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

Twentieth Meeting
Montreal, 16-18 October 1996

Addendum

PROJECT PROPOSALS: INDIA

This document includes the Comments from the Fund Secretariat on the following project:

Refrigeration

- Conversion of domestic refrigerator manufacture to cyclopentane blowing agent and either R600a or HFC-143a refrigerant at Godrej-GE Appliances Ltd. (GGEAL)

World Bank

SECTOR:	REFRIGERATION	ODS use in sector (1994):	3,437 ODP tonnes
Sub-sector cost-effectiveness thresholds:	Domestic Refrigeration		US \$ 13.76/kg

Conversion of domestic refrigerator manufacture to cyclopentane blowing agent and either R600a or HFC-134a refrigerant at Godrej - GE Appliances Ltd. (GGEAL)

Project Data	Domestic
	GGEAL
ODS phase-out (ODP tonnes)	718
Proposed project duration (Yrs)	2.3
Incremental capital cost (US\$)	
Contingency (%)	10
Incremental operational cost (US\$)	1,203,366
Total project cost (US\$)	15,512,383
Local ownership (%)	60
Export component (%)	0
Amount requested (US\$) {Original	8,573,689
{Revised	
Cost effectiveness (US\$/kg)	10.45 or 11.26 ¹
National Coordinating Agency	MOEF
Implementing Agency	World Bank
Technical review completed?	Yes

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

¹ Cost-effectiveness depends on choice of the final technology option for refrigerant, between HFC-134a and isobutane.

PROJECT DESCRIPTION

Conversion of domestic refrigerator manufacture to cyclopentane blowing agent and either R600a or HFC-143a refrigerant at Godrej - GE Appliances Ltd. (GGEAL).

1. ODS consumption in the refrigeration sector in 1991 was reported in the country programme to be 1980 MT. The updated 1994 figure provided in the project document is 3437 MT. It is estimated that ODS consumption in the domestic refrigeration sub-sector was 535 MT in 1994.
2. GGEAL, which is 60% Indian-owned, is the largest manufacturer of domestic refrigerator appliances in India with output of about 800,000 units per year. GGEAL has two plants: each plant has two carousel type production lines, one for doors and one for cabinets.
3. The project was submitted to the 19th Meeting of the Executive Committee covering only the foam part of the conversion. Decision 19/16 was taken, inter alia, requesting the World Bank and the Secretariat to resolve technical issues and present their findings to the next meeting.
4. The company has chosen cyclopentane as a substitute for CFC-11 blowing agent. The project requests financial allocations only for conversion of the foam operation, as Phase I of the project. Phase II, refrigerant conversion, will be submitted at a future date. Phase II will involve the replacement of CFC-12 with either HFC-134a or isobutane. Options in Phase II are being kept open because the direction that will be taken by the domestic refrigeration industry in India is not yet clear. An estimate of the cost of Phase II conversion is provided in the project document for both options. The cost-effectiveness is calculated on the basis of Phase I and Phase II for each option. The cost-effectiveness of each option is below the threshold value.
5. The Phase I conversion, as proposed, involves the replacement of each of the four existing carousel type production lines with a new line using more modern static fixtures and associated conveyors and loading/unloading equipment. The replacement of four existing high pressure foam machines and four mixing heads, with eight new foaming machines with additional 9 mixing heads, and the replacement of two pre-mixing units with four new units is proposed, together with the installation of two cyclopentane storage and distribution systems. Safety requirements will be met by installation of gas monitoring and ventilation systems.
6. Incremental operating costs are requested a period of 6 months.

SECRETARIAT'S COMMENTS

1. Following the 19th Meeting, the Secretariat provided further detailed technical comments to the implementing agency, associated with its position that costs should be calculated on the basis of modification or 'retrofit,' of the existing production facilities. The project was reformulated and resubmitted for the 20th Meeting, however, the basis for calculation of funding for the project continued to be complete replacement of production facilities at an overall cost of US \$15.5 million.

2. The Fund Secretariat again reviewed the project, including drawing on advice from various experts, provided further comments and held extensive discussions with the World Bank. In this regard, the Fund Secretariat noted that the Executive Committee has never approved any project based on complete replacement of production lines or a project with such a high cost-effectiveness figure, taking into account the capacity of the plant. Several projects have been approved for converting enterprises of comparable size to the same technology with cost-effectiveness values up to 4 times better than the proposed conversion at GGEAL, after removing the discount for foreign ownership. Analysis of all projects for conversion to hydrocarbon technology approved by the Executive Committee indicates that the cost-effectiveness of projects for enterprises with production rates exceeding 200,000 units a year ranges from US \$10/kg to less than US \$3/kg, including both the foam and refrigeration parts, with the trend downward as production volumes increase. This project, at a capacity of 1,000,000 units per year, should be at, or below, the lowest level, before allowance is made for foreign ownership. For example, a project for conversion of a similar carousel set-up with an actual production of 1 million units annually has been submitted to the 20th Meeting at a cost of about US \$3 million.

3. At the time of preparing this brief, the Fund Secretariat had been advised by the World Bank that a revised project costing, based on retrofits, is being prepared.

4. The following are the main cost and eligibility items likely to arise in a costing based on retrofits:

- productivity loss: the foam injection process on a retrofitted line will take 1.5 - 2 seconds longer which is claimed as a 20% productivity loss
 - productivity loss has not been incorporated in any other project, including for 'carousel' production lines
 - there is also an issue as to whether such a short delay is significant given the age of the equipment and the level of current technology
- costing of retrofits of locally manufactured moulds and jigs
- costing of storage facilities and piping
- number of pre-mixing units
- costing of gas detector system
- costing of foaming machines
- costing of fire protection system.

5. The Fund Secretariat does not presume to comment on the technical solutions GGEAL may wish to implement in its factories for a variety of business reasons. However, there is clear

evidence that production facilities of the same general configuration as those at GGEAL can be, and have been, converted to cyclopentane in both developed and developing countries. It is the Secretariat's view that incremental costs for conversion of the GGEAL facility will need to be calculated on this basis and that any additional costs relating to alternative technical solutions are not eligible.

6. In its comments to the World Bank, the Secretariat dealt item by item with the main components of the production lines and established a correct basis for funding. For the most part, the costs used were as indicated in the templates. When other costs were proposed, the reasons were fully explained. The Secretariat also prepared a detailed 'typical' budget based on its costings. The total project cost has been proposed at about US \$4 million, with the eligible grant, at 60% local ownership, being about US \$2.5 million.

7. Discussions between the Fund Secretariat and the implementing agency are continuing. The results will be reported to the Sub-Committee on Project Review.