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EXECUTIVE COMMITTEE OF  
THE MULTILATERAL FUND FOR THE  
IMPLEMENTATION OF THE MONTREAL PROTOCOL  
Sixty-second Meeting  
Montreal, 29 November - 3 December 2010

**PROJECT PROPOSAL: MOROCCO**

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

Foam

- Conversion from HCFC-141b in the manufacture of polyurethane rigid insulation foam for domestic refrigerators at Manar UNIDO

Fumigant

- Phase-out of methyl bromide used as a soil fumigant in the production of green beans and cucurbits (second tranche) UNIDO/Italy

**PROJECT EVALUATION SHEET – NON-MULTI-YEAR PROJECTS  
MOROCCO**

**PROJECT TITLE**

**IMPLEMENTING AGENCY**

|  |       |
|--|-------|
| (a) Conversion from HCFC-141b in the manufacture of polyurethane rigid insulation foam for domestic refrigerators at Manar | UNIDO |
|--|-------|

|                                      |  |
|--------------------------------------|--|
| <b>NATIONAL CO-ORDINATING AGENCY</b> | Ministry of Trade, Industry and Crafts |
|--------------------------------------|--|

**LATEST REPORTED CONSUMPTION DATA FOR ODS ADDRESSED IN PROJECT**

**A: ARTICLE-7 DATA (ODP TONNES, 2009, AS OF SEPTEMBER 2010)**

|       |      |  |
|-------|------|--|
| HCFCs | 68.0 |  |
|-------|------|--|

**B: COUNTRY PROGRAMME SECTORAL DATA (ODP TONNES 2009, AS OF OCTOBER 2010)**

| ODS Name          | Quantity |         | Quantity | Totals |
|-------------------|----------|---------|----------|--------|
| HCFC-141b         | 14.01    | HCFC-22 | 45.88    | 68.0   |
| HCFC-141b polyols | 8.09     |         |          |        |
|                   |          |         |          |        |

**HCFC consumption remaining eligible for funding:** Starting point: 2009 consumption (68.0 ODP tonnes)

|   |  |               |                        |
|---|--|---------------|------------------------|
| <b>CURRENT YEAR BUSINESS PLAN ALLOCATIONS</b> |  | Funding US \$ | Phase-out (ODP tonnes) |
| (a)   |  | 224,442       | 2.7                    |

|   |                      |               |
|---|----------------------|---------------|
| <b>PROJECT TITLE:</b>                       |                      |               |
| ODS USE AT ENTERPRISE:                      | ODP tonnes           | 11.0          |
| ODS TO BE PHASED OUT:                       | ODP tonnes           | 11.0          |
| ODS TO BE PHASED IN                         | ODP tonnes           | 0.0           |
| PROJECT DURATION:                           | Months               | 24            |
| INITIAL AMOUNT REQUESTED:                   | US\$                 | 1,679,758     |
| FINAL PROJECT COSTS:                        |                      |               |
| Incremental Capital Cost                    | US\$                 | 900,000       |
| Contingency (10%)                           | US\$                 | 90,000        |
| Incremental Operating Cost                  | US\$                 | -38,260       |
| Total Project Cost                          | US\$                 | 951,740       |
| LOCAL OWNERSHIP:                            |                      | 100 %         |
| EXPORT COMPONENT:                           |                      | Less than 10% |
| REQUESTED GRANT:                            | US\$                 | 951,740       |
| COST- EFFECTIVENESS:                        | US\$/kg              | 9.52          |
|   | Applicable threshold | n/a           |
| IMPLEMENTING AGENCY SUPPORT COST:           | US \$                | 71,380.50     |
| TOTAL COST OF PROJECT TO MULTILATERAL FUND: | US \$                | 1,023,121     |
| STATUS OF COUNTERPART FUNDING:              |                      | Yes           |
| PROJECT MONITORING MILESTONES INCLUDED:     |                      | Yes           |

|                                      |                          |
|--------------------------------------|--------------------------|
| <b>SECRETARIAT'S RECOMMENDATION:</b> | Individual consideration |
|--------------------------------------|--------------------------|

## PROJECT DESCRIPTION

1. On behalf of the Government of Morocco, UNIDO has submitted to the 62<sup>nd</sup> Meeting of the Executive Committee a project to phase out the use of 11.0 ODP tonnes (100.0 metric tonnes) of HCFC-141b used by the MANAR Company to produce polyurethane (PU) insulation foam for domestic refrigerators. The cost of the project as submitted is US \$1,679,758 plus agency support costs of US \$125,982.
2. The HCFC phase-out management plan (HPMP) preparation in Morocco is still in progress and thus the project has been submitted in accordance with decision 54/39(d).

### Conversion project for MANAR Company

3. MANAR Company, a Moroccan-owned enterprise established in 1956, is one of the largest refrigeration manufacturers in Morocco, with a market share of around 85 per cent (203,500 units/year). The production facility is currently using a blending system to supply three polyurethane foam production lines. Two of the production lines are very old with no enclosure or ventilation system and the moulds are poured manually. The third line is new, has ultra modern technology, and the moulds are poured automatically.
4. Following a review of the available alternative technology, MANAR selected cyclopentane as a replacement for HCFC-141b. Conversion includes a cyclopentane storage and pre-mixing station (US \$180,000); retrofitting of three foam dispensers (US \$420,000); safety-related equipment (US \$792,000); civil works, trials, testing, technical assistance and training (US\$85,000), and 10 per cent contingency (US \$147,700). Incremental operating costs have been estimated at US \$55,058. The proposed time for project implementation is two years.

## SECRETARIAT'S COMMENTS AND RECOMMENDATION

### COMMENTS

#### HCFC consumption

5. The HCFC consumption in Morocco, based on the survey conducted for the preparation of the HPMP, is presented in Table 1. Only HCFC-22 (67.5 per cent of total HCFC consumption measured in ODP tonnes) and HCFC-141b (32.5 per cent) are currently used in the country.

**Table 1. HCFC consumption by industry in Morocco**

| HCFC                  | 2006  | 2007  | 2008  | 2009    |
|-----------------------|-------|-------|-------|---------|
| <b>Metric tonnes</b>  |       |       |       |         |
| HCFC-22               | 452.4 | 470.5 | 674.7 | 834.2   |
| HCFC-141b             | 215.9 | 241.3 | 231.7 | 201.0   |
| Total (metric tonnes) | 668.3 | 711.8 | 906.5 | 1,035.2 |
| <b>ODP tonnes</b>     |       |       |       |         |
| HCFC-22               | 24.9  | 25.9  | 37.1  | 45.9    |
| HCFC-141b             | 23.8  | 26.5  | 25.5  | 22.1    |
| Total (ODP tonnes)    | 48.7  | 52.4  | 62.6  | 68.0    |
| <b>Article 7 data</b> | 49.8  | 33.2  | 50.9  | 68.0    |

6. HCFC-141b is only used in Morocco by three companies as a foam blowing agent in the manufacturing of refrigeration equipment (139.1 metric tonnes or 15.3 ODP tonnes), and by one company for cleaning the refrigeration circuits (4.7 metric tonnes or 0.5 ODP tonnes). Another 15 foam companies are using 75.3 metric tonnes (8.3 ODP tonnes) of HCFC-141b pre-blended in imported polyol systems. Nearly 60 per cent of HCFC-22 is used for servicing refrigeration equipment in the fishing sector, 25 per cent is used for manufacturing and servicing industrial refrigeration systems, mainly cold storage for food and commodity preservation, and the remaining 15 per cent is used for servicing air-conditioners.

#### HPMP strategy

7. The preparation of the HCFC phase-out plan for Morocco should be completed by the end of 2010 and will be submitted to the 64<sup>th</sup> Meeting. The Government of Morocco has chosen the 2009 reported consumption of HCFCs of 68.0 ODP tonnes (1,035.2 metric tonnes) as its starting point for aggregate reductions in HCFC consumption. The investment project at MANAR would allow Morocco to reduce its HCFC consumption by 11 ODP tonnes (100.0 metric tonnes) or 16 per cent of the baseline and comply with the Montreal Protocol control measures in 2013 and 2015. Conversion of the enterprise will be completed by mid-2012 if the project is approved at the 62<sup>nd</sup> Meeting.

#### Second stage conversion

8. At its 29<sup>th</sup> Meeting, the Executive Committee approved the project for the conversion to HCFC-141b technology (rigid foam) and HFC-134a (refrigeration) in the manufacture of domestic refrigerators and freezers at MANAR for a total cost of US \$434,183 for UNIDO. Additionally, the Committee approved US \$1,528,894 for 11 projects to be implemented by UNDP and UNIDO for the replacement of 80.1 ODP tonnes of CFC-11 by HCFC-141b. In accordance with decision 60/44 (b) on second-stage conversion, UNIDO reported that pure HCFC-141b is only used in Morocco at four enterprises including MANAR. One enterprise is foreign-owned (non-Article 5) and the other two are using HCFC-141b for cleaning refrigeration circuits. Fifteen other companies, including the ones converted from CFC-11, use imported pre-blended polyols (with a total consumption of 73.5 metric tonnes or 8.1 ODP tonnes of HCFC-141b). A further reason for selecting MANAR was the potential increase in HCFC consumption as the company will increase its manufacturing of domestic refrigerators once the economic crisis is over. Such an increase in production could put Morocco at risk of not complying with the freeze and the 2015 phase-out target.

#### Technical and cost issues

9. The Secretariat and UNIDO discussed issues related to the capital and operating costs of the project. These issues were satisfactorily addressed and the total capital cost of the project was agreed at US \$990,000 including a 10 per cent contingency (US \$90,000). Deducting the incremental operating savings of US \$38,260, the total incremental cost of the project is US \$951,740 with a cost effectiveness of US \$9.52/kg (i.e. below the US \$9.79/kg threshold when introducing low global warming potential (GWP) alternatives).

#### Climate impact

10. A preliminary calculation of the impact on the climate of HCFC consumption through the foam project in Morocco based only on the GWP values of the blowing agents and their level of consumption before and after conversion is as follows: 100.0 metric tonnes of HCFC-141b will be phased out, 62.7 tonnes of cyclopentane will be phased in, and 69,733 tonnes of CO<sub>2</sub> that would have been emitted into the atmosphere will have been avoided (table 2).

**Table 2. Impact on the climate**

| <b>Substance</b>         | <b>GWP</b> | <b>Metric tonnes/year</b> | <b>CO2-eq (tonnes/year)</b> |
|--------------------------|------------|---------------------------|-----------------------------|
| <b>Before conversion</b> |            |                           |                             |
| HCFC-141b                | 713        | 100.0                     | 71,300                      |
| <b>After conversion</b>  |            |                           |                             |
| Cyclopentane             | 25         | 62.7                      | 1,568                       |
| <b>Net impact</b>        |            |                           | (69,733)                    |

**RECOMMENDATION**

11. The Executive Committee may wish to consider:

- (a) Approving the project proposal for the conversion from HCFC-141b in the manufacture of polyurethane rigid insulation foam for domestic refrigerators at MANAR company to phase-out 11 ODP tonnes (100 metric tonnes) of HCFC-141b, at a total cost of US \$951,740 plus agency support costs of US \$71,381 for UNIDO;
- (b) Noting that the Government of Morocco had agreed at the 62<sup>nd</sup> Meeting to establish as its starting point for sustained aggregate reduction in HCFC consumption the 2009 consumption reported under Article 7 of the Montreal Protocol (68.0 ODP tonnes);
- (c) Deducting 11.0 ODP tonnes of HCFCs from the starting point for sustained aggregate reductions in HCFCs; and
- (d) Requesting UNIDO to provide to the Secretariat, at the end of each year of the project's implementation period, progress reports that address the issues pertaining to the collection of accurate data in line with the objectives of decision 55/43(b), and to include these reports in the implementation reports of the HPMP, once it is approved.

**PROJECT EVALUATION SHEET – MULTI-YEAR PROJECTS**  
**Morocco**

|                          |               |
|--------------------------|---------------|
| <b>(I) PROJECT TITLE</b> | <b>AGENCY</b> |
| Methyl bromide           | Italy, UNIDO  |

|  |        |           |           |                   |  |
|--|--------|-----------|-----------|-------------------|--|
| <b>(II) LATEST ARTICLE 7 DATA (ODP Tonnes)</b> |        |           |           | <b>Year: 2009</b> |  |
| CFC: 0   | CTC: 0 | Halons: 0 | MB: 108.4 | TCA: 0            |  |

| <b>(III) LATEST COUNTRY PROGRAMME SECTORAL DATA (ODP Tonnes)</b> |         |      |       |               |           |         |               |     |         |                | <b>Year: 2009</b> |                  |                          |
|--|---------|------|-------|---------------|-----------|---------|---------------|-----|---------|----------------|-------------------|------------------|--------------------------|
| Substances   | Aerosol | Foam | Halon | Refrigeration |           | Solvent | Process Agent | MDI | Lab Use | Methyl Bromide |                   | Tobacco fluffing | Total Sector Consumption |
|  |         |      |       | Manufacturing | Servicing |         |               |     |         | QPS            | Non QPS           |                  |                          |
| CFC  |         |      |       |               |           |         |               |     |         |                |                   |                  | 0                        |
| CTC  |         |      |       |               |           |         |               |     |         |                |                   |                  | 0                        |
| Halons   |         |      |       |               |           |         |               |     |         |                |                   |                  | 0                        |
| Methyl Bromide   |         |      |       |               |           |         |               |     | 6.      | 108.4          |                   |                  | 114.4                    |
| Others   |         |      |       |               |           |         |               |     |         |                |                   |                  | 0                        |
| TCA  |         |      |       |               |           |         |               |     |         |                |                   |                  | 0                        |

|  |       |               |             |             |             |             |             |             |             |             |             |             |             |             |             |              |
|--|-------|---------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|--------------|
| <b>(IV) PROJECT DATA</b>                             |       |               | <b>2001</b> | <b>2002</b> | <b>2003</b> | <b>2004</b> | <b>2005</b> | <b>2006</b> | <b>2007</b> | <b>2008</b> | <b>2009</b> | <b>2010</b> | <b>2011</b> | <b>2012</b> | <b>2013</b> | <b>Total</b> |
| <b>Montreal Protocol Consumption Limits</b>          |       | MB            |             | 697.2       | 697.2       | 697.2       | 557.8       | 557.8       | 557.8       | 557.8       | 557.8       | 557.8       | 557.8       | 557.8       | 557.8       |              |
| <b>Maximum Allowable Consumption (ODP Tonnes)</b>    |       | MB            | 744.        | 688.4       | 612.9       | 570.7       | 481.7       | 425.3       | 347.3       | 260.9       | 86.2        | 56.2        | 28.         |             |             |              |
| <b>Project Costs (US\$)</b>                          | UNIDO | Project Costs | 400,000.    |             |             | 607,513.    | 1,670,995.  | 411,633.    | 424,381.    | 1,088,427.  |             | 437,594.    |             |             |             | 5,040,543.   |
|  |       | Support Costs | 52,000.     |             |             | 45,563.     | 125,325.    | 30,872.     | 31,829.     | 81,632.     |             | 32,819.6    |             |             |             | 400,040.6    |
|  | Italy | Project Costs |             |             |             |             |             |             |             |             | 310,000.    |             |             |             |             | 310,000.     |
|  |       | Support Costs |             |             |             |             |             |             |             |             | 40,300.     |             |             |             |             | 40,300.      |
| <b>Total Funds Approved in Principle (US\$)</b>      |       | Project Costs | 400,000.    |             |             | 607,513.    | 1,670,995.  | 411,633.    | 424,381.    | 1,398,427.  |             | 437,594.    |             |             |             | 5,350,543.   |
|  |       | Support Costs | 52,000.     |             |             | 45,563.     | 125,325.    | 30,872.     | 31,829.     | 121,932.    |             | 32,819.6    |             |             |             | 440,340.6    |
| <b>Total Funds Released by the ExCom (US\$)</b>      |       | Project Costs | 400,000.    |             |             | 607,513.    | 1,670,995.  | 411,633.    | 424,381.    | 1,398,427.  |             | 0.          |             |             |             | 4,912,949.   |
|  |       | Support Costs | 52,000.     |             |             | 45,563.     | 125,325.    | 30,872.     | 31,829.     | 121,932.    |             | 0.          |             |             |             | 407,521.     |
| <b>Total Funds Requested for Current Year (US\$)</b> |       | Project Costs |             |             |             |             |             |             |             |             |             | 437,594.    |             |             |             | 437,594.     |
|  |       | Support Costs |             |             |             |             |             |             |             |             |             | 32,820.     |             |             |             | 32,820.      |

|  |                  |
|--|------------------|
| <b>(V) SECRETARIAT'S RECOMMENDATION:</b> | Blanket Approval |
|--|------------------|

## PROJECT DESCRIPTION

12. On behalf of the Government of Morocco, UNIDO has submitted to the 62<sup>nd</sup> Meeting of the Executive Committee a request for funding for the second and final tranche of the phase-out of methyl bromide (MB) used as a soil fumigant in the production of green beans and cucurbits, at a total cost of US \$437,594 plus agency support costs of US \$32,820. The submission also includes a progress report on the implementation of the MB phase-out plan during 2009 and the implementation programme for 2011-2012.

### Background

13. At its 56<sup>th</sup> Meeting, the Executive Committee approved in principle US \$1,127,594 plus agency support costs of US \$84,570 for UNIDO and US \$310,000 plus agency support costs of U \$40,300 for the Government of Italy as the total funding available to Morocco for the phase-out of MB used as a soil fumigant in the production of green beans and cucurbits. It also approved a revised agreement between the Government and the Executive Committee, and the first tranche of the project at a total cost of US \$690,000 plus agency support costs of US \$51,750 for UNIDO and US \$310,000 plus agency support costs of US \$40,300 for the Government of Italy.

### Progress report

14. Since the approval of the project, the following activities have been implemented, through a contract with the growers' association (APEFEL)<sup>1</sup>: improved management of organic matter in the control of soilborne pathogens; improved performance of grafting techniques in the production of cucurbit seedlings; testing and demonstration of alternative technologies for fumigation of green bean crops at one greenhouse (5,000 m<sup>2</sup>); demonstration of metham sodium injected through the irrigation system alone and in combination with solarization. Agreement on a cooperation programme with the International Nursery (which operates the nursery developed under the MB phase-out project in the tomato sector in Morocco) was reached for activities related to grafting in cucurbits and with the participation of growers testing of several root-stocks and varieties of melon and watermelon.

15. Farm materials have been purchased and distributed among farmers (i.e. alternative chemicals and plastics for solarization, biofumigation and mulching; equipment items for green bean cultivation; and pre-composted organic matter). All participating farms contributed with other inputs, such as pipes and irrigation devices, fertilizers, seeds and labour (these growers have been directly involved in the implementation of alternative technologies). As of September 2010, of the US \$1,000,000 approved for the first tranche, US\$730,209 had been disbursed. The balance of US \$269,791 will be disbursed during the remainder of 2010 and in 2011.

### 2011-2012 Work programme

16. Through the implementation of the second tranche of the project, the Government of Morocco will implement the following activities: improvement of the composting methods and the proper use of high quality compost; construction of a pilot composting plant with a quality control laboratory to enrol the majority of the farmers in adapting this technology and developing their own composting facilities. Training in the composting process and quality control will be provided to technicians and extended to growers. Development and adaptation of rootstock for various cucurbits will be conducted with support from the International Nursery. An agreement has been reached with the largest organization of green bean producers in Morocco to use their research facility for the purpose of the project.

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<sup>1</sup> Association Marocaine des producteurs et exportateurs des fruits et légumes

## SECRETARIAT'S COMMENTS AND RECOMMENDATION

### COMMENTS

17. The 2009 MB consumption reported by the Government of Morocco under Article 7 of the Montreal Protocol of 108.4 ODP tonnes was 36.5 ODP tonnes below the maximum allowable level for that year under the agreement between the Government and the Executive Committee (144.9 ODP tonnes). The Government has reported that, based on preliminary data, the expected MB consumption at the end of 2010 would be about 95 ODP tonnes or less representing the maximum allowable consumption under the agreement.

18. An explanation was sought on the long-term sustainability of the composting technology, considering that it is based on the results of one demonstration trial conducted in 2010 and that composting technology has not been used in any Multilateral Fund project. UNIDO reported that composting is one of the most sustainable techniques for soilborne pest management. Good quality organic matter is not extensively available in the market and it is usually expensive (semi-composted manure costs between US \$60 to US \$100 per tonne in Morocco). The residual from previous crops will be used as raw material for the production of compost. A pilot composting plant using forced ventilation and irrigation systems will be provided, and a quality-control laboratory will be equipped (e.g., moisture analyzer, balance, safety equipment, soilborne pathogen identification kits). Training in best practices and monitoring of the production process is crucial. This technology has been discussed with major stakeholders and has been analyzed during the various implementation phases of the project.

19. UNIDO also reported that the role of the compost plant is to demonstrate the technology at the national level, leading growers to adopt this practice in agriculture, thus reducing the need for chemicals for soil treatment. The laboratory will play an essential role by ensuring the quality of the material produced. The technology will be introduced at each farm through training programmes for farmers and technicians, technical support from international experts and through demonstration that will be organized by APEFEL.

### RECOMMENDATION

20. The Fund Secretariat recommends that the Executive Committee:

- (a) Takes note of the progress report on the implementation of the first tranche of the phase-out of methyl bromide (MB) used as a soil fumigant in the production of green beans and cucurbits for Morocco;
- (b) Approves the 2011-2012 annual implementation programme associated with the second tranche; and
- (c) Requests the Government of Morocco, with assistance from UNIDO, to submit a progress report on the implementation of the work programme associated with the second and final tranche of the MB phase-out no later than the 66<sup>th</sup> Meeting of the Executive Committee.

21. The Secretariat further recommends blanket approval of the 2011-2012 plan associated with the second and final tranche of the MB for Morocco, with associated support costs at the funding level shown in the table below.

|     | <b>Project Title</b>  | <b>Project Funding<br/>(US \$)</b> | <b>Support Costs<br/>(US \$)</b> | <b>Implementing<br/>Agency</b> |
|-----|---|------------------------------------|----------------------------------|--------------------------------|
| (a) | Phase-out of methyl bromide used as a soil fumigant in the production of green beans and cucurbits (second tranche) | 437,594                            | 32,820                           | UNIDO                          |

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