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

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PROJECT PROPOSALS: SUDAN

This document includes the Comments and Recommendations from the Fund Secretariat on the following projects:

Foam

- Phasing out of CFC-11 at Patra Foam Co. flexible polyurethane foam plant UNIDO

Refrigeration

- Phasing out of ODS at three small domestic refrigerator factories in Sudan (Coldair Refrigerator Factory, Modern refrigerator & Metal furniture Co., Sheet Metal Industries Co. Refrigerator Factory) UNIDO

PROJECT EVALUATION SHEET **SUDAN**

SECTOR: FOAM ODS use in sector (1993): 16 ODP tonnes

Sub-sector cost-effectiveness thresholds: Flexible (slabstock) US \$6.23/kg

Project Title:

Phasing out of CFC-11 at Patra Foam Co. flexible polyurethane foam plant.

Project Data	Flexible Foam
	Patra Foam Co.
ODS phase-out (ODP tonnes)	16
Proposed project duration (Yrs)	1.33
Incremental capital cost (US\$)	103,950
Contingency (%)	10
Incremental operational cost (US\$)	(,273)
Total project cost (US\$)	98,677
Local ownership (%)	100
Export component (%)	0
Amount requested (US\$) { Original	98,677
{ Revised	
Cost effectiveness (US\$/kg)	6.17
National Coordinating Agency	Ministry of Environment
Implementing Agency	UNIDO
Technical review completed?	Yes

<i>Secretariat's Recommendations</i>	
Amount recommended (US \$)	72,227
Project impact (ODP tonnes)	16
Cost effectiveness (US \$/kg)	4.52
Implementing Agency support cost (US\$)	9,390
Total cost to Multilateral Fund	81,617

PROJECT DESCRIPTION

Phasing out of CFC-11 at Patra Foam Co. flexible polyurethane foam plant.

1. Patra Foam Co is the only company in the flexible foam sector in Sudan. It has installed capacity of 5,000 tonnes with current production output of 1,500 tonnes. The company manufactures flexible foam blocks for the furniture industry. It intends to replace CFC-11 with methylene chloride as auxiliary blowing agent.
2. The capital cost of conversion relates to replacement of the CFC-11 monitoring system with methylene chloride metering pump system, improvement in the ventilation system and provision of enclosures at sources of exposure to methylene chloride in the production, cutting and transport systems.
3. Designs for machine enclosure will be procured from an equipment supplier and manufactured by a local contractor.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

1. The project costs were discussed between UNIDO and the Fund Secretariat and the following changes were agreed to:

Designs for machine enclosure US \$4,500 instead of US \$9,000 per project as similar activities will be carried out also in Syria and perhaps in other projects in future. The designs will be procured by UNIDO and provided to the countries. Other changes involved commissioning and start-up (US \$7,000), technology transfer and training (US \$10,000) and electrical control system (US \$4,000). The total project cost taking account of the agreed changes came to US \$72,227

2. The total project cost excludes US \$13,000 for installing ventilation system in the cure area which was considered to be ineligible, since the project document indicated that the company has an open-air curing facility.

RECOMMENDATION

1. The Fund Secretariat recommends approval of the project with associated support cost and the funding level shown below.

	Project Cost US \$	Support Cost US \$	Implementing Agency
Phasing out of CFC-11 at Patra Foam Co. flexible polyurethane foam plant.	72,227	9,390	UNIDO

PROJECT EVALUATION SHEET **SUDAN**

SECTOR: REFRIGERATION ODS use in sector (1993): 303.5 ODP tonnes

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

Project Titles:

Phasing out of ODS at three small domestic refrigerator factories in Sudan (Coldair Refrigerator Factory, Modern refrigerator & Metal furniture Co., Sheet Metal Industries Co. Refrigerator Factory)

Project Data	Domestic	
	Three small factories	
ODS phase-out (ODP tonnes)		7.28
Proposed project duration (Yrs)		1
Incremental capital cost (US\$)		145,250
Contingency (%)		10
Incremental operational cost (US\$)		23,976
Total project cost (US\$)		169,226
Local ownership (%)		100
Export component (%)		0
Amount requested (US\$) {Original		204,898
{Revised		169,226
Cost effectiveness (US\$/kg)		23.25
National Coordinating Agency	Ministry of Environment	
Implementing Agency	UNIDO	
Technical review completed?	Yes	

Secretariat's Recommendations

Amount recommended (US \$)	
Project impact (ODP tonnes)	
Cost effectiveness (US \$/kg)	
Implementing Agency support cost (US\$)	
Total cost to Multilateral Fund	

PROJECT DESCRIPTION

Phasing out of ODS at three small domestic refrigerator factories in Sudan (Coldair Refrigerator Factory, Modern refrigerator & Metal furniture Co., Sheet Metal Industries Co. Refrigerator Factory)

1. The Sudan umbrella household refrigerator project includes three enterprises. Coldair Refrigerator Factory, The Modern Refrigerator Co. and The Sheet Metal Industries are the only three manufacturers of domestic refrigeration appliances in Sudan. They produce 10,290 units per year. These companies can be qualified as small enterprises. Their ODS consumption ranges from 0.12 MT to 4.26 MT. The objective of the project is to eliminate the use of CFC-12 in the production of refrigerators at all three companies. HFC-134a will replace CFC-12 as refrigerant for the cooling system at all three companies. CFC-11 will be replaced by HCFC-141b as the foaming blowing agent at the Modern Refrigeration company. Cyclopentane was considered as a potential substitute but was not selected by the company since it would require wholesale replacement the foaming equipment and costly safety equipment which could not be justified with their small ODS consumption (3.9 MT/yr.). Thus Modern Refrigeration has opted for HCFC-141b as the blowing agent for the foreseeable future.

2. The capital cost of conversion to HFC-134a relates to replacement of refrigerant charging equipment, vacuum pumps and leak detectors. Phase out of CFC-11 does not require any capital costs. The existing low pressure foaming equipment will be used for HCFC-141b operations. Technical assistance will be provided to ensure the successful conversion to non-CFC technologies. Operational costs relate to higher cost of new components and chemicals. The project was discussed between UNIDO and the Fund Secretariat. It was agreed that costs related to recovery, recycling and servicing should be requested under separate project formulated for the country as a whole. These costs were excluded from the project.

3. The cost-effectiveness of the umbrella project is US \$23.25/Kg ODP which exceeds the threshold established for the domestic refrigeration sector. The cost-effectiveness for the individual companies was calculated as follows:

	Annual production (units)	Total incremental cost (US \$)	Phase out (ODP tonnes)	Cost - effectiveness (US \$/Kg. ODP)
Coldair	6,690	71,088	2.9	24.51
Modern Refrigerator Co.	3,000	47,840	4.26	11.23
Sheet Metal	600	46,240	0.12	386.00

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

1. The three companies are the only manufacturers of domestic refrigeration appliances in Sudan. They are small enterprises. The cost-effectiveness of only one enterprise meets the established threshold.

RECOMMENDATIONS

1. It is recommended to consider the project in the context of the discussion on the approaches to ODS phase-out in small and medium-sized enterprises.