



**United Nations
Environment
Programme**



Distr.
LIMITED

UNEP/OzL.Pro/ExCom/20/17/Corr.1
13 October 1996

ORIGINAL: ENGLISH

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

Twentieth Meeting
Montreal, 16-18 October 1996

Corrigendum

PROJECT PROPOSALS: CHINA

This corrigendum is issued to replace pages 2, 3, 4 and 5 related to the domestic refrigeration project on:

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).

(Please note that incremental operating cost associated with HFC-134a compressors was found to be ineligible in this project. Accordingly, operating cost of the project should be reduced by US \$190,000.)

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 Changfeng 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 Changfeng	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 \$)	704,150	1,899,230	2,914,904
Project impact (ODP tonnes)	65.2	320.0	708.0
Cost effectiveness (US \$/kg)	7.35	4.14	4.12
Implementing Agency support cost (US\$)	91,540	246,899	378,938
Total cost to Multilateral Fund	795,690	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 Changfeng 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 Changfeng 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 Changfeng 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 Changfeng'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 requested for refrigeration system optimization, higher cost of the refrigerant and extra polyurethane foam due to increased density. Operating cost associated with new HFC-134a compressors is requested in Gansu Changfeng Baoan project. 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.
4. Operating cost associated with new HFC-134a compressors requested in Gansu Changfeng project has been found to be ineligible. HFC-134a based domestic refrigeration compressor production funded by the Multilateral Fund in China provides sufficient capacity to meet the demand for HFC-134a compressors by domestic refrigeration manufacturers which are going to convert to HFC-134a refrigerant, including Gansu Changfeng. Therefore, the Fund Secretariat considers that on the ground of proper application of the policies of the Executive Committee regarding double counting, operating cost for HFC-134a compressors is not eligible incremental costs.
5. 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 at Shanghai Shuanglu Electrical Appliance Co. Ltd.	1,899,230	246,899	World Bank
(b) Phasing out ODS at the refrigeration plant of Aucma Electric Appliances Group Co	2,914,904	378,938	UNIDO

2. The Fund Secretariat recommends approval of the Gansu Changfeng project subject to agreement of the World Bank on adjusted operating cost at the funding level shown below:

	Project Cost US \$	Support Cost US \$	Implementing Agency
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.	704,150	91,540	World Bank