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PROJECT PROPOSALS: MALAYSIA

This document replaces UNEP/OzL.Pro/ExCom/17/39/Add.1.

PROJECT EVALUATION SHEET

COUNTRY OR REGION: Malaysia

PROJECT TITLE: a) Conversion to hydrocarbon technology in the manufacture of aerosol products at Maya Chemical Industries, Sdn. Bhd.
b) Alloychem Malaysia Sdn. Bhd., aerosol conversion project

BUDGET: a) US \$56,613
b) US \$122,455

INCREMENTAL COSTS: a) US \$56,613¹
b) US \$122,455

ODS PHASE-OUT: a) 13 MT
b) 29 MT

COST EFFECTIVENESS²: a) US \$4.35. per kg. ODP saved
b) US \$4.22. per kg. ODP saved

PROJECT DURATION:

IMPLEMENTING AGENCY: UNDP

NATIONAL COORDINATING AGENCY: Department of Environment

TECHNICAL REVIEW COMPLETED: YES X NO

SECRETARIAT'S COMMENTS

1. In 1994, Maya filling plant replaced about 90 per cent of its CFC consumption with hydrocarbon. The project proposal will replace the use of remaining CFC with hydrocarbon aerosol propellant (HAP) used for manufacturing insecticides. The project will result in the elimination of 13 tonnes of CFC.
2. The project includes replacement of existing Coaster filling machine with a semi-automatic filling machine and safety equipment.

¹ Including contingency (5 per cent).

² Determined as the ratio of incremental costs to the estimated annual saving of ODP (\$/ODPkg).
For CFC-11, ODS=ODP.

3. The existing CFC-filling equipment will be destroyed or dismantled upon project completion.
4. The plant will finance civil work and other equipment to enhance safety operations in the plant.
5. Contingency costs were calculated at 5 per cent instead of the usual 10 per cent. The use of 10 per cent contingency cost would have resulted in a cost effectiveness value of US \$4.58/kg, above the threshold value (US \$4.4/kg).
6. The Alloychem Malaysia aerosol conversion project will replace CFC with HAP used in manufacturing electronic contact cleaners and video head cleaners.
7. The project includes replacement of two existing filling machines with a semi-automatic filling machine, a water bath for testing, an additional molecular sieve purification column, safety equipment and plant training.
8. UNDP has calculated the net operating savings on the basis of the difference in costs per can when filling with CFC or HAPs. Operating savings were estimated at US \$18,805 for Maya Chemical and US \$22,931 for Alloychem, for a four-year period.
9. The adjusted cost-effectiveness values are US \$2.91/kg ODP for Maya Chemical, and US \$3.43/kg ODP for Alloychem.

SECRETARIAT'S RECOMMENDATION

10. The Secretariat recommends final approval of these projects as follows:

Maya Chemical: US \$37,808 and US \$4,915 as support costs to UNDP; and
Alloychem: US \$99,500 and US \$12,935 as support costs to UNDP.

PROJECT EVALUATION SHEET

COUNTRY OR REGION:	Malaysia
PROJECT TITLE:	a) Elimination of CFCs in the manufacture of cold cured PUF molded products at Urethane Technologies Sdn.Bhd. b) Elimination of CFCs in the manufacture of cold cured/Integral skin PUF molded products at Muda Murni Sdn.Bhd. c) Elimination of ODS in the process of EPE/EPS foam sheet at Star Foam Paper Products Sdn.Bhd.
BUDGET:	a) Capital Costs: US \$204,000 ³ Operating Costs: US \$0 b) Capital Costs: US \$302,000 Operating Costs: US \$0 c) Capital Costs: US \$578,000 Operating Savings: US \$115,800
INCREMENTAL COSTS:	a) US \$204,000 b) US \$302,000 c) US \$350,400
ODS PHASE-OUT:	a) 35 MT b) 21 MT c) 66 MT
COST EFFECTIVENESS:	a) US \$5.83/kg./yr. b) US \$14.38/kg./yr. c) US \$5.15/kg./yr.
PROJECT DURATION:	a) One year. b) One year. c) One year.
IMPLEMENTING AGENCY:	a) UNDP b) UNDP c) World Bank
NATIONAL COORDINATING AGENCY:	Department of Environment
TECHNICAL REVIEW COMPLETED:	YES X NO

³ Including 10% contingency.

SECRETARIAT'S COMMENTS

1. The project evaluation sheet covers three foam projects; two in the cold cured molded and integral skin foam sub-sector (Urethane Technologies and Muda Murni), and one in the production of extruded polystyrene and polyethylene foams (Star Foam). The three enterprises export some of their products. However, this export is to an Article 5 country and does not exceed 30 per cent of output in each case.
2. In the production of cold cured molded foams, the enterprises will switch to all water blown technology, while HCFC-141b will be used to substitute for CFC-11 in the production of integral skin foams. The capital costs of conversion relate to the cost of replacement of low pressure foaming machines with high pressure machines, provision of mold ovens, trials and start up and technology transfer. The two companies are not requesting incremental operating costs. However, the Secretariat's calculation shows that, were the companies to request these costs, their project costs would still meet the cost-effectiveness threshold. Following discussions with the implementing agency, some of the costs were adjusted.
3. In the production of extruded polystyrene and polyethylene foam, the company (Star Foam) will shift to the use of CO₂ as primary blowing agent. Initially, CO₂/butane blend will be used as blowing agent in a ratio of 85:15 for extruded polystyrene foam and 50:50 for the extruded polyethylene foam. The capital cost of the project relates to acquisition of new CO₂ pump, new CO₂ high pressure metering system, CO₂ storage structure, ventilation and other fire protection and safety measures for use of butane.
4. It appears from the project document that the use of this technology for production of polyethylene foam is not yet matured and the company intends to carry out development testing and is therefore requesting funding for pilot CO₂ pump for testing. The Secretariat expressed concern about this aspect of the project since there are matured, cost-effective technologies, such as the use of 100 per cent butane as substitute for CFC-12 which is being used in projects approved for Malaysia and other countries. Consequently, the cost of a pilot scale CO₂ pump was considered ineligible for funding. The company, however, agreed to pay for that equipment.
5. The Secretariat also expressed concern about the fact that the butane supplement will be used only for a transition period (four to six years) although the full complement of fire and safety infrastructure has to be provided. Following discussions with the implementing agency, it was agreed that 50 per cent of the cost of the butane component will be eligible for funding. This takes account of the estimated economic life time of 10 years and the residual value of the fire and safety infrastructure.
6. Consequently, the summary of agreed project costs for Star Foam is as follows:

	US \$	US \$
Capital costs		
Butane technology including safety	138,000	
Eligible component		69,000
Carbon dioxide technology	<u>440,000</u>	
Eligible component		404,000
Total capital costs	578,000	
Total eligible capital costs		473,000
Total eligible incremental savings		<u>- 115,000</u>
Incremental project cost		358,000
80% local ownership		<u>- 71,600</u>
Total project cost		286,400
Financial agent's fee (3%)		<u>8,600</u>
Total Grant		295,000
Cost effectiveness :	US \$5.43/kg./yr.	

SECRETARIAT'S RECOMMENDATION

7. The Secretariat recommends approval of the three projects with the following levels of funding:

<u>UNDP</u>	<u>Project Grant</u>	
Urethane Technologies:	US \$199,000	US \$25,870
Muda Murni:	US \$236,500	US \$30,745
<u>World Bank</u>		
Star Foam:	US \$295,000	

PROJECT EVALUATION SHEET

COUNTRY OR REGION:	Malaysia
PROJECT TITLE:	Umbrella project for elimination of CFCs 11 and 12 in the Manufacture of commercial refrigeration equipment at four small enterprises
BUDGET:	Capital Costs: US \$694,500 ⁴ Operational Costs: not requested
INCREMENTAL COSTS:	US \$694,500
ODS PHASE-OUT:	44.8 MT
COST EFFECTIVENESS ⁵ :	US \$15.5 per kg. ODP saved
PROJECT DURATION:	1.5 years
IMPLEMENTING AGENCY:	UNDP
NATIONAL COORDINATING AGENCY:	Department of Environment
TECHNICAL REVIEW COMPLETED:	YES X NO

SECRETARIAT'S COMMENTS

1. The project covers the conversion of both the refrigeration and foaming systems in four small commercial refrigeration enterprises (Lim Yew Ref, Exquisite, FMC, Noblelane) to HFC-134a and HCFC-141b respectively. The amount of CFC to be phased out by this project is 44.8 metric tonnes per year.

2. Conversion to HCFC-141b will require high pressure foam machines and test runs. HCFC-141b is a transitional chemical. Conversion to HCFC-141b was selected due to the physical constraints in the existing plant's layout. The provision of replacement high pressure foaming machines will facilitate conversion to zero-ODP technology at some future date.

⁴ Including a 10 per cent contingency fee.

⁵ Determined as the ratio of incremental costs, excluding safety-related costs, to the estimated annual savings of ODP (\$/ODP kg.). For CFC-11 and CFC-12, ODS=ODP.

3. The refrigeration system conversion to HFC-134a will require re-design of the system, prototyping, optimization and pilot scale manufacturing and testing.
4. Incremental operating costs include are not claimed by the enterprises.
5. The Secretariat reviewed the project proposal to assess the eligibility and costs of requested equipment and other project components in the light of similar projects approved by the Executive Committee. The Secretariat discussed with UNDP the incrementality of cost components and their amount. One cost item was recognized as not eligible for funding in all the projects and was deducted from the budget.
6. The cost effectiveness of the umbrella project is below the threshold established by the Executive Committee for commercial refrigeration sub-sector.

SECRETARIAT'S RECOMMENDATION

7. The Fund Secretariat recommends approval of the umbrella project and the approval of US \$680,000 in incremental costs as itemized in the following table, and recommends approval of US \$88,400 in support costs for UNDP.

Company	CFC Consumption MT/Year	Recommended approval US\$	Cost effectiveness US\$/kg. ODP
EXQUISITE	14.4	174,500	12.11
FMC	6	175,000	29.16
LIM YEW REF.	15	204,000	13.6
NOBLELANE	9.4	126,500	13.45
TOTAL	44.8	680,000	15.17

PROJECT EVALUATION SHEET

COUNTRY OR REGION:	Malaysia
PROJECT TITLE:	Reduction of the consumption of ozone depleting substances in the commercial air-conditioning sector via training, recovery and recycling of CFC-11 and CFC-12 in chillers (MASHRAE)
BUDGET:	Capital cost: US \$637,800
	Operating costs: US \$197,800
INCREMENTAL COSTS:	US \$835,600 ⁶
ODS PHASE-OUT:	105 MT
COST EFFECTIVENESS ⁷	US 9.15 per kg. ODP saved
PROJECT DURATION:	1 year
IMPLEMENTING AGENCY:	World Bank
NATIONAL COORDINATING AGENCY:	Department of the Environment
TECHNICAL REVIEW COMPLETED:	YES X NO

SECRETARIAT'S COMMENTS

1. The project proposal is to reduce CFC emissions from chillers during their operation, and maintenance and servicing operations.
2. The project will result in a phase out of 105 tonnes of CFCs. It will be implemented through the Malaysian Chapter of the American Society of Heating, Refrigerating and Air-conditioning Engineers (Mashrae).
3. The project includes training air-conditioning technicians in better operation and maintenance procedures, better changing and vacuuming processes and the elimination of ODS venting during repairs.

⁶ Including contingency (15 per cent) and 3 per cent financial agent fee

⁷ Determined as the ratio of incremental costs to the estimated annual saving of ODP (\$ODP kg). For CFC-11, ODS=ODP.

4. The project includes a national training programme for service technicians, and subsequent local training activities. The total cost for training is US \$83,000, including US \$60,000 for the national training programme to be implemented by UNEP. Training manuals, teaching aids and technical assistance services will be provided by UNEP. Mashrae will be responsible for the local training activities. Taking into account the availability of training manuals and procedures prepared by UNEP, the Secretariat recommends the total cost of the training programme to be adjusted to US \$60,000.
5. The project also includes establishment of a recovery network via the leasing of 30 CFC recovery and recharge machines, to service operators. In order to establish the network, chiller owners will be registered with Mashrae, which will maintain network records. A schedule will be instituted for sharing the use of the machines among the various chiller owners. The leasing costs have not been considered in the calculation of operating costs/savings.
6. Operating costs under the project amounts to US \$197,800 (net present value for a four-year period), which accounts for the salary of two staff (plus overhead costs) associated with equipment management and maintenance. The Secretariat considers that project implementation at the national level should be managed and monitored by the Ozone Unit supported by the Fund.
7. The project indicates that no operating savings as a result of the 70 tonnes of CFC to be recovered will be realized by Mashrae, since the involvement of the company in the project is strictly limited to managing the recycling network. The recycled CFC will be reused by the owners or operators of chillers that are serviced. The World Bank also considers that service shops had to have some positive return from their recycling efforts. It is to be noted, however, that the Bank's technical reviewer indicated that the amount that can be recovered represents a value of US \$150,000- US \$200,000.

SECRETARIAT'S RECOMMENDATION

8. The Executive Committee may wish to consider whether operational savings based on estimates of the tonnage of CFCs recovered, should be taken into account in the presentation of recycling project proposals, and that the monitoring of quantities recovered should be carried out by national ozone units and should not be included in the costs for recycling projects.

PROJECT EVALUATION SHEET

COUNTRY OR REGION:	Malaysia
PROJECT TITLE:	Phase out of CFC-12 MAC manufacturing equipment and conversion to HFC-134a MAC system manufacturing equipment at: a) APM-Air Conditioners Sdn. Bhd (Apmac) b) Nippondenso Capital Sdn. Bhd.
BUDGET:	a) Capital Costs: US \$1,071,072 Operating Costs: US \$2,026,469 b) Capital Costs: US \$2,885,548 Operating Costs: US \$2,462,761
INCREMENTAL COSTS:	a) US \$1,268,700 ⁸ b) US \$2,495,000
ODS PHASE-OUT:	a) 3.5 ODP tonnes b) 120 ODP tonnes indirectly
COST EFFECTIVENESS ⁹ :	N/A
PROJECT DURATION:	4 years
IMPLEMENTING AGENCY:	World Bank
NATIONAL COORDINATING AGENCY:	Department of the Environment
TECHNICAL REVIEW COMPLETED:	YES x NO

SECRETARIAT'S COMMENTS

1. The project proposals are for the conversion of two CFC-12 based MAC manufacturing plants to HFC-134a refrigerant.

⁸ Including contingency (15 per cent) and Financial Agent Fee (3 per cent)

⁹ Determined as the ratio of incremental costs to the estimated annual saving of ODP (\$/ODPkg).
For CFC-11, ODS=ODP.

2. In December 1994, Apmac invested in new equipment to manufacture parallel flow condensers for HFC-134a MAC systems. Production of new systems started in June 1995. Apmac is requesting retroactive funding for some of the equipment already ordered.
3. Apmac has an existing technical assistance agreement to acquire the CFC-12 serpentine technology with Zexel Corporation, Japan. Another technology transfer agreement for the design and process support of the parallel flow condenser has been signed with Dynamics, Germany, for which US \$50,000 is being requested.
4. A brazing process (Nocolok) is being requested with a capacity of 12,000 units per month, compared to the present brazing capacity of 6,000 units. Taking into consideration the increase in capacity and that evaporators account for half of the brazing process, Apmac is only requesting funding for 25 per cent of the cost of this process.
5. Net incremental operating costs are not being requested.
6. The Nippondenso proposal is for retroactive funding. Conversion to HFC-134a compressor and parallel flow condenser lines started at the end of 1992 and was completed by the end of 1994. In addition, funding is being requested to convert the receiver/drier, piping lines and hose lines.
7. The proposal indicates that parallel production for CFC-12 and HFC-134a compressors will continue over the four year life of the project, due to CFC-12 MAC warranties and existing market claims, which will represent 10 per cent of Nippondenso's compressor production lines.
8. The receiver/drier will be redesigned for compatibility with the size and technical requirements of the new HFC-134a MAC system. The Secretariat's consultant considers these modifications are due to design changes.
9. The proposal also includes modification of the joint valves from flare fittings to O-ring type. Due to leakage problems, the MAC industry in Japan and the United States has not used flare fittings for many years. Thus, the request for changing from flare to O-ring fittings can be considered as an old-technology upgrade.
10. Following the recommendations of the OORG MAC Working Group, Nippondenso is seeking a one-time reimbursement for incremental royalty fees. Royalty fees will be compensated, for a two-year period, only to the degree to which they exceed, on a per unit basis, those which may previously have been levied against CFC-12 MAC production. According to the terms of Nippondenso's agreement, the per unit royalty costs are fixed at 2.5 per cent of the selling price. Based on a monthly production of 6,000 complete units, incremental royalty costs amount to US \$80,640.
11. Net incremental operating costs are not being requested.

12. The World Bank has responded to the questions raised by the Fund Secretariat. The contingency costs have been adjusted to reflect only the equipment that has not yet been procured.

SECRETARIAT'S RECOMMENDATION

13. The Secretariat recommends to approve the two project proposals as follows:

Nippondenso: US \$2,299,700, of which US \$ 1,264,704 is for retroactive funding

Apmac: US \$1,217,000, of which US \$ 558,810 is for retroactive funding.

PROJECT EVALUATION SHEET

COUNTRY OR REGION: Malaysia

PROJECT TITLES: Conversion of Metal Cleaning Process
from 1,1,1-Trichloroethane (TCA) to
Hydrocarbons at:

(a) Ban Seng Lee Industries Sdn. Bhd.
(BSLI)
(b) Eng Teknologi Sdn. Bhd. (Eng Tek)

BUDGETS: (a) US \$133,200
(b) US \$133,200

INCREMENTAL COSTS: (a). US \$133,200
(b). US \$133,200¹⁰

ODS PHASE-OUT: (a). 33.6MT
(b). 33.6MT

COST EFFECTIVENESS¹¹: (a). US \$38.5 per kg. ODP saved
(b). US \$38.5 per kg. ODP saved

PROJECT DURATIONS: 1 year for each

IMPLEMENTING AGENCY: World Bank

NATIONAL COORDINATING AGENCY: Malaysian Department of the
Environment (DOE)

TECHNICAL REVIEWS COMPLETED: YES X NO

SECRETARIAT'S COMMENTS

1. The two enterprises each propose to replace existing metal cleaning facilities which use 1,1,1-trichloroethane (TCA) with new facilities using hydrocarbon solvent.

¹⁰ Including contingency (12 per cent) and Financial Agent Fee (3 per cent)

¹¹ Determined as the ratio of incremental costs to the estimated annual saving of ODP (\$/ODPkg).
For TCA, ODP=0.1

2. There are arithmetic errors in the calculation of grant proposals on the project cover sheets. Using the investment and operating cost figures in each proposal and applying the 12% contingency and 3% financial intermediary fee claimed in each case, the correct grant proposals as presented by the implementing agency, and the corresponding cost effectiveness figures, are:

BLSI:	US \$131,500	cost effectiveness US \$37.98/ODP kg
Eng Tek:	US \$132,400	cost effectiveness US \$38.26/ODP kg

3. The cost effectiveness threshold for the sub-sector is US \$38.5/ODP kg.

4. Project documentation is comprehensive, but little detail is provided on the cost of the proposed new degreasers. For example, the BSLI proposal has only one unit and the Eng Tek proposal two, for around the same cost. The implementing agency has provided explanation for the differences in capabilities and thus costs, although there is still little to substantiate the level of cost for individual major equipment items.

5. Each proposal contains costs for a refractometer (at US \$10,000) to measure the level of contaminants in the new solvent. Cleanliness of the solvent needs to be established in the existing TCA process as well as for the new cleaning process. The implementing agency has indicated that for BSLI the refractometer is an enhancement of current capability. The Fund Secretariat considers that BSLI capital costs should be reduced by \$10,000 for this item which is not eligible. The implementing agency agreed to this cost reduction.

6. It is important to establish accurate estimates of utility prices in various regions to provide a sound information base for project review. The implementing agency has advised of an error in electricity prices quoted in the operational cost calculations for BSLI. The correct value is 7c/kwh as opposed to 12.6c/kwh: this gives a minor reduction in operating savings. Electricity usage increases not originally included in Eng Tek operating costs proposal also give a minor reduction in operating savings.

7. The option of retrofitting was considered briefly in the Eng Tek proposal, but not taken up. Reasons included that retrofitting is cumbersome and may not be visually appealing to customers. Costs for the provision of 'visually appealing' equipment are not eligible. The implementing agency has indicated that retrofit cost savings are around \$10,000 for each enterprise but that production schedules do not permit one to two weeks shut down for retrofit. The Secretariat considers that funding should be based on the retrofit option, which is technically feasible, and that the capital costs should be reduced by \$10,000 at each enterprise. The implementing agency agreed to this cost reduction.

SECRETARIAT'S RECOMMENDATION

8. The Fund Secretariat recommends final approval of each project at the costs indicated below which take account of capital cost reductions of US \$20,000 at BSLI and US \$10,000 at Eng Tek:

BSLI	US \$108,400 (Cost-effectiveness US \$ 31.29/ODP kg.)
Eng Tek	US \$120,900 (Cost-effectiveness US \$ 34.90/ODP kg.)