
Foam Cost ($)		133,182					171,225
Cost Difference Between CFC-11 Foam and HCFC-141b Foam Per Year							38,043
Net Present Value of Incremental Operating Cost for Two Years (10%/yr.)							66,195

Essourur Company

Before Conversion				After Conversion			
Chemicals	Ratio	Price ($/kg)	Cost	Chemicals	Ratio	Price($/kg)	Cost
Polyol*	100	1.32	0.47	Polyol	100	2.15	0.73
CFC-11	40	2.10	0.30	HCFC-141b	34	3.50	0.40
MDI	140	1.45	0.73	MDI	160.8	1.45	0.79
Unit Cost ($/kg)			1.50	Unit Cost ($/kg)			1.92
Foam Production (kg)		84,000					84,000
Foam Cost ($)		125,700					161,606
Cost Difference Between CFC-11 Foam and HCFC-141b Foam Per Year							35,906
Net Present Value of Incremental Operating Cost for Two Years (10%/yr.)							62,476

Musrata Company

Before Conversion				After Conversion			
Chemicals	Ratio	Price ($/kg)	Cost	Chemicals	Ratio	Price($/kg)	Cost
Polyol*	100	1.32	0.47	Polyol	100	2.15	0.73
CFC-11	40	2.10	0.30	HCFC-141b	34	3.50	0.40
MDI	140	1.45	0.73	MDI	160.8	1.45	0.79
Unit Cost ($/kg)			1.50	Unit Cost ($/kg)			1.92
Foam Production (kg)		90,000					90,000
Foam Cost ($)		134,679					173,149
Cost Difference Between CFC-11 Foam and HCFC-141b Foam Per Year							38,471
Net Present Value of Incremental Operating Cost for Two Years (10%/yr.)							66,939

Eshams Company

Before Conversion				After Conversion			
Chemicals	Ratio	Price ($/kg)	Cost	Chemicals	Ratio	Price($/kg)	Cost
Polyol*	100	1.32	0.47	Polyol	100	2.15	0.73
CFC-11	40	2.10	0.30	HCFC-141b	34	3.50	0.40
MDI	140	1.45	0.73	MDI	160.8	1.45	0.79
Unit Cost ($/kg)			1.50	Unit Cost ($/kg)			1.92
Foam Production (kg)		92,000					92,000
Foam Cost ($)		137,671					176,997
Cost Difference Between CFC-11 Foam and HCFC-141b Foam Per Year							39,326
Net Present Value of Incremental Operating Cost for Two Years (10%/yr.)							68,427

ANNEX V

PROJECT COVER SHEET

COUNTRY:	Libya	**IMPLEMENTING AGENCY:** UNIDO
PROJECT TITLE:	Phasing out CFC-11 by conversion to HCFC-141b and CFC-12 to HFC-134a technology in the manufacturingf commercial and transportation refrigeration equipment (Terminal umbrella project)	

PROJECT IN CURRENT BUSINESS PLAN:		Yes
SECTOR:		Refrigeration
SUB-SECTOR:		Commercial/Transport Refrigeration
ODS USE IN COUNTRY		
	Baseline (1999)	900.8 ODP tonnes
	Current (2002)	902.6 ODP tonnes
ODS USE AT ENTERPRISE (Average of 2002):		30.0 MT CFC-11 and 10.6 MT CFC-12
PROJECT IMPACT (ODP TO BE ELIMINATED):		40.6 MT
PROJECT DURATION:		30 months
PROJECT COSTS:	Incremental Capital Cost	US$ 349,000
	Contingency (10% of equipment cost)	US$ 29,900
	Incremental Operating Cost	US$ 33,157
	Total Project Cost	US$ 412,057
LOCAL OWNERSHIP:		100 % Libyan
EXPORT COMPONENT:		None
REQUESTED GRANT:		US$ 412,057
COST EFFECTIVENESS:		10.10 US$/kg
IMPLEMENTING AGENCY SUPPORT COST:		US$ 30,904
TOTAL COST OF PROJECT TO MULTILATERAL FUND:		US$ 442,961
STATUS OF COUNTERPART FUNDING:		
PROJECT MONITORING MILESTONES INCLUDED:		Yes
NATIONAL COORDINATING AGENCY:		Ministry of Environment and Climate Changes

PROJECT SUMMARY

The project will phase out 30.0 MT 0f CFC-11 and 10.6 MT of CFC-12 consumption annually in the production of commercial refrigeration equipment at the terminal umbrella group of Commercial and Transport refrigeration manufacturers (Tasharoukiat El-Nakla, Tasharoukiat Marwa, Tasharoukiat El-Jalid, Tasharoukiat El-Shami and Tasharoukiat El-Takadom), Libya by converting to HCFC-141b as a foam blowing agent in the production of polyurethane foam and HFC 134a as the refrigerant in the cooling circuit of equipment in the production of a range of commercial refrigeration equipment. The project will include incremental capital costs covering three low pressure foaming machine (US$ 105,000), one high pressure foaming machine (US$ 80,000), production and portable refrigerant charging units (US$ 81,000), vacuum pumps (US$ 15,000), leak detectors (US$ 3,000), re-design, testing, trials (US$ 15,000), technical assistance (US$ 25,000) and training (US$ 25,000). Eligible incremental operating costs amount to US$ 33,157 resulting from conversion to the new technology.

Impact of project on country's Montreal Protocol obligations:

The approval of the project will help Libya in meeting its Montreal Protocol obligations, such as the phased reductions in ODS consumption as per the agreed schedules.

Prepared by: A.Malayeri Date: Aug.2003

Reviewed by: C. Murdoch Date:7.Sept.2003

1. BACKGROUND

It should be noted that this sub-sector is not explicitly reflected in the Country Programme of Libya, and the enterprises were identified during a recent national survey on the remaining ODS consuming sectors.

The identified enterprises are manufacturing different sizes and volume of water coolers, upright refrigerators, chest freezers, commercial freezers, etc. One of the enterprises is producing different sizes of refrigerated trucks using rigid PU foams for insulation. Due to the different volume sizes of the refrigerated trucks, the cooling capacity of the refrigeration units is also different and based on the respective capacities of the compressors.

1.1. Enterprise Baseline Data

The baseline data for the companies covered by this project contains:

- baseline production data
- baseline ODS consumption data
- baseline production equipment data

All of the companies covered by this project are similar in nature and operate using similar manufacturing techniques. All of the companies covered by this project are similar in nature and operate using similar manufacturing techniques. Similar to commercial refrigeration companies in Article 5 countries, production is generally on a batch and on order basis. Most companies manufacture a range of equipment, which can be tailored to suit the needs of the customer.
Production lines are generally in open plan factory units or workshops and consist of a series of workstations at which particular task can be carried out such as assembly, brazing, charging etc. Work in progress is moved from one station to another using trolleys or conveyors. In the majority of cases production lines can be reconfigured to suit the particular production and market requirements. A brief overview of each of the companies is given in Annex1.

A brief overview of each of the companies is given below:

Name	Location	Set up year	No. of Employees
Tasharoukiat El-Nakla	Tripoli	1992	32
Tasharoukiat Marwa	Tripoli	1994	18
Tasharoukiat El-Jalid	Tripoli	1993	36
Tasharoukiat El-Shami	Tripoli	1975	42
Tasharoukiat El-Takadom	Tripoli	1986	83

All companies except Tasharoukiat Marwa are using CFC-11 as foam blowing agent. Tasharoukiat Marwa is using expanded polystyrene boards for insulation.

1.2. The Terminal Umbrella Project; Ownership and licenses

Since the remaining companies in the commercial refrigeration sector are all small and medium scale enterprises, and therefore generally too small in terms of CFC usage to warrant individual project preparation, the umbrella project approach has been sanctioned by the Government of Ibya to phase out ODS usage in the commercial sector in Libya. All of the companies in this umbrella project have a number of common factors.

a) The choice of CFC replacement technology is the same in all cases.
b) All companies are 100% Libyaian owned. No licensing from other companies exists.
c) The production facilities are similar and in the majority of cases consist of simple production and fabrication facilities.

All companies involved in this project have formally been committed to scrapping equipment made redundant by the conversion to non-CFC technology. As an Article 5 country, Libya is entitled to import CFCs until 2006. CFC consumption was carefully checked against the specifications of refrigerated models actually produced by each of the companies.

These companies are 100% indigenously owned. No licensing from other companies exists.

1.3. Project Impact

The project will phase out 30.0 MT of CFC-11 and 10.6 MT of CFC-12. The total project impact, which will be eliminated, is 40.6 ODP tonnes, which will assist the Libyan Arab Jamahiriya in meeting its Montreal Protocol Obligations.

2. PROJECT OBJECTIVE

The objective of this project is to eliminate the use of CFC-11 and CFC-12 in the production of commercial refrigeration equipment at the Terminal Umbrella Group of Libyan commercial and transport refrigeration manufacturers through conversion to the use of HFC-134a refrigerant for the cooling system and HCFC-141b as blowing agent for the polyurethane insulation foam.

The same operating parameters and the same quality level must be guaranteed on completion of the conversion process, but no increase in production capacity will be brought about by the project. The companies involved are aware of the financial limitations of the funding process and are prepared to use its own funds to share some of the cost of the conversion process.

3. PROJECT DESCRIPTION

The companies included in this terminal umbrella project have recognized the need to be in compliance with the Montreal Protocol and have agreed to participate in Libya's ODS phase-out programme. The companies are committed to phase out CFCs by converting their foaming equipment to HCFC-141b and adopting HFC-134a as refrigerant. This project document describes the activities needed to carry out the phase out process.

3.1. Justification for Selection of Alternative Technologies

The selection of the alternative technology would be governed by the following considerations:

- Proven and reasonably mature technology;
- Cost effective conversion;
- Availability of the systems at favorable pricing;
- Critical properties that have to be obtained in the end product (in this project – thermal Conductivity, dimensional stability, closed cell content, surface properties and strength);
- Compliance with established (local and international) standards on safety and environment;

a) Refrigerant

The technological options currently available to replace CFC-12 refrigerant are presented in the table below:

Refrigerant	Assessment	Consequences
Iso-butane (R-600a)	• Inflammable and explosive in certain limits of mixture with air • ODP=0 • High coefficient of performance (COP) which means lower energy consumption • GWP near zero	Special safety infrastructure is needed. Technology and specific know-how are available, which guarantees safe conditions during manufacture repair and service. Special service technology must be applied. Changes in refrigerator design are necessary (special compressor, capillary tube etc)
HFC-134a	• ODP=0 • GWP=1,300	Product design can largely stay the same. Increased operation requirements. Especially high cleanliness necessary. Components affected by the refrigerant must be dry and free of mineral oil. Special compressor (lubricating oil), filter-dryer and different length capillary tube will be needed. Refrigerant is not flammable.

The alternative technologies for replacement of CFC-12 in small capacity hermetic or semi-hermetic refrigeration systems are as below:

HCFCs are not considered long-term substitutes, due to their residual ODP.

Hydrocarbon technologies are environmentally friendly (no ODP/GWP or health hazards) but require elaborate safety/monitoring provisions and investments due to their flammability and will not be suitable for viable transfer to enterprises of this size and organization.

HFC-152a has higher discharge temperatures/pressures, is flammable and less stable at high temperatures and the technology for the same is not widely commercially available.

HFC-134a technology as a replacement for CFC-12 based refrigeration systems, is universally accepted, especially in small hermetic or semi-hermetic systems. HFC-134a is a zero ODP option. The technology is commercially available and relatively cheap to implement. Hermetic compressors optimized for HFC-134a are commercially available. The enterprise has therefore chosen HFC-134a technology.

b) FOAM

The presently available and emerging CFC-phase-out technologies, for rigid polyurethane insulating foams are

Blowing agent	Assessment	Consequences
HCFC-141b	ODP = 0.11 GWP = 630	Almost drop-in replacement. Some adjustments in production process and product design required
Cyclopentane	ODP = 0 GWP = 3	Special technology and infrastructure is needed (high pressure PU dispenser). Additional equipment to ensure safe operation has to be installed.

Interim Technologies

HCFC-22 (independently or in combination with HCFC-142b and more recently with HCFC-141b) based systems cannot be supplied pre-blended, due to the low boiling point of HCFC-22 and will require investments in full-fledged in-house blending facilities. HCFC-22 also has residual ODP.

HCFC-141b has a boiling point near ambient temperatures. HCFC-141b based systems are technically mature and commercially available. They also provide relatively the most acceptable insulation value and energy efficiency, and the lowest investment and operating costs vis-a-vis other options. No major changes in the auxiliary equipment/tooling in the production program are needed. However, HCFC-141b has residual ODP and is also an aggressive solvent.

Long term Technologies

Pentane (n-, iso-, cyclo) based systems require extensive safety related provisions/investments due to their flammability. Due to safety considerations, the use of pre-blended systems is not viable and additional investments for in-house pre-mixing are required. Cyclopentane has miscibility limitations with polyols. The molded densities and insulation values are still inferior to those obtained with HCFC-141b. The advantages are their relatively lower unit costs; they are environmentally friendly (no ODP/GWP or health hazards) and constitute a permanent technology. Hydrocarbons are therefore the preferred conversion technology for large and organized users, where the safety requirements can be complied with and investments can be economically justified. In case of this enterprise, implementation of hydrocarbon based technology will require enormous investments for changing the plant layout completely (as the current layout is not suitable for handling hazardous substances consistent with local regulations), which are not justified by the level of their production.

Gaseous HFCs have been used successfully in some cases but have not been applied widely due to cost, technical and/or availability factors.

For water-based systems, the insulation values, density and commercial availability are unsatisfactory at present. However, these systems have acceptable processing characteristics and are expected to be mature and commercially viable in the near future, especially for applications where insulation values are not critical. They are environmentally friendly and safe (zero ODP/GWP, no health or safety hazards) and constitute a permanent technology.

Chemical and systems suppliers and the appliance industry are extensively evaluating liquid HFC-based systems. Preliminary trials with non-optimized formulations indicate lower molded foam densities, insulation values comparable to HCFC-141b and no solvent action. However, issues such as the time frame for commercial availability of liquid HFCs, their costs and their impact on climate change, need to be addressed satisfactorily. On the whole, liquid HFCs are considered to be the only potential zero-ODP alternatives to hydrocarbons.

Based on the above, cost, safety and technical considerations as well as due to the lack of expertise and well trained personnel, the enterprise will convert to CFC-free systems for their rigid polyurethane foam operations. Until the commercial introduction of mature CFC-free and national laws limiting use of HCFCs. HCFC-141b based systems will be selected as an interim technology, to maintain product standards and acceptability.

The companies are fully aware that HCFC-141b is a transitional substance and there is no possibility to apply for any further assistance in the future in case it becomes necessary to phase out the presently selected alternative(s).

3.2. Conversion

The conversion technology and expertise will be acquired from equipment, component and chemical suppliers and external foam and refrigeration experts. The impact on the plant/process due to the use of HCFC-141b as the blowing agent and HFC-134a as the refrigerant, would need to be addressed by implementing plant modifications and through the introduction of new equipment, components and processes, as below:

A. Refrigeration Operation

The conversion to HFC-134a as the replacement for CFC-12 will involve the following changes:

a) Compressors suitable for HFC-134a will be required. These will be available from existing suppliers.

b) The chemical stability of HFC-134a and of the synthetic lubricants compatible with HFC-134a are highly sensitive to moisture and impurities in the system, as compared to CFC-12 system. The evacuation/charging process for HFC-134a and polyol-ester lubricant will need to ensure the required level of cleanliness and dryness in the system. To ensure this the following is proposed:

- The vacuum pumps are not suitable for use with HFC134a. 6 of the existing vacuum pumps will be replaced.
- The existing refrigerant charging units are not suitable for use with HFC -134a and cannot be retrofitted, and will therefore be replaced with 4 production-charging units and 7 portable charging units.
- The design/sizing of the refrigeration system will need to be suitably changed, to ensure the viability of the process and to maintain the product standards for performance, such as:
- Up sizing the condensers and re-engineering evaporators and condensers, so as to ensure the levels of cleanliness and contamination that can be tolerated with HFC-134a
- Lengthening of the capillary tubes.
- Use of filter-dryers with finer pores, suitable for use with HFC-134a

d) The existing leak detectors are suitable for detecting CFC-12 only and will therefore need to be replaced with leak detectors suitable for detecting HFC-134a.

e) Provision for technical assistance from external international refrigeration experts and also from compressor suppliers will be required to be made to ensure smooth transition to the new technology and the successful implementation of the project.

f) In-house and field trials on prototypes of each model will be needed to be carried out, to establish performance and reliability with the HFC-134a based refrigeration systems.

g) The system dryness/cleanliness with the use of HFC-134a being of crucial nature, careful re-assessment of the production program, re-training/orientation of the staff for the new technology would be required.

Investments will need to be made and provisions thereof are included in the project budget, to cover the incremental costs of these changes. These changes will also result in incremental operating costs in the refrigeration operation originating from the following:

a) Increased costs of the compressors suitable for HFC-134a.
b) Increased costs of HFC-134a in relation to CFC-12.
c) Increased costs due to up sizing of the condensers.
d) Increased costs due to the lengthening of the capillary.
e) Increased costs of the filter/drier due to the finer pores required in relation to those presently used.

B. Refrigeration Service

h) No equipment or training is being requested in respect of service work. It is anticipated that training will be handled via a nationwide training program that has yet to be organized.

The servicing of new HFC-134a equipment as well as the recovery and recycling of the used refrigerant will have to be addressed on national level in line with the recommendation of the Fund Secretariat for the service sector.

C. Foam Operation

The use of HCFC-141b as an alternative-blowing agent for the foaming operation will result in the following:

a) New formulations suitable for CFC-141b will be required. These will be available from existing chemical suppliers. No investments are foreseen for handling chemicals.

b) In cases when the low pressure foaming machine will be replaced with a high pressure one, the use of new formulations will lead to a change in mixing ratios ad increased viscosity, leading to reduced flow characteristics of the chemical mixture. The foaming reaction parameters will change. HCFC-141b based foam will have an increased thermal conductivity compared to foam produced with CFC-11. The existing low-pressure foam dispensers with mechanical missing will not be able to process new formulations without adversely affecting the cell structure and thereby the thermal conductivity of the foam. These dispensers will therefore be replaced by one high-pressure foam dispensers of equivalent effective capacity for each company, which will provide a finer cell structure and help minimize the deterioration of thermal conductivity of the foam.

c) In cases when low pressure foaming machine will be replaced with a low pressure one, the new PU formulation, with HCFC-141b, it is necessary to use a slightly higher foam density in order to compensate for the lower insulation value of foam. Also, to guarantee a good foam structure, it is necessary to heat the foaming moulds. In some cases this can be accomplished by passing the moulds through an oven, in other cases electric heating of the moulds would resolve the question. In the PU system using HCFC-141b as the blowing agent must also guarantee thorough mixing of the higher viscosity chemicals.

It was noted by various technical for a that in the refrigeration sector with the use of low-pressure foaming machines, one can not meet the quality requirements in the manufacture of insulating polyurethane foam based on HCFC-141b formulations and it would therefore be optimal to apply high pressure foaming machines for use with HCFC-141b. Since the Montreal Protocol supports the concept of phase out of CFCs without either upgrading or downgrading existing production facilities, and in the light of the above considerations, the replacement of low pressure machines with high pressure ones has been the accepted procedure in the refrigeration sector projects.

However, in those cases, where the scale of production cannot allow purchase of a high pressure foaming machine within the applicable cost effectiveness threshold and the counterpart has no financial means to

substantially supplement the project cost, we are proposing purchase of new low pressure foaming machine to replace the existing conventional ones. The implementation of the projects through upgrading of the existing foam dispensers would be impractical since the existing equipment is locally made, very simple and rather unique. It is clear furthermore, that the use of HCFC-141b formulations with the existing machines would result in a net degradation of foam quality.

The design of low pressure foaming machines has improved over the last years as a result of research with the use of sophisticated simulations and mathematical models for the prediction of chemical behavior in real conditions, application of CAD systems in the design process, production of machine parts on numerical control machines and the use of the sophisticated surface treatments. The mixing head of the newer foaming machine have a control board with basic functions like emergency push button, pouring, washing, air shot, set and reset timers, mixing head forced lubrication and emergency cleaning facility. The metering group (for polyol premix and isocyanate components) has better precision to ensure accurate dosing and constant optimal conditions for the chemical reaction of the components. Nevertheless, the replacement of low pressure foaming machines with new low pressure foaming machines will not completely solve the issue of degradation of physical properties when using the HCFC-141b but it will compensate the quality problems to some extent, as the equipment will be inherently more accurate and more efficient.

Replacement of old for new will therefore have a positive impact on the foam quality, even if not completely counterbalancing the negative impact of HCFC-141b.

d) The HCFC-141b based foam will have an increased molded density with respect to the CFC-11based foam, resulting in increased requirement of chemicals.

e) Technical assistance from external process experts and from chemical and equipment suppliers will need to be acquired, to implement the new formulations and to ensure smooth transition to the new technology.

f) Trials will be needed for the new equipment, process and products. This will cover the cost of chemicals, raw materials, consumables & utilities required during trials/commissioning.

g) The production personnel in the enterprise need to be trained to be able to work with the new formulations and process.

Costs are included in the project budget, to cover the incremental costs of these changes. These changes will also result in incremental operating costs, for which provision has been made in the project budget. These incremental costs originate from the Increased cost of the formulations and increased foam density resulting in increased consumption of polyurethane chemicals.

4. INPUTS

4.1. Capital Goods Replacement, disposal of replaced CFC-related equipment

Annex A gives the detailed list of the required services, equipment to be modified, equipment to be replaced, and additional equipment to be provided for the conversion. The scope of supply is based on maintaining the present production capacity and the quality of products.

4.2. Conversion/Training

Within the scope of the project, technicians from the recipient enterprise will be trained in the following areas:

- redesign of refrigeration equipment and appliances;
- quality control in relation to conversion;
- operation and maintenance of the new machinery and equipment;
    - testing of refrigeration systems;
    - materials' specifications and selection;
    - refrigerator servicing techniques.

4.3. Model Redesign

It is foreseen that all models will have to be redesigned; this will be followed by the manufacture of prototypes and refrigeration performance tests. In this regard cooperation with well-qualified consultants would minimize the risk related to the conversion of the manufacturing technology and of the products.

5. IMPLEMENTATION

The project will be implemented according to the rules and procedures of UNIDO, under the management of the backstopping officer of UNIDO, in close cooperation with the counterpart company. The Ozone Unit of the Department of the Environment of Libya will do all necessary local coordination and control.

Suitably qualified and experienced consultants will be appointed and fielded by UNIDO, to substantively assist and supervise the technical aspects of the conversion process, to perform troubleshooting and to provide assistance in specialized product redesign work. The respective job description(s) will be prepared on approval of the project.

The detailed Terms of Reference for the supplies and services to be provided under the project will be elaborated after project approval and sent to the company for his review. After competitive bidding, performed by UNIDO in accordance with UNIDO's financial rules and procedures, a General Contractor will be appointed by UNIDO for the supply of the project equipment (production equipment, etc.). Training and production expertise is likely to be provided by individuals who will be separately contracted by UNIDO.

The final equipment specification and work plan can only be elaborated after approval of the basic approach for project implementation by the MFMP.

Permission from local authorities for the introduction of the new technologies under this project will be obtained by the counterpart, who will also be responsible for the compliance of the new technologies with the established national standards.

Having accepted the conversion of its plants to the application of non-ODS technologies under this project, the counterpart, shall be committed to provide the following inputs:

- All activities and costs related to the construction work needed (including the provision of technical infrastructure) to accommodate the new technologies introduced under this project;
- Technical staff, local labor as required by the General Contractor;
- Provision of tools, transportation and lifting equipment as required;

- Provision of materials, utilities, services, manpower, etc. related to commissioning, start-up, trial runs, prototyping and testing;
- Local transport, communication and secretarial facilities for the General Contractor's and UNIDO's staff involved in the project's implementation;
- All other expenses not included in this Project Document and not covered by the budget approved by the Multilateral Fund for the Implementation of the Montreal Protocol.

The General Contractor will elaborate the specification of these works after project approval and the necessary site inspection. Thus, the costs of construction work can be specified only after appointment of the General Contractor and finalization of the equipment list. The relevant construction work shall be arranged by the counterpart under the supervision of the General Contractor and in line with the established milestones for this project

UNIDO as Implementing Agency has the necessary experience and capabilities for the successful implementation of projects at enterprise level. Upon approval of the project by the MFMP the whole budget will be transferred to UNIDO. Any substantive or financial deviation from the approved project is subject to approval by the MFMP and UNIDO.

All of the equipment replaced during the conversion process through the project should be dismantled by the counterpart and rendered unusable for use with CFC (Low pressure Foaming Machines and Charging boards).

The Government of Socialist People's Libyan Arab Jamahiriya has already obtained the counterpart's commitment for cost sharing for this project and took note of the decision no. 27/13 taken during the 27th Session of the Ex.Com. The project document was technically appraised by an independent expert and his comments have been incorporated in the project document.

6. PROJECT COSTS

The total project cost is estimated at US$ **412,057** and is set out in Annex 4 along with the calculation of the cost effectiveness of the project.
The Incremental Capital Costs of US$ **349,000** include capital investments required for refrigerant charging/evacuation equipment, trials, technical assistance and training. The breakdown of these is provided separately for the foaming and refrigeration operations in annex 2.
The Incremental Operating Costs of US$ **33,157** represent the incremental operating cost calculated in Annex 3. Incremental operating costs are claimed within the limits of cost effectiveness for each enterprise.
A contingency of US$ **29,900** equal to 10% of the capital equipment cost is included to cover unforeseen expenditure within the limits of cost effectiveness for each enterprise.
Implementing agency support costs of US$ **30,904** are 7.5% of the of the total grant requested.
Grand total cost of US$ 442,961

PROJECT MONITORING MILESTONES

Milestone	Month, after approval	Results			Remarks
		Achieved	Not achieved	Delay	
Implementation Agreement submitted to beneficiary	2				
Implementation Agreement signed	3				
TOR for equipment (Refrigerant equipment and foaming machines)	3				
TOR for equipment cleared by beneficiary	4				
Bids requested	5				
Bids received, evaluated	6				
Contract for equipment supply signed	7				
Equipment delivered	15				
Commissioning and trial runs	18				
Decommissioning and destruction of replaced equipment	24				
Submission of project completion report	30				

Annexes

Annex 1: Baseline Production and ODS Consumption Data
Annex 2: Incremental capital Costs
Annex 3: Incremental Operating Costs
Annex 4: Project Budget and Cost Effectiveness
Annex 5: Baseline production equipment data and disposal

Annex1 - Baseline production and ODS consumption Data

Model / Description	Annual Production	Foam		CFC-11		Comp.	CFC-12		Total ODS kg
		per unit (kg)	Total (kg)	per unit (kg)	Total (kg)		per unit (kg)	Total (Kg)	
Tasharoukiat El-Nakla									
Comm. Freezers	200	17	3,400	2.20	440	1/3 – 1 HP	0.90	180	620
Comm. Refrigerators	300	21.5	6,450	2.80	840	1/3 – 1 HP	0.80	240	1,080
Water Coolers	3,250	7.2	23,400	0.95	3,090	? –1/3 HP	0.40	1,300	4,390
Chest freezers	130	7.7	1,001	1	130	? - ? HP	0.60	80	210
Total / average	**3,880**	**8.83**	**34,251**	**1.16**	**4,500**	------		**1,800**	**6,300**
Tasharoukiat Marwa									
Comm. Freezer	480	0	0	0	0	? – 3 HP	1.8	864	864
Comm. Refrigerator	400	0	0	0	0	? – 3 HP	2.0	800	800
Total / average	**780**	**0**	**0**	**0**	**0**	-----		**1,664**	**1,664**
Tasharoukiat El-Jalid									
Chest Freezers	700	7.8	5,460	1	700	1/3–1.5 HP	1.8	1,260	1,960
Water cooler	1,600	0	0	0	0	? - ? HP	0.38	608	608
Commercial Freezer	480	35	16,800	4.5	2,160	? - 3 HP	1.3	624	2.784
Upright Refrigerator	250	14	3,500	1.80	450	? - 1 HP	1.2	300	750
Total / average	**3,030**	**8,5**	**25,760**	**2.3**	**3,310**	---		**2,792**	**6,102**
Tasharoukiat El-Shami									
Comm. Freezer	450	37	16,650	4.8	2,160	? – 3HP	0.9	414	2,574
Comm. Ref,	680	45	30,600	5.9	4,012	? - 3 HP	1.2	816	4,828
Total / average	**1,130**	**41.80**	**47,250**	**5.46**	**6,172**	---		**1,230**	**7,402**
Tasharoukiat El-Takadom									
Comm. Freezers	1,280	35	44,800	4.9	6,272	? -3 HP	0.9	1,102	7,374
Comm. Refrigerators	920	42	38,640	5.9	5,482	? - 3 HP	1.8	1,656	7,138
Refrigerated Trucks	26	130	3,380	18.2	473	1 – 3 HP	6	156	629
Mobile cold rooms	32	40	1,280	5.6	179	3 – 5 HP	8	256	435
Panels for Prefabricated Houses	82	320	26,240	44.8	3,674	----	0	0	3,674
Total / average	**2,340**	**48.86**	**114,340**	**6.87**	**16,080**	**----**	3.02	**3,170**	**19,250**
Grand Total					**30.062**			**10.656**	**40.718**

Note: The production programme of commercial refrigerators and refrigerated trucks manufacturers consist of different volumes of products based on different types of compressors. Therefore different levels of CFC-12 charging is used in the range of 1.2- 3.8 kg/per unit. Small numbers of units are produced using even higher charging level.

However, taking into consideration that majority of these products are based on the CFC charges in the range of 1.2-1.8 kg/per unit, these amounts have been taken as a basis for the assessment of CFC-12 consumption for manufacturing.

Annex 2 - INCREMENTAL CAPITAL COSTS

Description	Cost	Tasharoukiat El-Nakla		Tasharoukiat Marwa		Tasharoukiat El-Jalid		Tasharoukiat El-Shami		Tasharoukiat El-Takadom		Total	
		Qty	Total Cost	Qty	Total Cost	Qty	Total Cost	Qty	Total Cost	Qty	Total Cost	Qty	Total Cost
Low pressure foam dispenser	35,000	1	35,000	0	0	1	35,000	1	35,000	0	0	3	105,000
High pressure foam dispenser	80,000	0	0	0	0	0	0	0	0	1	80,000	1	80,000
Total Foaming Equipment			***35,000***		***0***		***35,000***		***35,000***		***80,000***		***185,000***
Production charging units suitable for HFC-134a duty	15,000	1	15,000	0	0	1	15,000	0	0	2	30,000	4	60,000
Portable charging units suitable for HFC-134a duty	3,000	1	3,000	1	3,000	1	3,000	2	6,000	2	6,000	7	21,000
Vacuum pumps	2,500	1	2,500	1	2,500	1	2,500	1	2,500	2	5,000	6	15,000
Hand-held leak detectors for HFC-134a	500	1	500	1	500	1	500	1	500	2	1,000	6	3,000
Redesign of main models	1,000	1	1,000	1	1,000	1	1,000	1	1,000	1	1,000	5	5,000
Manufacture of prototypes	1,000	1	1,000	1	1,000	1	1,000	1	1,000	1	1,000	5	5,000
Laboratory and field test	1,000	1	1,000	1	1,000	1	1,000	1	1,000	1	1,000	5	5,000
Total Refrigeration Equipment			***24,000***		***9,000***		***24,000***		***12,000***		***45,000***		***114,000***
Total Equipment			**59,000**		**9,000**		**59,000**		**47,000**		**125,000**		**299,000**

Annex 3

Incremental Operating Costs

Refrigerant:

The prices of HFC-134a and CFC-12 used in this document have been calculated by average the prices given by a range of Libyan refrigeration companies; these prices are US$ 7/kg and US$ 2.50/kg respectively (without considering customs duties). The incremental cost column of refrigerant is calculated as follows:
(Total CFC-12 Consumption kg x US$5.85 x 0.9) - (Total CFC-12 Consumption kg x US$2.50)

The factor of 0.9 is applied, as average the charge of HFC-134a used is 90% of the mass of the original CFC-12 charge.

Foam:

When HCFC-141b is used as a blowing agent in polyurethane foam, approximately 5% more of the overall material mixture is needed to achieve the higher foam density required to compensate for slightly higher thermal conductivity and ensure mechanical strength. The prices of HCFC-141b and CFC-11 are currently US$ 3.5/kg and US$2.1/kg respectively, as supplied in 250 liters barrels.

Calculation of Incremental Cost per kg of Foam

	CFC-11 Foam			HCFC-141b Foam		
	wt%	Price$/kg	Cost US$/kg	wt%	Price $/kg	Cost US$/kg
Polyol + MDI	87	2.0	1.74	93	2.0	1.86
CFC-11 or HCFC 141b	13	2.1	0.273	7	3.50	0.245
PU-cost			**2.013**			**2.105**

The incremental cost of foam production is therefore 2.105 - 2.013 = US$ 0.092 per kg

The total incremental operating cost associated with the foam is calculated below in the following way:
Total Production x Average kg of Foam per unit x 1.05 x US$0.092

Where the factor of 1.05 applied as 5 more polyurethane foam is used, the density of the foam is in the range 30-32 kg/m^3.

Note: Taking into consideration that majority of the production programme of these enterprises in terms of annual number of units produced is close to the domestic refrigeration sub-sector, the IOC component was calculated accordingly.

Name	IOC, US$
Tasharoukiat El-Nakla	**3,659**
Tasharoukiat Marwa	**3,318**
Tasharoukiat El-Jalid	**6,232**
Tasharoukiat El-Shami	**6,124**
Tasharoukiat El-Takadom	**13,824**
Total	**33,157**

Annex 4
TOTAL PROJECT BUDGET AND COST EFFECTIVENESS

Project Budget	Cost Tasharoukiat El-Nakla	Cost Tasharoukiat Marwa	Cost Tasharoukiat El-Jalid	Cost Tasharoukiat El-Shami	Cost Tasharoukiat El-Takadom	Cost Total
International experts	5,000	5,000	5,000	5,000	5,000	25,000
Training of personnel	5,000	5,000	5,000	5,000	5,000	25,000
Equipment	59,000	9,000	59,000	47,000	125,000	299,000
Incremental Capital Cost	69,000	19,000	69,000	57,000	135,000	349,000
Contingency Cost (10% of capital equipment)	5,900	900	5,900	4,700	12,500	29,900
Incremental operating cost (IOC)	3,659	3,318	6,232	6,124	13,824	33,157
Total Project Cost	78,560	23,218	81,132	67,824	161,324	412,057
Implementing Agency Support Cost						30,904
Total Cost to Multilateral Fund						442,961
Cost Effectiveness	**Total**	**Total**	**Total**	**Total**	**Total**	**Total**
ODP phase out CFC-11	4,500	0	3,310	6,172	16,080	30,062
ODP phase out CFC-12	1,800	1,664	2,792	1,236	3,170	10,656
ODP of HCFC-141 b	495	0	364	679	2,153	3,307
Total ODP impact	6,034	2,400	6,723	8,586	21,011	44,426
Total Project Cost US $	78,560	23,218	81,132	67,824	161,324	412,057
Total Cost Effectiveness of Project US$/Kg	**12.4**	**13.6**	**13.3**	**9.1**	**8.4**	**10.1**

Annex 5: Baseline Production Equipment

DESCRIPTION	Nr.	INSTALLED (Year)	Specification	Disposal Plan
Tasharoukiat El-Nakla				
Foaming Machine	2	**1993**	**Low pressure, Locally made**	**Scrap**
Foaming jigs	2	**1993**	**Locally made**	**N/A**
Vacuum Pumps (for CFC-12)	3	**1993**	**Robinair**	**2 x Retrofit**
Production charging machine	3	**1993**	Galileo	**Scrap**
Leak Detector (for CFC-12)	1	**1994**	**Robinair**	**Use for service**
Tasharoukiat Marwa				
Vacuum Pumps (for CFC-12)	2	**1994**	**Robinair**	**1 x retrofit**
Production charging machine	2	**1994**	Galileo	**Scrap**
Leak Detector (for CFC-12)	1	**1994**	**Leybold**	**Use for service**
Tasharoukiat El-Jalid				
Vacuum Pumps (for CFC-12)	5	**1994**	Galileo	**4 x retrofit**
Production charging machine	3	**1994**	Galileo	**Scrap**
Leak Detector (for CFC-12)	2	**1994**	**Leybold**	**Use for service**
Moulds	10	**1994**	**Locally made**	**N/A**
Tasharoukiat El-Shami				
Foaming jigs	1	**1978**	**Locally made**	**N/A**
Vacuum Pumps (for CFC-12)	3	**1993**	Galileo	**2 x retrofit**
Production charging machine	2	**1990**	Galileo	**Scrap**
Leak Detector (for CFC-12)	1	**1990**	**Leybold**	**Use for service**
Tasharoukiat El-Takadom				
Foaming Machine	2	**1993**	**Low pressure**	**Scrap**
Foaming jigs	5	**1988**	**Locally made**	**N/A**
Vacuum Pumps (for CFC-12)	5	**1991**	Galileo	**3 x retrofit**
Production charging machine	5	**1991**	Galileo	**Scrap**
Leak Detector (for CFC-12)	3	**1992**	**Robinair**	**Use for service**

ANNEX VI
PROJECT COVER SHEET

COUNTRY	:	Libya
IMPLEMENTING AGENCY	:	UNIDO
PROJECT TITLE	:	Refrigerant management plan
PROJECT IN CURRENT BUSINESS PLAN	:	Yes
SECTOR	:	Refrigeration
SUB SECTOR	:	Service sector
ODS USE IN SERVICE SECTOR (2002)	:	101.6 MT
PROJECT IMPACT	:	101.6 MT
PROJECT DURATION	:	2003 – 2007
PROJECT COST	:	US$ 524,430
LOCAL OWNERSHIP	:	Nil
EXPORT COMPONENT	:	Nil
REQUESTED GRANT	:	US$ 524,430
COST-EFFECTIVENESS	:	US$ 5.1/kg ODP
IMPLEMENTING AGENCY SUPPORT COST	:	US$ 39,332
TOTAL COST OF PROJECT TO MLF	:	US$ 563,762
STATUS OF COUNTERPART FUNDING	:	N/A
PROJECT MONITORING MILESTONES INCLUDED	:	Yes
NATIONAL COORDINATING AGENCY	:	Ministry of Environment and Climate Change

PROJECT SUMMARY

Through the extensive survey of remaining ODS consumption conducted in connection with preparation of the National Phase-out Plan, the refrigeration service sector was reviewed and analyzed including series of discussions with relevant stakeholders, actions required to reduce the CFC consumption in the sector. These actions are included in four project components of the refrigerant management plan (RMP), i.e., Institutional framework project, Customs offices empowerment project, National project for training service technicians and National recovery and recycling project. Selected workshops and service technicians are upgraded and trained under the RMP. As the sector structure is complicated with about 2,700 workshops distributed in all regions, the first two non-investment project components are started this year in order to make the country be prepared for following project components. The latter two project components are started in following years. Accordingly, the funding is requested in five years from 2003 to 2007, thereby the funds are effectively used. Through implementation of these project components, the significant amount of CFC consumption in the sector will have to be eliminated in the refrigeration service sector.

IMPACT OF PROJECT ON COUNTRY'S MONTREAL PROTOCOL OBLIGATIONS

When implemented as scheduled, 101.6 MT CFC consumption will have been eliminated from the refrigeration service sector, whose CFC consumption is significant for the country's total CFC consumption. The project is essential to ensure Libya to meet the country's obligation with the Montreal Protocol to reduce 50% CFC consumption in 2005 and 85% in 2007.

Prepared by: A. Malayeri — Date: August 2003
Reviewed by: C. Murdoch — Date: September 2003

Refrigerant Management Plan (RMP), Libya

CONTENTS[1]

[1] Prepared according to the basic format for the RMP in "Guidelines for Development of Refrigerant Management Plans" (Policies, procedure, guideline and criteria, Annex XIII 18, Multilateral Fund for the Implementation of the Montreal Protocol).

BACKGROUND

The first draft of RMP project document was prepared in the year 2000 as an integral part of the Country Programme reflecting the CFC-12 consumption in year 1999 at the level of 141.3 tonnes.

Subsequently, the NOU has reported the actual consumption of CFC-12 for servicing with clear tendency of the reduction of the consumption up to 120 tonnes in year 2001.

The above-mentioned draft of RMP was used as a basis for the preparation of this RMP project as a part of the Sector Plan reflecting the actual CFC-12 consumption identified during the national survey on the remaining ODS consuming sectors .

Through the extensive survey of the refrigeration service sector in Libya followed by the data analysis and a series of discussions with relevant stakeholders, actions required to reduce the CFC consumption in the sector have been identified. These actions are included in four project components of the refrigerant management plan (RMP), i.e., Institutional framework project, Customs offices empowerment project, National project for training service technicians and National recovery and recycling project. Selected workshops and service technicians would be upgraded and trained under the RMP.

The servicing sector in Libya is very complicated and diversified. In total, there are approximately 10,000 workshops distributed in all regions, which provide services of various electrical and electronic households and office equipments. Most of these workshops provide very limited services for refrigeration equipment. Therefore, only approximately 2,500 workshops specialized in refrigeration servicing will be included in the RMP related activities. Through implementation of the proposed project components, the significant amount of CFC consumption in the sector will have to be eliminated in the refrigeration service sector.

1. Current Situation

According to the statistical information, the population of Libya in 2002 was around 6,167,000 persons, including non-Libyans. This is based on the actual population in 1999 and the population growth rate of 2.8% given for the year 2002. Usually the family consists of 4-6 persons; the number of families is estimated at approximately 1,028.000.
The gross domestic product (GDP) per capita in 2002 is estimated as 2520 Libyan Dinar (US$ 1938 approximately).

1.1 Consumption of CFC-12 in the Domestic Refrigeration Servicing Sector

On the average, a Libyan family (similar to other countries in this region), usually has one or two refrigerators and freezer. Therefore, in average, the total number of refrigeration units could be estimated at approx. to 1,500,000 units. According to the current practice of domestic refrigeration equipment servicing , approx. 10% of these units require service annually using in average 200 grams of CFC-12 for recharging. Therefore, the total CFC-12 consumption in domestic refrigeration servicing sector is estimated at 21.9 tonnes.

It is relevant to be mentioned that this assessment was fully confirmed by the results of the above described national survey on the remaining ODS consumption in the country.

1.2 Consumption of CFC-12 in the Commercial Refrigeration Servicing Sector

Due to the climate conditions as well as long history in food trading and food supply sectors, there is a great number of shops, cafeterias, food stores, grocery shops, etc equipped with different type of equipment, like chest freezers, display cabinets, ice cream machines, cold rooms, upright refrigerators and freezers, water coolers etc., This sub-sector was a subject for through review and analysis. For this purposes the consultants of the sub-contractor (Assalama Bureau) have visited great number of such shop at 7 most populated towns, as well as a number of places in small towns.
It was found out that in total there are approximately 155,000 shops and other above listed places normally equipped with one or more of these refrigerating units; in average 2 units per shop. As a result the total number refrigerating units in the commercial sector is approx. 310,000.

Assuming 20% of the total to be serviced annually, each requiring 800 grams of CFC-12 in the process of recharging, the total amount of CFC-12 consumed annually in the commercial sector of 49.3 tonnes.

The usage of CFC-11 and CFC-12 in the manufacture of commercial refrigeration sub sector will be addressed in detail by separate requests for funding, however the consumption and phase out targets have been fully taken into consideration as part of the RMP in line with Decision 31/48.

1.3 Consumption of CFC-12 in the Industrial Refrigeration Servicing Sector

This sub-sector was also subject for the survey. Based on the visits, questionnaires and reports provided by the end users, it is found out that the annual consumption of CFC-12 in the industrial refrigeration servicing sector sector is 22.3 tonnes.

1.4 Consumption of CFC-12 in the Mobile Air-Conditioning *(MAC)* Servicing Sector

According to the national statistic data regarding registered vehicles in the country it was found that in 1999 the number of vehicles was approx. 600,000. It is estimated that 7% of this number is air-conditioned using CFC-12 and need annual service. Thus, the number of vehicles' air conditioners using (CFC-12 which need annual service is approx. 40.000 units. Taking into account that each unit requires in average 200 grams of CFC-12 for topping up, the annual consumption of CFC-12 in this sector is 8 tonnes. All vehicles imported after 1999 mostly air-conditioned using HCFC-134a.

It should be noted that the above general assessment was supported by the results of the survey.

1.5 Summary of the Refrigeration Servicing Sector

The summary of ODS consumption by different sectors of Libya for the period 1999 – 2002 is indicated in Table 1 below.

The grand total of CFC-12 consumption in the refrigeration service sector in 2002 is estimated at 101.6 tonnes.

Refrigeration equipment used by hotels, restaurants and public buildings will be part of the commercial and industrial refrigeration and will be covered under the RMP project.

Table 1: Summary of ODS Consumption by sector (ODP MT) in Libya during 1999 - 2002

Sector	1999	2000	2001	2002
Flexible foams (CFC-11)	642	623	608	575
Rigid foams (CFC-11)	60.5	58.3	53	52
Domestic refrigeration manufacturing				
CFC-11	44.4	44.4	44.4	44.4
CFC-12	9.0	9.0	9.0	9.9
Commerc/transportation refrigeration manufacturing				
CFC-11		40.3	35.5	30.1
CFC-12		22.8	20.5	10.6
Refr. Servicing (CFC-12)	141.3	139.5	130.2	101.6
Halons	3.6	51.5	52	54.4
MeBr	175	164	113	151
Total	**1,075.8**	**1,152.8**	**1,065.6**	**927.4**

Table 2: Total Import of ODS (ODP MT) 2000 - 2002

Substance	2000	2001	2002
Annex A Group 1			
CFC-11	852	853.943	836.54
CFC-12	120	118.00	117.02
CFC-114	9	10.98	0
CFC-115 (as R-502)	3.5	4.89	2.837
Annex A Group II			
Halon 1211	1.50	1.58	0
Halon 1301	50	52.80	0
Total Annex A	**1,036**	**1,042.193**	**956.40**
Annex C Group I			
HCFC22	10.7	11.21	86.12
Annex E Group I			
Methyl Bromide	153	153.72	150.84

The difference between imports and actual consumption can be attributed to stocks.

When conducting the national survey related in particular to the refrigeration servicing sector the special attention was given to the establishment and verification of the key baseline data required for the RMP project: actual CFC consumption number of existing servicing workshops, eligible for the technical assistance, number of technicians operating in this sector, as well as review of existing ODS related legal and regulatory system of the country.

For this purpose the consultants of Assalama Bureau have visited capital towns (Tripoli, Bengazi, Misurata, Zawya, Surit, Sebha and Dernah) of main industrial zones in order to collect the required data and information. The outcomes of their visits to several service workshops, manufacturers of refrigeration equipment, trade communities etc. of these towns served as a basis for the reliable estimation of the total number of the servicing workshops operating in the country.

For instance, the number of the registered workshops at the Refrigeration and Air-Conditioning Syndicate in Tripoli is 555 workshops. The consultant have been informed that in addition about 20% of the workshops are not registered. Therefore, the total number of workshops only in Tripoli is approx. 660.

The result of the national survey on this sector indicates that the total number of the workshops in the country as the potential candidates to be included in the RMP is about 2100. In average, each workshop has three technicians with relevant experience in the refrigeration equipment servicing; in total 6300. It was also found out that there are more than 200 public factories and other public enterprises in the country using refrigeration equipment which is maintained with their own workshops.

The above outcomes of the survey are correlating to the assessment of the actual number of servicing workshops based on the identified CFC-12 consumption by the relevant sub-sectors described and indicated above. It was found out that in average, each workshop is using approx. 30-40 kg of CFC-12 annually. Therefore, the total number of workshops could be estimated between 3300 and 2500.

In addition, there are also about 50 technicians in the mobile air conditioning sector.

Therefore, it may be concluded that the total number of Libyan technicians need to be trained is ranging between 2,500 to 3,000 .

Although, the above-indicated key baseline data are identified based on the outcomes of the survey and comprehensive discussions with the partners and parties concerned, it was not possible to avoid some assessments and extrapolations to develop baseline data bearing in mind the specific conditions of the developing countries related in particular to the servicing sectors.

1.6. Concept of the RMP Project implementation

Based on the survey of the sub-sector, and taking into account the latest practice, achievements and trends of RMP projects' formulation and implementation , it is suggested that the RMP project for Libya will focus on the following activities:

- Establishment of 5 independent recycling centers to be equipped with the necessary equipment and also to be used as training centers;
- Establishment of 3 specialized training centers equipped with necessary equipment;
- Provision of the selected number of workshops with recovery equipment and related training services.

This concept is used as a basis for the elaboration of the entire RMP project document for Libya in accordance with the relevant guidelines.

1.7. Current Legal and regulatory Framework of the Refrigeration Sector

The General Peoples' Committee of Libya has established the National Committee for Climate Change (NCCC), (reporting to the Secretary of the General Peoples' Committee), and entrusted it with duties to develop a strategy and action plan for phasing out Ozone Depleting Substances. In order to implement these duties the NCCC has developed an Action Plan as follows:

- Establish the Executive Office of the NCCC as a focal point for all activities related to the Montreal Protocol.
- Embark on a public awareness program with assistance of UNEP, UNIDO and funding from the Multilateral Fund
- Develop and implement control measures such as:
  - Prohibit imports of ODS using equipment
  - Prohibit new enterprises producing and/or assembling equipment, foams, or aerosols using ODS
  - Establish import quotas into the existing licensing system.
  - Prohibit investments in building new plants using ODS
- Train Customs Department, National Information Center and NOU in monitoring and collection of data to meet the reporting requirements of the Protocol.
- Seek funding and monitor projects to convert refrigeration and foam manufacturing facilities
- Identify other investment projects not covered in this Country Programme and submit proposals for funding
- Implement a National Recovery and Recycling project.
- Identify key refrigeration installations and submit retrofitting proposals to the Multilateral Fund.

In addition to these objectives a number of institutional and regulatory measures will be developed as part of the RMP project as detailed in section 6.

2. Actions Required to Achieve Phase out in the Service Sub-sector

Based on the survey of the situation of the refrigeration service industry, training institutions and related regulatory framework followed by the analysis of the data collected through the extensive survey, a series of needs has been identified as measures to reduce CFC consumption in the refrigeration service sector in Libya. They are classified into several categories and listed below.

Enforcement of the legal and regulatory framework

- Customs training and provision of refrigerant identifiers to customs points;
- Awareness promotion of the Ozone issues and the RMP program to industry as well as consumers.

Improvement of service practice

- Upgrading the training facilities at existing training and technical institutions;
- Preparation of mobile training vehicles if necessary for training of technicians in remote areas;
- Training and certification of service technicians ;
- Development of a licensing system;
- Upgrading of service facilities at service workshops.

Use of recovered and recycled refrigerant

- Establishment of recycling centers;
- Provision of recovery machines to workshops;
- Consultation on recycling business.

Coordination and monitoring of the whole project

- Set up of function for coordination of the activities in the provinces.

3. Justification for Refrigerant Management Plan

3.1 Country compliance

Under the initiative of the strategic planning of the Multilateral Fund and in order to ensure for Article 5 countries to be in compliance with the Montreal Protocol control measures for the consumption of Annex A Group I substances (CFCs), "updated data in the 2003 – 2005 phase-out plan for the Multilateral Fund" have been compiled by the Multilateral Fund Secretariat in November 2002 after the 38th Meeting of the Executive Committee, Decision 38/66. Libya is classified into non-LVC that might require further assistance to achieve the 2007 phase out target, and amount of CFCs to be phased out in 2003 – 2005 through new assistance have been determined. The 2003 – 2005 strategic rolling business plan was prepared by implementing agencies in line with this Decision, and approved at the 39th Meeting of the Executive Committee held in April 2003. In the business plan, implementing agencies reported CFCs phase out plan due to the on-going projects as well.

3.2. Government commitment for CFC phase out

The Government of Libya is concerned about the consequences of non-availability of refrigerants for the industry. Abrupt change will affect the ability of the facilities (industry, houses, hotels, restaurants, hospitals etc.) to perform, and will decrease the earnings of the country. In addition, there will be a severe and unnecessary economic burden on the domestic and commercial refrigeration sector to replace systems that have not yet reached the end of their economic life.

Despite the above concerns, the Government is committed to meet their obligations as a Party to the Montreal Protocol. They realize that, in spite of possible hardships in the immediate time frame, regulatory instruments have to be enacted and implemented to ensure, that environmentally friendly technology is available and implemented at an early stage.

The Government has already taken several legislative measures to ensure the country's obligations, even by considering advanced phase out.

4. ASSISTANCE RECEIVED

At the 27th Meeting of the Executive Committee of the Multilateral Fund held in March 1999, the preparatory assistant fund was approved for the Country Programme preparation including preparation of the Refrigerant Management Plan.

Following the approval by the 38th Excom in Dec. 2002 of the preparatory assistance fund for NPP formulation, the Government of Libya, in close collaboration with UNIDO, initiated preparation of the NPP including RMP project.

In order to conduct the extensive survey of the refrigeration service sub-sector in Libya, the Committee consisting of the Ministry of Environment, Local Government and Rural Development, UNIDO and UNDP representatives selected specialized consulting company, Assalama Bureau as the national sub-contractor under the respective terms of reference which include inter alia to collect the following data and information:

- District wide distribution of service workshops,
- Estimation of total number of workshops,
- Current service practices,
- Assessment of training needs,
- Potential service providers,
- Industrial statistics of production and import of refrigeration and air conditioning equipment,
- Technical institutions and vocational training centers,
- Industrial associations,
- Customs organization and training facilities.

The survey was done for service workshops spread in Libya and information was collected from about 90 shops.

Various Government authorities, original equipment manufacturers, industrial associations, service workshops, importers and consumers of ODS and other relevant stakeholders were consulted in the preparation of the RMP. Among them are:

Government:	Chamber of Commerce and Industry Ministry of Industry and Production Ministry of Environment, Local Government and Rural Development Central Board of Revenue, Customs Tariff Section
Industry:	Libya HVACR Society OEMs:

5. ACTION PLAN

5.1 Objectives

The RMP as a part of the Sector Plan should contriubte to the country's obligation of the 50% reduction of CFC consumption in 2005, and provides a base for the country's obligation of the 85% reduction in 2007 and the total phase out in 2010.

The conditions and constraints for RMP in Libya are described below.

- The industry related to CFC must be developed in a sustainable manner.
- Employment must be kept in all related industries, particularly in SMEs, which play a major role in the refrigeration service sector. Even more employment may be created as a result of successful RMP implementation.
- The requirements of CFC refrigerants for servicing and maintenance of existing CFC refrigeration and air-conditioning equipment must be satisfied.
- The grant from the MFMP may be limited.
- The service sector in Libya is not well coordinated due to the number of SMEs involved.
- Availability of CFC may be limited in the near future.
- Legislation framework in Libya is to be modified.

External constraints for the RMP include the availability of CFCs at low prices and the disposal of CFC. These issues are under the consideration of Task Forces of the Multilateral Fund. Under these circumstances, the present RMP must serve as a seed to initiate a sustainable national system for refrigerant recovery and recycling and the responsible use of CFC (and non-CFC[2]) refrigerant in the refrigeration industry and the consumer sector.

In order to achieve the strategic objective of the RMP, activities identified are classified into four inter-related project components:

1. Institutional framework project,
2. Customs offices empowerment project,
3. National project for training service technicians, and
4. National recovery and recycling project.

The last project directly aims at phasing out CFCs in the sector, while other three projects facilitate to achieve the target of the national recovery and recycling project.

5.2 Institutional Framework

The following regulatory and instituational measures will be considered and developed by the coordinating bodies as part of the the RMP implemenetation

Legal Instruments

- Immediate application of ban of import of ODS-using and ODS-containing equipment (especially second-hand domestic refrigerators using CFC-12), etc.(approved).
- Immediate prohibition of any new activity which aims the production of ODSs or ODS-using equipment;
- Application of strict control of import/export of all ODSs (including licensing, taxation and/or quotas as appropriate);

[2] Responsible use of alternative refrigerant may be considered in the program. This is because the climate change issue will be the next global environment requirement, and HFC refrigerants are of high global warming potential in the "basket gas" in Kyoto Protocol.

- Application of control on trade of ODSs (including licensing and taxation policy as appropriate);
- Application of an obligatory certification of technicians. Consideration of ban of illegal service of refrigerators, interlinkage of license on trade with certificate.
- Development of fiscal incentives/disincentives system to encourage the use of ODS alternatives and transitional substances.

Awareness promotion

Although the awareness activity was executed for general issues of Ozone depletion and the Montreal Protocol, it is required to conduct the awareness promotion specifically for RMP activities in Libya. Target audience of the awareness activity is not only industries but also consumers who use refrigeration and air-conditioning equipment. This activity encourages more workshops to be involved in the RMP program.

Development of licensing system

A system and criteria for licensing service workshops and recycling centers will be developed. Provincial authorities or Federal authorities will issue licenses for qualified service workshops and recycling centres based on the established licensing criteria and the system. The detail of the system will be decided during the implementation of the project after the approval

5.3 Customs offices empowerment project

Training of 200 customs officers (inspectors, controllers and customs policemen) will be executed by three existing customs training centres in Libya, to get them acquainted with the Montreal Protocol and related environment issues, and to enable them to identify controlled substances under the Montreal Protocol, and imported refrigerators, freezers and other refrigeration and air-conditioning equipment using CFCs.[3] The experience obtained at customs authorities in non-A5 countries will be shared at training courses.

CFC detection equipment will be provided to 10 major customs points in the country. In addition, the project allows the customs department to create a database on imported ODS. The 10 major entry points will be selected during the project implementation.

5.4 National project for training service technicians

Establishment of Training Centres

Three specialized Training centers will be established at selected areas in addition to the upgraded training institutions existing in the country, so that service workshops can easily access to one of the centers (see Annex 3).

Five recycling centers to be established under the project will be also equipped with the training facilities.

In order to enable training of service workshops in remote areas, two mobile training vehicles will be made in addition to the stationary training centres.

[3] "Training manual for customs officers" published by UNEP is a basis of training manual in the RMP Libya.

Training workshops

The training programme includes both theoretical and hands-on sessions, and covers the following items.[4]

- elements of Ozone depletion and their effects,
- the relation with Montreal Protocol controlled refrigerants,
- methods for appropriate servicing and maintenance practices for ODS-containing refrigerant equipment,
- equipment working with new replacement refrigerants,
- leak detection,
- general concepts of refrigerant recovery and recycling,
- correct handling of refrigerants,
- Government regulations which affect the refrigeration sector.

This training programme ensures the permanent use of good refrigeration service and maintenance practices for systems using Ozone-friendly substances, and the correct handling of new replacement refrigerants. The training programme is coordinated with the recovery and recycling project component. The long-range objective is to enhance the refrigeration related courses at all training centres

5.5 National recovery and recycling project

Approach

As long as the supply of CFC exceeds the demand and CFCs are easily available at low prices, releasing refrigerants at servicing would be common practice. However, when the import of virgin CFC is declining, recovered or recycled refrigerants are the only source to keep existing equipment in operation. Recovered refrigerant is an asset, though it is currently only marginally used by service workshops due lack of infrastructure for recovery and recycling. The re-use of CFC will be important for all sectors in order to avoid the economic loss when perishable goods are ruined or premature scrapping of equipment when CFC imports decrease. The reuse of the CFC stock will play an important role in the phase-out of CFC in Libya.

Another problem encountered in RMPs in other countries is the no credibility of the quality of the recovered and recycled CFC. In order to create credibility for recovered and recycled CFCs, the legal requirements such as a ban on venting and compulsory recovery may be considered in addition to establishing the infrastructure to deal with the recovered refrigerant. This kind of activity is handled in the first component of the RMP.

To achieve a fully functioning and sustainable recovery and recycling scheme, it is important to establish a system that allows the recycling centres to operate long term on commercial basis. Therefore it is essential to train the staff of recycling centres on the commercial matter in addition to technical matters.[5]

[4] "Training Manual of good practices in refrigeration" published by UNEP is a base for the training manual of the RMP Libya.

[5] There are several ideas for this including (i) an environmental tax or fee - moving the cost for the handling of recovered material from the time when it is recovered to when new material is supplied to the market, and (ii) a fee on new refrigerant serving the dual purpose of increasing the price on new CFC and discouraging the intension for the service technician to release the refrigerant. The fee should also cover the potential cost of destruction of non-reclaimable material.

Recycling Centres

Five recycling centres will be established at major towns (see annex 3), including provision of necessary training facilities. Each recycling centre will receive fundamental equipment required for refrigerant recycling. The central recycling centre in each of the five provinces/regions will be equipped with a recycling machine with the facility to remove non-condensable gas. They also need a cylinder to keep un-recyclable refrigerants until further treatment will be done. Equipment to be provided are: recovery machines, recycling machines (chamber type), recycling machines with function to remove non-condensable gas (for 4 major recycling centres), several small recovery cylinders, vacuum pumps, refrigerant identifiers (infrared type), storage cylinders, sets of service tools (piercing valve, gauge manifold etc.), and hand-held leak detectors. The actual location of the centres will be decided during the project implementation.

Service equipment and recovery machines

In accordance with the agreed concept of the RMP implementation, the selected and most appropriate servicing workshops will also be provided with recovery machines and other service tools along with the necessary training of the personnel.

6. PROJECT MANAGEMENT

6.1. Project coordination

The Federal Ministries with the NOU will be responsible for the national coordination and project management of the whole RMP programme. They will consider further legislation as and when required, for the successful implementation of the RMP and implement rigorous monitoring and reporting of performance.

The Federal Ministries with the NOU will be responsible for managing the following activities:

- A list of service workshops should be updated in terms of their CFC consumption, necessary equipment for recovery, their readiness to recover CFC, commitment to CFC phase out activity, capability and other factors relevant to the recovery and recycling scheme project.
- Possible institutes and/or enterprises for centres for training and recycling should be surveyed.
- The business criteria of refrigerant recycling center should be developed.
- Recipient service workshops of recovery machine should be determined.
- Un-recyclable refrigerants should be kept for further treatment at the proper site.
- Further, local distribution of service equipment and refrigerant recovery and recycle machines, which will be procured through UNIDO bidding procedure and delivered to the country, should be executed.

The Executive Team to be established to coordinate implementation of the RMP as a part of the Sector Plan including following activities:

- Reassessment and analysis of the sector after the approval of the RMP.

- Determination of the specification of equipment to be provided by the RMP.
- Selection of trainers for training of technicians.
- Selection of service workshops to be trained.
- Awareness promotion.
- Development of licensing system.
- Monitoring and report.

6.2. Monitoring and reporting:

After the establishment of the countrywide scheme of refrigerant recovery and recycling, the monitoring activity will be initiated to know whether the project is successfully implemented and the target CFC phase out is achieved. Monitoring activity will include:

- Establishing the system to ensure with the counterpart institute, that every recycling centre and service workshop is encouraged or obliged to report data and give information to the recovery and recycling scheme. This may be enabled through forms to be filled by recycling centres and service workshops.
- Setting up adequate office facilities including a computer system to collect and analyze the data.
- Regular communication with the counterpart institute.
- Occasional visits to workshops and recycling centers.
- Regular communication with customs offices.

Following information will be collected from recycling centres and workshops:

CFC quantity

- number of appliances subjected to refrigerant recovery and type of these appliances at every service workshop,
- amount of recovered CFC refrigerants at every workshop,
- amount of recovered CFC refrigerants sent to the recycling centres at every workshop,
- amount of recovered CFC refrigerants stored at every workshop,
- amount of recovered CFC refrigerants received from service workshops at every recycling centre,
- amount of recycled CFC refrigerants at recycling centres,
- amount of recycled CFC refrigerants returned (sold) to workshops,
- amount of recycled CFC refrigerants used in workshops and its application, amount of CFC refrigerants, which can not be recycled and are subject to further treatment (e.g., sent to reclaiming plants, or decomposition plants abroad)
- other data relevant for monitoring the scheme (amount of imported CFC refrigerants etc.).

Cost information

- cost of recovery at every service workshop and parties who bear the cost,
- cost of recycling at every recycling centre and parties who bear the cost,
- price of recycled CFC refrigerants,
- other financial information relevant to monitoring the recovery and recycling scheme.

Data and information collected will be analyzed to check the adequate operations of the scheme

6.3 Timetable for implementation

Annex 2 shows the timeframe for the implementation of each activity in each project component. It was developed so as to cope with the phase out amount described in the 2003 – 2005 rolling business plan that would ensure the country compliance with the Montreal Protocol control measures in 2005 and 2007.

7. IMPACT AND ODS PHASE-OUT TARGET

The projected CFC phase-out amount to be phase-out by the RMP components is shown in Table 3.

Table 3. Impact of RMP components, ODP, Mt

Year	Reduction	Consumption
2001	**0**	**130.2**
2002	**0**	**101.6**
2003	**0**	**101.6**
2004	**16.6**	**85**
2005	**20**	**60**
2006	**25**	**65**
2007	**15**	**20**
2008	**10**	**10**
2009	**5**	**5**
2010	**5**	**0**

The target value of reduction of CFC emission through refrigerant leakage from installed equipment is 10% for all categories of shops. It will be achieved by the training of service technicians on good service practices followed by certification combined with the provision of essential service equipment to elected shops. Awareness promotion would help the achievement. Relatively high target reduction was set for "large" shops and "medium" shops, for MAC and split systems services, which can be achieved as facility and human resources are well organized in these shops. In addition to the direct impact by the present programme, the RMP would achieve the total phase-out in the service sub-sector through indirect influences (legislation, awareness promotion and others) and the possible national scheme in addition to the MF assisted plan.

Meeting the Montreal Protocol control measures

The RMP provides a concrete basis for Libya's obligations of 50% reduction of the CFC consumption in 2005, 85% reduction in 2007 and the total ban in 2010.

Reduction of ODS consumption

The RMP aims at phasing out 101.6 ODP Mt of CFCs in the refrigerant service sector.

Strengthening national capacity and expertise

The institutional framework project gives the opportunity to local personnel involved in the RMP implementation to get acquainted with the advanced systems and technologies with respect to the refrigerant management in industrialized countries.

This project requests the Executive Team to take the responsibility for the coordination of the wide spread activities in the RMP, thereby they acquire expertise for managing the project.

The customs-training program provides essential technical and financial support necessary for the enforcement of the national legislation to customs offices in Libya under the Central Board of Revenue. It plans to share experiences obtained in industrialized countries with customs officers in Libya in terms of inspection of ODS and ODS containing equipment including illegal trades. Major customs check points are equipped with refrigerant identifiers, so that imported CFC refrigerants, refrigeration and air conditioning equipment can be inspected.

Education facilities at selected institutions are updated, and satisfactory training can be executed for profound service practice, alternative technologies, Ozone issues, recovery and recycling technology, and other related matters.

Selected service workshops are provided with essential service equipment for prevention of leak of CFC refrigerants from installations at operation and at disposal, and refrigerant recovery equipment. Recycling facilities are provided to recycling centers. Under the recovery and recycling scheme, service industries are able to obtain and use recycled refrigerants when the CFC import will be reduced, thereby the service business can be sustainable.

8. FINANCIAL ASSISTANCE

Financial assistance required for each activity is summarized in Table 4 for the consideration by the Multilateral Fund. The grant is requested in phasing mode for three years, so that an effective use of the allocated fund is ensured. The administration costs of the implementing agency are 7.5 % of the project cost. The funding of the RMP project will be considered as a part of the Sector Plan funding divided for several tranches.

The list of activities, services and equipment including brief specification as well as its cost breakdown are provided in Annex 1.

Table 4.Costs of the RMP, Libya

Project components and activity	Cost, US$
Institutional framework project	**68,000**
Project coordination	
Awareness promotion	
Monitoring	
Customs empowerment project	**35,800**
Training of customs officers	
Provision of refrigerant identifiers	
National project for training service technicians	**75,580**
Establishment of training centers	
Training workshops	
Certification of service technicians	
National recovery and recycling project	**345,050**
Establishment of recycling centers	
Provision of service equipment and recovery units	
Total Project cost	**524,430**
Implementing Agency support Cost	**39,332**
Grant from MFMP	**563,762**

Cost effectiveness

Total project cost	524,430
IA support cost	39,332
Grant from MFMP	563,762
Impact (ODP tonnes)	**101,6**
Cost effectiveness	**5.1**

Annex 1. Cost breakdown of project components of RMP Libya, in US$

Project component and activities	Description	Unit cost	Q'ty	Sub total	Total for element
Project management					
International consultant		5,000	1	5,000	
Training of national experts		2,000	10	20,000	
Awareness promotion		3,000	5	15,000	
Development of licensing system					
Monitoring					
	Coordination office set up	15,000	1	15,000	
	Office equipment	2,000	1	2,000	
	Travel	50	100	5,000	
	Sundries			5,000	
	Reports	100	10	1,000	
Element Total					**68,000**

Project component and activities	Description	Unit cost	Q'ty	Sub total	Total for element
Customs empowerment project					
Custom training	2 x 2 days-workshops with 10 - 15 trainees				
Workshops	Travel and accommodation for outstation trainees	50	2	100	
	Workshop arrangement, certification	200	2	400	
	Martial, draft and translation, printing			15,000	
	International consultant	5,000	1	5,000	
	Fee for trainers	150	2	300	
Identifiers		1,000	10	10,000	
Contingency				5,000	
Element Total					**35,800**

Project component and activities	Description	Unit cost	Q'ty	Sub total	Total for element
National project for training service technicians					
Establishment of 3 training centres					
Training of trainers		500	3	1,500	
Training equipment	Teaching aids	400	3	1,200	
	Training rigs	1,000	3	3,000	
	Recovery machine	500	3	1,500	
	Recycling machine to be used for both training and recycling in R&R project	6,000	3	18,000	
	Cylinders, 13 kg	30	6	180	
	Vacuum pumps	150	6	900	
	Refrigerant identifier	1,000	3	3,000	
	Service tools, piercing valve, gauge manifold etc.	300	3	900	
	Leak detector	300	3	900	
Contingency				10,000	
Sub-total					41,080
Training workshops: 30 x 4-days workshops with 10 trainees					
	Support for outstation trainees	50	200	10,000	
	Material – preparation drafting, translation, printing 10,000 copies			10,000	
	Fee for teachers	150	30	4,500	
	certification, arrangement	200	50	10,000	
Sub-total					34,500
Element Total					**75,580**

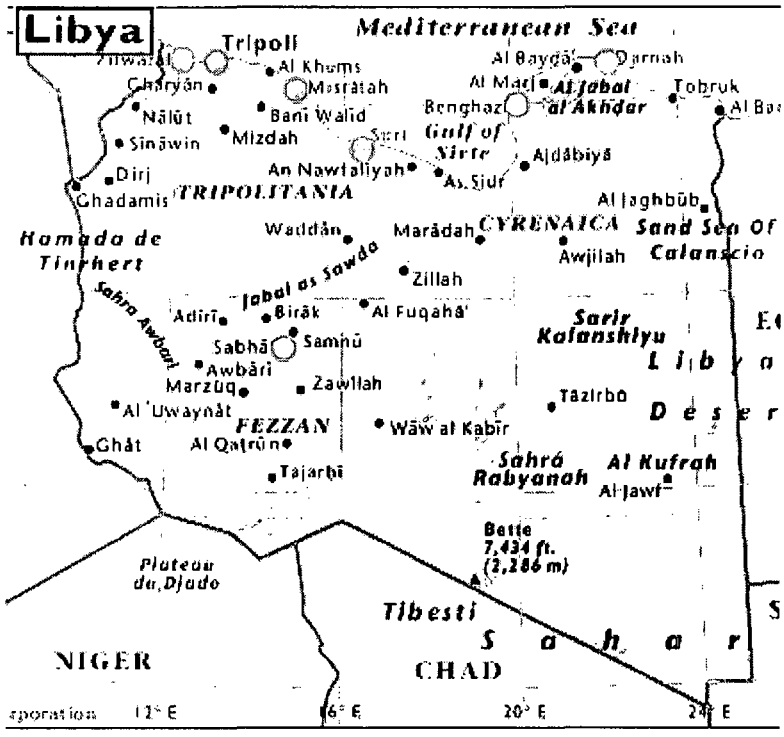
Project component and activities	Description	Unit cost	Q'ty	Sub total	Total for element
National recovery and recycling project: Establishment of 5 recycling centers					
Trainers	Training of recovery centre staff	500	5	2,500	
Training equipment	Recycling machine with air purge function	8,000	5	40,000	
	Recovery cylinders	30	10	300	
	Storage cylinders	150	5	750	
	Service tools (piercing valve, gauge manifold etc.)	300	10	3,000	
	Leak detector	300	5	1,500	
				Subtotal	**48,050**
Equipment for service shops	For 1,500 shops				
	Recovery machine	700	250	175,000	
	Recovery bag	32	250	8,000	
	Vacuum pump	150	250	37,500	
	Recovery cylinder	30	300	9,000	
	Service tools (piercing valve, gauge manifold etc.)	190	250	47,500	
				Subtotal	**277,000**
Contingency					20,000
Element Total					**345,050**

The specifications of the equipment jointly with NOU will be reviewed during the implementation of the project.

Annex 2 Timetable for implementation of the RMP Libya

Year	2003		2004		2005		2006		2007		2008		2009		2010	
	H1	H2	H1	H2	H1	H2	H1	H2	H1	H2	H1	H2	H1	H2	H1	H2
ACTIVITY																
Approval																
Institutional framework																
Coordination group set up																
Training of national experts																
Awareness promotion																
Development of licensing system																
Monitoring																
Customs training																
Martial, draft and translation, printing																
Workshops																
Identifiers delivery																
Technician training																
Establishment of training centers																
Training equipment delivery																
Mobile training wagon																
Trainers training																
Material – preparation drafting, translation, printing																
Training courses for technicians																
Recovery and recycling scheme																
Equipment delivery to centres																
Training of centre staff																
Equipment for service shops																

Annex 3 Geographical distribution of training and R&R /training centers



Place of Centers	Distribution of servicing workshops, %	Training servicing Centers	R&R and Training Centers
Tripoli	30	-	2
Benghazi	15	-	1
Misurata	10	-	1
Zawya	10	1	-
Surit	10	1	-
Sebha	8	-	1
Dernah	7	1	-
Other towns	10	-	-

Annex VII

2.OCT.2002 12:03 ENV.PROTECTION DEPT. NO.883 P.1

Socialist Peoples Libyan Arab Jamahiriya

Executive Office of the national Committee for Climate Change

30/09/2002

To : Mr. Marco Gonzalez
Executive Secretary
Ozone Secretariat

Subject : Consumption of ODS for the period 1 July 2000 to 30 June 2001

Sir:

I refer to your letter under reference number OzL/CntlData2/Libyan Arab Jamahirya on the above subject. Please find attached the ODS consumption and Import data for the abovementioned period. Due to the stability of the economic activities in the country, no change was reported on the level of consumption of ODS. Also, as you may be aware, no ODS phasing out Projects have been implemented, all of the approved projects are in the early stage of implementation.

Please note that due to the UN sanctions imposed on our country, we were unable to benefit from the funds of the Multilateral Fund for the preparation of the country program at an earlier time. We have prepared the country program in 1999, which was considered as the base year. However, we are confident that as soon as we start the implementation of the ODS phasing out projects, ODS consumption will take a declining trend.

1

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CC: EK ✓
TG

Socialist Peoples Libyan Arab Jamahiriya
Executive Office of the national Committee for Climate Change

For easy and speedy communication we kindly ask you to direct your future correspondences, enquiries and information related to the Vienna Convention and the Montreal Protocol directly to our Office. The National Committee for Climate Change and the Manager of its Executive Office are the official Focal Point for the Convention and the Protocol. The National Ozone Unit is also operating under the guidance and supervision of the executive office of the National Committee for Climate Change.

Please accept, Sir, the assurances of my highest consideration,

Abdullatif Salem Benrageb

Manager,
Executive Office of the National Committee for Climate Change

Cc Chairman of the National Committee for Climate Change.
Mr. Michael Graber Deputy Executive Secretary.

P.O. Box 256 Tripoli, Libya Phone +(218 21) 4449222 Fax: +(218 21) 33 38 848

Socialist Peoples Libyan Arab Jamahiriya
Executive Office of the national Committee for Climate Change

Imports of ODS (ODP TONNES) - 2001

Chemical	2001
Annex A group 1	
CFC-11	853.47
CFC-12	118.00
CFC-114	10.98
CFC-115 (as R-502)	4.89
Annex a Group 2	
HALLON 1211	1.58
HALLON 1301	52.80
Total Annex A	1041.72
Annex C Group 1	
HCFC-22	11.21
Annex E Group 1	
Methyl Bromide	129.61

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Socialist Peoples Libyan Arab Jamahiriya
Executive Office of the national Committee for Climate Change

Consumption of ODS in 2001 by use and application (M.T)

Sector	Sub – sector	ODS	Application	2001
Refrigeration & air Conditioning	Domestic/ Commercial/Industrial	CFC - 11	Purging	2.33
	Industrial	CFC - 11	Recharge	2.11
	Domestic	CFC - 12	Initial	11.22
	Domestic/ Commercial/Industrial	CFC - 12	Recharge	142.90
	Industrial	CFC - 114	Recharge	0.15
	Commercial / Industrial	CFC115 (as R-502)	Initial and recharge	3.13
	MAC	CFC - 12	Recharge	3.56
	Domestic/ Commercial / Industrial	HCFC - 22	Initial and	63.69
Foam	Flexible Foam	CFC - 11	Recharge	730.08
	Rigid foam (including Insulation for water heaters And refrigerators	CFC - 11		123.44
Hallons	Industrial	Halon 1211	Fire Protection	0.26
		Halon 1301	Fire Protection	3.54
Methyle Bromide	Soil treatment			187.25

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P.O. Box 256 Tripoli, Libya Phone +(218 21) 4449222 Fax: +(218 21) 33 38 [illegible]

Annex VIII

الجماهيرية العربية الليبية الشعبية الإشتراكية العظمى
اللجنة الوطنية لتغير المناخ
وحدة الأوزون

030619report1-imp.com/التسجيل 20/06/2003 /التاريخ

To: Dr. Omar E. El-Arini
Chief Officer
Multilateral Fund Secretariat
For The Implementation of The Montreal Protocol

Dear Sir:
Libyan Arab Jamahiriya have established the National Ozone Unit within the National Committee for Climate Change. The National Ozone Unit is now staffed by four employees, established a website under the following address.
Equipment have been delivered, and preparation for installation work have been done. Delays for installations have been caused by a combination of reasons examples manufacturers are not communicating through the Ozone Unit which caused difficulties in getting entry visas for technicians. Now it is complicated by the SARS disease travel restrictions for nationals of some countries.

We expect that installation work should be finished for the following projects before the end of this year.

Projects implemented by UNDP:

LIB/FAO/32/INV/05	Phase out of CFC-11 by conversion to Methylene Chloride	26
LIB/FAO/32/INV/06	Phase out of CFC-11 by conversion to Methylene Chloride	40.3
LIB/FAO/32/INV/07	Phase out of CFC-11 by conversion to a combination of water and HCFC-141b based system.	11.0
LIB/FAO/32/INV/08	Phase out of CFC-11 by conversion to Methylene Chloride	31.4
LIB/FAO/34/INV/12	Phase out of CFC-11 by conversion to Methylene Chloride	32.0
LIB/FAO/34/INV/13	Phase out of CFC-11 by conversion to Methylene Chloride	22.0
LIB/FAO/34/INV/16	Phase out of CFC-11 by conversion to Methylene Chloride	23.0

Projects implemented by UNIDO:

Equipment have been delivered and preparation for installation work is finished, projects waiting technician arrival. The following project which involves three factories should enter the implementation phase before the end of this year.

المؤسسة الوطنية للنفط – ميدان غزوة الخندق هاتف. مباشر 4449222 - 021 فاكس 3338848 – 021 ، ص.ب 2655

الجماهيرية العربية الليبية الشعبية الإشتراكية العظمى
اللجنة الوطنية لتغير المناخ
وحدة الأوزون

التسجيل/030619report1-imp com التاريخ/ 20/06/2003

LIB/REF/32/INV/03 phasing out of ODS in the production of refrigerators and Freezers
53.4

The national Committee at this stage would like to express great appreciation to UNIDO as it is the Agency that has pushed forward to get the country Program started. The agency has implemented successfully the country program, and now in the process of preparing the National Phase out Plan (NPP).

Yours sincerely

Abdullatif Salem Benrageb
Manager, Executive Office
National Committee for the Climate Change

المؤسسة الوطنية للنفط – ميدان عزوة الخندق هاتف. مباشر 4449222 - 021 فاكس 3338848 –
021 ، ص.ب 2655

Annex IX

07 SEP 2003 20:45 MURDOCH CONSULTING 00 44 1763 243586 p.1

Murdoch consulting Limited
Moonrakers
Mill Lane
Bassingbourn
Royston, Herts
SG8 5PP
United Kingdom

Tel 00 44 1763 248463
Fax 00 44 1763 243586

Date: 6th September 2003

Mr. A. Malayeri
Project Manager
Montreal Protocol Branch
UNIDO
Vienna International Centre
A-1400, Vienna

Dear Mr. Malayeri

Phasing out CFC-11 by Conversion to HCFC-141b and CFC-12 to HFC-134a Technology in the Manufacture of Commercial and Transport Refrigeration Equipment at the Terminal Umbrella Group of Libyan Commercial and Transport Refrigeration Manufacturers

Please find attached the Technical Review for the above Project. If you have any further queries please do not hesitate to contact us.

Yours Sincerely

Cameron Murdoch

For and on behalf of
Murdoch Consulting Limited

Annex X

09 SEP 2003 11:02 MURDOCH CONSULTING 00 44 1763 243586 p.1

Murdoch consulting Limited

Moonrakers
Mill Lane
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United Kingdom

Tel 00 44 1763 248463
Fax 00 44 1763 243586

Date: 8 September 2003

Mr. A. Malayeri
Project Manager
Montreal Protocol Branch
UNIDO
Vienna International Centre
A-1400, Vienna
1

Dear Mr. Malayeri

Refrigerant Management Plan for Libya

Pleased find attached the project technical appraisal for the RMP for Libya. I would conclude that the principals, on which the document is based, are in line with acceptable practice for RMPs. However some further elaboration is need in a number of areas as indicated in the review.

Yours Sincerely

Cameron Murdoch
For and on behalf of
Murdoch Consulting Limited

Annex XI

TECHNICAL REVIEW

Prepared by P. Appleyard

1. Country of Origin.	Libya
2. Project Title.	National phase-out plan
3. Sectors Covered.	Multi-sector
4. Relationship to Country Programme	The remaining activities required for the final phase-out in the flexible PU foam, the rigid PU foam manufacturing and the transportation and commercial refrigeration manufacturing sectors have been identified. Implementation will ensure the elimination of ca.350 tonnes ODP, based on 2002 data..

5. Technology

There are twenty one foam companies considered in this phase-out plan, twelve flexible foam and nine rigid foam.

The chosen technologies are HFC-134a as replacement for CFC-12 in the refrigeration cycle, HCFC-141b for CFC-11 as foam blowing agent for rigid foams, and methylene chloride as blowing agent for flexible foams.

The choice of both HFC-134a as replacement for CFC-12 is fully supported. It Is a well proven technology and both technically and commercially feasible.

The selection of HCFC-141b as rigid foam blowing agent is also valid even though it is a transitional substance. Its use as an intermediate replacement for CFC-11 is the only acceptable solution in terms of cost.

The replacement of CFC-11 by methylene chloride in flexible foam manufacture is logical and acceptable assuming any necessary improvements to ventilation in foam production and curing areas are in place.

6. Environmental Impact.

HCFC-141b has a small residual ODP and GWP, (0.11 and 0.12 respectively).

HFC-134a has a zero ODP and has been approved as a permanent replacement for ozone depleting substances.

Methylene chloride has a zero ODP.

7. Project Costs.

The necessary cost information for the conversion to HCFC 141b, HFC-134a and methylene chloride is detailed in Annex II to IV.

Equipment Costs.

For the rigid foam sector it is proposed to purchase two low pressure and two high pressure foam dispensing machines and four spray units. All existing equipment will be to replaced. These will allow conversion to HCFC-141b.
Also required are eighteen vacuum pumps, fifteen charging units and eight leak detectors all suitable for use with HFC 134a.

The conversion of existing flexible foam machinery from CFC-11 to methylene chloride will also be undertaken.

The budgets requested are acceptable.

Incremental Operating Costs

Incremental operating costs have been calculated over a two year period.

8. Other Costs.

The budgets for trials, technical assistance and training are adequate. A contingency fund of 10% is acceptable considering the length of the project.

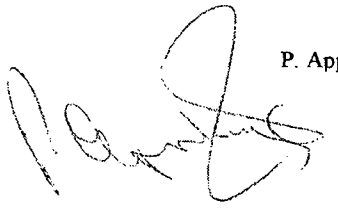
9. Implementation Time.

The proposed schedule is realistic.

10. Recommendation.

Approve as proposed

P. Appleyard



National phase-out plan, Libya

Annex XII

GOVERNMENT NOTE OF TRANSMITTAL OF INVESTMENT PROJECTS TO THE EXECUTIVE COMMITTEE OF THE MULTILATERAL FUND FOR THE IMPLEMENTATION OF THE MONTREAL PROTOCOL

PROJECT OF THE GOVERNMENT OF LIBYAN ARAB JAMAHIRIYA

The Government of Libya requests UNIDO to submit the project indicated in the Table 1 below to the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol for consideration at its 41st Meeting.

Section I: ODS Consumption Data

1. The ODS consumption figure(s) of the project(s) has/have Unit (NOU).been validated by the National Ozone
2. The consumption data have been retained in the records of the NOU for reference and/or future verification.
3. The Government has been advised by the NOU that the agreement to the project provides a commitment to ensure that the phase-out of the validated consumption indicated in Table 1 below is realized and yields a sustained permanent aggregate reduction in the country's consumption of Annex A Group I substances. Accordingly, Libya acknowledges that its remaining consumption of Annex A Group I substances calculated in accordance with Decision 35/57 will be reduced by the amount of the phase-out realized.

Table 1: Projects Submitted to the 41st Meeting of the Executive Committee

Project Title/Sector	Type of ODS	Validated Consumption (ODP Tonnes), (Year)	ODP to be Phased Out (ODP Tonnes)	Residual ODP (ODP Tonnes)	Implementing Agency
National CFC Phase-out Plan	CFC-11, CFC-12, CFC-13, CFC-14 and CFC-15	450.5	442.5	8.0	UNIDO
(excluding halon sector)					
Total		**450.5**	**442.5**	**8.0**	

Remaining amount of Annex A Group I substances prior to submission of the above project(s) calculated according to Decision 35/57.	(450.5) ODP tonnes
Remaining amount of Annex A Group I substances following approval of the above project(s).	(0) ODP tonnes

Section II: Other Relevant Actions Arising from Decision 33/2

4. It is understood that, in accordance with the relevant guidelines, the funding received for a project would be partly or fully returned to the Multilateral Fund in cases where technology was changed during implementation of the project without informing the Fund Secretariat and without approval by the Executive Committee;

5. The National Ozone Unit is requested to monitor closely, in cooperation with customs authorities and the environmental protection authorities, the importation and use of CFCs and to combine this monitoring with occasional unscheduled visits to importers and recipient manufacturing companies to check invoices and storage areas for unauthorized use of CFCs.

6. The implementing agency in cooperation with the National Ozone Unit is requested to conduct safety inspections where applicable and keep reports on incidences of fires resulting from conversion projects.

Section III: Projects Requiring the Use of HCFCs for Conversion

7. In line with Decision 27/13 of the Executive Committee and in recognition of Article 2F of the Montreal Protocol, the Government

(a) has reviewed the specific situations involved with the project (enterprises in the rigid PU foam as well as in the commercial refrigeration sub-sectors to be converted using HCFC-141b are listed in the project document as well as its HCFC commitments under Article 2F; and

(b) has nonetheless determined that, at the present time, the projects needed to use HCFCs for an interim period with the understanding that no funding would be available for the future conversion from HCFCs for the company/companies involved.

Name and signature of responsible Officer:

Abdullatif Salem Benrageb
Manager, Executive Office
National Committee for Climate Change
In Charge of the Ozone Unit

Designation: Date:

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