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THE MULTILATERAL FUND FOR THE  
IMPLEMENTATION OF THE MONTREAL PROTOCOL  
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**PROJECT PROPOSALS: INDONESIA**

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

Foam

- Conversion to CFC-free technology in the manufacture of rigid polyurethane spray foam at Karya Sempati Sarana. UNDP
- Conversion to HCFC-141b technology in the manufacture of rigid polyurethane foam (spray foam) at PT Sentras Varitima UNDP
- Conversion to CFC-free technology in the manufacture of rigid polyurethane spray foam at Metal Tunggal Prakarsamandiri UNDP

Refrigeration

- Supply conversion project to CFC-free technology in the manufacture of commercial refrigeration equipment at PT Gaya Teknik UNDP
- Elimination of use of CFC-11 and CFC-12/R-502 conversion to HCFC-141b (foam) and HFC-134a/R404a (refrigerant) technology in the manufacture of commercial refrigerators and display cases at P.T. Interma Pacific UNDP
- Conversion project to CFC-free technology in the manufacture of commercial refrigeration equipment at PT Aneka Froze Citratama UNDP

## PROJECT EVALUATION SHEET INDONESIA

SECTOR:           FOAM                                   ODS use in sector (1992):           1215 ODP tonnes

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

**Project Titles:**

- (a) Conversion in the manufacture of polyurethane spray foam at Karya Sempati Sarana.
- (b) Conversion technology in the manufacture of rigid polyurethane foam (spray foam) at PT Sentras Varitima.
- (c) CFC-free technology in the rigid polyurethane spray foam at Metal Tunggal Prakarsamandiri.

| Project Data                         | Rigid                                   |            |               |
|--------------------------------------|-----------------------------------------|------------|---------------|
|                                      | Karya                                   | PT Sentras | Metal Tunggal |
| ODS phase-out (ODP tonnes)           | 9.5                                     | 18.1       | 8.7           |
| Proposed project duration (months)   | 24                                      | 24         | 24            |
| Incremental capital cost (US \$)     | 27,500                                  | 49,500     | 27,500        |
| - including contingency (%)          | 10                                      | 10         | 10            |
| Incremental operational cost (US \$) | 18,050                                  | 75,500     | 15,830        |
| Total project cost (US \$)           | 45,550                                  | 125,000    | 43,330        |
| Local ownership (%)                  | 100                                     | 100        | 100           |
| Export component (%)                 |                                         |            |               |
| Amount requested (US \$) {Original}  | 45,550                                  | 125,000    | 43,330        |
| {Revised}                            |                                         |            |               |
| Cost effectiveness (US \$/kg)        | 5.18                                    | 6.91       | 5.39          |
| National Coordinating Agency         | Indonesian Ministry of Environment (LH) |            |               |
| Implementing Agency                  | UNDP                                    |            |               |
| Technical review completed?          | Yes                                     | Yes        | Yes           |

| <b>Secretariat's Recommendations:</b>    |        |         |        |
|------------------------------------------|--------|---------|--------|
| Amount recommended (US \$)               | 45,550 | 125,000 | 43,330 |
| Project impact (ODP tonnes)              | 8.8    | 18.1    | 8.04   |
| Cost effectiveness (US \$/kg)            | 5.18   | 6.91    | 5.39   |
| Implementing Agency support cost (US \$) | 5,922  | 16,250  | 5,633  |
| Total cost to Multilateral Fund (US \$)  | 51,472 | 141,250 | 48,963 |

## PROJECT DESCRIPTION

- (a) Conversion in the manufacture of polyurethane spray foam at Karya Sempati Sarana.
- (b) Conversion technology in the manufacture of rigid polyurethane foam (spray foam) at PT Sentras Varitima.
- (c) CFC-free technology in the rigid polyurethane spray foam at Metal Tunggal Prakarsamandiri.

1. The total CFC consumption in 1992 in Indonesia is reported to be 1215 tonnes. CFC-11 consumption in the rigid foam sector in that year was 315 tonnes (26% total CFC) of which 190 tonnes was for refrigeration appliance insulation and 125 tonnes was for general insulation. Current data are not available. However based on the estimated growth rate for the sub-sector of 8% in 1993 and 15% in 1994-1996 the consumption in this sector is expected to be 350-450 ODP tonnes. 10 rigid foam projects have been approved to phase out 172 tonnes CFC-11 in the sub-sector. 27 tonnes is reported to have been phased out.

2. With regard to the country's obligations under the 1999 CFC consumption freeze the project documents state as follows:

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.

3. The three above listed polyurethane foam projects have been submitted by UNDP. The three companies are all 100% Indonesian-owned. Karya Sempati Sarana was established and commenced production in 1992, Metal Tunggal commenced production in 1994, while Sentras Varitima (a bus manufacturer) was established in 1987 and commenced production of rigid foams in 1994. All three companies produce rigid polyurethane spray foam for in-situ and pour-in-place applications. Sentras also manufactures flexible molded seats using water-based system. CFC consumption of the enterprises are: Karya Sempati - 8.7 tonnes, Metal Tunggal - 9.4 tonnes and Sentras Varitima - 20 tonnes.
4. Each of the three enterprises currently uses Gusmer FF-1600 high pressure machine installed between 1990 (Sentras Varitima) and 1994 (Metal Tunggal). The enterprises will convert their production initially to HCFC-141b partially with water and finally convert to water-blown systems at their own costs. It is proposed to retrofit the Gusmer machines used by Karya Sempati and Metal Tunggal at the cost of US \$10,000 each, while that of Sentras Varitima is to be replaced at the cost of US \$30,000. Trials, technology transfer and training is \$15,000 for each project. The operating costs of Karya Sempati and Metal Tunggal do not include any additional cost for density increase, while that of Sentras Varitima includes an additional amount of US \$24,000 for 10% density increase.

## SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

### COMMENTS

1. The implementing agency's attention was drawn to the differences in the treatment of the projects for Karya Sempati and Metal Tunggal on one hand and Sentras Varitima on the other regarding replacement of the Gusmer for Sentras Varitima while retrofitting for the other two, and also, allowing for additional incremental cost to Sentras. UNDP indicated that the foam densities of Sentras are quite low which cannot be obtained with HCFC-141b, giving rise to additional density and the need for higher capacity dispenser.
2. The justification for the use of HCFC-141b has been made in the project document. However the period of transitional use has not been indicated.
3. Letters from the enterprises giving their commitment to provide any required counterpart funding, to use HCFCs only to the extent required and to dispose of any replaced equipment have been attached to the project documents.

### RECOMMENDATION(S)

1. The Fund Secretariat recommends approval of the Karya Sempati, Sentras Varitima and Metal Tunggal projects with the level of funding and associated support costs as indicated in the table below.

| Project Title                                                                                           | Project Cost<br>US \$ | Support Cost<br>US \$ | Implementing<br>Agency |
|---------------------------------------------------------------------------------------------------------|-----------------------|-----------------------|------------------------|
| Conversion in the manufacture of polyurethane spray foam at Karya Sempati Sarana                        | 45,550                | 5,922                 | UNDP                   |
| Conversion technology in the manufacture of rigid polyurethane foam (spray foam) at PT Sentras Varitima | 125,000               | 16,250                | UNDP                   |
| CFC-free technology in the rigid polyurethane spray foam at Metal Tunggal Prakarsamandiri               | 43,330                | 5,633                 | UNDP                   |

# **PROJECT EVALUATION SHEET** **INDONESIA**

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

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

**Project Titles:**

- (a) Conversion to CFC-free technology in the manufacture of refrigerators and display cases at P.T. Intermas Pacific.
- (b) Conversion to CFC-free technology in the manufacture of refrigeration equipment at PT Gaya Teknik Supply.
- (c) Conversion to CFC-free technology in the manufacture of refrigeration equipment at PT Aneka Froze Citratama.

| Project Data                         | Commercial Refrigeration                |                       |                          |
|--------------------------------------|-----------------------------------------|-----------------------|--------------------------|
|                                      | P.T. Intermas Pacific                   | PT Gaya Teknik Supply | PT Aneka Froze Citratama |
| ODS phase-out (ODP tonnes)           | 17.9                                    | 10.05                 | 13.05                    |
| Proposed project duration (months)   | 24                                      | 24                    | 24                       |
| Incremental capital cost (US \$)     | 193,600                                 | 96,250                | 108,900                  |
| - including contingency (%)          | 10                                      | 10                    | 10                       |
| Incremental operational cost (US \$) | 33,100                                  | 78,930                | 85,600                   |
| Total project cost (US \$)           | 226,700                                 | 175,180               | 194,500                  |
| Local ownership (%)                  | 100                                     |                       |                          |
| Export component (%)                 | 0                                       |                       |                          |
| Amount requested (US \$) {Original}  | 226,700                                 | 152,830               | 194,500                  |
| {Revised}                            |                                         |                       |                          |
| Cost effectiveness (US \$/kg)        | 12.66                                   | 15.21                 | 14.90                    |
| National Coordinating Agency         | Indonesian Ministry of Environment (LH) |                       |                          |
| Implementing Agency                  | UNDP                                    |                       |                          |
| Technical review completed?          | Yes                                     |                       |                          |

**Secretariat's Recommendations:**

|                                          |  |  |  |
|------------------------------------------|--|--|--|
| Amount recommended (US \$)               |  |  |  |
| Project impact (ODP tonnes)              |  |  |  |
| Cost effectiveness (US \$/kg)            |  |  |  |
| Implementing Agency support cost (US \$) |  |  |  |
| Total cost to Multilateral Fund (US \$)  |  |  |  |

## **PROJECT DESCRIPTION**

### Background for all projects.

1. The sector description in the project document contains the following information: ODS consumption in the commercial refrigeration sector is estimated at 310 tonnes. The Executive Committee approved six commercial refrigeration project, phasing out 93.7 ODP tonnes.
2. The three projects are for medium/large sized enterprises that manufacture a range of commercial refrigeration units: refrigeration units for storage and display, and cold room storage for food. The implementation of these projects will result in the phasing out of 41.0 ODP tonnes.
3. The project document provides the following statement:

“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.”
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.
5. The proposals provide the lists of equipment to be destroyed and the letters of commitment from the companies to provide the necessary counterpart funding.

### **(a) Conversion to CFC-free technology in the manufacture of refrigerators and display cases at P.T. Intermas Pacific.**

1. INTERMAS will phaseout the use of 19 t CFC-11, 0.2 t CFC-12 and 0.2 t R-502 in the manufacture of display cabinets, freezers and cold rooms. The production is to be converted to HCFC-141b as an interim step for the foam applications, and HFC-134a and R404A (zero-ODP blend) for the refrigerant. The project includes replacement of a low pressure dispenser by a high pressure dispenser (\$110,000) and retrofit of a spray foam dispenser (\$5,000), as well as trials (\$15,000), technology transfer and training (\$20,000) for the foam operation. For the refrigeration, costs include replacement of the existing charging unit (2) and vacuum pumps (2) with 2 charging/evacuation combination units (\$10,000), procurement of a hand held leak detector (\$1,000), prototype testing and trials (\$5,000) and technology transfer and training (\$10,000). The project also includes incremental operating costs for two years (\$36,000).

**(b) Conversion to CFC-free technology in the manufacture of refrigeration equipment at PT Gaya Teknik Supply.**

1. This project will phaseout the use of about 12.6 t of CFCs annually, at PT Gaya Teknik Supply, in the manufacture of commercial refrigeration equipment by converting foam operations to CFC-free (HFC/water) based systems, with HCFC-141b based systems as an interim step and refrigeration operations to HFC-134a and R404A (zero-ODP blend). The company has no foaming machines as the baseline. The project covers changes to the production program comprising of the acquisition of one high pressure foam dispenser, refrigeration evacuation and charging equipment and provision for trials, technology transfer and training.

**(c) Conversion to CFC-free technology in the manufacture of refrigeration equipment at PT Aneka Froze Citratama.**

1. This project will phaseout the use of about 15.1 t of CFCs annually at PT Aneka Froze Citratama in the manufacture of commercial refrigeration equipment by converting foam operations to CFC-free (HFC/Water) based systems, with HCFC-141b based systems as an interim step and refrigeration operations to HFC-134a and R404A (zero-ODP blend). The project covers changes to the production program comprising of a high pressure foam dispenser, refrigeration evacuation and charging equipment and provision for trials, technology transfer and training.

Justification for the use of HCFC-141b

1. The three companies have considered all the options available to substitute CFC-11 in foam operations, including cyclopentane. The three enterprises have selected HCFC-141b interim technology based on the following considerations.

Cyclopentane based system require extensive safety related provisions/investments, that are justified in case of large scale users. Due to safety considerations, the use of preblended systems is not viable. Cyclopentane is widely used for domestic refrigeration applications but has miscibility limitations with polyols. The molded densities and insulation values are still inferior to those obtained with HCFC-141b. The investment costs required to convert the three enterprises to cyclopentane are prohibitive based on the relatively small level of production. The companies will use either water based or HFC systems when they become commercially available. (Expected time is 3 to 5 years. The commercial availability of HFC-245fa is expected by 2003). Until that time, the companies will employ HCFC-141b as an interim technology to maintain product standards. No significant additional investments are foreseen to be needed to convert to HFC based systems and will be borne by the enterprises to the extent required.

### SECRETARIAT'S COMMENTS

1. The project indicates that approval of the three proposals will assist in phasing out of CFCs in new product and "provide the Government of Indonesia with the control needed to assure the 1999 freeze in Indonesia's usage of ODS"
2. The chosen technologies are proven. The justification for the use of HCFC-141b is provided by the enterprises.
3. The Secretariat has discussed with UNDP the requested incremental capital and operating costs. Several issues have been raised regarding the acquisition of a new high pressure machine in Gaya project, cost of retrofitting the foam dispenser in Interimas project, cost of replacement and retrofits of vacuum pumps, foam density and associated cost of chemicals, savings associated with foam losses in the baseline, the amount of R404A charge.
4. The Secretariat is still discussing with UNDP the issues outlined in the Secretariat's comments. The Sub-Committee on Project Review will be informed accordingly.