PROJECT PROPOSALS: TUNISIA

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

**Foam:**

- Phasing out of CFC-11 in the manufacture of rigid polyurethane foam at Societe Nouvelle de Coupe Industrielle (SNCI) by conversion to a combination of water +HCFC-141b based systems
- Phasing out of CFC-11 in the manufacture of rigid polyurethane foam at Soften by conversion to a combination of water +HCFC-141b based systems
- Phasing out of CFC-11 in the manufacture of rigid polyurethane foam at Bafes by conversion to a combination of water +HCFC-141b based systems
- Phasing out of CFC-11 in the manufacture of rigid polyurethane foam at Societe de Construction Industrialisee (SCI) by conversion to a combination of water +HCFC-141b based systems
- Phasing out of CFC-11 in the manufacture of rigid polyurethane foam at Coldeq by conversion to a combination of water +HCFC-141b based systems

World Bank
PROJECT EVALUATION SHEET
TUNISIA


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

Project Titles:
(a) Phasing out of CFC-11 in the manufacture of rigid polyurethane foam at Bafes by conversion to a combination of water +HCFC-141b based systems
(b) Phasing out of CFC-11 in the manufacture of rigid polyurethane foam at Coldeq by conversion to a combination of water +HCFC-141b based systems
(c) Phasing out of CFC-11 in the manufacture of rigid polyurethane foam at Societe de Construction Industrialisee (SCI) by conversion to a combination of water +HCFC-141b based systems
(d) Phasing out of CFC-11 in the manufacture of rigid polyurethane foam at Societe Nouvelle de Coupe Industrielle (SNCI) by conversion to a combination of water +HCFC-141b based systems
(e) Phasing out of CFC-11 in the manufacture of rigid polyurethane foam at Soften by conversion to a combination of water +HCFC-141b based systems

<table>
<thead>
<tr>
<th>Project Data</th>
<th>Bafes</th>
<th>Coldeq</th>
<th>SCI</th>
<th>SNCI</th>
<th>Soften</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enterprise consumption (ODP tonnes)</td>
<td>12.70</td>
<td>9.60</td>
<td>9.00</td>
<td>22.10</td>
<td>8.20</td>
</tr>
<tr>
<td>Project impact (ODP tonnes)</td>
<td>11.70</td>
<td>8.80</td>
<td>8.30</td>
<td>20.30</td>
<td>7.50</td>
</tr>
<tr>
<td>Project duration (months)</td>
<td>36</td>
<td>36</td>
<td>36</td>
<td>36</td>
<td>36</td>
</tr>
<tr>
<td>Initial amount requested (US $)</td>
<td>91,477</td>
<td>68,917</td>
<td>64,700</td>
<td>159,123</td>
<td>59,079</td>
</tr>
<tr>
<td>Final project cost (US $): Incremental capital cost (a)</td>
<td>80,000</td>
<td>80,000</td>
<td>100,000</td>
<td>100,000</td>
<td>80,000</td>
</tr>
<tr>
<td>Contingency cost (b)</td>
<td>8,000</td>
<td>8,000</td>
<td>10,000</td>
<td>10,000</td>
<td>8,000</td>
</tr>
<tr>
<td>Incremental operating cost (c)</td>
<td>24,329</td>
<td>18,543</td>
<td>17,520</td>
<td>46,235</td>
<td>15,991</td>
</tr>
<tr>
<td>Total project cost (a+b+c)</td>
<td>112,329</td>
<td>106,543</td>
<td>127,520</td>
<td>156,235</td>
<td>103,991</td>
</tr>
<tr>
<td>Local ownership (%)</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Export component (%)</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Amount requested (US $)</td>
<td>91,477</td>
<td>68,917</td>
<td>64,700</td>
<td>156,235</td>
<td>59,079</td>
</tr>
<tr>
<td>Cost effectiveness (US $/kg)</td>
<td>7.83</td>
<td>7.83</td>
<td>7.78</td>
<td>7.78</td>
<td>7.83</td>
</tr>
<tr>
<td>Counterpart funding confirmed?</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Secretariat’s Recommendations

| Amount recommended (US $) | 91,477 | 68,917 | 64,700 | 156,235 | 59,079 |
| Project impact (ODP tonnes) | 11.70 | 8.80 | 8.30 | 20.30 | 7.50 |
| Cost effectiveness (US $/kg) | 7.83 | 7.83 | 7.78 | 7.78 | 7.83 |
| Implementing agency support cost (US $) | 11,892 | 8,959 | 8,411 | 20,311 | 7,680 |
| Total cost to Multilateral Fund (US $) | 103,369 | 77,876 | 73,111 | 176,546 | 66,759 |
PROJECT DESCRIPTION

Sector Background

- Latest available total ODS consumption (1998) 739.50 ODP tonnes
- Baseline consumption (average 1995-1997) of Annex A Group I substances (CFCs) 870.10 ODP tonnes
- Consumption of Annex A Group I substances for the year 1999 716.00 ODP tonnes
- Baseline consumption of CFCs in foam sector 463.33 ODP tonnes
- Consumption of CFCs in foam sector in 1999 366.00 ODP tonnes
- Funds approved for investment projects in foam sector as of end of 1999 US $2,354,190
- Quantity of CFC to be phased out in foam sector as of end of 1999 478.80 ODP tonnes
- Quantity of CFCs phased out from investment projects in the foam sector as of end of 1999 188.00 ODP tonnes
- Funds approved for investment projects in the foam sector in the year 2000 US $0
- Quantity of CFC to be phased out in foam projects approved in the year 2000 0 ODP tonnes

1. Based on data reported by Tunisia to the Ozone Secretariat, the country is in compliance with both the CFC freeze and the 50% CFC reduction by 2005. These accomplishments demonstrate that the country is in good position to achieve the complete phase out of CFC by 2010.

(a) Phasing out of CFC-11 in the manufacture of rigid polyurethane foam at Bafes by conversion to a combination of water +HCFC-141b based systems
(b) Phasing out of CFC-11 in the manufacture of rigid polyurethane foam at Coldeq by conversion to a combination of water +HCFC-141b based systems
(c) Phasing out of CFC-11 in the manufacture of rigid polyurethane foam at Societe de Construction Industrialisee (SCI) by conversion to a combination of water +HCFC-141b based systems
(d) Phasing out of CFC-11 in the manufacture of rigid polyurethane foam at Societe Nouvelle de Coupe Industrielle (SNCI) by conversion to a combination of water +HCFC-141b based systems
(e) Phasing out of CFC-11 in the manufacture of rigid polyurethane foam at Soften by conversion to a combination of water +HCFC-141b based systems

Rigid Foam

1. Five companies listed in Table 1 below manufacture rigid polyurethane foam panels for insulation of storage and cold rooms and truck bodies. All the companies use low pressure
machines. Their production will be converted to the use of combination of water and HCFC-141b systems. The cost of conversion relates to the replacement of the existing low pressure machines with equivalent high pressure machines at US $70,000-US $90,000; trials, technology transfer and training at US $10,000 each. Incremental operating costs as listed in table 1 are expected to be incurred by each company.

Table 1: Profile of the rigid foam producing enterprises

<table>
<thead>
<tr>
<th>Name of Enterprise</th>
<th>Date Established</th>
<th>ODS Consumption OPD tonnes</th>
<th>ODS Phase out ODP tonnes</th>
<th>Baseline Equipment</th>
<th>Year*</th>
<th>ICC** US $</th>
<th>IOC*** US $</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bafes</td>
<td>1993</td>
<td>12.7</td>
<td>11.7</td>
<td>TeeMac LPD 60 kg/min</td>
<td>1993</td>
<td>88,000</td>
<td>24,329</td>
</tr>
<tr>
<td>Coldeq</td>
<td>1983</td>
<td>9.6</td>
<td>8.8</td>
<td>OMS LPD 80 kg/min</td>
<td>1982</td>
<td>88,000</td>
<td>18,543</td>
</tr>
<tr>
<td>S.C.I.</td>
<td>1980</td>
<td>9.0</td>
<td>8.3</td>
<td>Cosmec LPD 100 kg/min</td>
<td>1990</td>
<td>110,000</td>
<td>17,520</td>
</tr>
<tr>
<td>S.N.C.I.</td>
<td>1990</td>
<td>22.1</td>
<td>20.3</td>
<td>Cosmec LPD 100 kg/min</td>
<td>1994</td>
<td>115,500</td>
<td>46,235</td>
</tr>
<tr>
<td>Soften</td>
<td>1984</td>
<td>8.2</td>
<td>7.5</td>
<td>Cannon C-60 LPD 60 kg/min</td>
<td>1986</td>
<td>88,000</td>
<td>15,991</td>
</tr>
</tbody>
</table>

*Year – year of purchase and/or installation of equipment

**ICC – incremental capital cost
***IOC – incremental operating cost
1 LPD – Low pressure dispenser

Justification for the use of HCFC-141b

2. Justification for the use of HCFC-141b by all five companies has been provided in each project document and as annexes to the document, including projected “techno-economic impact of zero ODP technologies as well as estimated cost of conversion to zero ODP technology. The Government of Tunisia has also provided a letter endorsing the use of HCFC-141b by the companies.

3. A sample of the justification (additional justification) annexed to the projects and a copy of the letter of the Government of Tunisia supporting the choice of HCFC-141b are attached to this evaluation.

Impact of the projects

4. A total of 56.6 ODP tonnes will be phased out from the five foam projects. This will eliminate 7.9% of Tunisia’s 1999 baseline consumption of Annex A Group I substances. There will be residual ODS consumption of 5 ODP tonnes as a result of the conversion to HCFC-141b technology.
SECRETARIAT’S COMMENTS AND RECOMMENDATIONS

COMMENTS

1. The five projects and their associated costs have been discussed between the Secretariat and the World Bank and agreed.

RECOMMENDATIONS

1. The Fund Secretariat recommends blanket approval of the Bafes, Coldeq, SCI, SNCI and Soften projects with the funding levels and associated support costs indicated in the table below.

<table>
<thead>
<tr>
<th></th>
<th>Project Title</th>
<th>Project Funding (US$)</th>
<th>Support Cost (US$)</th>
<th>Implementing Agency</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a)</td>
<td>Phasing out of CFC-11 in the manufacture of rigid polyurethane foam at Bafes by conversion to a combination of water +HCFC-141b based systems</td>
<td>91,477</td>
<td>11,892</td>
<td>IBRD</td>
</tr>
<tr>
<td>(b)</td>
<td>Phasing out of CFC-11 in the manufacture of rigid polyurethane foam at Coldeq by conversion to a combination of water +HCFC-141b based systems</td>
<td>68,917</td>
<td>8,959</td>
<td>IBRD</td>
</tr>
<tr>
<td>(c)</td>
<td>Phasing out of CFC-11 in the manufacture of rigid polyurethane foam at Societe de Construction Industrialisee (SCI) by conversion to a combination of water +HCFC-141b based systems</td>
<td>64,700</td>
<td>8,411</td>
<td>IBRD</td>
</tr>
<tr>
<td>(d)</td>
<td>Phasing out of CFC-11 in the manufacture of rigid polyurethane foam at Societe Nouvelle de Coupe Industrielle (SNCI) by conversion to a combination of water +HCFC-141b based systems</td>
<td>156,235</td>
<td>20,311</td>
<td>IBRD</td>
</tr>
<tr>
<td>(e)</td>
<td>Phasing out of CFC-11 in the manufacture of rigid polyurethane foam at Soften by conversion to a combination of water +HCFC-141b based systems</td>
<td>59,079</td>
<td>7,680</td>
<td>IBRD</td>
</tr>
</tbody>
</table>
Annex

Additional Justification for Using HCFC-141b Technology

The World Bank technical expert appraised the enterprise in June 2000, prior to the preparation of this project document, and had discussions with the company’s representatives about the choice of technology for replacing the existing CFC-based technology. The enterprise was briefed in detail about the following:

(a) An overview of the available interim (low ODP) and permanent (zero ODP) replacement technologies.
(b) The “techno-economic impact” of each technology on the products manufactured, and the processes and practices employed.
(c) Possible implications of each technology, in terms of its known impact on environment, health and safety, such as ozone depleting potential, global warming potential, occupational health, etc.
(d) It was emphasized to the enterprise that HCFC technologies are interim technologies due to their residual ODP and therefore may continue to adversely affect the environment, although at a lower rate than CFCs.
(e) It was further explained that HCFCs may become controlled substances under present or future international conventions and will therefore also need to be phased out at a future date, and any investments required for their phase-out and for conversion to a permanent technology will have to be borne by the enterprise themselves.

The main conclusions reached by the enterprise through discussions with technical expert were:

1. HCFC-141b will maintain the insulation properties required by the enterprise’s customers.
2. All Water based formulations do not provide sufficient insulation properties for the application and would require a significant cost increase to the enterprise.
3. Hydrocarbon technology was seen as not a feasible option due to the layout of the plant operations. The use of hydrocarbons in this environment would be risky and very expensive.

In view of the above, the technology selected is HCFC-141b based systems in the interim, until permanent technology (either water based of HFC-based systems) is available and can provide the required physical properties.
Projected Techno-economic Impact of Zero-ODP Technologies

The projected impact of applying various zero-ODP technologies with respect to the selected technology (HCFC-141b) in this project is summarized as below:

**Water based technologies** are not sufficiently developed to meet the needs of this application (insulated truck bodies) which has stringent insulation/thickness requirements. Therefore, they can not be considered.

**HFC-134a based systems** are not offered in the applicable regional area and are not a feasible zero-ODP option.

**Hydrocarbons** cannot be used for safety reasons related to the plant layout.

Thus, the selection of HCFC-141b based systems, as the preferred conversion technology, is justified taking into account all the technical, commercial and cost factors.

**Estimated Cost of Future Conversion to Zero-ODP Technology**

At the present time, there are no zero-ODP technology options, which can be applied cost-effectively for this project.

The following possibilities exist for a future conversion to zero-ODP technology, based on information available presently:

- Water based systems
- HFC based systems

If and when liquid HFC or water-based systems become technically mature and commercially available, the capital investments required to apply this technology are expected to be negligible. The equipment installed/retrofit under this project will be suitable for processing either of these systems. Future costs are expected to be in the area of incremental operating costs, related to higher isocyanate usage (in the case of water based) or higher costs of the HFCs. It is assumed that by the time water-based systems become available, no further density increase will be required.

| Before: 6,9 t HCFC-141b | @ US$ 3,10 = 21 496 |
| After: 11,5 t MDI increase | @ US$ 2,50 = 28 750 |
| Incremental Operating Costs/y | 7 254 |

It is unknown what the price would be of the HFCs in the future; therefore, IOCs related to a potential conversion to HFC technology are not quantifiable at this point.
Nous gouvernement Tunisien, avons revue la conversion des 5 entreprises Tunisiennes à savoir, COLDEQ, SCI, BAFES, SNCI et SOFTÉN et leur proposition d'utiliser les HCFC comme substitution du CFC-11, le gouvernement est d'accord sur le choix du HCFC pour cette application spécifique.

La Tunisie est consciente que le HCFC est une substance de transition et qu'une conversion ultérieure aux substances sans ODS sera nécessaire. La Tunisie est d'accord que conformément aux décisions actuelles du comité exécutif, aucun financement ne sera demandé pour une conversion aux substances sans ODS dans l'avenir.

Le Directeur du Contrôle
et de l'Unité Ozone

Hassen Hannachi