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EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Twenty-third Meeting
Montreal, 12-14 November 1997

## PROJECT PROPOSALS: INDONESIA

This documents includes the comments and recommendations of the Fund Secretariat on the following project proposals:

Foam

| | |
|---|---|
| • Conversion to CFC-free technology in the manufacture of flexible cold cured molded PUF at Ciptaindah Jokindo | UNDP |
| • Conversion to CFC-free technology in the manufacture of flexible cold cured molded and integral skin PUF at PT Archigramma | UNDP |
| • Flexible molded PU foam. Technical assistance program for SMEs at Indonesian Foam Association (AFI) | World Bank |
| • Elimination of CFC-11 in the manufacture of flexible polyurethane foam (slabstock) at PT Sea Horse Maspion Indonesia | World Bank |
| • Elimination of CFC-11 in the manufacture of flexible polyurethane foam (slabstock) at PT. Irc Inoac Indonesia | World Bank |
| • Flexible boxfoam. Technical assistance program for SMEs at Indonesian Foam Association (AFI) | World Bank |
| • Elimination of CFC-12 in the manufacture of extruded polethylene foam sheet at PT. Tara Guna Foam | World Bank |
| • Conversion to CFC -free technology in the manufacture of rigid polyurethane foam (panels, blocks) at PT Aneka Cool Citratama | UNDP |

| | |
|---|---|
| • Conversion to CFC-free technology in the manufacture of rigid polyurethane foam (thermoware) at PT Dilihan Glory | UNDP |
| • Conversion to CFC-free technology in the manufacture of rigid polyurethane foam (spray foam) at PT Ferrarindo Multi Sarana | UNDP |
| • Conversion to CFC-free technology in the manufacture of rigid PUF spray insulation at Karya Cipta Semesta | UNDP |
| • Conversion to CFC-free techology in the manufacture of rigid PUF insulated thermoware at PT Langgeng Makmur Plastic Industry Ltd. | UNDP |
| • Conversion to CFC-free technology in the manufacture of rigid PUF insulated products at UD Samrow Foam | UNDP |

Refrigeration

| | |
|---|---|
| • Conversion to CFC-free technology in the manufacture of commercial refrigeration equipment at C.V. Kulkasindo | UNDP |
| • Conversion of CFC-12 commercial refrigeration to HFC-134a at PT Maspion | World Bank |
| • Conversion of CFC-12 commercial refrigeration to HFC-134a at PT Porkka Indonesia | World Bank |
| • Conversion of CFC-12 refrigerate to HFC-134a, and CFC-11 to HCFC-141b as the blowing agent for foam insulation in the manufacture of commercial refrigeration units at PT Wahana Derby Sejati | World Bank |

## PROJECT EVALUATION SHEET
## INDONESIA

SECTOR: FOAMS ODS use in sector (1992): 1,025 ODP tonnes
ODS use in sector (1996) 4,000 ODP tonnes

Sub-sector cost-effectiveness thresholds: Integral Skin US $16.86/kg

***Project Titles***:
(a) Ciptaindah Jokindo - Conversion to CFC-free technology in the manufacture of flexible cold cured molded PUF
(b) PT Archigramma - Conversion to CFC-free technology in the manufacture of flexible cold-cured molded and integral skin PUF
(c) FLEXIBLE MOLDED PU FOAM - Technical Assistance Program for SMEs

| **Project Data** | **Integral Skin** | | |
|---|---|---|---|
| | **Ciptaindah** | **PT Archigramma** | **TAP for SMEs** |
| ODS phase-out (ODP tonnes) | 9 | 17 | 370 |
| Proposed project duration (months) | 24 | 24 | 24 |
| Incremental capital cost (US $) | 143,000 | 226,000 | 2,185,500 |
| - including contingency (%) | 10 | 10 | 10 |
| Incremental operational cost (US $) | 7,000 | 20,000 | 1,609,500 |
| Total project cost (US $) | 150,000 | 246,000 | 4,013,550 |
| Local ownership (%) | 100 | 100 | |
| Export component (%) | | | |
| Amount requested (US $) {Original} | 150,000 | 246,000 | 4,013,550 |
| {Revised} | | | |
| Cost effectiveness (US $/kg) | 16.67 | 14.95 | 10.85 |
| National Coordinating Agency | Indonesian Ministry of Environment (LH) | | |
| Implementing Agency | UNDP | | World Bank |
| Technical review completed? | Yes | Yes | Yes |

| ***Secretariat's Recommendations:*** | | | |
|---|---|---|---|
| Amount recommended (US $) | Pending | Pending | Pending |
| Project impact (ODP tonnes) | | | |
| Cost effectiveness (US $/kg) | | | |
| Implementing Agency support cost (US $) | | | |
| Total cost to Multilateral Fund (US $) | | | |

## PROJECT DESCRIPTION

Foam Sector Profile

| | |
|---|---|
| Sector ODS consumption (1992) reported in country programme | 1025 tonnes ODP |
| Most recent consumption data (1996) | 4000 tonnes ODP |
| ODS to be phased out in approved projects (as at July 1997) | 1538 |
| ODS reported to have been phased out (as at July 1997) | 27 |
| ODS to be phased out in current proposed projects | 1702 |
| Latest (1995) CFC-11 consumption reported according to Art.7 | 151 |

### (a) Ciptaindah Jokindo - Conversion to CFC-free technology in the manufacture of flexible cold cured molded PUF

1. Ciptaindah Jokindo will phaseout the use of CFC-11 in the manufacture of flexible cold cured molded polyurethane foam for the furniture, automobiles and aircraft markets. The company currently has one LP Cannon dispenser (1994) with maximum output 60 lit/min and twelve fiberglass molds.

2. The manufacturing operations are to be converted to water blown systems. The capital costs include: the replacement of the low pressure machine by a high pressure foam dispenser (US $90,000); the replacement of the twelve fiberglass molds by metallic molds (US $15,000), and finally the introduction of a mold heating system (US $10,000). Trials, technology transfer and training amount to US $15,000. Contingency costs of US $13,000 are also included. Incremental operating costs of US $7,000 are expected based on the use of the following chemicals: 9,000 kg CFC-11, 31,500 kg; MDI; 42,500 kg.

3. Incremental operational cost of all the projects were calculated based on the following prices: CFC-11 - US $2.00/kg; MDI - US $ 2.00/kg, except in the technical assistance progamme where MDI price was quoted as US $3.00/kg.

### (b) PT Archigramma - Conversion to CFC-free technology in the manufacture of flexible cold-cured molded and integral skin PUF

1. The company PT Archigramma will convert from the use of CFC-11 in the manufacture of flexible cold cured and integral skin polyurethane foam for the furniture industry. PT Archigramma operates one low pressure machine, Elastogran (1977) with a capacity of 40 lit/min, and three high pressure foam dispensers: Krauss Maffei (1985); Elastogran (1990); Cannon (1991), with capacities of 40 lit/min; 150 lit/min ,and 40 lit/min, respectively. The company also uses sixty fiberglass molds.

2. PT Archigramma is substituting water blown formulations for CFC-11 as an auxiliary blowing agent. For integral skin polyurethane foams HCFC-141b systems will be used as an interim step. The capital cost of conversion involves: the replacement of the Elastogran low

pressure dispenser by a high pressure dispenser (US $90,000); the replacement of sixty fiberglass molds by aluminum molds (US $75,000), and finally the introduction of a mold heating system (US $10,000). The capital cost associated with trials, technology transfer and training is US $30,000, while the cost of contingency is US $21,000. Incremental operating costs of US $20,000 are expected on the basis of the use of the following chemicals:

for cold-cured molded PUF: 10,000 kg CFC-11, 35,000 kg MDI; 47,000 kg MDI

for integral skin PUF: 7,000 kg CFC-11, 24,500 kg MDI; 5,000 kg HCFC-141b and 26,000 MDI .

Justification for the use of HCFCs

3. If applicable, the enterprise has opted for converting to water-based systems, with HCFC-141b based systems as an interim step, until technologies for safe CFC-free alternatives become mature and commercially available, which can be expected in the next 2-3 years.

Equipment or Components to be Destroyed or Rendered Unusable

4. No information regarding the disposal of the replaced equipment is provided in the above projects.

**(c) FLEXIBLE MOLDED PU FOAM - Technical Assistance Program for SMEs**

1. This project will convert from the use of CFC-11 at twenty-six Indonesian enterprises that manufacture molded flexible polyurethane foam. The different companies use the following equipment:

low pressure dispenser (number of units): Putra Alam (1), Kumala Indah Tata (1), Bogorindo Cemeriang (1), Arjuna Maha Sentosa (1), Fuka Internasional (1), Xerama Bycicle Industrial (1), Belga Jaya Perkasa (1), Lion Metal Work (1), Rizala Wijaya (1), Nirwana (2), Tirta Multi Wahana (1), Pekky (1), Ocean Foam (1), UFO Sumber Mas (1), Asia Sentosa Mandiri (1), Dwisata Foam (2), Elita Permai Metal Works (1), Surya Adikencana (1);

high pressure dispenser (number of units): Samudra Plastik (2), Kumala Megah Tata (2), Dithelm Furniture Indonesia (2), Aldaco Citra (2).

Handmix: Power Foam (1), ACC MotorCycle Spare Parts (1), and Dunia Chemical Industries (1).

2. It is expected that no or few recipients will process hydrocarbon foam. In such case, MC/GLYCERINE will be applied as first choice. In cold-cured operations, water based technology will be applied, preferably while maintaining the current choice of isocyanate. The

capital cost of conversion involves the conversion of thirty-one dispensers (US $2,063,900). The capital cost associated with trials, technology transfer and training is US $121,600, while the cost of contingency is US $218,550. Incremental operating costs of US $1,609,500 are expected on the basis of the use of the following chemicals: 370 tonnes CFC-11; 555 tonnes MDI.

Impact of Project on 1999 Freeze

3. There is a large, fast growing service sector that will continue using CFCs as long as CFC containing equipment needs to be serviced. Only the phase-out of CFCs in new products will therefore contain this sector and provide the Government with the control needed to assure the 1999 freeze in Indonesia's usage of ODS.

## SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

### COMMENTS

1. Based on expert advice to the Secretariat the following cost items are still being discussed with the Implementing Agencies.

- change of molds following conversion
- provision of heating ovens
- replacement of low pressure with high pressure machines.

2. Agreed costs of the three projects will be communicated to the Sub-Committee on Project Review.

## PROJECT EVALUATION SHEET
## INDONESIA

SECTOR: FOAM ODS use in sector (1996): 4,000 ODP tonnes

Sub-sector cost-effectiveness thresholds: Flexible (slabstock) US $6.23/kg
EPE/EPS US $8.22/kg

***Project Titles***:
(a) SEA HORSE - Elimination of CFC-11 in the manufacture of flexible polyurethane foam (slabstock)
(b) INOAC - Elimination of CFC-11 in the manufacture of flexible polyurethane foam (slabstock)
(c) FLEXIBLE BOXFOAM Technical Assistance Program for SMEs
(d) TARA GUNA - Elimination of CFC-12 in the Manufacture of Extruded Polyethylene Foam Sheet

| **Project Data** | **FLEXIBLE** | | | **EPE/EPS** |
|---|---|---|---|---|
| | **SEA HORSE** | **INOAC** | **BOXFOAM** | **TARA GUNA** |
| ODS phase-out (ODP tonnes) | 90 | 110 | 954 | 35 |
| Proposed project duration (months) | 24 | 24 | 24 | 24 |
| Incremental capital cost (US $) | 555,000 | 570,000 | 1,820,000 | 405,900 |
| - including contingency (%) | | 10 | 10 | 10 |
| Incremental operational cost (US $) | 200,000 | 75,000 | 2,175,000 | 24,000 |
| Total project cost (US $) | 810,500 | 700,855 | 4,177,000 | 429,900 |
| Local ownership (%) | 100 | 90 | 100 | 100 |
| Export component (%) | | | | |
| Amount requested (US $) {Original} | 560,700 | 630,769 | 4,177,000 | 287,700 |
| {Revised} | | | | |
| Cost effectiveness (US $/kg) | 6.23 | 5.73 | 4.38 | 8.22 |
| National Coordinating Agency | Indonesian Ministry of the Environment (LH) | | | |
| Implementing Agency | The World Bank | | | |
| Technical review completed? | | | | |

| ***Secretariat's Recommendations:*** | | | | |
|---|---|---|---|---|
| Amount recommended (US $) | Pending | Pending | Pending | 287,700 |
| Project impact (ODP tonnes) | | | | 35 |
| Cost effectiveness (US $/kg) | | | | 8.22 |
| Implementing Agency support cost (US $) | | | | 37,401 |
| Total cost to Multilateral Fund (US $) | | | | 324,401 |

## PROJECT DESCRIPTION

Foam Sector Profile

| | |
|---|---|
| Sector ODS consumption (1992) reported in country programme | 1025 tonnes ODP |
| Most recent consumption data (1996) | 4000 tonnes ODP |
| ODS to be phased out in approved projects (as at July 1997) | 1538 tonnes ODP |
| ODS reported to have been phased out (as at July 1997) | 27 tonnes ODP |
| ODS to be phased out in current proposed projects | 151 tonnes ODP |
| Latest (1995) CFC-11 consumption reported according to Art.7 | 1702 tonnes ODP |

### (a) SEA HORSE - Elimination of CFC-11 in the manufacture of flexible polyurethane foam (slabstock)

1. Sea Horse will phase out the use of CFC-11 in the manufacture of flexible foam slabstock for furniture, bedding and textiles. The foam operation consists of two Sunkist/Taiwan foam production lines.

2. The purpose of this project is to phase out CFC-11 by converting to liquid carbon dioxide (LCD) technology for one foaming unit and methylene chloride on another. The capital costs for Maxfoam unit #1 include the LCD system with auxiliaries for the Maxfoam installation (US $420,000), local works (US $20,000), and a license fee (US $50,000). The capital costs for Maxfoam unit #2 include one ventilation system (US $30,000). Trials, technology transfer and training amount to US $15,000 for Maxfoam unit #1 and to US $20,000 for Maxfoam unit #2. Contingency costs of US $55,500 are also included. Incremental operating costs of US $201,000 represent net present value of incremental operating costs/savings for four years of operation and do not reflect growth.

### (b) INOAC - Elimination of CFC-11 in the manufacture of flexible polyurethane foam (slabstock)

1. INOAC will phase out the use of CFC-11 in the manufacture of flexible foam slabstock for furniture and foam bed products. The company currently uses one high pressure Maxfoam and a Beamech foaming unit.

2. The purpose of this project is to phase out CFC-11 by converting to liquid carbon dioxide (LCD) technology. The capital costs for Beamech unit include the LCD system with auxiliaries for the Maxfoam installation (US $420,000), local works (US $20,000), and a license fee (US $50,000). The capital costs for Maxfoam unit include one ventilation system (US $40,000). Trials, technology transfer and training amount to US $15,000 for Beamech unit and to US $25,000 for Maxfoam unit. Contingency costs of US $57,000 are also included. Incremental operating costs of US $73,855 represent net present value of incremental operating costs/savings for four years of operation and do not reflect growth.

**(c) FLEXIBLE BOXFOAM Technical Assistance Program for SMEs**

1. This project will phase out consumption of CFCs at 60 small/medium enterprises (SMEs) that manufacture discontinuous flexible slabstock polyurethane foam (boxfoam). The project is said to be a follow up on a previous one which was restricted to Metro Jakarta and West/Central Java.

2. The project is described as a technical assistance programme for the conversion of 60 SMEs from the use of CFC to low index/additive technology to the extent possible, supplemented with methylene chloride. The project will also include measures to ensure safe processing and minimization of human exposure to chemical emissions (TDI, methylene chloride). The capital costs associated with conversion per dispenser include: two metering units (US $5,000); one process exhaust system (US $15,000); three personal safety sets (US $1,500), and one block thermometer with three probes (US $500). Technology transfer and organizational costs amount to US $200,000, and each conversion package includes trials for US $27,000. Contingencies amount to US $182,000, while the incremental operating costs amount to US $2,175,000.

Justification for the Use of HCFCs

3. Not applicable.

Equipment or Components to be Destroyed or Rendered Unusable

4. There is no mention of any replaced equipment in the above projects.

Impact of Project on 1999 Freeze

5. These projects will help achieving LH's goal as well as to meet the Montreal Protocol's obligation to freeze ODP consumption on '95-'97 levels.

**(d) TARA GUNA - Elimination of CFC-12 in the Manufacture of Extruded Polyethylene Foam Sheet**

1. Tara Guna produces extruded polyethylene foam for packaging, mostly for electronics and furniture. 140 tonnes of foam was produced using 35 tonnes CFC-12.

2. The enterprise will phase out the use of CFC-12 through substitution with LPG. The capital cost includes the retrofit of the existing extruder (US $90,000), building modification and relocation of the extruder to a larger room (US $75,000), safety costs (US $114,000) and LPG bulk tank and pump room (US $60,000). Trials, training and technology transfer amount to US $30,000. Incremental operational cost amounts to US $24,000.

3. The following prices were used (where applicable) to calculate the incremental operational costs/savings of the projects: CFC-11: US $2.20/kg (boxfoam), US $2.00/kg (umbrella, flexible molded, LCD projects); CFC-12: US $2.00/kg; MDI: US $3.00/kg; Methylene chloride: US $1.80/kg (umbrella, boxfoam), US $1.00/kg (other projects); Santofoam: US $2.60/kg; Butane: US $0.6/kg, extra insurance: US $15,000.

## SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

### COMMENTS

Flexible Slabstock Foam (LCD) (Sea Horse, INOAC)

1. The Executive Committee at its Twenty-second Meeting requested the Fund Secretariat and the Implementing Agencies to finalize their discussions on the guidelines for LCD projects and present their recommendations to the Committee alongside the projects which may be submitted to the Twenty-third Meeting for approval. As at 20 October 1997 there were still ongoing discussions among the Implementing Agencies and the Fund Secretariat with the view to finalizing the recommendations.

2. The final project cost of this and the other LCD projects will be communicated to the Sub-Committee on Project Review should agreement be reached on the guidelines.

3. The two companies, Sea Harse and INOAC are each requesting funding for conversion of one production line to LCD and another to methylene chloride within the same plants. The Fund Secretariat questioned the eligibility of the costs of such dual conversions.

Flexible Slabstock foam (Boxfoam) (Technical Assistance Programme)

4. The concept as well as the costs of the project are under discussion between the implementing agency and the Secretariat. The outcome will be communicated to the Sub-Committee on Project Reviews.

Extruded Polyethylene Foam (Tara Guna)

5. In the case of Tara Guna, the cost of equipment relocation and building modification at the cost of US $75,000 and the LPG bulk tank at US $60,000 were considered to be high. Also the price of CFC-12 which is the same as or cheaper than CFC-11 does not follow usual trend where CD-11 is usually cheaper than CFC-12. However, since the eligible grant is much less than the assessed project cost any revision of the costs will have no impact in the grant amount.

**RECOMMENDATION(S)**

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

| Project Title | Project Cost US $ | Support Cost US $ | Implementing Agency |
|---|---|---|---|
| (a) SEA HORSE - Elimination of CFC-11 in the manufacture of flexible polyurethane foam (slabstock) | Pending | | World Bank |
| (b) INOAC - Elimination of CFC-11 in the manufacture of flexible polyurethane foam (slabstock) | Pending | | World Bank |
| (c) FLEXIBLE BOXFOAM Technical Assistance Program for SMEs | Pending | | World Bank |
| (d) TARA GUNA - Elimination of CFC-12 in the Manufacture of Extruded Polyethylene Foam Sheet | 287,700 | 37,401 | World Bank |

## PROJECT EVALUATION SHEET
## INDONESIA

SECTOR: FOAMS ODS use in sector (1992): 1025 ODP tonnes

Sub-sector cost-effectiveness thresholds: Rigid US $7.83/kg

***Project Titles***:
(a) PT Ancka Cool Citratama: conversion to CFC free technology in the manufacture of rigid PUF (panels, blocks)
(b) PT Dilihan Glory - conversion to CFC free technology in the manufacture of rigid PUF (thermoware)
(c) PT Ferrarindo Multi Sarana - conversion to CFC free technology in the manufacture of rigid PUF (spray foam)
(d) Karya Cipta Semesta - Conversion to CFC-free technology in the manufacture of rigid PUF spray insulation
(e) PT Langgeng Maknur Plastic Industry Ltd Conversion to CFC-free technology in the manufacture of rigid PUF insulated thermoware
(f) UD Samrow Foam - Conversion to CFC-free technology in the manufacture of rigid PUF insulated products

| **Project Data** | **Rigid** | | | | | |
|---|---|---|---|---|---|---|
| | **Ancka** | **Dilihan** | **Ferrarindo** | **Karya** | **Langgeng** | **Samrow** |
| ODS phase-out (ODP tonnes) | 32.7 | 13.05 | 8.2 | 18 | 20 | 25 |
| Proposed project duration (months) | 24 | 24 | 24 | 24 | 24 | 24 |
| Incremental capital cost (US $) | 269,500 | 115,500 | 14,300 | 33,000 | 105,000 | 60,000 |
| - including contingency (%) | 10 | 10 | 10 | 10 | 10 | 10 |
| Incremental operational cost (US $) | 15,225 | (2,700) | 18,600 | 35,000 | 41,000 | 50,000 |
| Total project cost (US $) | 284,725 | 112,800 | 32,900 | 68,000 | 146,000 | 110,000 |
| Local ownership (%) | 100 | 100 | 100 | 100 | 100 | 100 |
| Export component (%) | | | | | | |
| Amount requested (US $) {Original} | 256,000 | 102,200 | 32,900 | 68,000 | 142,000 | 110,000 |
| {Revised} | | | | | | |
| Cost effectiveness (US $/kg) | 7.83 | 7.83 | 4.01 | 4.16 | 7.83 | 4.85 |
| National Coordinating Agency | Indonesian Ministry of Environment (LH) | | | | | |
| Implementing Agency | UNDP | | | | | |
| Technical review completed? | Yes | Yes | Yes | Yes | Yes | Yes |

| ***Secretariat's Recommendations:*** | | | | | | |
|---|---|---|---|---|---|---|
| Amount recommended (US $) | Pending | 102,200 | 32,900 | 68,000 | 142,000 | 110,000 |
| Project impact (ODP tonnes) | | 13.05 | 7.65 | 16.35 | 18.14 | 22.69 |
| Cost effectiveness (US $/kg) | | 7.83 | 4.01 | 4.16 | 7.83 | 4.85 |
| Implementing Agency support cost (US $) | | 13,286 | 4,277 | 8,840 | 18,460 | 14,300 |
| Total cost to Multilateral Fund (US $) | | 115,486 | 37,177 | 76,840 | 160,460 | 124,300 |

## PROJECT DESCRIPTION

Foam Sector Profile

| | |
|---|---|
| Sector ODS consumption (1992) reported in country programme | 1025 tonnes ODP |
| Most recent consumption data (1996) | 4000 tonnes ODP |
| ODS to be phased out in approved projects (as at July 1997) | 1538 tonnes ODP |
| ODS reported to have been phased out (as at July 1997) | 27 tonnes ODP |
| ODS to be phased out in current proposed projects | 1702 tonnes ODP |
| Latest (1995) CFC-11 consumption reported according to Art.7 | 151 tonnes ODP |

### (a) PT Aneka Cool Citratama: conversion to CFC free technology in the manufacture of rigid PUF (panels, blocks)

1. PT Aneka Cool Citratama will phaseout the use of CFC-11 in the manufacture of rigid polyurethane foam panels and blocks. The enterprise handmixes the chemical system and pours into two parallel presses, as well as a block mold. There are five closed molds used for block production. The company does not currently have a dispenser.

2. The manufacturing operations are to be converted to HCFC-141b as an interim solution, followed by water or liquid HFC's. The capital costs include: the installation of a high pressure machine of capacity 160 kg/min (US $110,000), a premixer (US $60,000), local works (US $25,000), and electrical (US $10,000) and air (US $ 5,000) systems. Trials, technology transfer and training amount to US $40,000. Contingency costs of US $24,500 are also included. Incremental operating costs of US $15,225 are expected based on the use of the following chemicals: 35 tonnes CFC-11; 21 tonnes HCFC-141b.

3. Incremental operational costs of the projects were calculated using the following prices: CFC-11 - US $2.00/kg; HCFC-141b - US $3.75/kg.

### (b) PT Dilihan Glory - conversion to CFC free technology in the manufacture of rigid PUF (thermoware)

1. The company PT Dilihan Glory will convert from the use of CFC-11 in the manufacture of rigid polyurethane foam (thermoware). Dilihan Glory operates one low pressure machine Cannon C35 RF/2 (1987).

2. Ultimately, production will be converted most likely to full water blown foams, but HCFC-141b will be used as an interim solution. The capital cost of conversion involves the introduction of a high pressure dispenser of output 40 kg/min (US $90,000). The capital cost associated with trials, technology transfer and training is US $15,000, while the cost of contingency is US $10,500. Incremental operating costs of US $2,700 are expected on the basis of the use of the following chemicals: 14.35 tonnes CFC-11 and 15.5 tonnes flushing agent; 12.2 tonnes HCFC-141b.

**(c) PT Ferrarindo Multi Sarana - conversion to CFC free technology in the manufacture of rigid PUF (spray foam)**

1. PT Ferrarindo Multi Sarana will phaseout the use of CFC-11 in the manufacture of rigid polyurethane foam (spray foam). The company currently has one Gusmer FF-1600 manufactured in 1993, and purchased used in June 1995.

2. The manufacturing operations are to be converted to HCFC-141b as an interim solution, followed by water or liquid HFC's. The capital costs include retrofit of the existing dispenser (US $5,000). Trials, technology transfer and training amount to US $8,000. Capital costs also include contingency (US $1,300). Incremental operating costs of US $18,600 are expected based on the use of the following chemicals: 9 tonnes CFC-11; 7.65 tonnes HCFC-141b.

**(d) Karya Cipta Semesta - Conversion to CFC-free technology in the manufacture of rigid PUF spray insulation**

1. Karya Cipta Semesta will phaseout the use of CFC-11 in the manufacture of rigid polyurethane foam spray insulation. The company has two Gusmer FF1600 spray foam dispensers (1995), each with a capacity of 9 lit/min.

2. The chosen interim replacement is HCFC-141b, until full conversion to water blown systems. The capital costs include the retrofitting of one the two low pressure foam machines (US $10,000). Trials, technology transfer and training amount to US $20,000. Capital costs also include contingency (US $3,000). Incremental operating costs of US $35,000 are expected based on the use of the following chemicals: 18,000 kg CFC-11; 15,000 kg HCFC-141b.

**(e) PT Langgeng Makmur Plastic Industry Ltd Conversion to CFC-free technology in the manufacture of rigid PUF insulated thermoware**

1. PT Langgeng Makmur Plastic Industry Ltd. will phaseout the use of CFC-11 in the manufacture of rigid polyurethane foam insulated thermoware. The company currently has one Admiral low pressure machine (1983) with a maximum output of 20 lit/min.

2. The chosen interim replacement is HCFC-141b, until full conversion to water blown systems. The capital costs include the replacement of the low pressure machine by a high pressure foam machine (US $80,000). Trials, technology transfer and training amount to US $15,000. Capital costs also include contingency (US $10,000). Incremental operating costs of US $41,000 are expected based on the use of the following chemicals: 20,000 kg CFC-11; 17,000 kg HCFC-141b.

**(f) UD Samrow Foam - Conversion to CFC-free technology in the manufacture of rigid PUF insulated products**

1. The company UD Samrow Foam will convert from the use of CFC-11 in the manufacture of rigid polyurethane foam insulation products. Samrow Foam do not have a foam dispensing machine, and foam production is by handmix technique.

2. Samrow Foam is converting to fully water blown or HFC based systems, with HCFC-141b based systems as an interim step. The capital cost of conversion involves installation of one high pressure dispenser (US $90,000) less US $45,000 company contribution. The capital cost associated with trials, technology transfer and training is US $15,000, while the cost of contingency is US $10,,000. Enterprise contributions amount to US $45,000. Incremental operating costs of US $50,000 are expected on the basis of the use of the following chemicals: 25,000 kg CFC-11; 21,000 kg HCFC-141b.

Justification for the Use of HCFCs

3. The above companies have chosen interim use of HCFC-141b until a permanent solution technology is commercially available in Indonesia.

Equipment or Components to be Destroyed or Rendered Unusable

4. Not applicable.

Impact of Project on 1999 Freeze

5. There is a large, fast growing service sector that will continue using CFCs as long as CFC containing equipment needs to be serviced. Only the phase-out of CFCs in new products will therefore contain this sector and provide the Government with the control needed to assure the 1999 freeze in Indonesia's usage of ODS.

## SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

### COMMENT

1. The costs of all the projects except PT Aneka Cool Citratama have been agreed. The Fund Secretariat and UNDP are still discussing the eligible incremental costs relating to the changeover from a manual to an automated system.

**RECOMMENDATION**

1. The Fund Secretariat recommends blanket approval of the projects of Dilihan Glory, Ferrarindo Multi Sarana, Karya Cipta Semesta, Laggeng Makmur Plastic Industry and UD Samrow with the funding levels and associated support costs indicated in the table below.

| Project Title | Project Cost US $ | Support Cost US $ | Implementing Agency |
|---|---|---|---|
| (a) PT Aneka Cool Citratama: conversion to CFC free technology in the manufacture of rigid PUF (panels, blocks) | Pending | | UNDP |
| (b) PT Dilihan Glory - conversion to CFC free technology in the manufacture of rigid PUF (thermoware) | 102,200 | 13,286 | UNDP |
| (c) PT Ferrarindo Multi Sarana - conversion to CFC free technology in the manufacture of rigid PUF (spray foam) | 32,900 | 4,277 | UNDP |
| (d) Karya Cipta Semesta - Conversion to CFC-free technology in the manufacture of rigid PUF spray insulation | 68,000 | 8,840 | UNDP |
| (e) PT Langgeng Makmur Plastic Industry Ltd Conversion to CFC-free technology in the manufacture of rigid PUF insulated thermoware | 142,000 | 18,460 | UNDP |
| (f) UD Samrow Foam - Conversion to CFC-free technology in the manufacture of rigid PUF insulated products | 110,000 | 14,300 | UNDP |

# PROJECT EVALUATION SHEET
# INDONESIA

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

Sub-sector cost-effectiveness thresholds: Commercial 15.21 US $/kg

***Project Titles***:

(a) Conversion to CFC-free technology in the manufacture of commercial refrigeration equipment at C.V. Kulkasindo
(b) Conversion of CFC-12 commercial refrigeration to HFC-134a at PT Maspion
(c) Conversion of CFC-12 commercial refrigeration to HFC-134a at PT Porkka Indonesia
(d) Conversion of CFC-12 refrigerant to HFC-134a and CFC-11 to HCFC-141b as the blowing agent for foam insulation in the manufacture of commercial refrigeration units at PT Wahana Derby Sejati

| **Project Data** | **Commercial Refrigeration** | | | |
|---|---|---|---|---|
| | C.V. Kulkasindo | PT Maspion | PT Porkka | PT Wahana Derby Sejati |
| ODS phase-out (ODP tonnes) | 9.4 | 9 | 3.96 | 10.28 |
| Proposed project duration (months) | 2 | 18 | 18 | 24 |
| Incremental capital cost (US $) | 116,000 | 72,930 | 38,500 | 176,317 |
| - including contingency (%) | | 10 | 10 | 6 |
| Incremental operational cost (US $) | 66,000 | 479,216 | 59,029 | 221,490 |
| Total project cost (US $) | 182,000 | 552,146 | 97,529 | 397,807 |
| Local ownership (%) | 100 | 100 | 60 | 40 |
| Export component (%) | | | 0 | 5 |
| Amount requested (US $) {Original} | 136,000 | 136,890 | 58,517 | 139,233 |
| {Revised} | | | | |
| Cost effectiveness (US $/kg) | 14.47 | 15.21 | 14.77 | 13.54 |
| National Coordinating Agency | Indonesian Ministry of Environment (LH) | | | |
| Implementing Agency | UNDP | World Bank | | |
| Technical review completed? | Yes | | | |

| ***Secretariat's Recommendations:*** | | | | |
|---|---|---|---|---|
| Amount recommended (US $) | 136,000 | Pending | 58,517 | 139,233 |
| Project impact (ODP tonnes) | 9.4 | | 3.96 | 10.28 |
| Cost effectiveness (US $/kg) | 14.47 | | 14.77 | 13.54 |
| Implementing Agency support cost (US $) | 17,680 | | 7,607 | 18,100 |
| Total cost to Multilateral Fund (US $) | 153,680 | | 66,124 | 157,333 |

## PROJECT DESCRIPTION

Background for all projects.

1. The sector description in the project document contains the following information: ODS consumption in the affected sector is estimated at 404.42 tons. The Executive Committee approved one commercial refrigeration project, phasing out 30.0 ODP tons.

2. The three projects are for medium/large sized enterprises that manufacture a wide range of commercial refrigeration units: water dispensers for drinking water, commercial refrigeration units for storage and display, and coldroom storage for food. The implementation of these projects will result in the phasing out of 23.24 MT ODP.

3. Implementation of these projects will contribute to helping Indonesia achieve the 1999 ODS consumption freeze.

4. The incremental operating costs are for component and material costs, as well as the cost of the continuous implementation of safe working practices. The costs are calculated for two years duration.

### (a) Conversion to CFC-free technology in the manufacture of commercial refrigeration equipment at C.V. Kulkasindo

1 The company manufactures a wide range of commercial refrigeration equipment. About 4,000 refrigeration units was produced in the previous 12 months. The implementation of this project will result in the phasing out of 9.4 t ODP.

2. The company will convert from CFC-11 to HCFC-141b for its foaming. It is recognized as an interim technology, and will convert to a non-ODP water/HFC based technology at the later stage. New high pressure variable ratio foam dispensing machines are requested to replace the current use of one low pressure dispenser.

Justification for HCFC-141b technology

3. This technology provides the best energy efficiency, and the lowest investment and operational costs. It is technically mature and commercially viable. No major changes in auxiliary equipment/tooling are needed. Water-based systems provide unsatisfactory insulation values and commercial availability at present. This system is expected to be mature and commercially viable in the near future. Additional investments required to convert to CFC-free systems will be at the company's expense.

4. This project selected HFC 134a to replace CFC-12 use. New compressors and lubricants, evacuation/charging equipment, modification of the refrigeration system, and leak

detectors are required. The replacement of three charging units, 3 vacuum pumps, and a leak detector are requested in the proposal.

5. Incremental operating costs are for chemicals and components and are requested for two years.

6. No statement is made concerning the destruction of the replaced equipment

**(b) Conversion of CFC-12 commercial refrigeration to HFC-134a at PT Maspion**

1. The implementation of this project will result in the phasing out of 9 MT ODP.

2. This project will convert to HFC-134a from CFC-12 use for refrigeration with the retrofitting of a vacuum pump, a charging machine, and the acquisition of a new leak detector and technical assistance. The replaced leak detector will be scrapped.

3. The incremental operating costs include compressor and material costs.

**(c) Conversion of CFC-12 commercial refrigeration to HFC-134a at PT Porkka Indonesia**

1. PT Porkka is 60% owned by Indonesians; 40% is owned by the HUURRE Group of Finland.

2. The implementation of this project will result in the phasing out of 3.96 MT ODP.

3. This project includes the foam sector only. The cost of changing CFC-12 and R502 to R404 will be covered by the enterprise.

4. This project selected HCFC -141b technology to replace CFC-11 use. The cyclopentane option was rejected because it is uneconomical and impractical, given the scope and nature of PT Porkka Indonesia's operation. Should they decide to switch to cyclopentane in the future, the high pressure foam injection machine retrofitted for HCFC-141b conversion will be converted with no additional request for funding. The advantages for HCFC-141b use are listed: low flammability, widely used, and extensive training is not necessary. The disadvantages of the other technologies include: special mixing equipment requirements, higher thermal conductivities, poor solubilities, expensive, explosive, and special safety and equipment requirements.

5. It is stated that the enterprise will be CFC free (aside from the residual ODP related to HCFC-141b) when the project is implemented.

6. The incremental operating costs are comprised of higher costs for chemicals.

7. The requested grant amount is discounted for 40% foreign ownership.

**(d) Conversion of CFC-12 refrigerant to HFC-134a and CFC-11 to HCFC-141b as the blowing agent for foam insulation in the manufacture of commercial refrigeration units at PT Wahana Derby Sejati**

1. This project is already completed, funding is requested retroactively.

2. The implementation of this project should result in the phasing out of 10.28 MT ODP.

3. The company is 40% Indonesian owned. 30% is owned by the IFU (Industrial Fund for Developing Countries) of Denmark, and Derby A/S Denmark owns 30%.

4. This project has converted to HFC-134a from CFC-12 use for refrigeration with a new vacuum pump, charging machine, and leak detector, as well as technical assistance. The disposal plan is provided for replaced ODS equipment.

5. This project selected HCFC -141b technology to replace CFC-11 use. The cyclopentane option was rejected because it is uneconomical and impractical, given the scope and nature of PT Wahana Derby's operation. There is also an unusually high fire hazard that results from a fire-prone factory next door. Should they decide to switch to cyclopentane in the future, the high pressure foam injection machine retrofitted for HCFC-141b conversion will be converted with no additional request for funding. The advantages for HCFC-141b use are listed: low flammability, widely, and extensive training is not necessary. The disadvantages of the other technologies include: special mixing equipment requirements, higher thermal conductivities, poor solubilities, expensive, explosive, and special safety and equipment requirements.

6. The incremental operating costs are comprised of higher costs for chemicals and compressor/drier.

7. The disposal plan for the replaced equipment is provided in the proposal.

8. A deduction is made for foreign ownership, and for export to Non Article 5 countries.

## SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

## COMMENTS

General comments

1. Implementation of the projects will contribute to the 1999 freeze in Indonesia.

2. The technologies selected by the four companies are proven.

3. HCFC-141b foam technology is proposed. Each project contains justification for the use of a transitional substitute. On technical grounds, the use of HCFC-141b makes for simple and a cost-effective conversion process.

### (a) Conversion to CFC-free technology in the manufacture of commercial refrigeration equipment at C.V. Kulkasindo

1. The Secretariat discussed with UNDP the basis for calculation of CFC consumption and IOC for compressors and the cost of one new pump and retrofitting two other pumps. The enterprise requests a grant covering partial incremental costs (to the extent allowed by the cost-effectiveness threshold of US $15.21/kg/y for the subsector) amounting to US $136,000. Additional information was provided to justify the requested cost.

### (b) Conversion of CFC-12 commercial refrigeration to HFC-134a at PT Maspion

1. The Secretariat discussed with the World Bank the issue of classification of this project as commercial refrigeration project. The company manufactures water dispensers for drinking water. Production in 1996 was 36,000 units. The Secretariat proposed to qualify the project as domestic refrigeration project, taking into account the significant similarities of this project to other domestic refrigeration projects approved for medium enterprises, i.e., the production technology used; cost structure of projects; size and design of final product; and capacity of compressors employed. A reference was made to the agreement reached with the World Bank regarding the reclassification of two projects in Argentina (Lobato and Gepasa/Gesal) from commercial to domestic refrigeration projects which manufacture similar to those produced by PT Maspion. Consequently, cost-effectiveness at US $13.76/kg ODP and 6 month duration for IOC calculation should be applied.

3. The Secretariat identified that incremental cost requested for compressors was high considering relatively small charge of refrigerant per unit.

4. Cost of retrofit of the charging machine was identified to be higher than cost approved in other projects for the same item. Costs of technology acquisition, testing, training, certification

and commissioning are requested at a high level in light of the fact that these cost items are related to conversion of the refrigerant part only.

5. The Secretariat and the World Bank are still discussing the issue of the classification of the project and the level of eligible capital and operating incremental costs. The Sub-Committee on Project Review will be informed accordingly.

**(c) Conversion of CFC-12 commercial refrigeration to HFC-134a at PT Porkka Indonesia**

**(d) Conversion of CFC-12 refrigerant to HFC-134a and CFC-11 to HCFC-141b as the blowing agent for foam insulation in the manufacture of commercial refrigeration units at PT Wahana Derby Sejati**

1. The Secretariat discussed with the World Bank the eligibility and incrementality of all cost items in these two projects. Requested costs are justified.

## RECOMMENDATION

1. The Fund Secretariat recommends blanket approval of the C.V. Kulkasindo, P.T. Porkka and PT Wahana projects with associated support costs at the funding level shown in the table below.

| Project Title | Project Cost US $ | Support Cost US $ | Implementing Agency |
|---|---|---|---|
| (a) Conversion to CFC-free technology in the manufacture of commercial refrigeration equipment at C.V. Kulkasindo | 136,000 | 17,680 | UNDP |
| (b) Conversion of CFC-12 commercial refrigeration to HFC-134a at PT Maspion | Pending | - | World Bank |
| (c) Conversion of CFC-12 commercial refrigeration to HFC-134a at PT Porkka Indonesia | 58,517 | 7,607 | World Bank |
| (d) Conversion of CFC-12 refrigerant to HFC-134a and CFC-11 to HCFC-141b as the blowing agent for foam insulation in the manufacture of commercial refrigeration units at PT Wahana Derby Sejati | 139,233 | 18,100 | World Bank |