UNITED
NATIONS

EP

United Nations
Environment
Programme

Distr.
LIMITED

UNEP/OzL.Pro/ExCom/20/17
18 September 1996

ORIGINAL: ENGLISH

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

Twentieth Meeting
Montreal, 16-18 October 1996

PROJECT PROPOSALS: CHINA

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

Refrigeration

- Phasing out ODS at the refrigerator plant of Aucma Electric Appliances Group Co. — UNIDO
- Conversion of manufacturing facilities from CFC-11 foaming agent to cyclopentane at Shanghai Shuanglu Electrical Appliance Co. Ltd. — World Bank
- Conversion of manufacturing facilities from CFC-11 foaming agent to cyclopentane and CFC-12 refrigerant to HFC-134a at Gansu Changfeng Baoan Industry Co. Ltd. — World Bank

Solvent

- Elimination of ODS (CFC-113) used in the production line at Shanghai No. 8 Radio Factory — UNDP
- Elimination of ODS (CFC-113) used in the production line at Shanghai Automation Instrumentation Factory — UNDP

PROJECT EVALUATION SHEET
CHINA

SECTOR: REFRIGERATION ODS use in sector (1992): 5,650 ODP tonnes

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

Project Titles:

(a) Conversion of manufacturing facilities from CFC-11 foaming agent to cyclopentane and CFC-12 refrigerant to HFC-134a at Gansu Changefeng Baoan Industry Co. Ltd.

(b) Conversion of manufacturing facilities from CFC-11 foaming agent to cyclopentane at Shanghai Shuanglu Electrical Appliance Co. Ltd.

(c) Phasing out ODS at the refrigeration plant of Aucma Electric Appliances Group Co.

Project Data	**Domestic Refrigeration**		
	Gansu Changefeng	**Shanghai Shuanglu**	**Aucma**
ODS phase-out (ODP tonnes)	65.2	320.0	708.0
Proposed project duration (Yrs)	2	0.75	2
Incremental capital cost (US$)	679,800	2,047,700	3,284,173
Contingency (%)	10	10	10
Incremental operational cost (US$)	320,380	406,200	1,636,825
Total project cost (US$)	1,000,180	2,453,900	4,920,998
Local ownership (%)	100	100	100
Export component (%)	0	0	0
Amount requested (US$) {Original	1,000,180	2,453,900	4,920,998
{Revised	894,150	1,899,230	2,914,904
Cost effectiveness (US$/kg)	10.27	4.14	4.12
National Coordinating Agency	NEPA	NEPA	MEPA
Implementing Agency	World Bank	World Bank	UNIDO
Technical review completed?	Yes	Yes	Yes

Secretariat's Recommendations			
Amount recommended (US $)	894,150	1,899,230	2,914,904
Project impact (ODP tonnes)	65.2	320.0	708.0
Cost effectiveness (US $/kg)	10.27	4.14	4.12
Implementing Agency support cost (US$)	116,239	246,899	378,938
Total cost to Multilateral Fund	1,010,389	2,146,129	3,293,842

PROJECT DESCRIPTION

(a) Conversion of manufacturing facilities from CFC-11 foaming agent to cyclopentane and CFC-12 refrigerant to HFC-134a at Gansu Changefeng Baoan Industry Co. Ltd.

(b) Conversion of manufacturing facilities from CFC-11 foaming agent to cyclopentane at Shanghai Shuanglu Electrical Appliance Co. Ltd.

(c) Phasing out ODS at the refrigeration plant of Aucma Electric Appliances Group Co.

1. There are an estimated 100 domestic refrigerator and freezer production lines with a production capacity of 15 million units per annum in China. About 60 per cent of the total number of domestic refrigeration appliances are produced by ten refrigerator manufacturers with annual output of more than 300,000 units each. The Executive Committee approved eleven projects for the largest domestic refrigerator manufacturers in China.

2. The current annual production at the three companies under consideration is as follows: Shanghai Shuanglu 402,000 units; Gansu Changefeng 70,000 units and Aucma Electric 650,000 units. All the current production is sold in China. Under the projects submitted, the two companies will eliminated a total consumption of 1093.2 MT of CFC-11 by converting to HFC-134a as refrigerants, and to cyclopentane as the blowing agent. The proposals are included in the strategy of the Government of China for the phase-out of CFCs in the domestic refrigeration sector.

3. Conversion of the refrigerant part of the Shanghai Shuanglu enterprise to MP-39 ternary blend was approved at the 13th Meeting of the Executive Committee at US $1,010,000. These allocations have been taken into account while calculating cost-effectiveness of the project.

4. Conversion to HFC-134a refrigerant involves the replacement of refrigerant charging boards, leak detectors, refitting existing vacuum system, model redesign and testing.

5. The salient feature of Aucma Foam part conversion to cyclopentane is that the enterprise has several carousel conveyors with more than 200 electrically heated jigs in bell positions which are locally made. Allocations are requested to retrofit electrical part of these jigs and plugs for safe cyclopentane based operations.

6. Conversion to cyclopentane entails also the replacement of existing low pressure foam machines with high pressure machines, retrofitting of existing high pressure machines, modifying jigs and fixtures at Changefeng and Shuanglu enterprises, providing cyclopentane storage and delivery systems, and replacement of premixing stations. Conversion to cyclopentane will necessitate also implementing a stringent safety programme to ensure personnel and plant safety owing to flammable nature of cyclopentane.

7. Refrigerator model redesign and the technical aspects of the conversion including safety measures associated with cyclopentane application, will be supervised by Cannon Ltd., Shanghai Shuanglu and Gansu Changefeng's technology partner. These arrangements would ensure a proper technology transfer and safe operations. A contractor will be appointed by UNIDO for the implementation of the Aucma project. The contractor will be responsible for the supply of service equipment, installation, commissioning and on-the-job-training at Aucma's staff. A suitable third party Safety Auditor shall be appointed to review the technology and equipment and issue an "operational safety statement". TÜV - Germany, has been contacted to act as the Safety Auditor.

8. Incremental operational costs are associated with new HFC-134a compressor, refrigeration system optimization, higher cost of the refrigerant and extra polyurethane foam due to increased density. Incremental operational costs are requested for six months of operation for all the three companies.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

1. The chosen technologies are proven.

2. The enterprises will share cost of several equipment items.

3. The Secretariat discussed with implementing agencies the eligibility and incrementality of all cost items. Cost of foaming equipment, cyclopentane, storage facilities, leak detectors has been reduced to reflect the standard prices for this type of equipment. Operating cost had been reduced to reflect the prevailing density of the foam system and prices of materials. Capital and operating costs in the project budgets have been adjusted accordingly. All the recommended amounts are below the cost-effectiveness thresholds of the sub-sector.

RECOMMENDATION

1. The Fund Secretariat recommends blanket approval of the projects, with associated support costs at the funding level shown in the table below.

	Project Cost US $	Support Cost US $	Implementing Agency
(a) Conversion of manufacturing facilities from CFC-11 foaming agent to cyclopentane and CFC-12 refrigerant to HFC-134a at Gansu Changefeng Baoan Industry Co. Ltd.	894,150	116,239	World Bank
(b) Conversion of manufacturing facilities from CFC-11 foaming agent to cyclopentane at Shanghai Shuanglu Electrical Appliance Co. Ltd.	1,899,230	246,899	World Bank
(c) Phasing out ODS at the refrigeration plant of Aucma Electric Appliances Group Co	2,914,904	378,938	UNIDO

PROJECT EVALUATION SHEET
CHINA

SECTOR: **SOLVENTS** ODS use in sector (1993): 4527 ODP tonnes

Sub-sector cost-effectiveness thresholds: CFC-113 19.73 US $/kg
1,1,1-trichloroethane 38.5 US $/kg

Project Titles:
(a) Elimination of ODS (CFC-113) used in the production line at Shanghai No.8 Radio Factory
(b) Elimination of ODS (CFC-113 and 1,1,1-trichloroethane) used in the production line at Shanghai Automation Instrumentation Factory

Project Data	**CFC-113/1,1,1-TCA**	
	Shanghai No.8	**Shanghai Automation**
ODS phase-out (ODP tonnes)	19.2	16.1
Proposed project duration (Yrs)	2	2
Incremental capital cost (US $)	470,000	356,000
Contingency (%)	10	10
Incremental operational cost (US $)	3,000	Nil
Total project cost (US $)	473,000	356,000
Local ownership (%)	100	100
Export component (%)	-	-
Amount requested (US $) {Original}	378,000	325,000
{Revised}	378,000	325,000
Cost effectiveness (US $/kg)	19.7	20.2
National Coordinating Agency	NEPA through MEI	NEPA through MEI
Implementing Agency	UNDP	UNDP
Technical review completed?	Yes	Yes

Secretariat's Recommendations:		
Amount recommended (US $)	378,000	325,000
Project impact (ODP tonnes)	19.2	16.1
Cost effectiveness (US $/kg)	19.7	20.2
Implementing Agency support cost (US $)	49,140	42,250
Total cost to Multilateral Fund (US $)	427,140	367,250

PROJECT DESCRIPTION

(a) Shanghai No.8 Radio Factory.

1. This project will phase out CFC-113 used in vapor degreasers to clean computer parts and circuit boards. Five ODS lines currently used in production will be replaced by a total of four alternative processes: 1 semi-aqueous based process (hydrocarbon/water) and 3 co-solvent based processes for the critical parts, two of which will be retrofitted.

(b) Shanghai Automation Instrumentation Factory.

2. This project will phase out CFC-113 used in vapor degreasers to clean metal and ceramic parts and circuit boards and 1,1,1-trichloroethane used to clean aluminum and stainless steel parts. Three ODS lines currently used in the production processes will be replaced by 1 semi-aqueous hydrocarbon/water-rinse process and 2 co-solvent based processes for the critical assemblies. One of the co-solvent processes will be implemented by retrofitting an existing vapor degreaser.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

1. These projects are the latest in a series of relatively large-scale projects being prepared by UNDP in the metal cleaning part of the solvent sector in China. The technical details of each project are straightforward and present no significant cost or eligibility problems. A small partial funding contribution is being made by each enterprise to maintain the requested grant below the applicable cost-effectiveness threshold.

2. While the projects are consistent with the overall strategy for the sector in China, they do not make any use of the Application Development Centre or the Manufacturing Centre for non-ODS cleaning equipment, projects which were originally funded at the 12th Meeting. The Fund Secretariat observes, again, that there could be merit in bringing forward projects which made use of the facilities to be provided through projects which have already been funded.

3. The cost-effectiveness of the Shanghai Automation project is 20.2 US$/kg. This is below the weighted average threshold of 20.31 US$/kg applicable to the quantities of CFC-113 and TCA now being consumed.

RECOMMENDATION

1. The Fund Secretariat recommends blanket approval of the projects with associated support costs at the funding level shown in the table below:

Project Titles	Project Cost US $	Support Cost US $	Implementing Agency
(a) Elimination of ODS (CFC-113) used in the production line at Shanghai No.8 Radio Factory	378,000	49,140	UNDP
(b) Elimination of ODS (CFC-113) used in the production line at Shanghai Automation Instrumentation Factory	325,000	42,250	UNDP