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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: MALAYSIA

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

Foam

- Elimination of CFCs in the manufacture of Molded/Integral Skin UF at Artwright — UNDP
- Elimination of CFCs in the manufacture of Molded/Integral Skin UF at Sze Chuan — UNDP
- Elimination of CFCs in the manufacture of rigid polyurethane foam at TM Cooling Technology — UNDP

Halon

- Conversion of Production of Portable Fire Extinguishers at EVERSAFE — UNDP

Refrigeration

- Elimination of CFCs 11 and 12 in the Manufacture of Domestic Refrigerators at Sanyo Industries Berhad — UNDP
- Phase-out of CFC-12 MAC manufacturing equipment and conversion to HFC-134a MAC manufacturing equipment at UCM — World Bank

Solvent

- Conversion of Metal Cleaning Process from 1,1,1 TCA to Hydrocarbons at AE Technology Sdn. Bhd. — World Bank
- Conversion of correction fluid manufacturing process from 1,1,1 TCA to non-ODS solvent at Mondial Sdn. Bhd. — World Bank
- Conversion of correction fluid manufacturing process from 1,1,1 TCA to non-ODS solvent at Widetech — World Bank

PROJECT EVALUATION SHEET
MALAYSIA

SECTOR: FOAM ODS use in sector (1992): 1,585 ODP tonnes

Sub-sector cost-effectiveness thresholds: Integral Skin foam US $16.86/kg
Rigid Foam US $7.83/kg

Project Titles:
(a) Elimination of CFCs in the manufacture of integral skin polyurethane foam at Artwright Technology Sdn. Bhd.
(b) Elimination of CFCs in the manufacture of integral skin polyurethane foam at Sze Chuan Sdn. Bhd
(c) Elimination of CFCs in the manufacture of rigid polyurethane foam at T.M. Cooling Sdn. Bhd.

Project Data	**Integral Skin Foam**		**Rigid Foam**
	Artwright Technology	**Sze Chuan**	**T.M. Cooling**
ODS phase-out (ODP tonnes)	6.5	6	11
Proposed project duration (Yrs)	1	1	1
Incremental capital cost (US$)	121,000	121,000	121,000
Contingency (%)	10	10	10
Incremental operational cost (US$)	4,800	5,600	8,600
Total project cost (US$)	125,800	126,000	129,600
Local ownership (%)	100	100	100
Export component (%)	less than 10	less then 10	0
Amount requested (US$) {Original	125,800	126,000	129,600
{Revised	100,000	96,000	78,000
Cost effectiveness (US$/kg)	15.17	22.11	12.15
National Coordinating Agency	Department of the Environment		
Implementing Agency	UNDP	UNDP	UNDP
Technical review completed?	Yes	Yes	Yes
Secretariat's Recommendations			
Amount recommended (US $)	100,000	96,000	78,000
Project impact (ODP tonnes)	5.95	5.725	10.01
Cost effectiveness (US $/kg)	16.81	16.77	7.31
Implementing Agency support cost (US$)	13,000	12,480	10,140
Total cost to Multilateral Fund	113,000	108,480	88,140

PROJECT DESCRIPTION

(a) Elimination of CFCs in the manufacture of integral skin polyurethane foam at Artwright Technology Sdn. Bhd.

and

(b) Elimination of CFCs in the manufacture of integral skin polyurethane foam at Sze Chuan Sdn. Bhd

1. Artwright and Sze Chuan were established in 1987 and 1988 respectively. Artwright manufactures integral skin polyurethane foam such as computer furniture, chair arm rests, leg bases, etc. for the furniture industry. Sze Chuan manufactures cold cured molded polyurethane foam products such as furniture seat cushions and integral skin polyurethane foam products such as head rests, arm rests, panels, computer furniture, etc. Both companies export part of their products. However, this is reported to be less than 10 per cent, to the neighbouring Article 5 countries. Hence the export component was not taken into account in calculating the eligible project cost.

2. Artwright operates a Cannon low pressure foam dispenser (Model C30R2) while Sze Chuan operates a Cannon low pressure dispenser (Model C30) and a Cannon high pressure dispenser (Model H100).

3. In the integral skin foam production, both companies will switch from CFC-11 to HCFC-141b as blowing agent, using high pressure machines. In the production of molded foam, Sze Chuan will switch to all-water blown system. The capital costs of both projects include the cost of one high pressure machine each, trials, technology transfer and training. Both projects incur some incremental operational costs.

(c) Elimination of CFCs in the manufacture of rigid polyurethane foam at T.M. Cooling Sdn. Bhd.

4. T.M. Cooling which was established in 1985 manufactures modular cold-rooms constructed from rigid polyurethane foam panels, insulated truck containers and other rigid polyurethane foam products. It operates a low pressure foam dispenser which will require replacement with high pressure dispenser when the company switches over to the HCFC-141b based formulations, which it has selected for its CFC-11 phase-out.

5. The capital cost relates to the cost of one high pressure foam dispenser, trials, technology transfer and training. The project will incur operational costs.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

1. The three project proposals (Artwright, Sze Chuan and T.M. Cooling) were among two groups of six project proposals dealing with small ODS-consuming enterprises in the rigid and integral skin polyurethane foam sub-sectors in Malaysia, submitted by UNDP to the Seventeenth Meeting. Most of the projects did not meet the cost-effectiveness criteria and were therefore not considered for approval.

2. UNDP and the government have subsequently reconsidered the above three projects and revised the requests for funding from the Multilateral Fund, bringing them within the relevant cost-effectiveness thresholds.

RECOMMENDATIONS

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

Project	Project Cost US $	Support Cost US $	Implementing Agency
Integral Skin Foam			
(a) Elimination of CFCs in the manufacture of integral skin polyurethane foam at Artwright Technology Sdn. Bhd.	100,000	13,000	UNDP
(b) Elimination of CFCs in the manufacture of integral skin polyurethane foam at Sze Chuan Sdn. Bhd	96,000	12,480	UNDP
Rigid Foam			
(c) Elimination of CFCs in the manufacture of rigid polyurethane foam at T.M. Cooling Sdn. Bhd	78,000	10,140	UNDP

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

PROJECT EVALUATION SHEET
MALAYSIA

SECTOR: HALON ODS use in sector (1993): 1,600 ODP tonnes

Sub-sector cost-effectiveness thresholds: US $1.48/kg

Project Title: Conversion of Production of Portable fire extinguishers at EVERSAFE*

Project Data	EVERSAFE
ODS phase-out (ODP tonnes)	574
Proposed project duration (Yrs)	1
Incremental capital cost (US$)	463,782
Contingency (%)	10
Incremental operational cost (US$)	-60,784
Total project cost (US$)	402,998
Local ownership (%)	100
Export component (%)	0
Amount requested (US$) Original	402,998
Revised	402,998
Cost effectiveness (US$/kg)	.69
National Coordinating Agency	Department of Environment
Implementing Agency	UNDP
Technical review completed?	Yes

Secretariat's Recommendations	
Amount recommended (US $)	179,586
Project impact (ODP tonnes)	574
Cost effectiveness (US $/kg)	0.31
Implementing Agency support cost (US$)	23,346
Total cost to Multilateral Fund	202,932

* New proposal to 18th Meeting.

PROJECT DESCRIPTION

1. The purpose of the project is to eliminate the consumption of 574 ODP tonnes of halon including 148 metric tonnes halon 1211 (1993) and 13.5 metric tonnes halon 1301 used for production of new portable fire extinguishers in Malaysia. The project will cover the cost of a new filling equipment for ABC powder (85 per cent) and CO2 (15 per cent) extinguishers.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

1. The Secretariat received confirmation from UNDP that this project represents a sub-sectoral phase-out of halon fire extinguisher manufacturers in Malaysia. The Fire Service of Malaysia played has enforced the ban on new halon uses since 1991. The Ministry of Environment issued a directive controlling the import of halons in 1994.

2. The original request included the provision of a recovery unit for halon 1211 in order to use recovered halons for refilling of existing fire extinguishers. However, Malaysia received a grant from the Multilateral Fund in 1992 to establish a halon banking through recovery and recycling machines.

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
Conversion of Production of Portable fire extinguishers at EVERSAFE	179,586	23,346	UNDP

2. To note that this project represents the phase out of the halon fire extinguisher sub-sector in Malaysia.

PROJECT EVALUATION SHEET
MALAYSIA

SECTOR: REFRIGERATION ODS use in sector (1994): 1,500 ODP tonnes

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

Project Title: Elimination of CFC-11 and CFC-12 in the Manufacture of Domestic Refrigerators at Sanyo Industries Berhard

Project Data	**Domestic Refrigeration**
	Sanyo Industries Berhard
ODS phase-out (ODP tonnes)	13.38
Proposed project duration (Yrs)	1
Incremental capital cost (US$)	269,500
Contingency (%)	10
Incremental operational cost (US$)	0
Total project cost (US$)	269,500
Local ownership (%)	68
Export component (%)	0
Amount requested (US$) {Original	376,859
{Revised	183,260
Cost effectiveness (US$/kg)	13.69
National Coordinating Agency	Ministry of Environment
Implementing Agency	UNDP
Technical review completed?	Yes

Secretariat's Recommendations	
Amount recommended (US $)	183,260
Project impact (ODP tonnes)	13.38
Cost effectiveness (US $/kg)	13.69
Implementing Agency support cost (US$)	23,824
Total cost to Multilateral Fund	207,084

PROJECT DESCRIPTION

Elimination of CFC-11 and CFC-12 in the Manufacture of Domestic Refrigerators at Sanyo Industries Berhard

1. CFC consumption in the refrigeration and air-conditioning sector in Malaysia is estimated at 1,500 ODP tonnes. The Executive Committee approved five projects in domestic and commercial refrigeration sector to phase out 268 ODP tonnes.

2. The project covers phase out of 13.38 ODP tonnes by converting to HFC-134a as a refrigerant and HCFC-141b as a blowing agent.

3. The conversion will involve replacing the existing refrigeration system with charging board, vacuum pumps and leak detectors suitable for HFC-134a as well as prototype testing.

4. The available high pressure machine will be retrofitted to accommodate new requirements in foaming operations.

5. Costs for training and technology transfer are included.

6. HCFC-141b is recognized by Sanyo Industries (Malaysia) as a CFC-11 replacement primarily due to the following reasons:

- proven technology in both processing and product performance
- available in the Malaysian market
- a technology that can be implemented safely and cost effectively within the existing factory configurations
- a technology which their Japanese parent and technology partner, Sanyo Corporation, has selected

7. The provision of high pressure foam dispensing equipment will facilitate the subsequent step to final zero-ODP insulating foam system and Sanyo Industries (Malaysia) accepts that any additional capital costs associated with such a change is for their own account. The estimated cost of subsequent conversion will be in the range of US $500,000 - 600,000.

8. The enterprise will not request the incremental operating costs.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

1. The chosen technologies are proven. The choice of interim HCFC technology in foaming operations is justified.

2. The project was first submitted for consideration at the 17th Meeting of the Executive Committee. However, due to a number of issues raised by the Secretariat, this project was deferred and included in Annex I to UNEP/OzL.Pro/ExCom/17/3/Rev.1.

3. The implementing agency and the government reviewed the project and addressed the issues involved. The Secretariat discussed with UNDP the eligibility and incrementality of all cost items. The project budget has 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
Elimination of CFC-11 and CFC-12 in the Manufacture of Domestic Refrigerators at Sanyo Industries Berhard	183,260	23,824	UNDP

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

PROJECT EVALUATION SHEET
MALAYSIA

SECTOR: **REFRIGERATION** ODS use in sector (1994): 1,200 ODP tonnes
Sub-sector: **MAC** (New equipment and servicing)

Project Title:

Phase out of CFC-12 mobile air conditioner system (MAC) manufacturing equipment and conversion to HFC-134a MAC manufacturing equipment at UCM Industrial Corporation Berhad (UCM)*****

Project Data	**UCM Industrial Corporation Berhad**
ODS phase-out (ODP tonnes)	41.4 indirect
Proposed project duration (Yrs)	4
Incremental capital cost (US $)	1,460,470
Contingency (%)	15
Incremental operational cost (US $)	2,500,273 (not being requested)
Total project cost (US $)	3,960,743
Local ownership (%)	100
Export component (%)	15% to Australia, Singapore and USA
Amount requested (US $) {Original	1,643,400
{Revised	1,643,400
Cost effectiveness (US $/kg)	N/A
National Coordinating Agency	Malaysian Department of the Environment (DOE)
Implementing Agency	World Bank
Technical review completed?	Yes

Secretariat's Recommendations	
Amount recommended (US $)	1,468,797
Project impact (ODP tonnes)	41.4 (indirect)
Cost effectiveness (US $/kg)	N/A
Implementing Agency support cost (US$)	190,944
Total cost to Multilateral Fund (US$)	1,659,741

* New proposal to the 18th Meeting

PROJECT DESCRIPTION

1. UCM is the largest producer of serpentine evaporator coils, condensers and pipes assemblies in Malaysia with a local replacement market share of about 50 per cent. In 1994, UCM manufactured 155,000 evaporators and 46,000 condensers in its single production line. For 1995, the company is expected to produce about 240,000 evaporator coils and 72,000 condensers.

2. Of the total 1994 production, 15 per cent was exported to non-Article 5 countries, namely Australia, Singapore and the United States.

3. The project is proposing to convert the existing CFC-12 production line to HFC-134a refrigerant, by making changes to the following equipment and/or manufacturing process: condenser assembly section; piping section; hose caulking section; condenser brazing section; leak testing; and final assembly section.

4. The current CFC-12 condenser, which is based on a serpentine design, will be converted to a parallel flow design. The parallel flow design will allow UCM to maintain similar cooling capacity as compared to the serpentine design. The evaporator component will not require any major modification, and as such UCM will not be requesting Multilateral Fund financing for this component.

5. Conversion to parallel flow design will require manufacturing equipment including a fin forming machine, a core builder machine, a milling machine, a non-corrosive flux brazing (Nocolok process) and stainless steel jigs and fixtures, at an estimated cost of US $1,203,000.

6. The proposed Nocolok brazing process from the existing vacuum brazing process will entail a major change in brazing technology. Recognizing the cost of the process (US $1.1 million) and since future production of condensers will not likely reach the installed brazing capacity, 50 per cent of the cost of the process will be borne by UCM.

7. The conversion to the new parallel flow condenser will also require modifications to pipe connectors, a new four-layered type of low leakage hose and a small portable helium leak testing kit. The incremental cost of equipment required is estimated at US $143,400.

8. In 1992, UCM signed a contract for a period of five years with North Engineering Ltd., (Japan), which includes a provision for the production of HFC-134a condensers. While the total cost of the contract is US $178,600, UCM is requesting only US $50,000 to cover the cost associated with the development of HFC-134a condensers.

9. The incremental operational cost (NPV) for four years is US $2,500,273. However, this cost is not requested by UCM.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

1. The Secretariat discussed with the World Bank the eligibility of financing 50 per cent of Nocolok process cost taking into account the production ratio between evaporators and condensers (about 3:1). The Bank indicated that the existing brazing capacity of evaporators is 140 units per hour and 90 units per hour for condensers, a ratio of approximately 3:2. Thus, the eligible incremental cost of the Nocolok process has been adjusted to US $440,000. The total project cost has been revised accordingly.

RECOMMENDATION

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
Phase out of CFC-12 mobile air conditioner system (MAC) manufacturing equipment and conversion to HFC-134a MAC manufacturing equipment at UCM Industrial Corporation Berhad (UCM)	1,468,797	190,944	World Bank

PROJECT EVALUATION SHEET
MALAYSIA

SECTOR: **SOLVENT** ODS use in sector (1993) 662 ODP tonnes

Sub-sector cost-effectiveness thresholds:		
	CFC-113	US $19.73/kg
	1,1,1 TCA (methyl chloroform)	US $/38.5kg
	Mixed	N/A

Project Titles:

(a) Conversion of metal cleaning processes from 1,1,1,-trichloroethane to hydrocarbons at AE Technology Sdn.Bhd.
(b) Conversion of correction fluid manufacturing process from 1,1,1,-trichloroethane to non-ODS solvent at Mondial Sdn.Bhd
(c) Conversion of correction fluid manufacturing process from 1,1,1,-trichloroethane to non-ODS solvent at Widetech (Malaysia) Sdn.Bhd

Project Data	**1,1,1 TCA**		
	AE Technology	**Mondial**	**Widetech (Malaysia)**
ODS phase-out (ODP tonnes)	16.8	85	29
Proposed Project Duration (Yrs)	1	1	1
Incremental capital cost (US $)	230,000	889,737	480,525
Contingency (%)	15	15	15
Incremental operational cost (US $)	(64,982)	4,177,883	674,547
Total project cost (US $)	165,018	5,076,620	1,155,072
Local Ownership (%)	30	30	92.12
Export component (%)	-	67.78	29.7
Amount requested (US $) {Original	58,600	326,900	607,720
{Revised	58,600	326,900	607,720
Cost Effectiveness (US $/kg)	3.39	3.84	20.35
National Coordinating Agency	DOE	DOE	DOE
Implementing Agency	World Bank	World Bank	World Bank
Technical Review Completed?	Yes	Yes	Yes

Secretariat's Recommendations

Amount recommended (US $)	56,893	144,447	398,418
Project Impact (ODP tonnes)	16.8	85	20
Cost effectiveness (US $/kg)	3.39	1.70	13.74
Impl. Agency Support Cost (US $)	7,396	18,778	51,794
Total Cost to Multilateral Fund (US $)	64,289	163,225	450,212

PROJECT DESCRIPTION

(a) Conversion of metal cleaning processes from 1,1,1,-trichloroethane to hydrocarbons at AE Technology Sdn.Bhd.

1. This project will eliminate 16.8 tonnes of 1,1,1-trichloroethane currently being used in the metal cleaning process at AE Technology Sdn. Bhd. by converting to hydrocarbon based solvent. The project will provide AE Technology Sdn. Bhd. with two solvent degreaser units designed to operate with hydrocarbon solvents. As the choice of replacement solvent is combustible, AE Technology will undertake various safety modifications at its plant.

(b) Conversion of correction fluid manufacturing process from 1,1,1,-trichloroethane to non-ODS solvent at Mondial Sdn.Bhd

(c) Conversion of correction fluid manufacturing process from 1,1,1,-trichloroethane to non-ODS solvent at Widetech (Malaysia) Sdn.Bhd

2. This project will enable Mondial and Widetech to phase out consumption of approximately 85 and 29 ODP tonnes respectively of 1,1,1 TCA used as a solvent in the production of correction fluids. The enterprises will convert to hydrocarbon-based formulations that are zero-ODP but highly flammable. Because of the flammability of the new formulation, explosion proofing of new equipment is required. In addition, some new product processing and storing equipment is needed. Mondial is converting a production capacity of 14 million bottles per year and Widetech 11 million.

3. Because of the physical characteristics of the new solvent, steel mixing balls need to be added to the correction fluid to enable the maintenance of an acceptable quality of product. These balls form the main component of the operating costs. In each case, the enterprises have only sought incremental operating costs for one year.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

1. Proposed capital costs for each project include substantial amounts for building extensions and modifications. The Fund Secretariat considers that safety items such as non-halon fixed fire protection systems, anti-static floor treatment and explosion proof electrical installations are eligible as incremental costs but, consistent with previous practice, major factory extensions to house the new facilities are not eligible.

2. The correction fluid is produced and marketed as a "functional unit" consisting of one bottle of correction fluid and one bottle of thinners. Both the correction fluid and thinners are being converted to the same non-ODS solvent. Steel mixing balls are only required for the bottle of correction fluid, not the thinners. In each project as presented, the incremental operating costs include the cost of steel mixing balls in all bottles which is double the number needed. As the projects are dealing with 14 million and 11 million bottles respectively, this has a significant effect on total eligible incremental costs.

3. The eligible level of grant has been re-calculated on the basis of the view of the Fund Secretariat on the above issues. The amended figures are shown in the recommendations below:

RECOMMENDATIONS

1. The Fund Secretariat recommends approval of the projects with associated support costs 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 to hydrocarbons at AE Technology Sdn.Bhd.	56,893	7,396	World Bank
(b) Conversion of correction fluid manufacturing process from 1,1,1,-trichloroethane to non-ODS solvent at Mondial Sdn.Bhd	144,447	18,778	World Bank
(c) Conversion of correction fluid manufacturing process from 1,1,1,-trichloroethane to non-ODS solvent at Widetech (Malaysia) Sdn.Bhd	398,418	51,794	World Bank

2. The Fund Secretariat further recommends that projects (a) (b) and (c) be included in the Consolidated List.