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**PROJECT PROPOSALS: JORDAN**

This document consists of the comments and recommendations of the Fund Secretariat on the following projects:

Refrigeration

- Replacement of CFC-11 foam blowing agent with HCFC-141b and CFC-12 refrigerant with HFC-134a in manufacture of commercial refrigeration equipment at Maurice al-Deek Co. UNIDO
- Replacement of CFC-11 foam blowing agent with HCFC-141b and CFC-12 refrigerant with HFC-134a in manufacture of commercial refrigeration equipment at six Jordanian companies UNIDO

## PROJECT EVALUATION SHEET JORDAN

SECTOR: FOAM/REFRIGERATION      ODS use in sector (1993):      150 ODP tonnes

Sub-sector cost-effectiveness thresholds:      Commercial      US \$15.21/kg  
                                                                          Rigid      US \$7.83/kg

**Project Titles:**

- (a) Replacement of CFC-11 foam blowing agent with HCFC-1141b and CFC-12 refrigerant with HFC-134a in manufacture of commercial refrigeration equipment at Maurice al-Deek Co.
- (b) Replacement of CFC-11 Foam Blowing Agent with HCFC-1141b and CFC-12 Refrigerant with HFC-134a in manufacture of commercial refrigeration equipment at six Jordanian companies.

| Project Data                         | Commercial/Rigid Foam                                                |                                                  |
|--------------------------------------|----------------------------------------------------------------------|--------------------------------------------------|
|                                      | Maurice al-Deek                                                      | Six companies                                    |
| ODS phase-out (ODP tonnes)           | 25.7                                                                 | 25.154                                           |
| Proposed project duration (months)   | 24                                                                   | 24                                               |
| Incremental capital cost (US \$)     | 101,090                                                              | 96,580                                           |
| - including contingency (%)          | 10                                                                   | 10                                               |
| Incremental operational cost (US \$) | 235,143                                                              | 209,184                                          |
| Total project cost (US \$)           | 336,233                                                              | 305,764                                          |
| Local ownership (%)                  | 100                                                                  | 100                                              |
| Export component (%)                 | 0                                                                    | 0                                                |
| Amount requested (US \$) {Original}  | 358,997                                                              | 343,770                                          |
| {Revised}                            | 336,233                                                              | 305,764                                          |
| Cost effectiveness (US \$/kg)        | 13.27 commercial refrigeration<br>5.5 rigid foam                     | 13.2 commercial refrigeration<br>0.75 rigid foam |
| National Coordinating Agency         | Ministry of Municipal, Rural Affairs & Environment, GCEP, Ozone Unit |                                                  |
| Implementing Agency                  | UNIDO                                                                |                                                  |
| Technical review completed?          | Yes                                                                  |                                                  |

| <b>Secretariat's Recommendations:</b>    |                                                  |                                                  |
|------------------------------------------|--------------------------------------------------|--------------------------------------------------|
| Amount recommended (US \$)               | 336,233                                          | 305,764                                          |
| Project impact (ODP tonnes)              | 25.7                                             | 25.15                                            |
| Cost effectiveness (US \$/kg)            | 13.27 commercial refrigeration<br>5.5 rigid foam | 13.2 commercial refrigeration<br>0.75 rigid foam |
| Implementing Agency support cost (US \$) | 43,710                                           | 39,749                                           |
| Total cost to Multilateral Fund (US \$)  | 379,943                                          | 345,513                                          |

## PROJECT DESCRIPTION

- (a) Replacement of CFC-11 foam blowing agent with HCFC-1141b and CFC-12 refrigerant with HFC-134a in manufacture of commercial refrigeration equipment at Maurice al-Deek Co.**
- (b) Replacement of CFC-11 Foam Blowing Agent with HCFC-1141b and CFC-12 Refrigerant with HFC-134a in manufacture of commercial refrigeration equipment at six Jordanian companies.**

1. ODP consumption in commercial refrigeration sub-sector was about 150 ODP tonnes in 1992. More recent figures are not available. It is estimated that the current consumption is unlikely to be quite different. Two projects in the commercial refrigeration sector were approved by the Executive Committee for Jordan to phase-out 77 ODP tonnes. The proposals being submitted by UNIDO will phase out 50.2 ODP tonnes assisting Jordan to meet its obligation under the Montreal Protocol.

2. Maurice Al-Deek Co. consumes 25.7 ODP tonnes in the production of various models of commercial refrigeration equipment. In 1997, 1,900 chest freezers, 1,000 water coolers, 1,500 commercial refrigerators, and fifty cold rooms were produced.

3. The production facility includes three charging boards, three vacuum pumps, two portable leak detectors, and five servicing vacuum pumps for refrigeration, and one OMS low pressure foam dispensing machine (1985) with two locally made jigs for foaming.

4. The proposal objective is the elimination of CFC-12 use in production of refrigeration equipment by conversion to HFC 134a as refrigerant. CFC-11 used in foam blowing will be replaced by HCFC 141b.

5. The existing OMS low pressure foam machine can be used with HCFC-141b with little modifications. Currently, CFC-11 is purchased pre-mixed with polyol. HCFC-141b can be purchased and used in the same way. Minimum equipment modifications are required.

6. Requested equipment for the change in the refrigeration system includes: two charging boards, one portable refrigerant charger, three new vacuum pump groups, three leak detectors, one HFC 134a industrial leak detector, and test equipment.

7. All the equipment replaced during the conversion process should be dismantled by the counterpart and rendered unusable for use with CFC (charging boards and leak detectors).

8. Incremental operating costs are requested for one year at US \$202,247.

- (b) Replacement of CFC-11 Foam Blowing Agent with HCFC-1141b and CFC-12 Refrigerant with HFC-134a in manufacture of commercial refrigeration equipment at six Jordanian companies.**

9. The six companies, Al-Amer Workshop, Burhan Al-Awartani Est., Eissa Hedjawi Workshop, Gulf Workshop, Naim Dahdal and Sons Workshop, and Makak Est. consume

124.5 ODP tonnes. Twenty-six small and medium commercial refrigerator manufacturers were identified in Jordan. The above-mentioned six are the first group project to implement CFC phase out at small and medium commercial refrigerator manufacturers sector.

10. Companies produce in a batch or on a made-to-order basis. Cold stores and larger equipment items are often assembled on site, requiring portable charging and leak-detection equipment. Total collective production in 1997 was 5935 units. They will all convert foaming equipment to HCFC-141b and adopt HFC-134a as refrigerant.

11. All companies involved in this project have formally committed to scrapping equipment made redundant by the conversion to non-CFC technology. Some producers have stated that they will retain equipment for use in after-sales servicing and repairs.

12. The conversion of the refrigeration systems to HFC-134a technology requires new charging boards, portable refrigerant chargers, new vacuum pumps, leak detectors, redesign, testing and training.

13. The existing low pressure foaming machines can be used with HCFC-141b. The conversion of the foam system to HCFC-141b requires the addition of electric heaters to the existing jigs, which can be achieved with little expense.

14. Incremental operating costs are requested for six months' duration at US \$127,070.

15. The following justification for HCFC-141b technology is provided in both projects: "Cyclopentane is widely used in the production of domestic refrigeration units, but it is less widespread in commercial equipment. All US and many European manufacturers are still using HCFC-141b. A development of a zero ODP drop-in replacement for HCFC 141b is predicted for 1999. Cyclopentane's flammability would require the replacement of the foaming equipment and rigorous training. The local authorities are reluctant to issue a cyclopentane license for storage and application, as the company is in a populated area. The company was informed that no further assistance would be made by the MFMP for the phase out of the transitional HCFC-141b later."

## **SECRETARIAT'S COMMENTS AND RECOMMENDATIONS**

### **COMMENTS**

1. The Secretariat discussed with UNIDO capital and operating costs in the proposed projects. All the companies except Gulf Workshop participate in manufacturing insulation panels. This type of activity was qualified as rigid foaming operations. Eligible incremental costs of the respective parts of the projects were calculated using the cost-effectiveness threshold established for rigid foam sub-sector.

2. All the companies are using foam density 40 kg/cub. m. Such a high density does not require further density increase in HCFC-141b foam. Therefore, an additional 10% cost of foam chemicals associated with the increased density was not recognized as eligible for funding. The

Secretariat proposed also to use the price of chemicals prevailing in the region. Incremental operating costs were recalculated accordingly.

3. For low pressure foam machines nearing the end of their useful lifetime, the incremental cost for replacement with new high-pressure dispensers was reduced in accordance with Decision 25/48.

4. In the revised version of projects, UNIDO requested incremental operating costs for one year in the proposal for six companies and for 18 months in Maurice al-Deek proposal at cost of US \$ 209,184 and US \$ 235,143, respectively. The total requests for grant are within the established thresholds.

## RECOMMENDATIONS

The Fund Secretariat recommends blanket approval of the project with the funding level and associated support cost as indicated below.

| Project Title                                                                                                                                                                  | Project Cost<br>US \$ | Support Cost<br>US \$ | Implementing<br>Agency |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|-----------------------|------------------------|
| Replacement of CFC-11 foam blowing agent with HCFC-1141b and CFC-12 refrigerant with HFC-134a in manufacture of commercial refrigeration equipment at Maurice al-Deek Co.      | 336,233               | 43,710                | UNIDO                  |
| Replacement of CFC-11 Foam Blowing Agent with HCFC-1141b and CFC-12 Refrigerant with HFC-134a in manufacture of commercial refrigeration equipment at six Jordanian companies. | 305,764               | 39,749                | UNIDO                  |