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

Eighteenth Meeting
Vienna, 22-24 November 1995

PROJECT PROPOSALS: INDONESIA

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

Refrigeration

- Phasing out ODS at P.T. Air Tech co. Ltd., Indonesia UNIDO
- Elimination of ODSs used in the production of Household Refrigerators at P.T. Topjaya Antariksa Electronics World Bank
- Elimination of ODSs used in the production of Household Refrigerators at P.T. National Gobel World Bank
- Elimination of ODSs used in the production of Household Refrigerators at P.T. Sharp Yasonta World Bank

Solvent

- Conversion of Metal Cleaning Processes from 1,1,1 Trichloroethane (TCA) to Aqueous Cleaning at PT. INTI World Bank
- Conversion of Metal Cleaning Processes from 1,1,1 Trichloroethane (TCA) to Aqueous Cleaning at PT. Garuda World Bank
- Conversion of Metal Cleaning Processes from 1,1,1 Trichloroethane (TCA) to Aqueous Cleaning at PT. Markindo Theco World Bank

PROJECT EVALUATION SHEET INDONESIA

SECTOR: REFRIGERATION ODS use in sector (1992): 2,096 ODP tonnes

Sub-sector cost-effectiveness thresholds: Domestic refrigeration US \$13.76/kg.
Commercial refrigeration US \$15.21/kg.

Project Titles:

- (a) Elimination of ODSs used in the production of Household Refrigerators at P.T. Topjaya Antariksa Electronics
- (b) Elimination of ODSs used in the production of Household Refrigerators at P.T. National Gobel
- (c) Elimination of ODSs used in the production of Household Refrigerators at P.T. Sharp Yasonta
- (d) Phasing out ODS at P.T. Air Tech Co Ltd.

Project Data	Domestic Refrigeration			Commercial Refrigeration
	Topjaya	National Gobel	Sharp Yasonta	P.T. Air Tech
ODS phase-out (ODP tonnes)	5.1	89.46	74.8	30.1
Proposed project duration (Yrs)	7	5	8	1.5
Incremental capital cost (US\$)	628,620	1,641,138	1,311,000	354,200
Contingency (%)	15	15	15	10
Incremental operational cost (US\$)	128,000	500,000	341,000	55,650
Total project cost (US\$)	756,620	214,138	1,652,000	409,850
Local ownership (%)	100	40	36.25	100
Export component (%)	0	0	0	0
Amount requested (US\$) {Original	975,800	1,425,400	717,800	423,050
{ Revised	702,000	856,500	600,000	409,850
Cost effectiveness (US\$/kg)	13.76	9.57	12.46*	13.58
National Coordinating Agency	ISME	ISME	ISME	Ministry of Environment
Implementing Agency	WB	WB	WB	UNIDO
Technical review completed?	Yes	Yes	Yes	Yes

Secretariat's Recommendations				
Amount recommended (US \$)	702,000	856,500	600,000	409,850
Project impact (ODP tonnes)	51	89.46	74.8	83.01
Cost effectiveness (US \$/kg)	13.76	9.57	8.02	13.58
Implementing Agency support cost (US\$)	91,260	111,345	78,000	53,280
Total cost to Multilateral Fund	793,260	967,845	678,000	463,130

* Taking into account US \$346,000 approved for the refrigeration part.

PROJECT DESCRIPTION

- (a) Elimination of ODSs used in the production of Household Refrigerators at P.T. Topjaya Antariksa Electronics
- (b) Elimination of ODSs used in the production of Household Refrigerators at P.T. National Gobel
- (c) Elimination of ODSs used in the production of Household Refrigerators at P.T. Sharp Yasonta

1. ODS consumption in the refrigeration sector is 2,096 MT. In 1993, the domestic refrigeration industry in Indonesia consumed approximately 384 MT of CFCs. The production of household refrigerators and freezers in Indonesia was approximately 520,000 units in 1993.

2. There are eight major manufacturers: The Executive Committee approved two projects for two companies for complete ODS phase-out. One project was approved for the refrigeration part for Sharp Yasonta. The foam part conversion is submitted for this meeting.

3. National Gobel will convert to HFC-134a as a refrigerant and cyclopentane as a blowing agent, Sharp Yasonta will convert its foam operations to cyclopentane (conversion of refrigerant part was approved at the 15th Meeting) and Topjaya will convert to HFC-134a as a refrigerant and to HCFC-141b as blowing agent. Totally, 169.6 MT of CFCs will be eliminated after submitted projects are implemented.

4. Conversion to HFC-134a refrigerant involves replacement of charging equipment and leak detectors and retrofitting of existing vacuum systems, model redesign, procurement of testing equipment and training.

5. Conversion to cyclopentane entails the replacement of existing low pressure foam machines with high pressure machines, retrofitting existing high pressure machines, where possible, providing storage for cyclopentane and delivery systems, and replacing premixing stations. Conversion to cyclopentane will necessitate also implementing a stringent safety programme to ensure personnel and plant safety owing to the flammable nature of cyclopentane.

6. Conversion to HCFC-141b involves retrofitting existing equipment, testing and technology transfer.

7. Refrigerator model redesign and the technical aspects of the conversion including safety measures associated with cyclopentane application will be provided through the established arrangements with Japanese partners. These arrangements would ensure a proper technology transfer and safe operations.

8. Topjaya fully relies on its partner Toshiba (Japan) in terms of adaptation of new technology. Toshiba has not decided yet on application of non-ODS technology in foam blowing and recommended to Topjaya to convert to HCFC-141b. The enterprise recognizes the transitional nature of HCFC technology. Conversion to cyclopentane will be facilitated by the availability of high pressure foaming equipment. Costs associated with second stage conversion which are estimated within the range of US \$500,000 and US \$1 million, will be borne by the company itself.

9. The companies request incremental operational costs associated with higher cost of components and foam formulation

(d) Phasing out ODS at P.T. Air Tech Co Ltd.

10. Under this project, P.T. Air Tech will eliminate the use of 30.1 MT of CFC-11 and CFC-12 in the manufacture of cold stores, reach-in refrigerators and polyurethane panels, through formulations and procedures for foam injection based upon the use of HCFC-141b as blowing agent for foam and HCFC-22 as refrigerant. Additional fringe benefits include those derived from the elimination of solvents due to the use of self-cleaning mix heads. The projects include equipment replacement, technology transfer, production trials and training.

11. The company has been advised by the implementing agency on the interim nature of HCFC refrigerants and blowing agents. The ultimate solution based on HFC-134a and cyclopentane was proposed as a proven alternative technology.

12. The company recognized the interim nature of the use of HCFC-141b and HCFC-22 and accepted to bear all costs associated with subsequent transfer to zero-ODP technology. However, equipment provided under this project will allow the company to convert to non-ODS substances without substantial additional costs.

13. The following justifications were provided by P.T. Air Tech for the use of HCFC-141b:

- Plant location that prevented use of flammable substitutes
- Lower capital requirement
- Fewer safety requirements
- No need to change process flow or plant layout
- No need to change product design

14. The company also stated that many of the manufactures in Indonesia have chosen HCFC-22 as intermediate replacement for R-502 and CFC-12. This would be a viable and commercially available option for the Indonesian manufacturer.

15. The company requested operational cost for 6 months duration due to price increase caused by higher foam density and higher cost of a new foam formulation.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

1. The chosen technologies are proven. The choice of interim HCFC technologies are justified.
2. The Secretariat discussed with implementing agencies the eligibility and incrementality of all cost items. Projects budgets have been adjusted accordingly.

RECOMMENDATIONS

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

Project	Project Cost US \$	Support Cost US \$	Implementing Agency
(a) Elimination of ODSs used in the production of Household Refrigerators at P.T. Topjaya Antariksa Electronics	702,000	91,260	WB
(b) Elimination of ODSs used in the production of Household Refrigerators at P.T. National Gobel	856,500	111,345	WB
(c) Elimination of ODSs used in the production of Household Refrigerators at P.T. Sharp Yasonta	600,000	78,000	WB
(d) Phasing out ODS at P.T. Air Tech Co Ltd.	409,850	53,280	UNIDO

2. The Fund Secretariat further recommends that the project be included in the Consolidated List.

PROJECT EVALUATION SHEET INDONESIA

SECTOR: SOLVENT ODS use in sector (1992) 474 ODP tonnes

Sub-sector cost-effectiveness thresholds: CFC-113 US \$14.73/kg
TCA (methyl chloroform) US \$38.5/kg
Mixed N/A

Project Titles:

- (a) Conversion of metal cleaning processes from 1,1,1-trichloroethane (TCA) to aqueous cleaning at PT INTI
- (b) Conversion of metal cleaning processes from 1,1,1-trichloroethane (TCA) to aqueous cleaning at PT Markindo Theco
- (c) Conversion of metal cleaning processes from 1,1,1-trichloroethane (TCA) to aqueous cleaning at PT Garuda

Project Data	TCA		
	PT INTI	PT Markindo Theco	PT Garuda
ODS phase-out (ODP tonnes)	0.97	2.16	2.67
Proposed Project Duration (Yrs)	1	1	1
Incremental capital cost (US \$)	124,000	226,00	331,000
Contingency (%)	15	15	15
Incremental operational cost (US \$)	41,560	157,670	168,74
Total project cost (US \$)	165,560	383,670	347,834
Local Ownership (%)	100	80	100
Export component (%)	-	12	-
Amount requested (US \$) {Original	38,500	85,700	105,900
{Revised	38,500	85,700	105,900
Cost Effectiveness (US \$/kg)	38.5	38.5	38.5
National Coordinating Agency	Ministry of Environment		
Implementing Agency	World Bank	World Bank	World Bank
Technical Review Completed?	Yes	Yes	Yes

Secretariat's Recommendations			
Amount recommended (US \$)	37,380	83,200	33,264
Project Impact (ODP tonnes)	0.97	2.16	0.864
Cost effectiveness (US \$/kg)	38.5	38.5	38.5
Impl. Agency Support Cost (US \$)	4,859	10,816	4,324
Total Cost to Multilateral Fund	42,239	94,016	37,588

PROJECT DESCRIPTION

(a) P.T. INTI

1. This project will phase out 0.97 ODP tonnes of TCA in the manufacture of printed circuit boards at PT. INTI. The enterprise produces several types of telephones such as desk telephones, public pay-phones, mobile telephone systems, digital telephone switching equipment, and digital PABX. The products are locally marketed. TCA is used as a developer in the manufacture of PCBs. The phase-out of ODS will be accomplished by replacing the current developing and stripping machines with aqueous-based machines.

(b) P.T. MARKINDO THECO

2. This project will eliminate the use of TCA in the cleaning of small condenser and evaporator coils, at P.T. Markindo Theco. The company is a manufacturer of condenser and evaporator coils for automotive air conditioners. Its products are sold primarily in Indonesia, with about 20% being exported to Hong Kong, Philippines, and Australia. P.T. Markindo Theco manufactures condensers and evaporator coils from aluminum sheet and copper and aluminum tubing. The phase out of ODS will be accomplished by replacing the current vapour degreasing and manual dip cleaning processes with an aqueous cleaning process. The company is seeking funding up to the limit of the cost effectiveness threshold and will be providing the balance of funds required from its own resources.

3. The technical reviewer has commented on the high energy requirement of aqueous cleaning systems and has suggested that more consideration be given in future projects to fully contained systems which could permit the use of alternative non-ODS solvents, thus eliminating the very large increase in energy consumption.

(c) P.T. GARUDA

4. The project, as presented, will phase out 2.67 ODP tonnes of TCA used in solvent cleaning in the maintenance and repair of commercial aircraft. In aircraft maintenance, TCA is used as a cleaning solvent for parts of aircraft such as engine landing gear, exhaust systems, brakes, etc. P.T. Garuda Indonesia is the state-owned national airline of Indonesia and performs maintenance work on its fleet at its new maintenance facility at Soekarno Hatta airport.

5. Exactly 2/3 of the consumption is used for "hand-wipe" cleaning applications and will be phased out without any investment cost by changing to a hydrocarbon "hand-wipe" solvent. There will be a cost saving as the hydrocarbon solvent is 13 per cent cheaper. The remaining 1/3 of the consumption (0.86 ODP tonnes) will be phased out through the installation of two aqueous-based cleaning systems, and associated water treatment facilities. The enterprise is seeking a grant up to the limit of the cost-effectiveness threshold, on the basis of the total TCA consumption of the enterprise, to install the two aqueous systems.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

P.T. GARUDA

1. The Fund Secretariat considers there is a need to point out that two thirds of the consumption of the enterprise, that is, 1.81 ODP tonnes, used for “hand-wipe” applications could be phased out immediately, at no cost to the Multilateral Fund, by substitution of the proposed alternative solvent, with a cost saving to the enterprise.
2. If this was done, the actual ODS consumption for which investment funds are required would be 0.864 ODP tonnes, not the total of 2.67 ODP tonnes appearing in the project proposal.
3. The Fund Secretariat suggests that only the actual consumption of solvent in the existing degreasing machines should be included in the project. The situation is analogous to calculation of consumption in the manufacture of domestic refrigerators, where the downstream consumption of CFC-12 used in the servicing of refrigerators during their lifetime is not included in the enterprise’s consumption figures. On this basis, using the established cost effectiveness threshold of US \$38.5/kg, the maximum level of grant would be US \$33,264. The Secretariat proposes that funding be approved at this level only. The implementing agency remains of the view that the total consumption of the enterprise is the correct basis for allocation of the level of grant.
4. The proportion of the company’s contribution to the project appears to be substantial. However, the Fund Secretariat has reservations about the very high total costs suggested for water treatment and recycling (US \$160,000) to serve only two small degreasers, one of which has its own de-ionised water recycling system. The normal cost for an item like this would be US \$20,000 to US \$40,000. The enterprise may well wish to install these facilities, but they are unlikely to be essential for the degreasers being provided under this project. Discounting these costs, the company’s actual contribution would be much more modest.

All Projects

5. The Fund Secretariat considers that the choice of technology in each project is suitable, notwithstanding the high energy requirements of aqueous systems. Aqueous systems are being used in increasing numbers and avoid the difficulties associated with chlorinated or flammable non-ODS solvents. However fully contained and virtually leak proof machines, which are now becoming available, will offer the possibility of safe use of non-ODS solvents while minimizing energy costs.
6. Each project includes a financial contribution by the enterprise. The Fund Secretariat considers that incremental costs to the level of grant sought are eligible. However, the Fund Secretariat makes no comment on the validity or otherwise of the total level of incremental costs included in the project submissions.

RECOMMENDATIONS

1. The Fund Secretariat recommends approval of the projects at the funding level shown in the table below:

Project	Project Cost US \$	Support Cost US \$	Implementing Agency
(a) Conversion of metal cleaning processes from 1,1,1-trichloroethane (TCA) to aqueous cleaning at PT INTI	37,380	4,859	World Bank
(b) Conversion of metal cleaning processes from 1,1,1-trichloroethane (TCA) to aqueous cleaning at PT Markindo Theco	83,200	10,816	World Bank
(c) Conversion of metal cleaning processes from 1,1,1-trichloroethane (TCA) to aqueous cleaning at PT Garuda	33,264	4,324	World Bank

2. The Fund Secretariat further recommends that the projects be included in the Consolidated List.