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EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Twenty-fourth Meeting
Montreal, 25-27 March 1998

PROJECT PROPOSAL: MEXICO

Refrigeration

- Manufacture of complete heat exchanger systems for air conditioning IBRD equipment that use HFC-134a at Climas de Mexico

PROJECT EVALUATION SHEET **MEXICO**

SECTOR: Refrigeration (MAC) ODS use in sector (1994): 893 ODP tonnes

Sub-sector cost-effectiveness thresholds: N/A

Project Title:

Manufacture of complete heat exchanger systems for air conditioning equipment that use HFC-134a at
Climas de Mexico

Project Data	Refrigeration (MAC)
	Climas de Mexico
ODS phase-out (ODP tonnes)	N/A
Proposed project duration (months)	18
Incremental capital cost (US \$)	3,637,211
- including contingency (%)	10
Incremental operational cost (US \$)	0
Total project cost (US \$)	4,037,211
Local ownership (%)	100
Export component (%)	-
Amount requested (US \$)	3,637,211
{ Original }	
{ Revised }	2,359,812
Cost effectiveness (US \$/kg)	N/A
National Coordinating Agency	Instituto Nacional de Ecología/Unidad de Protección al Ozono
Implementing Agency	World Bank
Technical review completed?	Yes

Secretariat's Recommendations:	
Amount recommended (US \$)	2,359,812
Project impact (ODP tonnes)	N/A
Cost effectiveness (US \$/kg)	N/A
Implementing Agency support cost (US \$)	306,776
Total cost to Multilateral Fund (US \$)	2,666,588

PROJECT DESCRIPTION

Manufacture of complete heat exchanger systems for air conditioning equipment that use HFC-134a at Climas de Mexico.

1. This project is to convert the existing tube and fin condenser and evaporator designs to parallel flow designs for MAC units using HFC-134a refrigerants, for several models of two car manufacturers (VW and Chrysler) and for the aftermarket. The current annual production capacity (one shift) at the plant is 40,000 condensers, 20,000 evaporators and 95,000 fittings for MACs. The total production for 1996 was 28,500 condensers, 10,500 evaporators and 88,000 fittings.
2. The country programme proposes a CFC-12 phase-out in the MAC sector on or before 2005 for new equipment, and 2010 for servicing existing CFC-12 MAC units. A final phase out strategy for management of existing CFC-12 systems will be decided shortly by the Government.
3. The Mexican automobile industry produced over 934,000 and 1,217,080 vehicles in 1995 and 1996, respectively. About 45 per cent of new vehicles are assembled with a MAC unit. The aftermarket for MAC units is very important, since around 60 percent of automobiles less than three years old install a MAC unit during this period.
4. The MAC sector in Mexico includes several manufacturing companies. Climas de Mexico is the largest of the domestic companies with a 50 per cent share of the national production. The company also exports some units to other Article 5 countries in Latin America.
5. The enterprise started manufacturing and repairing condensers in 1964. Currently, it is the only manufacturer of MAC units authorized by VW and Chrysler for some of their car models. In 1994, the company tested some modifications to the existing production line for the manufacture of tube and fin condensers for HFC-134a refrigerant. The end product, however, did not meet international standards required for HFC-134a MACs. Consequently, the enterprise has decided to develop a new parallel flow condenser.
6. The total capital cost for the conversion has been estimated at US \$2.63 million, including a new fin machine with trayer (US \$647,875), a tube straighten and cut machine (US \$250,846), an assembly machine (US \$463,370) a Nocolok brazing system (US \$773,385), an aqueous spray washer and drier system (US \$189,931) and a waste water treatment system (US \$123,352).
- 1.
7. The project proposes to change the tube and fin condenser to parallel flow design which requires a new multi-flow-tube cutting system and a fin machine for manufacturing the corrugated fins. The conversion also requires a type of brazing different from the one used in the plant. The company has selected the Nocolok furnace brazing process (nitrogen gas is applied continuously and a non corrosive flux is utilised to effect proper brazing).

8. In addition to the equipment cost, US \$686,500 (equivalent to 26% of the project cost), is being requested for technology transfer/assistance, product performance testing, training and consultant services. Contingency (10 %) is estimated at US \$331,656. Under the technology transfer agreement, training will be provided to personnel at the plant for production start-up (8-week), for operation of the brazing furnace and the tube cut-off equipment (1-week each), and 300 hundred hours for design enhancement.

9. The project proposal includes a list with the description of the baseline equipment that would be replaced when switching to HFC-134a refrigerant. This equipment will be removed and demolished; the destruction process will be verified by the National Institute of Ecology (INE).

10. The enterprise has agreed to fund the equipment items that were considered non-eligible under the Multilateral Fund criteria with its own resources in order to carry out the conversion of the plant and fulfilled its commitments.

Ability to meet the 1999 freeze

11. "The objective of this project is to convert the existing production facility at Climas de Mexico to manufacture complete heat exchanger systems for air conditioning equipment that use HFC-134a. This will result in the reduction of CFC-12 demand in the mobile air-conditioning sector by 110.52 tons per year. As a result of this reduction in demand for ODS, implementation of the project will contribute to helping Mexico to achieve the 1999 freeze".

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

1. The Secretariat reviewed the projects in the context of Executive Committee policies and guidelines; Mexico country programme; MAC conversion projects so far approved by the Executive Committee; and the OORG MAC Subsector Meeting's Report (January 1995).

2. A preliminary review by the Secretariat questioned the eligibility and the technical soundness of the proposal and decided to seek clarification from an international consultant on these matters. The report by the Secretariat's consultant concluded that:

- (a) Climas de Mexico, as a supplier for the aftermarket, has to consider building MAC systems that would fit many different vehicle manufacturer models over many production model years. Due to individual vehicle space problems, the aftermarket condenser has to be compromised in most cases, resulting in a reduced condenser frontal area and different mounting relationships to the radiator. Without the exact duplication of the vehicle manufacturers' design requirements, higher system operating

pressures can occur, and in turn can result in refrigerant being vented to the atmosphere.

- (b) In the United States, the aftermarket MAC system experienced low performance in their original CFC-12 systems that were converted to HFC-134a refrigerant with a parallel flow condenser, and decided to release their HFC-134a MAC systems without a new condenser (in most cases they simply change the service fittings, expansion valve and compressor switch calibrations, and make sure that the other system components are compatible with the new refrigerant).

3. The World Bank provided the following explanation on this issue:

- (a) The aftermarket in Mexico is different from the aftermarket in the United States. In Mexico, it includes installation of MACs to: (i) auto dealers requesting air conditioners for new vehicles that consumers cannot afford fully equipped; (ii) new vehicles that are still in the auto manufacturers plant; and , (iii) relatively new vehicles (two to three years-old) that consumers frequently buy without MAC units but add them once they are able to afford them. Climas de Mexico supplies MAC systems not only for the aftermarket but also for VW (Jetta, Golf, Derby, Pointer and Beetle) and for Chrysler (Ram Charger).
- (b) The same size condenser meets the design requirements of many models and types of vehicles (for example, the full size pick-up model at Ford, Chrysler and GM use the same condenser; the only difference is in the manifolds, supports and brackets). The company manufactures six different sizes of condensers which meets the design requirements of most of its market.
- (c) The number of fins/inch used in the condenser can vary the air flow restrictions, and thus guarantee the correct functionality of the whole system. The high pressure can be controlled by pressure switches and additional fans. The vented refrigerant from the high pressure safety device of the compressor can be due to a wrong installation of the unit or an excess charge of the refrigerant.

4. On the issue raised by the Secretariat as to whether the supply of products for the aftermarket represents any ODS phase out since there is no ODS consumption in the aftermarket to be phased out, the World Bank responded that there is CFC-12 consumption in the aftermarket; CFC-12 has been the refrigerant used in the aftermarket since its inception; the only approved refrigerants for MACs are CFC-12 and HFC-134a, and generally the service network is not equipped to handle or supply any other refrigerant.

5. The Secretariat and the World Bank also discussed issues regarding the current production levels of the company, the reasons for the replacement of the current brazing system since the enterprise is currently producing aluminum tube and fin condensers, and the high level of funding requested for some pieces of equipment, as compared to similar projects already approved, namely the

fin machine with trayer, tube straighten and cut machine, assembly machine, Nocolok brazing system, leak detection system, waste water treatment and braze evaluation laboratory.

6. The Secretariat also informed the Bank that considering (i) the production capacity of the new furnace will be higher than the current production, and (ii) the furnace will be used for both the production of condensers (28,500 units/year) and evaporators (10,500/year), the level of eligible funding should be calculated taking into account the capacity increase and the production of evaporators (which are not eligible).

7. Subsequently, the World Bank informed the Secretariat that the enterprise agreed to cover 50 per cent of the costs of the fin machine (US \$323,938) and the assembly machine (US\$ 250,000) and the aqueous spray washing system (US \$100,000), and full costs of the braze evaluation lab (US \$46,000). Costs of other equipment items were adjusted according to costs so far approved in similar projects.

8. Regarding other costs associated with technology transfer and consultancy services, in addition to the equipment cost, the Secretariat informed the World Bank that many of these costs are either not eligible since they are associated with the production of evaporators and fittings or are part of the agency's support costs. Subsequently, the Bank adjusted the non-equipment costs accordingly in line with levels approved for similar projects.

RECOMMENDATION

1. The Fund Secretariat recommends blanket approval of the projects at the funding levels indicated below:

Project Title	Project Cost US \$	Support Cost US \$	Implementing Agency
Manufacture of complete heat exchanger systems for air conditioning equipment that use HFC-134a at Climas de Mexico	2,359,812	306,776	World Bank