

**Proposal for Review**

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| <b>Project Title:</b>            | <b>Bulgaria: Ozone Depletion Substance Phase-out</b>  |
| <b>GEF Focal Area:</b>           | Phase-out of Ozone Depleting Substance (ODS)  |
| <b>Country Eligibility:</b>      | Bulgaria ratified the Montreal Protocol in October 1989 and with a per-capita GDP less than \$ 4,000 is eligible to receive GEF assistance. |
| <b>Total Project Cost:</b>       | US\$ 18.7 million   |
| <b>GEF Financing:</b>            | US\$ 11.9 million (including 15% contingency and 3% fee for local financial agent)  |
| <b>Government Financing:</b>     | Funding the Ozone Task Force in the Ministry of Environment to develop and implement the Country Program of ODS phase-out in Bulgaria.      |
| <b>Enterprise Financing:</b>     | US\$ 7.1 million  |
| <b>Associated Project:</b>       | Stand-alone project   |
| <b>GEF Implementing Agency:</b>  | The World Bank  |
| <b>Executing Agency:</b>         | The World Bank  |
| <b>Local Counterpart Agency:</b> | Bulgarian Ministry of Environment   |
| <b>Estimated Start Date:</b>     | September 1995  |
| <b>Project Duration:</b>         | less than 3 years   |
| <b>GEF Preparation Costs:</b>    | No PRIF or PPA resources were used  |

## BULGARIA: OZONE DEPLETION SUBSTANCE PHASE-OUT

### BACKGROUND

1. Bulgaria ratified the Montreal Protocol in October 1989 and is committed to the phase-out of halons and chlorofluorocarbons (CFCs) - ozone depleting substances (ODS) - as scheduled under the Protocol and subsequent London and Copenhagen Amendments. Parties to the Montreal Protocol agreed to phase out the production and consumption of CFCs and halons entirely by the year 2000 as set forth in the 1990 London Amendment. The Copenhagen Amendment of November 1992 shortened the allowable phase-out deadlines to 1996 for CFCs and 1994 for halons. All countries considered to be 'developed' under the U.N. system<sup>1</sup> must no longer import or export ODS or ODS products starting from January 1996. Bulgaria is classified under the Montreal Protocol as a non-Article 5 or a 'developed' country and has ODS-related industrial and commercial exports to developed West European countries. Thus, the Government of Bulgaria is committed to assist its enterprises in accelerating the process of conversion to non-ODS products.
2. The GEF provides financing to countries with a 1989 GDP of less than US\$4,000 per capita to assist with ODS phase-out. Bulgaria, with per capita GDP of US\$1,184 is eligible for GEF assistance. The Bulgarian Government has requested assistance from the Bank, as one of the implementing agencies of the GEF, in preparing and implementing a Project for the phase-out of ODS. The GEF will finance eligible incremental costs consistent with Montreal Protocol criteria and procedures, and eligible expenditures.
3. **ODS Sector Background.** Bulgaria has prepared with bilateral assistance from the Government of Denmark a country program for the phase-out of ODS by January 1996 (available from the World Bank, ENVGC, fax: 522-3256). An update of data collected for the Program indicates that in 1994, the ODS consumption was about 567 tons (not including the transitional substance HCFC-22), corresponding to an ozone depleting potential (ODP) of approximately 531 tons<sup>2</sup>. Bulgaria is not a producer of ODS and imports all ODS required for production. This represents a significant drop in ODS consumption since 1989 (when ODS consumption was 3,015 tons/yr), linked primarily to the economic recession experienced after the collapse of the former command and control regime. Many enterprises are no longer running at full capacity, thus reducing ODS consumption. The decline is also in part attributed to the conversion to CFC-free alternatives in the aerosol and flexible foam sector which were possible when the technology was easily applied and involved little increase in production costs.
4. There are at least 28 enterprises of varying production capacity which currently utilize ODS. Five sectors account for Bulgaria's primary ODS use: Refrigeration, 50% or 283 tons

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<sup>1</sup> Defined as "non-Article five" under the Montreal Protocol.

<sup>2</sup> ODS have different potential effects on the ozone layer. ODP is calculated based on the potential damage a substance has to the ozone layer, relative to that of CFC-11.

(of which over half is used for servicing with the remaining used in refrigerant foam equipment production); Solvents, 34% or 195 tons; Aerosols, 9% or 50 tons; Foams, 7% (non-refrigeration) or 37 tons; and Fire protection, <1% or 2 tons. By substance, CFCs account for about 90% of total ODS consumption (not including transitional substances) and should therefore be the focus of phase-out activities. Methyl chloroform (MCF - 6%), carbon tetrachloride (CTC - 4%) and halons (less than 1%) account for the remainder.

## PROJECT OBJECTIVES AND BENEFITS

5. The objective is to assist Bulgaria in carrying out its transition to CFC-free technology in order to comply with its obligations under the Montreal Protocol and its amendments. It is expected that about 72% (417 of 567 MT) of ODS consumption in Bulgaria will be directly eliminated as a result of this project. Another 50 MT annual consumption will be reduced through recycling and servicing. The project will contribute to global efforts to protect the ozone layer and benefit human health and the environment. The sub-projects have the following key elements:

- (a) they are part of the Country Program that outlines Bulgaria's plan to phase-out ODS as per the Montreal Protocol;
- (b) Montreal Protocol methods of calculating incremental costs were used; and
- (c) they underwent a technical review by the Ozone Operations Resource Group (OORG), set up by the World Bank to review sub-projects for financing under the Multilateral Fund of the Montreal Protocol.

## PROJECT DESCRIPTION

6. In order to fulfill the stated objectives, the project consists of two components: (A) technology transfer investment component and (B) technical assistance and training component. Details of sub-projects are provided in the attachment. Table 1 summarizes the project components and cost.

- (A) The technology transfer investment component consists of 15 sub-projects in the refrigeration, foam and solvent sectors:
  - (a) The refrigeration sector consists of six sub-projects (\$ 4,509,921 proposed GEF financing) involving refrigerants and five involving foams. All of the sub-projects deal with the same technology transfer of conversion from the use of CFC-12 as refrigerant to HFC-134a. This technology has been chosen based on several criteria, including costs and viability. Although HFC-134a does have a global warming potential, the use in refrigerators is small and is unlikely to have a

significant impact on global warming, especially when compared to CO<sub>2</sub> emissions associated with the production of electricity used by a refrigerator over its lifetime, or to the total global emissions of fluorinated compounds. In terms of costs, the hydrocarbons alternative for refrigeration is viable, though slightly more expensive because of associated safety costs. HFC-134a has been chosen as the preferred alternative because the foreign technology partners have substantial experience with this technology. There are five enterprises associated with these sub-projects: MRAZ, VMZ, Frigo, Brist and Klimat Inkoms. All but Klimat are public enterprises. MRAZ is requesting financing for both the refrigerator production line and also an HFC-134a compressor production line. VMZ will only be requesting financing to convert a compressor line. The sub-projects consist of adapting the refrigerator or compressor production line in order to be able to use the replacement refrigerant (HFC-134a) and optimize the physical parameters of each design through a testing program so that lines of production can commence in a second phase. The unit abatement costs (UAC) and sub-project costs are summarized in Table 1.

- (b) The foam sector consists of six sub-projects (\$ 3,807,199 proposed GEF financing) which are primarily related to insulation foam needs of refrigerators and are thus associated with the same enterprises as above and will be carried out in coordination with the above sub-projects. These sub-projects all involve conversion from the use of CFC-11 to cyclopentane as a foaming agent. In addition, Vazhod, which produces foam cushions for bicycle and tractor seats is also requesting financing to convert to a cyclopentane foaming process. The effects of the new foaming agent on physical and energy parameters of the refrigerators will be tested and optimized. The selection of this technology involves the requirement of a technology partner to ensure the appropriate safety procedures are incorporated into the design and implementation of the sub-project.
- (c) The solvents sector consists of three sub-projects (US\$ 2,315,619 proposed GEF financing) which replace the use of CFC and MCF as a degreasing agent with a variety of alternatives including kerosine, water-based solvents and infrared drying systems. The three enterprises involved are DZU, VMZ and Opticoelectron, all public. The ODS-related products of these enterprises are ball and roller-bearings, hard disk drives and precision optical equipment. In these sectors, operational savings are yielded over a period of time which have been estimated and subtracted from the total amount of the project.

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DUE TO THE RECENT MONTREAL PROTOCOL (MP) DECISION TO LIMIT ASSISTANCE TO EXPORTING ENTERPRISES, THE PROPOSED GRANT FINANCING BY GEF, WHICH FOLLOWS MP GUIDELINES, IS SUBJECT TO REVISION. FINAL FIGURES WILL BE AVAILABLE PRIOR TO THE MAY 1995 GEF COUNCIL MEETING AFTER THE EXPORT MARKET STRUCTURE IS MADE AVAILABLE TO THE WORLD BANK'S PRE-APPRAISAL MISSION IN APRIL 1995.

Requests for GEF Assistance to ODS Phase-out Projects in Bulgaria.  
Sub-project Overview

| Code | Name  | ODS Consump  | Investment Cost    | Technical Assistance | Incremental Operating Cost | Total GEF Project Cost | TOTAL GRANT w/ 3% LFA fees & 15% conting. | UAC (\$/kg)   | Enterprise Contribution | TOTAL PROJECT COST (w/ cont.) |
|------|---|--------------|--------------------|----------------------|----------------------------|------------------------|---|---------------|-------------------------|-------------------------------|
| NF1  | Vazhod - Cyclopentane - Cushions for seals    | 25           | \$290,827          | \$0                  | \$23,030                   | \$313,857              | \$313,857                                 | 2.81          |                         | \$360,936                     |
| NH10 | Kinal Inkonis Cyclopentane-Commercial Fridge  | 10.5         | \$422,000          | \$0                  | \$28,730                   | \$448,730              | \$448,730                                 | 9.31          | \$10,020                | \$526,080                     |
| NH2  | MHAZ Domestic Helireration Cyclopentane       | 44           | \$1,512,858        | \$0                  | \$0                        | \$1,512,858            | \$1,512,858                               | 5.80          | \$275,100               | \$2,014,887                   |
| NH5  | Fugo Display Cases using Cyclopentane         | 12.2         | \$300,360          | \$0                  | \$27,267                   | \$327,627              | \$327,627                                 | 6.24          |                         | \$376,771                     |
| NH7  | Unist Commercial Fridges to Cyclopentane      | 6.8          | \$284,298          | \$0                  | \$11,685                   | \$295,983              | \$295,983                                 | 8.60          |                         | \$340,386                     |
| NH8  | Zem Cyclopentane - Commercial & Domestic      | 16.2         | \$270,400          | \$0                  | \$44,727                   | \$315,127              | \$315,127                                 | 4.94          |                         | \$362,386                     |
|      | <b>SUBTOTAL FOAMS</b>                         | <b>114.7</b> | <b>\$3,080,743</b> | <b>\$0</b>           | <b>\$133,439</b>           | <b>\$3,214,182</b>     | <b>\$3,214,182</b>                        | <b>5.53</b>   | <b>\$285,120</b>        | <b>\$3,981,429</b>            |
| NH1  | MHAZ Domestic Helireration HFC-134a           | 13.2         | \$284,568          | \$0                  | \$0                        | \$284,568              | \$284,568                                 | 3.50          | \$552,200               | \$879,453                     |
| NH11 | VMZ Domestic Compressors HFC-134a             | 52.5         | \$300,000          | \$0                  | \$0                        | \$300,000              | \$300,000                                 | 7.30          | \$5,041,838             | \$5,341,838                   |
| NH3  | MHAZ Commercial Compressors HFC-134a          | 70           | \$2,079,355        | \$0                  | \$456,207                  | \$2,535,562            | \$2,535,562                               | 6.30          | \$433,000               | \$3,348,896                   |
| NH4  | Fugo Commercial Display Cases HFC-134a        | 4.5          | \$169,500          | \$70,000             | \$82,446                   | \$241,946              | \$241,946                                 | 27.10         |                         | \$370,238                     |
| NH6  | Unist Commercial Fridges HFC-134a             | 2.7          | \$130,500          | \$0                  | \$36,191                   | \$166,691              | \$166,691                                 | 21.80         |                         | \$191,695                     |
| NH9  | Kinal Inkonis HFC-134a                        | 8            | \$108,000          | \$0                  | \$30,680                   | \$138,680              | \$138,680                                 | 13.20         | \$30,070                | \$258,552                     |
|      | <b>SUBTOTAL REFRIGERATION</b>                 | <b>150.9</b> | <b>\$3,071,923</b> | <b>\$70,000</b>      | <b>\$565,524</b>           | <b>\$3,807,447</b>     | <b>\$3,807,447</b>                        | <b>7.80</b>   | <b>\$6,057,108</b>      | <b>\$10,435,672</b>           |
| NS1  | DZU - Feasib. Study and Hard Disk Wash        | 48.1         | \$1,708,700        | \$0                  | \$378,000                  | \$1,330,700            | \$1,330,700                               | 3.30          | \$378,000               | \$1,908,305                   |
| NS2  | VMZ - Feasib. Study and Ball Bearings Wash    | 52           | \$865,970          | \$20,000             | \$357,067                  | \$528,903              | \$528,903                                 | 0.61          | \$357,067               | \$965,305                     |
| NS3  | Opticoelectron - DI Water - Optical equipment | 2.4          | \$108,100          | \$0                  | \$12,769                   | \$95,331               | \$112,920                                 | 5.65          | \$12,769                | \$122,400                     |
|      | <b>SUBTOTAL SOLVENTS</b>                      | <b>102.5</b> | <b>\$2,682,770</b> | <b>\$20,000</b>      | <b>\$747,836</b>           | <b>\$1,954,934</b>     | <b>\$2,315,619</b>                        | <b>(3.01)</b> | <b>\$747,836</b>        | <b>\$2,996,070</b>            |
| NH12 | Inst of Hel - Service Training                | 60           | \$0                | \$30,400             | \$184,340                  | \$234,740              | \$234,740                                 | 2.05          |                         | \$269,951                     |
| NH13 | Inst of Hel - Service Recycling               | 39.6         | \$0                | \$451,600            | \$44,050                   | \$495,650              | \$495,650                                 | 3.21          | \$13,291                | \$583,289                     |
| NH14 | Inst of Hel - National Accredited Test Inst.  | 0            | \$0                | \$177,340            | \$19,000                   | \$196,340              | \$196,340                                 | N/A           |                         | \$225,701                     |
| TSC  | Institutional Strengthening Component         | 0            | \$32,250           | \$75,800             | \$47,800                   | \$155,850              | \$155,850                                 | N/A           |                         | \$179,228                     |
|      | <b>SUBTOTAL TA &amp; TRAINING</b>             | <b>99.6</b>  | <b>\$32,250</b>    | <b>\$755,140</b>     | <b>\$295,190</b>           | <b>\$1,082,580</b>     | <b>\$1,282,316</b>                        | <b>4.25</b>   | <b>\$13,291</b>         | <b>\$1,258,258</b>            |
|      | <b>TOTAL</b>                                  | <b>468</b>   | <b>\$8,867,686</b> | <b>\$845,140</b>     | <b>\$346,317</b>           | <b>\$10,059,143</b>    | <b>\$11,915,055</b>                       | <b>4.12</b>   | <b>\$7,103,355</b>      | <b>\$18,671,369</b>           |

- (B) The technical assistance and training component (US\$ 1,282,316 proposed GEF financing) consists of four sub-projects, three associated with the Institute of Refrigeration and the fourth would involve the institutional strengthening of the Ministry of Environment's Ozone Task Force (OTF).
- (a) The Institute of Refrigeration is requesting financing for the development of a CFC-recycling and refrigeration maintenance program to train refrigeration technicians how to recycle CFCs and handle non-ODS refrigerants. The training course would be the first step in introducing a technicians accreditation system which would eventually be attached to the licensing of industries handling and importing ODS's. The institute is also responsible for national testing of compressors and condensing units according to Bulgarian legislation. They will thus be requesting financing to adapt their testing facilities to HFC-134a type units in order to ensure reliability of Bulgarian manufactured compressors.
  - (b) The Institutional Strengthening component supports the OTF for the implementation of Bulgaria's Country Program for the phase-out of ODS. The OTF is headed by a Project Director (a Deputy Minister of the Environment) and consists of six staff members whose primary responsibilities would be the overall designing, monitoring, and implementing the ODS phase-out strategy in accordance with the aims of the Montreal Protocol and the GEF. The OTF will facilitate ODS conversion at the industrial level, disseminate relevant information, and maintain open dialogue between the government agencies, industries and other institutions involved with ODS phase-out. The component would provide consulting services, equipment and support staff to the OTF in order to carry out their responsibilities for the overall management and monitoring of project progress. A management consultant would be provided in order to provide assistance with the preparation of operational procedures and guidelines, detailed terms of reference, design and establishment of a monitoring system which would be used to follow up on phase-out activities, and procurement of consultants and goods.
7. Key project documents available from the Regional Coordinator, ENVGC (fax: 522-3256) include: (a) Bulgaria Country Program for the Phasing out of ODS; (b) detailed voluminous sub-project descriptions including financial and technical analysis; (c) sub-project technical reviews.

#### RATIONALE FOR GEF FUNDING

8. The Project meets one of the four major objectives of the GEF: protection of the ozone layer. The Government has signed the Montreal Protocol, confirmed participation in the newly replenished GEF, and has shown its commitment to ODS phase-out through the preparation of

a Country Program, and is unable to request financing from the Montreal Protocol as it is not defined as an Article 5 country and local enterprises have difficulty accessing ODS phase out technology and receiving loans from local banks. The average unit abatement cost (UAC) for all sub-projects in the refrigeration sector is between \$2.0-27\$/kg ODP; for the solvents sector between 0.61-5.65\$/Kg ODP replaced. This is within the expected range for these types of phase-out projects and has been accepted by the OORG.

## PROJECT SUSTAINABILITY AND PARTICIPATION

9. The Government of Bulgaria is committed to phase out ODS as per the Country Program and the project will help the Government achieve its goal. Through the strengthening of the Ozone Task Force in the Ministry of Environment, continued monitoring and global environmental benefits will be achieved. Sustainability will be promoted through the careful selection of enterprises which are viable in the short, medium, and long terms.

10. As part of the development of the Country Program, the Ministry of Environment undertook consultations with a broad spectrum of enterprises and interested parties, including other ministries--including industry, economics, finance--NGOs, industry associations and others. Enterprises were given the opportunity to participate in the project as long as they could provide the necessary data for project staff to evaluate their financial viability, technological capabilities and eligibility for financial assistance. Consultations with enterprises and other interested parties continued through a series of country workshops held under the aegis of the Montreal Protocol on project preparation and implementation, as well as during project preparation.

11. The phase-out of ODS is included as one of the Government's objectives in the recent Update<sup>3</sup> of Bulgaria's Environmental Strategy Study. The Country Program includes policy recommendations, phase-out strategies, and an action plan to achieve ODS phase-out. A system for monitoring the mandatory refrigeration service technician re-education scheme is now under preparation by the Ministry of Environment and a formal ban on CFC use is planned. In 1992, the Government established the Ozone Task Force (OTF) which is responsible for communicating ODS related information to enterprises and assisting enterprises with the development of sub-projects to be submitted to the GEF for financing. The OTF consists of six staff, and is headed by a Deputy Minister of Environment. The major focus of the Task Force will be devoted to ODS conversion at the industrial level, information dissemination among government agencies, industries and others involved in ODS phase-out.

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<sup>3</sup> Environmental Strategy Study - Update and Follow-Up, Grey Cover Report, December 30, 1994.

## LESSONS FROM PREVIOUS BANK EXPERIENCE AND TECHNICAL REVIEW

12. Ozone phase-out projects are currently being prepared or implemented with the Bank as Trustee in about 15 countries including, for example, China, Turkey, Tunisia, Jordan, Brazil, India, Thailand and Venezuela. GEF ODS projects have been prepared or are under preparation in the Czech Republic, Slovakia and Hungary. In Venezuela, a project has been successfully completed. Experience indicates the need for flexibility and simplicity in the project design and financing mechanisms, well prepared sub-projects and implementation plans, and most importantly, the need to support to strengthen local capacity during the preparation and implementation of Project activities.

13. The project was reviewed by a specialist from the STAP roster who looked at overall project consistency with Montreal Protocol guidance and procedures, priority of project selection and consistency with Country Program objectives. In addition, each sub-project received a thorough technical analysis from technical specialists as part of the Bank's Ozone Operations Research Group (OORG) review process for Montreal Protocol projects. These reviews analyze sub-projects according to several criteria: appropriateness of technology, environmental impact, project cost effectiveness, implementation timeframe, safety issues, and eligibility of incremental costs. All 19 sub-projects have been accepted by the OORG reviewers.

## PROJECT FINANCING, BUDGET, AND INCREMENTAL COSTS

14. A GEF grant of US\$ 11.92 million is proposed, to cover eligible incremental costs for sub-projects, out of the total project cost of US\$ 18.67 million (See Table I, page 4). The GEF grant amount includes 15 % contingency and a 3 % fee for a local financial agent to administer the grant. The difference in costs between the GEF grant (the incremental costs) and the project cost will be borne by the enterprises. Due to the recent GEF decision to limit assistance to exporting enterprises, the level of grant is subject to a downward revision. Enterprises have been requested to provide a detailed export market structure and the information will be provided to the upcoming Bank's pre-appraisal mission in April 1995.

## ISSUES AND ACTIONS

15. Project processing and institutional issues to be addressed include:

- (a) Due to the recent Montreal Protocol Multilateral Fund decision to reduce assistance to exporting enterprises, the proposed grant financing by GEF is subject to downward revision. The enterprises have been requested to submit detailed information on their export markets and the information will be used to finalize the exact level of GEF assistance prior to the May 1995 GEF Council meeting.



- (c) Ratification of the Grant Agreement by the Bulgarian Parliament could possibly slow down Project effectiveness. The Bank's pre-appraisal mission in April 1995 will discuss the possibility of obtaining a waiver for this Grant.

#### ENVIRONMENTAL IMPACT

16. The environmental risks of the project are primarily associated with the handling and use of cyclopentane, which is flammable, in the foam sector and the potential increase in wastewaters resulting from sub-projects in the solvents sector. Environmental analysis will be performed in accordance with the Bulgarian Environmental Protection Act which requires Environmental Impact Assessments (EIA) for investment projects. Appropriate application of environmental and safety measures will be applied as per the EIA.

#### INSTITUTIONAL FRAMEWORK AND PROJECT IMPLEMENTATION

17. The Ozone Task Force (OTF) in the Ministry of Environment will be the implementing agency for the project and will ensure that sub-projects are implemented in accordance with the Bank's and the Montreal Protocol guidelines. The OTF will be responsible for managing and coordinating project activities with other agencies and enterprises, analyzing and approving requests for disbursements, and monitoring and supervising sub-projects. Also, enterprises will be responsible for sub-project implementation and will report to the OTF on a periodic basis. The World Bank recommends that the Ministry of Environment uses The First Private Bank of Bulgaria as the local financial agent (LFA). The First Private Bank will manage and disburse grant funds for the sub-projects and directly reimburse suppliers for equipment, materials and supplies. A maximum fee of 3% of total project cost is proposed for the First Private Bank..

18. It is proposed to have a grant agreement between the World Bank and the Ministry of Environment and an administrative agreement between the Ministry and the First Private Bank. The First Private Bank will be responsible for making arrangements with the enterprises and drafting agreements which should be approved by the World Bank. An estimated schedule for the project is shown below:

| <u>Step</u>           | <u>Estimated Date</u> |
|-----------------------|-----------------------|
| GEF approval          | May 1995              |
| Bank Appraisal        | May 1995              |
| Negotiations          | August 1995           |
| Project Effectiveness | October 1995          |

**ANNEX A: SUMMARY AND RECOMMENDATIONS  
OF THE TECHNICAL REVIEW**

**BULGARIA: OZONE DEPLETION SUBSTANCE PHASE-OUT**

1. The technical review for the Bulgaria Ozone Depleting Substances phase-out project, as for all ODS projects, consists of two parts: (a) the overall analysis of project and program integrity, priority of sub-projects, and consistency with other ODS projects financed by the Multilateral Fund; and (b) technical analysis of individual sub-projects undertaken by the Ozone Operations Resource Group (OORG). The OORG was established by the World Bank to undertake the analysis of proposed sub-projects for funding under the Multilateral Fund for the Montreal Protocol. It utilizes standard criteria against which to judge the technical viability and cost-effectiveness of a given sub-project. These include: appropriateness of the technology, environmental impact, project costs, implementation timeframe, lessons from experience, safety issues and final recommendations.
2. In the case of Bulgaria, the STAP reviewer's impression was that the project is well planned and will lead to a reduction in ODS of more than 80%. Given the short time frame for the implementation of phase-out projects in Eastern Europe, the technical assistance and training components are considered essential for the project. As well, the reviewer felt that the 19 sub-projects were well defined and could be accomplished within the suggested time frame.
3. At the time of the initial project review, about 8 sub-projects had not yet received OORG endorsement. Outstanding issues included a reevaluation of the equipment costs (for the refrigeration subsector), and an issue related to the choice of technology for the insulation project. All other sub-projects were accepted.

**RECOMMENDATIONS**

4. All 19 sub-projects have now been reviewed and approved by the OORG. Following the usual iterative process, the OORG comments were reviewed by the enterprises and the Bank, the proposed changes were made and the revised proposals resubmitted for OORG review. The overall recommendation is that all the components are ready for appraisal and implementation. Technical reviews are available from ENVGC, Fax # (202) 522-3256.

**Proposal for Review**

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| <b>Project Title:</b>                  | <b>Hungary: Project for the Phaseout of Ozone Depleting Substances</b>                                 |
| <b>GEF Focal Area:</b>                 | <b>Ozone Depletion</b>   |
| <b>Country Eligibility:</b>            | <b>Acceded to the Montreal Protocol in 1989; GEF eligibility on basis of IBRD eligibility.</b>         |
| <b>Total Project Cost:</b>             | <b>US\$9.4 million</b>   |
| <b>GEF Financing:</b>                  | <b>US\$6.9 million</b>   |
| <b>Counterpart Financing:</b>          | <b>US\$2.5 million</b>   |
| <b>Cofinancing/Parallel Financing:</b> | <b>None</b>  |
| <b>Associated Project:</b>             | <b>None</b>  |
| <b>GEF Implementing Agency:</b>        | <b>World Bank</b>  |
| <b>Executing Agency:</b>               | <b>World Bank</b>  |
| <b>Local Counterpart Agency:</b>       | <b>Hungarian Ministry for Environment and Regional Policy and Investment Sub-Project beneficiaries</b> |
| <b>Estimated Starting Date:</b>        | <b>September 1995</b>  |
| <b>Project Duration:</b>               | <b>Two Years</b>   |
| <b>GEF Preparation Costs:</b>          | <b>No PRIF or PPA resources were used</b>  |

## HUNGARY: PROJECT FOR THE PHASEOUT OF OZONE DEPLETING SUBSTANCES

### COUNTRY/SECTOR BACKGROUND/CONTEXT

1. The Vienna Convention for the Protection of the Ozone Layer (1985) and the Montreal Protocol on Substances that Deplete the Ozone Layer (1987) are international agreements which call for the phaseout of substances that deplete the stratospheric ozone layer.
2. Hungary acceded to the Vienna Convention and the Montreal Protocol in 1989, and the London Amendments to the Montreal Protocol in November, 1993. It formally ratified the Copenhagen Amendments in May 1994. However, Hungary has not been designated an Article 5 country under the Montreal Protocol, and is therefore not eligible for financial assistance from the Multilateral Fund for the Implementation of the Montreal Protocol. Global Environment Facility (GEF) resources will therefore be required to finance the Project.
3. All ozone-depleting substances (ODS) in Hungary are imported from the European Union, mainly the United Kingdom, Germany, France, the Netherlands, and Italy. In addition, approximately 15% of ODS used in Hungary were exported in final products in 1993, and thus the export market has effectively dictated the phaseout of ODS in some enterprises in advance of national legislation. Recovery and recycling of ODS will be required as of January 1, 1995 in the refrigeration and fire fighting sectors which together account for over 1/3 of ODS consumption. Thus far, the weakest area of phaseout has been in the solvents sector due to its considerably more fragmented nature.
4. In 1993, consumption of regulated ODS was approximately 2,224 metric tons. Compared to 1991, total annual ODS consumption has fallen by 43%, and is now equivalent to 2,140 ozone-depleting-potential (ODP) in weighted tons. In terms of ODS consumption and ozone-depleting-potential, Chlorofluorocarbons (CFCs) account for roughly three-quarters of the total. Consequently, the focus of the project should be on phasing out the use of CFCs. Refrigerator and freezer production account for approximately 43% of CFC use, and 33% of national ODS consumption. In addition, approximately 55% of the ODS used in the foam sector are for insulation for refrigeration devices. Consequently, refrigeration products account for roughly 49% of national ODS consumption. The remaining ODS consumption is quite evenly distributed with aerosols, foams, halons, and solvents each accounting for 11-15%.

### PROJECT OBJECTIVES

5. The principal objective of the Project is to assist Hungary in the phaseout of ODS, as mandated by the Montreal Protocol and its amendments and adjustments, in a cost effective manner. More specifically, the goals of this Project are to: (i) support the phaseout of the consumption of chlorofluorocarbons (CFCs) through adoption of new cost-effective CFC-free technologies; (ii) phase in the operation of a national network for recovery/reclamation/recycling (3R) of refrigerants (CFC-

12 and CFC-11); and (iii) through institutional strengthening improve the capability of the Ministry for Environment and Regional Policy (MERP) to manage and oversee the phaseout of ODS in Hungary.

6. By focussing on the key sectors and enterprises, the project will phase out 1156.9 tons of ODP per year, or roughly 52% of ODP-weighted ODS consumption in Hungary. Approximately 39% of the phaseout under the Project will be accomplished through a recovery, reclamation, and recycling scheme in the refrigeration subsector, and an additional 23% in the halons subsector.

#### PROJECT DESCRIPTION

7. The proposed project will consist of (i) an Institutional Strengthening Component; (ii) a Recovery, Reclamation, and Recycling Component (3R Component) for ODS used as refrigerants; and (iii) an Investment Component comprising thirteen Sub-Projects. These Components were designed in close cooperation between the Government of Hungary, Participating Enterprises, the World Bank, and international consultants. The Ministry for Environment and Regional Policy (MERP) will be primarily responsible for the implementation of the Institutional Strengthening Component, while the Hungarian Association of Air-Conditioning and Refrigeration Enterprises will be primarily responsible for the 3R Component, and the Participating Enterprises for the Sub-Projects which will comprise the Investment Component.

8. **Institutional Strengthening Component.** This component will set up an ODS Phaseout Project Implementation Unit (PIU) to be supported by a Technical Advisory Group (TAG). The PIU will coordinate the implementation of the Project, oversee procurement and disbursement for the investment Sub-Projects compliance with World Bank guidelines, and in close cooperation with the Financial Intermediary, supervise project activities according to the requirements of the World Bank and MERP. As necessary, the PIU will arrange for technical assistance and consultants to assist in project implementation, and provide support to facilitate cooperation among government institutions and the consumers of ODS. Funding for this Sub-Project will be US\$244,500 to cover salaries for three staff, office equipment, and the cost of hiring international consultants for supervision and monitoring during implementation of the Sub-Projects.

9. **3R Component.** This component will cost approximately \$2.04 million, of which \$1.42 million is proposed to be financed by the GEF. The Association of Refrigerating and Air-Conditioning Enterprises which will be responsible for implementing the project will establish a national network to remove ODS from refrigerators and recycle them, through the training of approximately 1500-1600 refrigerator service technicians (75-80% of the total number of technicians). This component will lead to the annual phaseout of 450 tons of ODP weighted ODS consumption, or approximately 39% of the total under the project.

10. **Investment Component.** This component covers 13 investment Sub-Projects -- 6 solvents, 3 foams, 2 aerosols, 1 halons, and 1 refrigeration and foams -- for a total of \$6.19 million, of which \$5.04 million is proposed to be financed by the GEF. A variety of ODS-phaseout technologies will be implemented, but three Sub-Projects (HIM (Foams), MMG-AM (Solvents), and Metalucon

(Foams)) will account for roughly 60% of the financing required for this component. This component will lead to the annual phaseout of 704.1 tons of ODP -- 38% in halons, 29% in aerosols, 27% in foams, 4% in solvents, and 2% in refrigeration and foams.

11. **Key Project Documents.** Hungary completed a Country Program in fulfillment of its obligations under the Montreal Protocol. The project proposed here is based on the findings of the Country Program. Other documents include detailed sub-project descriptions which include financial and technical data, and the technical reviews of these sub-projects undertaken by specialists from the Ozone Operations Research Group (OORG). As well, a detailed technical annex has been prepared in draft for this project. All of these documents are available from the Regional Coordinator, ENVGC; fax # 202-522-3256.

#### **RATIONALE FOR FUNDING UNDER THE GLOBAL ENVIRONMENT FACILITY**

12. The Project would form a part of Hungary's ODS phaseout program some of which might not be implemented without Bank involvement. In addition to promoting the phaseout of ODS, one rationale for the project is that it will reduce the economic dislocation associated with ODS phaseout by assisting those enterprises which will be required to change their production technologies. The proposed Project is consistent with the Implementation Guidelines and Criteria for GEF funding established by the Executive Committee of the Montreal Protocol (MPEC), for which the Bank is also an implementing agency. The Project will be developed and structured on the basis of specific ODS phaseout requirements in Hungary, and the project eligibility criteria guidelines set forth by the Multilateral Fund for the Implementation of the Montreal Protocol.

#### **SUSTAINABILITY AND PARTICIPATION**

13. The investment program will focus on priority sectors and cost-effective measures which were defined in the Country Program for the phaseout of ODS, and will be complemented by changes in policies and regulations to ensure compliance with ODS phaseout targets (e.g., penalties for violation of regulations, obligatory reporting and monitoring requirements). Limited availability of ODS and ODS dependent components will work to ensure sustained future use of ODS recycling equipment and non-ODS technology. This will be primarily attributable to the phaseout of ODS production in Europe.

14. As part of the development of the Country Program, the Ministry of Environment undertook consultations with a broad spectrum of enterprises and interested parties, including other ministries: industry, economics, finance, NGO's, industry associations, and others. Enterprises were given the opportunity to participate in the project as long as they could provide the necessary data for project staff to evaluate their financial viability, technological capabilities and eligibility for financial assistance. Consultations with enterprises and other interested parties continued through a series of country workshops held under the aegis of the Montreal Protocol on project identification, preparation and implementation, as well as during actual project design.

15. The Project will be implemented within a limited time-frame. ODS phaseout projects which are successfully implemented will have a permanent ODS phaseout effect, and be in compliance with the requirements of the Montreal Protocol to completely phase out by 1996. In order to ensure long-term sustainability of the various project components (especially the 3R scheme), training and policy and regulatory measures, already under consideration by the MERP, will be introduced early in the project implementation period.

16. Furthermore, a careful review of the financial mechanism supporting the 3R-project will be undertaken to further establish the project structures required to ensure Sub-Project sustainability. Part of the funds will be earmarked to cover some of the expected financial shortfall of the recycling center during its first two years of operation. It is essential, for long-term sustainability of this Sub-Project, that the incentive to the service sector (the front line in the 3R field) be strong enough for them to undertake the recovery process.

#### LESSONS FROM PREVIOUS BANK INVOLVEMENT AND TECHNICAL REVIEW

17. ODS Phaseout Projects utilizing GEF resources are being developed concurrently in the Slovakia, Slovenia, and other countries. Implementation arrangements based on environment ministry implementation with local financial agent assistance in fund administration have been established for most ODS phaseout operations, and these have been used in the design of the Project. With respect to the 3R Component, the Czech Republic is just beginning to initiate its recycling and recovery program. Implementation will be closely watched to cull lessons learned, and meetings of the Hungarian and Czech counterparts will be encouraged.

18. **Technical Review.** The project was reviewed by technical specialists from the STAP roster as well as experts who serve on the Ozone Operations Research Group (OORG). The OORG was initially set up by the World Bank to review sub-project proposals for funding by the Multilateral Fund of the Montreal Protocol. The 13 investment sub-projects have been cleared by the reviewers, as has the 3-R component. The institutional strengthening sub-components is being revised by the Ministry to conform to recommendations made by both OORG reviews and ENVGC's Montreal Protocol staff.

#### PROJECT FINANCING, BUDGET AND INCREMENTAL COSTS

19. It is proposed that the Project cost of \$9.4 million be funded in the amount of \$6.9 million by the Global Environment Facility (GEF). Funds would be provided as a grant from the GEF to the Government of Hungary (for the Institutional Strengthening Component), and a financial institution with demonstrated capabilities in handling investment projects for transfer to Sub-Project beneficiaries under the 3R and Investment Components. The Financial Intermediary will receive a fee of 2-3% on all money it disburses for its services.

20. Each Sub-Project involves incremental costs (i.e., those capital and operating costs which would not have occurred in the absence of the Montreal Protocol) and non-incremental costs (i.e.,

those costs which would have occurred regardless of the presence of the Montreal Protocol). All estimated costs for the Sub-Projects which are determined to meet the definition of incremental costs (as determined by the London Amendments to the Montreal Protocol), and for which financing is available, will be covered under grant funding, while the Participating Enterprises will be expected to finance the associated non-incremental costs of the Project.

21. The project's major benefit will be to assist Hungary to achieve its objective of completely phasing-out the use of ODS as early as is technically feasible. The project will help the Government implement an accelerated ODS phaseout program by providing financing for priority Sub-Projects which will result in the phaseout of 1154.1 tons of ODP annually (or about 52 percent of Hungary's total ODP-weighted use of ODS).

22. The project consists of Sub-Projects which will contribute to maximizing the useful life of equipment which currently rely on the availability of CFC for their continued use. This will contribute to reducing the country's economic cost of phasing out the use of the regulated substances by converting equipment to alternative uses and technologies. In addition, the project will enable export-oriented firms to maintain their export markets by adjusting in a timely manner to non-ODS products as requested by importers from industrialized countries. These companies export around 10-15% of their ODS use.

#### ISSUES, ACTIONS, AND RISKS

23. Management structure and ownership of most of the companies which would be assisted under this project could change in the future. Although the financial viability of each of the Participating Enterprises was assessed earlier by the Economics Department of the MERP, the situation could change in the future. The financial situation of each of the Participating Enterprises will therefore be reassessed during appraisal to better ensure project sustainability.

24. Under the Institutional Strengthening Component, the MERP will be responsible for monitoring the use and phaseout of ODS in Hungary. To address this problem, the MERP will need to ensure that a system of fines is in place to discourage their use, and that use of ODS is strictly monitored and enforced.

25. Finally, experience in national 3R programs is limited to only a few countries, although many are now under development. The limited experience to date has indicated that, initially, the amounts of CFC recovered will be small, and that the most important aspect of the program is to provide adequate incentives to the servicing sector. A condition for disbursement for this component will be that these incentives will be in place in the form of economic and financial incentives/penalties. The financial sustainability of the 3R scheme will be monitored closely in order to react to market conditions (price and availability of CFCs) which will influence the short and medium term profitability of the operation. Project risk is being mitigated by placing the financial risk with the enterprises which are most capable of assuming it, and by ensuring that the incentive to the servicing sector is sufficient to encourage widespread recovery of CFC through maintenance activities.



26. Other issues and actions which will need to be addressed includes project implementation procedures. Specifically, the PIU will need to be up and running by the time the project is approved, and a Project Administration Agreement (PAA) governing the working relationship between the Corvin Bank and the MERP is needed. For the PAA, the model used in the Czech Republic will be followed and has already been shared with the relevant authorities.

27. Finally, it will be important to ensure that an adequate framework has been developed by the MERP governing the incentives for the 3R Component. The services sector will need to have adequate economic and financial incentives through both recycling credits and penalties. The 3R Component for the Czech ODS Phaseout Project will be used as a model for developing the incentives framework. Most of the regulatory and incentives framework has already been developed by the Economics Department of the MERP in consultation with the World Bank's consultants.

#### INSTITUTIONAL FRAMEWORK AND PROJECT IMPLEMENTATION

28. **Project Implementation.** The Ministry for Environment and Regional Policy (MERP), through its Project Implementation Unit (PIU), will act as general program coordinator for the Project. The MERP will liaise with other ministries on policies and industrial strategy issues, and, through its PIU, be responsible for day-to-day management of project implementation.

29. The Corvin Bank (CB) was selected to be the Financial Intermediary (FI) on December 15, 1994, by the National Bank of Hungary (NBH). It will have the responsibility to manage the local funds administration for the 3R and Investment Components. A Project Administration Agreement (subject to Bank review) will be established between the CB and the MERP. For each Sub-Project a Sub-Grant Agreement between the CB and each of the Participating Enterprises will be prepared. The Sub-Grant Agreement will include reporting provisions, annexes on disbursement, and provisions related to environmental protection and worker safety. Standard Bank disbursement procedures will be followed, with established limits on initial deposit and replenishment levels, statements of expenditures, and Bank review levels.

30. To ensure smooth disbursement, early involvement of the Corvin Bank in supervision will be required. The emphasis in selection of the CB by the NBH was based on its ability to disburse and administrate project funds. A Project Implementation Manual (PIM) has been provided, and includes the relevant Bank guidelines on procurement, disbursements, use of consultants, financial reporting, auditing, sample bidding documents, and other project-specific documents, such as the Terms-of-Reference for the Financial Intermediary. In addition, a one week training course on project implementation and management was held in Budapest in mid-January 1995.

31. **Environmental Aspects.** Each project sub-component was subject to local environmental regulations and Bank project environmental review procedure. The Project consists of light industrial projects which have been classified as category B on the basis of the Bank's project environmental classification system (OD 4.01) and based on previous classification of similar projects. For each sub-project, an annex on environmental and safety procedures was attached to the sub-project document which was reviewed by the technical reviewers.

32. Although the overall project objective is protection of the environment by reducing the emission of ODS, the change to non-ODS technologies or substitution of ODS with other chemicals may involve other environmental risks. Sub-Projects may employ flammable substitutes or, in the case of solvent Sub-Projects, increase wastewater. Sponsoring enterprises will be responsible for providing an environmental impact assessment (EIA) as required by Hungarian law. In addition, the MERP will ensure that information on international safety standards and procedures will be requested from the suppliers, and that these standards and procedures will be applied to the use of new substances by all Participating Enterprises.

33. **Timing of Preparatory Activity.** The following steps are planned for project processing:

|                              |                |
|------------------------------|----------------|
| FEPS Review Meeting          | May 1995       |
| Project Appraisal            | May 1995       |
| Yellow Cover Review Meeting  | June 1995      |
| Negotiations                 | July 1995      |
| Board Approval               | August 1995    |
| Signature of Grant Agreement | September 1995 |

Table 1  
Hungary ODS Phaseout - Summary of Sub-Project Data and Costs

| Sub-Project                         | Sector                 | Types of ODS Used    | Annual ODS Use (Tons of ODS) | Annual ODS Use (Tons of ODP) <sup>1</sup> | Annual ODP Phaseout <sup>2</sup> | Incremental Capital Cost <sup>2</sup> | Incremental Operating Cost <sup>2</sup> | Eligible Project Cost          | Requested GEF Grant            |
|-------------------------------------|------------------------|----------------------|------------------------------|---|----------------------------------|---------------------------------------|---|--------------------------------|--------------------------------|
| Project Implementation Unit         | Institutional          |                      |                              |   |                                  | \$167,090                             | \$77,410                                | \$273,000                      | \$244,500                      |
| Refrigeration Association           | Refrigeration          | CFC-11/12<br>CFC-502 | 450.00                       | 450.00                                    | 450.00                           | \$2,042,670                           | \$0                                     | \$2,042,670                    | \$1,415,495                    |
| Frigolux                            | Refrigeration and Foam | CFC-11/12<br>CFC-502 | 15.65                        | 15.00                                     | 13.15                            | \$572,864                             | \$0                                     | \$572,864                      | \$476,064                      |
| Hajdusagi Iparmuevek Company        | Foam                   | CFC-11               | 63.00                        | 63.00                                     | 63.00                            | \$1,071,000                           | \$335,000                               | \$1,406,000                    | \$1,051,000                    |
| Metalucon                           | Foam                   | CFC-11               | 45.60                        | 45.60                                     | 45.60                            | \$698,562                             | \$186,046                               | \$884,608                      | \$724,319                      |
| Metisol                             | Foam                   | CFC-11               | 80.00                        | 80.00                                     | 79.00                            | \$441,207                             | \$0                                     | \$441,207                      | \$346,022                      |
| Mediroll                            | Aerosol-Propellant     | CFC-12               | 107.00                       | 107.00                                    | 107.00                           | \$15,379                              | \$42,874                                | \$58,253                       | \$53,399                       |
| Auto-mobil                          | Aerosol-Propellant     | CFC-11<br>TCE        | 92.00<br>47.60               | 96.76                                     | 96.76                            | \$69,901                              | \$13,611                                | \$83,512                       | \$83,512                       |
| MMG-AM                              | Solvent                | TCE<br>CFC-113       | 87.00<br>3.50                | 12.20                                     | 12.20                            | \$1,506,100                           | (\$272,921)                             | \$1,233,179                    | \$1,220,000                    |
| Hitelap                             | Solvent                | TCE                  | 32.00                        | 3.20                                      | 3.20                             | \$193,940                             | (\$14,151)                              | \$179,789                      | \$179,789                      |
| Tisza Shoe                          | Solvent                | CFC-11<br>TCE        | 3.70<br>19.86                | 5.69                                      | 5.69                             | \$211,390                             | (\$35,432)                              | \$175,958                      | \$175,958                      |
| Finommechanikai                     | Solvent                | CFC-113              | 1.45                         | 1.16                                      | 1.16                             | \$33,570                              | \$0                                     | \$33,570                       | \$33,570                       |
| BRG Radiotechnikai                  | Solvent                | CFC-113              | 1.50                         | 1.20                                      | 1.20                             | \$0                                   | \$22,845                                | \$22,845                       | \$22,845                       |
| Rutitex                             | Solvent                | CFC-11<br>CFC-113    | 7.61<br>0.33                 | 6.42                                      | 6.42                             | \$355,120                             | (\$14,720)                              | \$340,400                      | \$340,400                      |
| Fire Protection Association         | Fire Extinguisher      | H-1211<br>H-1301     | 85.13<br>1.43                | 269.70                                    | 269.70                           | \$417,700                             | \$0                                     | \$417,700                      | \$321,000                      |
| Financial Intermediary <sup>1</sup> |                        |                      |                              |   |                                  |                                       |   |                                |                                |
| Contingency <sup>1</sup>            |                        |                      |                              |   |                                  |                                       |   |                                |                                |
| <b>Total</b>                        |                        |                      | <b>1,144.36</b>              | <b>1,156.93</b>                           | <b>1154.08</b>                   | <b>\$7,796,493</b>                    | <b>\$340,562</b>                        | <b>\$8,165,555<sup>1</sup></b> | <b>\$6,687,873<sup>1</sup></b> |

<sup>1/</sup> Ozone-Depleting-Potential (ODP) is a concept which has been developed to aggregate the impacts of all ozone depleting substances (ODS) on the ozone layer. Since not all ODS are equally damaging to the ozone layer, their effects on the ozone layer must be weighted by the appropriate damage factor. For example, CFCs are ten times as damaging as 1,1,1-Trichloroethane (TCE), so TCE only receives a weight of 0.10.

<sup>2/</sup> Incremental costs are defined as those costs of ODS phaseout which would not have been incurred in the absence of the Montreal Protocol. Estimates of incremental capital and operating costs are based on the methodology developed by the Multilateral Fund of the Montreal Protocol.

Annual Intermediary Fee (expected to be 2-3%) and Contingency (expected to be 5-10%) to be determined during Appraisal to ensure that total project cost does not exceed \$9.4 million and GEF Grant does not exceed \$6.9 million. It is expected that the amount to be included under Contingencies (5-10%) will be offset by an equivalent reduction in project financing which will be attributable to excluding exports to non-GEF countries from eligibility for GEF financing under the Project. This reduction due to the exclusion of exports has not yet been calculated and included/reflected in the table above.

## ANNEX A: PROJECT DESCRIPTION AND COSTS

### HUNGARY: PROJECT FOR THE PHASEOUT OF OZONE DEPLETING SUBSTANCES

1. The project consists of (i) an Institutional Strengthening Component (Sub-Project 1); (ii) a Recovery, Reclamation, and Recycling Component (3R-Component) for ODS used as refrigerants (Sub-Project 2); and (iii) an Investment Component comprising fourteen Sub-Projects (Sub-Projects 3-15). Below is a description of each of these components. Comprehensive Sub-Project descriptions are provided in the Technical Report.
2. **Sub-Project 1 -- Project Implementation Unit.** The MERP will set up an ODS Phaseout Project Management unit (PIU) to be supported by a Technical Advisory Group (TAG) of Hungarian specialists who will be appointed by the PIU. The PIU will coordinate the implementation of the Project, oversee procurement and disbursement for Sub-Projects 1-15 in compliance with World Bank guidelines, and in close cooperation with the Corvin Bank (CB), supervise project activities according to the requirements of the World Bank and the MERP. As necessary, the PIU will arrange for technical assistance and consultants to assist in project implementation, and provide support to facilitate cooperation among government institutions and the producers and consumers of ODS. Finally, the PIU will be responsible for calling meetings of the TAG, which will be responsible for providing technical support to ODS consumers and producers in the implementation of investment Sub-Projects aimed at ODS Phaseout. Funding for this Sub-Project amounts to US\$244,500 to cover salaries, office equipment and the cost of hiring international consultants for supervision and review during implementation of the Sub-Projects.
3. **Sub-Project 2 -- Reduction of the emission of ozone depleting freon gases through recovery, reclamation, and recycling of refrigerants.** The objective of the Sub-Project is to decrease the amount of CFC-11, CFC-12 and CFC-502. These substances are used and discharged during the maintenance and repairs of domestic, commercial, and industrial refrigerators, and air conditioners. The Sub-Project establishes a national network to remove these ozone depleting substances from refrigerators and to collect and regenerate them. There are approximately 2000 qualified refrigerator fitters in Hungary, and it is expected that the Association will work with 75-80 percent of the qualified refrigerator fitters. Under this Sub-Project the refrigerator fitters will learn the new closed system repair and maintenance technology which will be required to operate the recovery, reclamation, and recycling scheme for refrigerants which is expected to recycle 450 tons of CFCs per year. The total cost of the Sub-Project is US\$2,042,670. The Association will cover US\$627,175 of the total incremental cost of the Sub-Project, and the GEF Grant will cover US\$1,415,495.
4. **Sub-Project 3 -- Phaseout of ozone depleting substances in the manufacturing of refrigerators and freezers at Frigolux Ltd.** The objective of the Sub-Project is to phaseout the consumption of various ODS by 90 percent per year. Present consumption includes 3.8 tons of CFC-12 and 0.85 tons of CFC-502 refrigerant, as well as 11 tons of blowing agent CFC-11 which will be displaced with the implementation and use of low ozone-depleting R-141 blowing agent and

the R-22 and R-134a cooling material. The choice of alternate technologies and materials is based on several criteria, including costs and the experience of the enterprise and the foreign technology partner with the chosen alternatives. For these changes new filling equipments, vacuum pumps, gas detectors, and temperature control units are to be procured and put into service. The Sub-Project includes training, which is necessary for the implementation of the new technologies, and some elements of servicing. The first phase of the Sub-Project was carried out between June 1994 and December 1994. In the first phase, the phaseout of the ODS was not complete, since the emission of ozone depleting substances equivalent to about 1.8 tons of ODP will continue. By the end of the second phase (through 1996), ozone depleting substances will not be used. The total cost of the Sub-Project is estimated at \$572,864. Frigolux Ltd. will cover US\$96,800 of the total incremental cost of the Sub-Project from its own sources, while the remaining incremental costs of the Sub-Project (US\$476,064) are to be financed by the GEF grant.

5. **Sub-Project 4 -- CFC-11 free polyurethane foam processing for the heat-insulation of hot water storage tanks at the Hajdusagi Iparmuvek Company.** The objective of the Sub-Project is to phase out annual consumption of 63 tons of CFC-11 PU-blowing-agent propellant through construction alterations, the establishment of a storing park, and the installation of a foaming machine which uses high pressure water/CO<sub>2</sub> as propellant. During the first ten months (January-October 1994), the high pressure foaming machine using water/CO<sub>2</sub> as propellant (which is necessary for the new process which will not use foams with CFC-11) was put into operation. In the first phase, technological experiments and heat loss tests were also carried out with the foams which do not contain CFC-11. In the second project phase from November 1994 to December 1995, the foaming in form or pillory is to be worked out and inaugurated, and the construction modifications are to be planned and carried out depending on the results of heat loss tests. In the third phase between January and December 1996, the transportation and storage system of the polyurethane base are to be rationalized. The total cost of the Sub-Project is estimated at \$1,406,000. Hajdusagi Iparmuvek Company will cover US\$355,000 of the total incremental cost of the Sub-Project from its own sources, while the remaining incremental costs of the Sub-Project (US\$1,051,000) are to be financed by the GEF grant.

6. **Sub-Project 5 -- Phaseout of ozone depleting CFC-11 freon in sandwich panel production at Metalucon Ltd.** The objective of the Sub-Project is to phase out annual consumption of 45.6 tons of CFC-11 freon blowing agent. In the first phase of the Sub-Project the CFC-11 freon will be substituted with the much lower ozone depleting HCFC-141b blowing agent. To carry out this change, new foaming equipment which uses the new blowing agent will be procured, and the temperature adjustment of the electric heating of the foaming frames will be assessed. In the second phase of the Sub-Project, cyclopentane will be substituted for HCFC-141b blowing agent. The first phase of the Sub-Project is planned to be executed in 1995-1996, and the second phase in 1997. The most important parts of the first phase are the procuring and putting into service of the foaming equipment, the stirrer, the tanks, and the injection device, and the realization of the electric heating and temperature adjustment of the foaming frames. In the second phase of the Sub-Project the implementation of the cyclopentane blowing agent will be possible without any investment cost because the equipment installed under the first phase can be converted to use cyclopentane. The total cost of the Sub-Project is estimated at \$884,608. Metalucon Ltd. will cover US\$160,289 of the total

incremental cost of the Sub-Project from its own sources, while the remaining incremental costs of the Sub-Project (US\$724,319) are to be financed by the GEF grant.

7. **Sub-Project 6 -- Phaseout of ozone depleting CFC-11 freon in sandwich panel production at Metisol Ltd.** The objective of the Sub-Project in the first phase is to substitute for annual use of 80 tons of CFC-11 blowing agent with HCFC-141b blowing agent. This will entail necessary technological changes, reconditioning certain equipments, changing the temperature adjustment, and technical assistance. During the second phase of the Sub-Project in 1997, the phaseout of the consumption of ozone depleting substances will be complete. The execution of the first phase of the Sub-Project took seven months from June-December 1994. The total cost of the Sub-Project is estimated at \$441,207. Metisol Ltd. will cover US\$95,185 of the total incremental cost of the Sub-Project from its own sources, while the remaining incremental costs of the Sub-Project (US\$346,022) are to be financed by the GEF grant.
8. **Sub-Project 7 -- Phaseout of CFC propellant in gas-sterilizer cartridge production using ethylene oxide at Mediroll Ltd.** The objective of the Sub-Project is to phase out annual consumption of 107 tons of CFC 12 with HCFC-124 propellant and to carry out the development work and the obligatory sterilizing tests. The Sub-Project will be carried out in two phases. The first phase should take four months, and the second twelve months. The total cost of the Sub-Project is estimated at \$58,253. Metalucon Ltd. will cover US\$4,854 of the total incremental cost of the Sub-Project from its own sources, while the remaining incremental costs of the Sub-Project (US\$53,399) are to be financed by the GEF grant.
9. **Sub-Project 8 -- Phaseout of CFC-11, CFC-12, and 1,1,1-Trichloroethane solvents and propellants at Auto-Mobil Ltd.** The objective of the Sub-Project is to phase out annual consumption of 28 tons of CFC-11, 64 tons of CFC-12, and 47.6 tons of 1,1,1-Trichloroethane ozone depleting substances through the application of other propellants such as propane-butane gas and compressed air. The execution of the Sub-Project will take six months. The planning phase of the Sub-Project was between June 1, 1994 and September 31, 1994, and its execution phase between October 1, 1994 and December 31, 1994. The total cost of the Sub-Project is estimated at \$83,512, of which the entire amount will be financed by the GEF Grant.
10. **Sub-Project 9 -- Modification of cleaning technology of automatic and electronic parts of oil and gas pipelines, substituting for CFC and 1,1,1-Trichloroethane solvents with water based solution at MMG-AM Ltd.** The objective of the Sub-Project is to phase out annual consumption of 87 tons of 1,1,1-Trichloroethane and 3.5 tons of CFC ozone depleting substances by conversion to a water-based solution using washing technology. During the execution of the Sub-Project seven modern ultrasonic washing appliances will be bought and installed. These new appliances use water based solution, and will be substituted for eight degreasing washing appliances which employ 1,1,1-Trichloroethane and CFCs. The investment Sub-Project also includes: (i) ventilation plants, which are to be installed at the washing appliances, (ii) a recirculating water-using rinsing appliance, and (iii) a solution desalting appliance, which is based on reverse osmosis. The realization of the Sub-Project should take six months. The Sub-Project is divided into three phases. In the first phase preparatory research and development works (experimental degreasing with modern water based washing solution, experimental soldering, etc.), planning tasks, and tasks related to

ordering will be executed. The second phase consists of the installation and of the new appliances. In the third phase of the Sub-Project the operating parameters of the new appliances will be set. The total cost of the Sub-Project is estimated at \$1,506,100, of which \$1,233,179 will be financed by the GEF Grant.

11. **Sub-Project 10 -- Phaseout of 1,1,1-Trichloroethane photoresistant developer with alkalic solution in the manufacturing of printed circuit panels at Hitelap Ltd.** The objective of the Sub-Project is to phase out the annual consumption of 32 tons of 1,1,1-Trichloroethane, by developing products in water based solutions, and washing with water. The Sub-Project will substitute for the old developer and washer by procuring and putting into service modern equipment. A new sewage cleaning plant is to be installed to make it possible to treat the sewage water. The execution of the Sub-Project will take ten months. It will consist of planning, and putting into operation the alkalic developer, the washer, and the coagulant filter -- including the introductory operation. The total cost of the Sub-Project is estimated at \$193,940, of which \$179,789 will be financed by the GEF Grant.

12. **Sub-Project 11 -- Conversion from release agent solvent to solvent free release agent substance, and from the consumption of 1,1,1-Trichloroethane to water based cleaning in polyurethane sole producing at Tisza Shoe Company.** The objective of the Sub-Project is to phase out annual consumption of 3.7 tons of CFC-11 solvent, 16.78 tons of 1,1,1-Trichloroethane washing liquid, and 5.6 tons release agent which contains 1,1,1-Trichloroethane through the application of a new release agent, installation of a new sprinkler device, and use of a water-solution washer. The new release agent is completely solvent free, and consists of a mixture of waxes and silicon oils. A sewage treatment facility must be installed and the ventilation system updated. The execution of the Sub-Project will take ten months. In the first phase of the Sub-Project (April 1-June 30, 1995) the alternative substances, technologies, and equipments are to be chosen, tests are to be carried out, and permits are to be obtained. In the second phase of the Sub-Project the old equipments are to be detached, the new strewing equipment, water-using washer, and water treatment facility are to be installed, the ventilation is to be up-dated; and the staff is to be trained (July 1-September 30, 1995). In the final phase, the new technologies are to be installed and checked (October 1- December 31, 1995). The total cost of the Sub-Project is estimated at \$211,390 of which \$175,958 will be financed by the GEF Grant.

13. **Sub-Project 12 -- Conversion from open system vapor phase washing with CFC-113 to closed system washing with perchloroethylene at Fovarosi Finommechanikai Ltd.** The objective of the Sub-Project is to phase out annual consumption of 1.50 tons of CFC-113 ozone depleting substances by switching over from an open freon system using washing to a closed perchloroethylene system based on washing. The Sub-Project will be realized in three phases. During the first phase, the alternative cleaning technologies and cleaning substances will be evaluated, and experimental production will be done with the selected substances. In the second phase of the Sub-Project, the freon-using washer will be detached, the two renewed closed system perchloroethylene-using washers will be installed and put into service, the staff will be trained in the new technology, and the operating parameters of the new washing technology will be set. In the third phase a closed system of perchloroethylene-based washing will be applied and the technology will be tested. The total cost of the Sub-Project is estimated at \$33,570, of which the entire amount will be financed by the GEF Grant.

14. **Sub-Project 13 -- Conversion to soldering with residue free fluxic soldering tin instead of cleaning with freon after soldering at the BRG Radiotechnikai Company.** The objective of the Sub-Project is to phase out annual consumption of 1.5 tons of CFC-113 ozone depleting substance through the implementation of the modern MULTICORE soldering tin, which makes washing with freon unnecessary. Although the composition of the flux of the modern MULTICORE-made soldering tin makes the washing after soldering unnecessary, its application increases the soldering time, and therefore the working time and the consumption of electric energy. For this reason BRG must employ 32 people instead of 30 for soldering jobs, in order to avoid that the new technology decrease its output. The duration of the Sub-Project is one month, and the Sub-Project is divided into three phases. During the first phase, alternative soldering substances and cleaning technologies were evaluated and trial producing was done with the chosen substances. In the second phase the staff was trained for the new soldering technology, the materials and the soldering iron edges needed for the new technology were procured. In the third phase the new soldering technology is to be tested in manufacturing. The total cost of the Sub-Project is estimated at \$22,845 to be financed by the GEF grant.
15. **Sub-Project 14 -- Conversion from freon-using cloth cleaning machines to perchloroethylene-using machines at the Rutitex Company.** The objective of the Sub-Project is to phase out annual consumption of 7.9 tons of CFC-11 and CFC-113 freon ozone depleting substances through the substitution for freon-based cleaners with new perchloroethylene-based cleaners. During the Sub-Project four closed system perchloroethylene-based cleaners will be bought. The execution of the Sub-Project will take eight months. The total cost of the Sub-Project is estimated at \$355,120, of which \$340,400 will be financed by the GEF Grant.
16. **Sub-Project 15 -- Regenerating and closed system draining of extinguishing gases at the member companies of the Fire-Protection Association.** The Fire-Protection Association was established in 1994 by the decision of the Elzett Safety Technology Company, Fajro Automatics and Fire-Protection Equipment Producing Ltd., and the Fire-Protection Education and Research Institution. The objective of the Sub-Project is to recycle 2,764 tons of halon 1211 and 159 tons of halon 1301 extinguishant. As a benefit of the Sub-Project the emission of 122.55 tons of halon 1211 and 2.51 tons of halon 1301 extinguishant would discontinue by putting into service regenerating devices, closed system draining devices, and other additional devices (evaluating and measuring instruments, etc.). The realization of the Sub-Project will take four months. In the first phase the old equipment will be dismantled and the new ones will be installed at Elzett and Fajro. The second phase will be carried out in two months and will consist of the training of the controlling staff. The Sub-Project will include the following items: (i) procurement of thirteen personal computers and printers; (ii) organization of the computers and printers into a geographic information system (GIS); and (iii) putting into service and testing of the system. The total cost of the Sub-Project is estimated at \$417,700, of which the amount of \$321,000 will be financed by the GEF Grant.



**SUMMARY AND RECOMMENDATIONS  
OF THE TECHNICAL REVIEW**

**HUNGARY: PROJECT FOR THE PHASEOUT  
OF OZONE DEPLETING SUBSTANCES**

1. The technical review for the Hungary Ozone-Depleting Substances (ODS) Phase-Out Project, as for all ODS projects, consists of two parts: (a) the overall analysis of project and program integrity, priority of subprojects, and consistency with other ODS projects financed by the Multilateral Fund for the Implementation of the Montreal Protocol; and (b) technical analysis of individual subprojects, undertaken by the Ozone Operations Resource Group (OORG). The OORG was established by the World Bank to undertake the analysis of proposed subprojects for funding under the Multilateral Fund. It uses standard criteria against which it judges the technical viability and cost-effectiveness of a given subproject. These criteria include appropriateness of the technology, environmental impact, project costs, implementation time frame, lessons from past experience, safety issues and final recommendations.
2. The STAP technical reviewer felt the project as a whole is well planned, and with the revisions suggested, it should be funded. The overall project will lead to a reduction of about 50% in Hungary's ODS consumption. Although the recycling-reclamation-recovery component will reduce ODS by only a modest amount, this component is deemed important to establish operational procedures for long-term ODS savings.
3. At the time of this technical review, the OORG had reviewed the 15 subprojects at least once, and the six subprojects still needing revisions were in the process of resubmitting proposals to incorporate the design modifications recommended by OORG. The issues raised by OORG related to technology transfer guarantees from the supplier and use of HFCs (refrigeration sector), use of undesirable substances (solvents sector), and capital and operating costs (halon sector). These 6 subprojects have subsequently been revised and approved by OORG.
4. The reviewer questioned the costs of the institutional strengthening and monitoring components, given the short life of the project, and recommended that the life and budget of the Project Implementation Unit (PIU) be reduced to appropriately lower levels. Likewise, the data control and information system and the monitoring office would not have time to contribute meaningfully to the project, so the reviewer recommended that some of these functions be taken on by the PIU. The institutional network strengthening activities are very important, but their budget could be reduced and tasks more clearly defined. A long-term UV-B monitoring component should be added to the project to follow future changes in UV-B. At present, no country in Eastern Europe is monitoring UV-B.

## RECOMMENDATIONS

5. Fourteen of 15 sub-projects have been approved by OORG, including the 3-R component. The institutional strengthening component is currently being revised by the Ministry to take the reviewers' comments into account. The revised proposal will be ready by appraisal.

### Proposal for Review

**Project Title:** Russian Federation: Phase-out of ODS: Phase I

**GEF Focal Area:** Phaseout of Ozone Depleting Substances

**Country Eligibility:** The Former Soviet Union (FSU) ratified the Montreal Protocol in November, 1988 as a developed country. The Russian Federation continues the FSU membership in the Protocol and ratified the London Amendments in January, 1992.  
GEF eligibility on basis of IBRD eligibility.

**Total Project Costs:** \$90.1 million

**GEF Financing:** \$8.6 million\*

**Counterpart Enterprise Financing of GEF Component:** \$3.4 million

**Associated Project:** None

**GEF Implementing Agency:** World Bank

**Executing Agency:** World Bank

**Local Counterpart Agency:** Ministry of Environment

**Estimated Starting Date (Effectiveness):** October, 1995

**Project Duration:** 2 years (Phase I)

**GEF Preparation Costs:** \$950,000 in Project Preparation Advance  
\$300,000 from U.S. Trade and Development Agency

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\* Council's approval of the project, and of an allocation of US\$8.6 million to cover costs of Phase I activities, is sought. After Phase I disbursement commences, a project proposed for Phase II, including a work plan and budget, will be submitted to GEFOP for its review with a view to inclusion of the Phase II project proposal in a subsequent work program. Total GEF financing to be requested is \$60 million.

## RUSSIAN FEDERATION

## PHASEOUT OF OZONE DEPLETING SUBSTANCES

## INTRODUCTION

1. Russia recognizes its legal obligations as a developed country signatory to the Montreal Protocol respecting targeted ODS phase out schedules. However, the country's economic capability to complete this task has declined significantly, since ratifying the London Amendments in 1992. As a consequence, it has fallen behind in phase out activities and will not be able to meet its phase out schedule obligations. A number of steps have been initiated to ensure that its obligations are met. Responsibility for ODS phase out activities has been assigned to the Ministry of Environmental Protection and Natural Protection (MEPNR). A comprehensive Country Program as described below has been developed and adopted by the government. This Program acknowledges that Russia is out of compliance with its obligations and proposes a revised phase out schedule. Russia intends to present its Country Program to the Global Environmental Facility (GEF) Council and to the Parties to the Montreal Protocol in May 1995, formally acknowledging its non-compliance status and confirming its commitment to the revised phase out schedule. Similarly, Russia is expected to be a developed country contributor to the Multilateral Fund for the Implementation of the Montreal Protocol (Multilateral Fund), with in-kind contributions. While no contributions have been made to date, Russia has undertaken to resolve its arrears position when its economic conditions improve, and will discuss this matter with the Montreal Protocol Implementation Committee in May 1995.

## SECTOR AND COUNTRY BACKGROUND

2. General recognition of upper atmosphere ozone depletion in the mid-1980's has led to a substantial international effort to phase out Ozone Depleting Substances (ODS). These include chlorofluorocarbons (CFC's), halons, several halogenated solvents, and a class of transitional chemicals known as hydrochlorofluorocarbons (HCFC's). The basis of this effort is the 1987 Montreal Protocol, ratified by all developed and most developing countries. Further recognition that ozone depletion is occurring more rapidly than first anticipated has led to two protocol amendments which add materials and accelerate phase out. The first in June, 1990 (London Amendment) added the two solvents, methyl chloroform (MCF) and carbon tetrachloride (CTC), as well as tightening the phase out schedule. The Copenhagen Amendment in November, 1992 added HCFC's and methyl bromide as regulated substances, as well as further accelerating phase out. The current, developed country phase out date for CFC's, MCF, and CTC is January 1996 with halons being January 1994. Production levels of transitional HCFC's are frozen as of January 1996 with progressive reduction to phase out in 2030.

3. Russia is one of the world's largest producers and consumers of ODS. In 1990 when production peaked, it was estimated that 198,000 MT was produced, accounting for between 15 - 20% of world production. In 1992, Russian ODS production had fallen by 26% to 146,500 MT. This production supplies 100% of the domestic market, as well as the requirements of the countries of the FSU, and other export markets that continue to exist. Russian domestic consumption also

peaked in 1990 at approximately 70,000 MT and had fallen by 40% to 48,365 MT in 1992. Consumption continues to decrease primarily due to the economic downturn and, to a lesser extent, phase out action that has been taken. Five sectors account for Russia's ODS use: aerosols (46%), refrigeration and air-conditioning (27%), solvents (14%), foams (11%) and fire protection (2%).

4. The Former Soviet Union (FSU) ratified the Montreal Protocol in November, 1988 as a developed country. The Russian Federation continues the FSU membership in the Protocol and in January, 1992, Russia ratified the London Amendments. However, ratification of the Copenhagen Amendments has not occurred. Based on its ratification status as a developed country under the Montreal Protocol, Russia's obligations for ODS phase out are in accordance with the accelerated developed country schedule for halons (January 1994), and for CFC, CTC and MCF (January 1996).
5. Development of the ODS phase out Country Program was completed in August 1994 with Danish support and World Bank technical input. A position paper based on the Country Program has been prepared by MEPNR, describing an achievable phase out program which has been adopted by the Government. Assuming international financial assistance is available, it targets ODS phase out for 1999, somewhat ahead of the London Amendment schedule (January 2000), but slower than the Copenhagen Amendment schedule (January 1996). Production would be phased out consistent with domestic consumption phase out schedules, and phase out in countries of the FSU to which Russia is the sole supplier, particularly Ukraine and Belarus. For this reason, Russia's export of ODS to other countries after January, 1996 also would have to be accommodated on a transitional basis.
6. Russia has also established the basic institutional structure to support the administration of the proposed ODS phase out program. An Inter-Agency Commission has been created to coordinate ODS policy among all relevant government agencies with specific subcommissions dealing with legal, technical, economic/institutional, and monitoring aspects. An ODS Task Force has been established by ministerial decree within MEPNR. It has been assigned overall responsibility for implementing the national phase out strategy and to act as a secretariat for the Inter-Agency Commission. As documented in the Country Program, various policy and regulatory initiatives are currently under development within MEPNR including the issuing of production/import licenses, the introduction of sector specific bans, and allocation of economic support for ODS replacement projects at the industry level from Russian and international sources. These institutional strengthening initiatives specific to the phase out of ODS are consistent with Russia's overall commitment to increasing its overall institution capacity in environmental management. The country is currently investing US\$60 million in such strengthening related to various environmental problem areas through the World Bank Environmental Management Project Loan.
7. Because of its limited financial and technical capacity, Russia has made little progress to date with ODS phase out. Therefore, it has requested GEF assistance to accelerate this work. Provision has been made for the GEF to provide limited financial support to transitional economies that do not meet Multilateral Fund criteria on country grounds, but nevertheless need technical and financial assistance. In addition, it has requested the World Bank to assist it to mobilize donor funding for additional phase out initiatives covering both production and consumption.

## PROJECT OBJECTIVES

8. As one of the World's largest producers and consumers of ODS, Russia's contribution to global ozone depletion is a major one. With the rapid phase out progress being made in other countries, Russia's relative contribution will further increase. For this reason, the implementation of the proposed Country Program, prepared along the same lines as country programs for the Multilateral Fund, is viewed as an international priority in addressing the overall global issue. Within the context of the country programming exercise, this project's main objective is to assist Russia with the rapid phase out of ODS consumption in a manner consistent with international efforts in the field, while ensuring that this is accomplished with a minimum of economic dislocation.

The project's more specific objectives are: i) to allow Russia to credibly meet its obligations under the Montreal Protocol within a realistic time frame; ii) to facilitate access to financial resources needed for ODS phase out from a range of international and domestic sources; iii) to provide modest technical assistance and institutional strengthening as required; iv) to fund enterprise specific investments in critical high consumption sectors; and v) to ensure that ODS phase out activities accommodate economic and social impacts that may result.

## PROJECT DESIGN AND DESCRIPTION

9. The overall GEF project targets priority phase out activities in the aerosol and refrigeration sectors, along with the provision of modest technical assistance at both the institutional and enterprise levels to facilitate and accelerate Country Program implementation. It is structured as a framework project consisting of a series of sub-projects eligible for a total GEF funding amount of US\$60 million. The proposed sub-projects are listed in Annex 1 and account for a total incremental investment of US\$89 million. The sub-projects have been selected for appraisal by MEPNR with World Bank assistance, based on the project preparation work in the aerosol and refrigeration sectors, undertaken under a GEF Project Preparation Advance. They have been reviewed and approved by the Ozone Operations Resource Group (OORG) established by the World Bank to provide technical advice on technology selection under the Multilateral Fund. It is anticipated that the sub-projects will be processed in several tranches as funds are approved by the GEF Council. The first tranche request of US\$8.6 million applies specifically to two enterprise sub-projects in the aerosol sector, listed in Annex 1, as well as for technical assistance to strengthen project implementation capability and for preparation of future sub-projects.

10. Aerosol Sector ODS consumption in the form of CFC propellants in Russia likely represents the largest and most cost effective single consumption phase out opportunity in the world today. The Russian Federation has an established aerosol industry that continues to consume large quantities of CFC's. The CFC aerosols (78% of total aerosols) are strongly favored by the cosmetic industry and are selling readily even in a suppressed economy. In 1992, consumption of CFC's by the aerosol industry totaled 33,000 metric tons, approximately 46% of the total ODS consumed in Russia. The two sub-projects which are submitted for consideration by the GEF for this first tranche account for 14% of the ODS used by this important industry. In total, an estimated 4,579 MT will be phased out. Phase out in the aerosol sector is efficient and cost effective with low unit abatement costs. The effectiveness of the GEF grant is enhanced for the two sub-projects since the enterprises will

fund a significant portion of the costs, with the GEF grant serving as a key stimulus for enterprise investment. This phase out can be achieved relatively quickly, with a targeted completed date of late 1997. The two aerosol sub-projects all utilize hydrocarbon aerosol propellant (HAP) as a replacement for CFC propellant in common aerosol sprays. HAP is a purified form of liquid petroleum gas (LPG) and is available in limited quantities in Russia. The technology for use of HAP has developed globally since 1980 and is readily available. Current Russian capacity is estimated at 1,000 MT/year with potential existing for additional capacity to be added rapidly as demand develops. In addition, excess capacity exists in several neighboring European countries.

11. For each sub-project, unique features affect the estimates of incremental project costs. Arnest can reuse its can making facility but must replace its valve facility and convert filling to HAP. Halogen only needs to convert filling to HAP. Annex 2 provides a summary of these projects as proposed for the first tranche request. Novosibirsk is the largest CFC consumer, and in order to safely use HAP must upgrade its entire can and valve making facility plus convert its filling operation. Existing can manufacturing cannot produce aerosol cans strong enough to withstand the higher pressures required for HAP. Precision valves are required to minimize leakage during storage hence reduce fire hazards associated with use of HAP. This subproject has been approved by GEFOPS and will be presented in the next tranche.

12. Refrigeration Sector ODS consumption of refrigerant (CFC-12) and for foam insulation (CFC-11) in the manufacture of domestic, commercial and industrial refrigeration products, involves 4,028 MT/year of ODS material. In addition, the refrigeration servicing sector is estimated to account for an annual consumption of 4,500 MT/year. Project preparation work has identified thirteen sub-projects originating in seven of the largest manufacturers of domestic refrigerators, and two sub-projects in the commercial and industrial refrigeration sectors that are ready for appraisal. From these, six sub-projects in domestic refrigeration manufacturing enterprises and one sub-project in an industrial refrigeration compressor manufacturer have been selected based on OORG review recommendations for inclusion in the Project in latter tranches (Annex 1). These sub-projects provide 1567 MT/year of ODS phase out based on 1993 consumption and 2,212 MT/year of ODS phase out based on production capacity. They involve the replacement of CFC-12 refrigerant with HFC-134a or potentially hydrocarbons (isobutane), and the replacement of CFC-11 or CFC-12 insulating foam blowing agents with either cyclopentane or HFC-134a. Use of HFC-134a or hydrocarbons is a generally accepted choice for refrigerant replacement in many western countries, but requires redesign of refrigeration circuits and compressors. HFC-134a is not currently available in Russia, although this is anticipated within five years. Cyclopentane is a globally accepted foam blowing agent substitute in refrigeration applications, and offers equivalent long term properties to CFC-11 foams.

13. Technical assistance will supplement current resources, including those available through the World Bank's Environmental Management Project and will be directed to several key areas. Firstly, resources will be provided directly to MEPNR to support the regulatory and institutional actions proposed for the overall ODS phase out program as outlined in the Country Program. These actions include: a) development of an ODS production and consumption data reporting/monitoring system as recommended by the Scientific and Technical Panel (STAP) reviewer; b) implementation of ODS production import/export licenses and charges; c) introduction of sector specific bans; and d)

establishment of an ODS account in the Federal Environment Fund. Secondly, feasibility studies will be funded in the following areas: a) evaluation of supply options for hydrocarbon based substitutes including HAP's; b) investigation of drop-in ODS substitutes for existing refrigeration equipment; and c) development of effective organizational and training arrangements for refrigeration servicing.

#### KEY PROJECT DOCUMENTS

14. Several background reports were written as part of the Country Program exercise. In addition, detailed sub-project descriptions and the technical reviews of these sub-projects are on file in ENVGC. The above documents are available from R. Batstone (fax 202-477-3285) and from ENVGC (fax 202-522-3256).

#### RATIONALE FOR GEF FINANCING

15. Russia represents a major producer and consumer of ODS material, but lacks the financial capacity to undertake comprehensive phase out in accordance with its obligations under the Montreal Protocol. In excess of US \$220 million is estimated to be required for phasing out ODS production and consumption in Russia. As a developed country signatory to the Montreal Protocol, it is not eligible for support from the Multilateral Fund, but is eligible for GEF funding. The project is consistent with GEF Guidelines for ODS phase out. These guidelines have been carefully developed to reflect Montreal Protocol policies and procedures, thus ensuring consistency of approach between GEF and Montreal Protocol projects. These guidelines endorse working with a range of enterprise specific sub-projects that offer substantive ODS phase out gains, but require investments for which the beneficiary enterprise would not be able to obtain sufficient financing from commercial sources. Within these sub-projects, grant funding is limited to eligible incremental investment costs, while the enterprises are responsible for financing the balance from their own resources or loans. Integration of the project's implementation with other Bank initiatives in the Russian Federation, particularly the National Pollution Abatement Fund (NPAF), will facilitate additional financing as well as draw on the project management capability within MEPNR provided under the Environmental Management Project (EMP), of which the NPAF is a major component.

#### SUSTAINABILITY AND PARTICIPATION

16. The overall project's sustainability is based on Russian Federation's policy commitment to ultimately meeting the country's obligations under the Montreal Protocol, and to provide a sound institutional and policy framework for its overall ODS phase out program. This institutional and policy framework will be supported by the EMP, along with the provision of modest additional technical assistance to MEPNR for strengthening its ODS phase out implementation operations. Sustainability of enterprise specific sub-projects has been assured through a thorough evaluation of proposed technologies and their cost effectiveness in relation to other alternatives. Participating enterprises will be further subject to a financial viability evaluation as a prerequisite to sub-project appraisal and final selection. Assessment of domestic and export market potential will be included in this evaluation, as well as enterprise financial management and marketing plans.



17. As part of the development Country Program, the Ministry of Environment undertook consultations with a broad spectrum of enterprises and interested parties: other ministries--including industry, economics, finance--NGOs, industry associations and others. Enterprises were given the opportunity to participate in the project as long as they could provide the necessary data for project staff to evaluate their financial viability, technological capabilities and eligibility for financial assistance. Consultations with enterprises and other interested parties continued through a series of country workshops held under the aegis of the Montreal Protocol on identification, preparation and implementation, as well as during actual project design.

#### **LESSONS LEARNED AND TECHNICAL REVIEW**

18. The proposed project is only the second GEF funded ODS phase out project to be initiated and, therefore, direct World Bank experience and associated lessons are limited. However, as one of the Multilateral Fund Implementing Agency, the World Bank is now implementing ODS phase out projects in fifteen countries. A number of lessons have been learned from experience with these projects including: a) the importance of a national phase out policy or Country Program as a basis assuring commitment and ownership by the client country; b) the value of strong enterprise/government linkages to achieve phase out objectives; c) the need for institutional strengthening and training for local implementation units and financial intermediaries; d) the utility of using umbrella grant agreements with the Multilateral Fund supporting a pipeline of sub-projects subject to individual appraisal and approval; and e) the importance of technical support in the preparation and review of sub-projects. Additional lessons have been learned from other World Bank projects in Russia, including the importance of: a) identifying a consistent committed counterpart team with sufficient authority to move the project forward; b) coordinating among key interested parties at the federal, regional and enterprise levels; c) early detailed attention to procurement and other implementation issues; and d) involving local consultants and institutes in the process.

19. The design, preparation and structure of the project incorporates these lessons in a number of ways. Project preparation work has involved a well defined country program and identification of a wide selection of sub-projects. The umbrella grant agreement model, covering a sub-project pipeline, is being utilized. Technical assistance has been provided to strengthen institutional capacity within the government, implementing agency and enterprises has been provided for. Project processing procedures will parallel those used for Multilateral Fund projects, including the utilization of the technical review capability established for these projects. STAP and OORG technical reviewers were used to review the initial pipeline of nineteen sub-projects identified during project preparation. As a result of this initial review, nine were rejected or identified as requiring substantial additional preparation. In addition, modifications to those approved were identified for incorporation during appraisal. Finally, established local implementation organizations developed through other Bank initiatives will be utilized.

#### **PROJECT FINANCING AND BUDGET**

20. Under the proposed GEF ODS Phase Out Umbrella Program, the total project cost is estimated to be US\$90.1 million, including US\$72.8 million in eligible incremental investment costs and US\$15.4 million in incremental operating costs, net of operating cost savings . US\$38.3 million

will be financed by enterprises funds, commercial banking sources and an ODS sub-loan window established within the NPAF. The proposed GEF grant of US\$60.0 million will cover up to 100% of eligible incremental investment and one time costs for sub-projects, consistent with Multilateral Fund incremental costs eligibility criteria, but will exclude incremental operating costs where they apply. The proposed GEF grant includes US\$1.6 million for a financial agent charge (3% of grant).

21. For the two aerosol sub-projects proposed for the first tranche, the net direct total cost, allowing for operating cost savings is estimated to be US\$8.34 million. US\$10.88 million in incremental investment costs will be incurred with incremental cost savings of US\$2.53 being realized. US\$3.34 million will be financed by enterprises funds, commercial banking sources and an ODS sub-loan window established within the NPAF. The proposed GEF grant of US\$8.6 million will cover up to 100% of eligible incremental investment, net of incremental operating cost savings, plus US\$0.23 million in financial agency fees (3% of grant) and US\$0.83 million in technical assistance. Agreements will be drafted at appraisal on the arrangements for co-financing sub-projects and the use of the NPAF for project appraisal and supervision.

22. Project preparation costs have totaled US\$1,250,000. This includes US\$950,000 provided by GEF Project Preparation Advances and US\$300,000 was donor funded by the United States Trade and Development Agency for development of halon and solvent phase out sub-projects.

#### INCREMENTAL COSTS

23. This project funds only a portion of incremental investment costs, net of any incremental operating cost savings, that may apply. No funding is applied to incremental operating costs with these being borne entirely by participating enterprises. The project's cost effectiveness is defined by the unit abatement costs associated with each sub-project. These compare favorably to unit abatement costs for Multilateral Fund projects in other countries. In particular, the three aerosol sub-projects proposed for the first tranche offer unit abatement costs in the ranging from US\$0.19 to US\$0.30/kg./year based on 1992 production. These unit abatement costs remain relatively low (US\$0.35 to US\$0.60/kg./year) when discounted for lower current consumption levels.

#### ISSUES, ACTIONS AND RISKS

24. Risks associated with the project are generally comparable to other industrial and institutional development activities in Russia. These include: a) the fragmented decision making process on environmental and investment matters at the federal and regional levels; b) the limited enforcement capability to support environmental initiatives; c) conflicting mandates and lack of cooperation between government agencies; d) lack of familiarity with Bank procedures, investment planning, and project management; e) difficulties in arranging financing of local costs for environmental investments; and f) the general economic climate in the country. Project specific risks are primarily associated with the sustained financial viability of participating enterprises, and the need to support ODS consumption phase out with domestic supply of substitute materials and equipment.

25. The project has been designed to mitigate these risks to the maximum degree possible. The general institutional risks associated with activities in Russia are mitigated by the overall institutional strengthening provided by the EMP, and the direct policy and regulatory assistance provided to MEPNR for ODS phase out. Administrative and project management risks are mitigated by focusing the Project's implementation responsibility within the NPAF management unit, along with provision of modest ODS technical and project supervision resources. Risks associated with financing local costs are addressed by provision of co-financing assistance through the NPAF management unit. Project specific risks associated with enterprise viability and technical capability are mitigated by establishing a pipeline of candidate sub-projects from which the most viable and cost effective have been selected, use of commercially proven technology, and the provision of financial planning assistance as part of project implementation. The supply of HAP is expected to be met by private sector suppliers as it would be a commercially viable venture. Initial HAP supply capacity exists in Russia and Ukraine with scope for expansion. This expansion may offer a potential investment opportunity for the NPAF.

26. The project is not expected to cause any significant negative social or environmental impacts. It was prepared with the Russian aerosol and refrigeration sector enterprises to address ODS phase out in a comprehensive, equitable and efficient manner with minimal disruption of the industry, its workers and ultimately to consumers. Potential environmental impacts do exist, including those associated with the flammability and air emissions characteristic of hydrocarbon based non-ODS substitutes, and site specific impacts associated with manufacturing plant developments or modifications. Each sub-project will be subject to environmental assessment in accordance with the guidelines and procedures established by the NPAF management unit to meet both Russian Government and World Bank environmental assessment requirements.

27. The following outstanding issues will be addressed during the course of appraisal and negotiations:

- (a) assurance from MEPNR related to development of regulatory and policy action necessary to support ODS phase out, inclusive of availability of implementation and enforcement resources;
- (b) confirmation of financial viability of participating enterprises, inclusive of ability to support sub-project investments with required financial resources not supplied by the Project;
- (c) agreement on the criteria to be used for final sub-project selection for sub-projects beyond this tranche; and
- (d) development of the umbrella, sub-project, co-financing and NPAF implementation agreements during appraisal for finalization at negotiations.

## INSTITUTIONAL FRAMEWORK AND PROJECT IMPLEMENTATION

28. MEPNR will be responsible for overall project implementation and administration, utilizing the NPAF management unit and Center for Project Preparation and Implementation (CPPI) established for the EMP. Enterprises will be responsible for sub-project preparation and implementation.

29. The NPAF management unit will be responsible for sub-project appraisal, disbursement approvals, approval of sub-loans from the NPAF, co-financing arrangements, progress reports, and ensuring compliance with GEF procedures. The NPAF management unit will also be responsible for managing consultants contracted to carry out feasibility studies under the Project's technical assistance component. The ODS Task Force within MEPNR will be responsible for managing the technical assistance components related to regulatory and institutional activities proposed under the project. The CPPI will be provide procurement services, approved under each tranche.

30. Monitoring and evaluation of project implementation will be carried out by a unit in the Center for Project Preparation and Implementation (CPPI) that has been set up for the EMP. MEPNR is currently implementing a regulatory program which will provide the legal basis for enforcement of the revised phase out schedule as adopted by the Government. Funds for technical assistance to help develop an ODS production and consumption data reporting system are included in the project as the basis of the regulatory program.

31. The project will be covered by an umbrella financial agreement with MEPNR for GEF grant funds to be disbursed to the enterprise specific sub-projects finalized during appraisal, and key elements of technical assistance. Criteria for finalizing sub-project selection for sub-projects beyond this tranche will be agreed at appraisal but would include cost effectiveness, expected impact, and financial viability, consistent with procedures and practices of the Multilateral Fund of the Montreal Protocol. Individual sub-projects will be covered by agreements between MEPNR and the participating enterprises. Both the umbrella agreement and sub-project agreements are to be patterned after those utilized by the Multilateral Fund in other countries. Sub-projects will be approved in accordance with the World Bank's trustee obligations to GEF. Drafts of the umbrella agreement and sub-project agreements will be developed at appraisal and finalized at negotiations.

32. Key implementation activities, dates and milestones for the first tranche covered by this Proposal are:

|   |            |
|---|------------|
| GEF Council Approval                          | May/95     |
| Completion of Enterprise Financial Evaluation | June/95    |
| Completion of Detailed Sub-Project Scope      | June//95   |
| Sub-Project Appraisal                         | July/95    |
| Negotiations                                  | August/95  |
| Date of Grant Effectiveness                   | October/95 |
| Expected Date of Completion                   | October/97 |

A. 1  
SUMMARY OF SUB-PR DATA AND COSTS

| SUB-PROJECT/<br>ENTERPRISE               | SECTOR                      | SUB-PROJECT<br>DESCRIPTION   | ANNUAL ODS<br>USE<br>(MT/YR.)                      | UNIT<br>ABATEMENT<br>COST<br>(US\$/kg/YR.) | INCREMENTAL<br>CAPITAL COST<br>(US\$) | INCREMENTAL<br>OPERATING<br>COST (SAVINGS)<br>(US\$) | TOTAL<br>SUB-PROJECT<br>COST<br>(US\$) | ENTERPRISE<br>FINANCING<br>REQUIREMENT<br>(US\$) | REQUESTED<br>GEF GRANT<br>(US\$) |
|--|-----------------------------|--|--|--|---------------------------------------|--|--|--|----------------------------------|
| JSC Arnest                               | Aerosol                     | CFC to HAP Propellant Conversion   | 3.016MT  | \$0.30/kg. CFC                             | 8,050,000                             | (1,894,000)  | 6,156,000                              | 2,485,000  | 5,566,000                        |
| Halogen<br>Financial<br>Intermediary Fee | Aerosol                     | CFC to HAP Propellant Conversion   | 1.563MT  | \$0.19/kg. CFC                             | 2,826,000                             | (640,900)  | 2,185,100                              | 850,000  | 1,976,000                        |
| Technical<br>Assistance                  | Institutional               | Country Program Implementation,<br>Feasibility Studies, Investment<br>Assistance                 |  |  |                                       |  | 833,000                                |  | 226,000                          |
|  |                             |  |  |  |                                       |  |  |  | 833,000                          |
| FIRST TRANCHE SUB-TOTAL                  |                             |  |  |  | 10,876,000                            | (2,534,900)  | 9,174,100                              | 3,335,000  | 8,600,000                        |
| Novosibirsk<br>(INDCP)                   | Aerosol                     | CFC to HAP Propellant Conversion   | 4.482MT  | \$0.33/kg CFC                              | 16,300,000                            | (4,020,000)  | 12,280,000                             | 5,100,000  | 11,200,000                       |
| POLUS<br>(Zlatoust)                      | Domestic<br>Refrigeration   | Replace CFC-12 with HFC-134a in<br>Refrigerant and Foam, Replace<br>CFC-113 with Non-ODS Solvent | CFC-11 - 290 MT<br>CFC-12 - 76MT<br>CFC-113 - 79MT | \$6.06/ kg. ODP                            | 1,949,443                             | 8,201,000  | 10,150,443                             | 8,520,443  | 1,630,000                        |
| SEPO<br>(Saratov EPO)                    | Domestic<br>Refrigeration   | Replace CFC-12 with HFC-134a in<br>Refrigerant   | CFC-12 - 100MT<br>CFC-113 - 160MT                  | \$11.7/kg. ODP                             | 1,960,000                             | 2,349,000  | 4,309,000                              | 2,579,000  | 1,730,000                        |
| NLMK<br>("Stinol")                       | Domestic<br>Refrigeration   | Replace CFC-11 Foaming Agent<br>with Cyclopentane  | CFC-11 - 570MT                                     | \$5.16/kg. ODP                             | 4,000,000                             | 7,985,000  | 11,985,000                             | 8,665,000  | 3,320,000                        |
| KRP Biryusa<br>(Krasnoyarsk)             | Domestic<br>Refrigeration   | Replace CFC-11 Foaming Agent<br>with Cyclopentane  | CFC-11 - 339MT                                     | \$11.88/kg. ODP                            | 13,000,000                            | 1,897,000  | 14,997,000                             | 3,997,000  | 11,000,000                       |
| Zavod<br>(Zelenodolsk)                   | Domestic<br>Refrigeration   | Replace CFC-11 Foaming Agent<br>with Cyclopentane  | CFC-11 - 206MT                                     | \$10.18/kg. ODP                            | 8,565,800                             | 698,640  | 9,264,440                              | 1,984,440  | 7,300,000                        |
| Orsk                                     | Domestic<br>Refrigeration   | Replace CFC-11 Foaming Agent<br>with Cyclopentane  | CFC-11 - 202MT                                     | \$10.54/kg. ODP                            | 7,872,720                             | 848,415  | 8,721,135                              | 2,519,135  | 6,204,000                        |
| Kazan                                    | Commercial<br>Refrigeration | Convert Large CFC-12 Compressor<br>Designs to HFC-134a Refrigerant                               | CFC-12 - 200MT                                     | \$4.80/kg. CFC                             | 8,267,000                             | NIL  | 8,267,000                              | 1,587,000  | 6,680,000                        |
| Financial<br>Intermediary Fee            |                             |  |  |  |                                       |  |  |  | 1,369,000                        |
| Technical<br>Assistance                  | Institutional               | Country Program Implementation,<br>Feasibility Studies, Investment<br>Assistance                 |  |  |                                       |  | 967,000                                |  | 967,000                          |
| SUB-TOTAL FOR LATER TRANCHEs             |                             |  |  |  | 61,914,963                            | 17,959,055   | 80,941,018                             | 34,932,018                                       | 51,400,000                       |
| PROJECT TOTALS                           |                             |  |  |  | 72,790,963                            | 15,424,155   | 90,115,118                             | 38,267,018                                       | 60,000,000                       |

Note: The total financing requirement (requested GEF grant + enterprise financing requirement) is the sum of the incremental capital costs, the incremental operating costs (without netting out operating savings), technical assistance costs and FI fee.

## ANNEX 2

## PROJECT COVER SHEET

|                             |  |                |
|-----------------------------|--|----------------|
| COUNTRY:                    | Russian Federation   |                |
| SUB-PROJECT TITLE:          | JSC Arnest: Conversion of aerosol production to HAP        |                |
| SECTOR:                     | Aerosols   |                |
| ODS USE IN SECTOR:          | 33,910 MT CFC per yr. - 1992                               |                |
| PROJECT IMPACT:             | 3,016 MT CFC per yr. - 1992                                |                |
| PROJECT DURATION:           | 2 years  |                |
| PROJECT ECONOMIC LIFE:      | 10 years   |                |
| SUB-PROJECT COSTS:          | Incremental Capital Cost                                   | \$ 8,050,000   |
|                             | Incremental Operating Cost(Savings)                        | \$ (1,894,000) |
|                             | Project Cost (Net of Savings)                              | \$ 6,156,000   |
|                             | GEF Funding Requested                                      | \$ 5,565,000   |
| UNIT ABATEMENT COST:        | 0.30 \$/kg. CFC  |                |
| IMPLEMENTING ENTERPRISE:    | JSC Arnest   |                |
| IMPLEMENTING AGENCY:        | The World Bank   |                |
| COORDINATING NATIONAL BODY: | Ministry of Environmental Protection and Natural Resources |                |

## PROJECT SUMMARY

The use of CFC's at JSC Arnest will be eliminated through the conversion to hydrocarbon aerosol propellant (HAP). Arnest produced 33 million aerosol cans in 1992, corresponding to 16% of Russian aerosol can production. CFC usage was 3,016 MT in 1992, corresponding to 9% of CFC use in the aerosol sector. The project will contain two components: 1) plant conversion including propellant delivery and storage, can filling, and finished product storage, and 2) personnel training to assure safe operation of facilities and storage of products. HAP was selected as the most cost effective alternative evaluated.

## ANNEX 2

### PROJECT COVER SHEET

|                             |  |    |           |
|-----------------------------|--|----|-----------|
| COUNTRY:                    | Russian Federation   |    |           |
| SUB-PROJECT TITLE:          | Halogen: Conversion of aerosol production to HAP           |    |           |
| SECTOR:                     | Aerosols   |    |           |
| ODS USE IN SECTOR:          | 33,910 MT CFC per yr. - 1992                               |    |           |
| PROJECT IMPACT:             | 1,563 MT CFC per yr. - 1991                                |    |           |
| PROJECT DURATION:           | 2 years  |    |           |
| PROJECT ECONOMIC LIFE:      | 10 years   |    |           |
| SUB-PROJECT COSTS:          | Incremental Capital Cost                                   | \$ | 2,826,000 |
|                             | Incremental Operating Cost/Savings                         | \$ | (640,900) |
|                             | Project Cost (Net of Savings)                              | \$ | 2,185,100 |
|                             | GEF Funding Requested                                      | \$ | 1,976,000 |
| UNIT ABATEMENT COST:        | 0.19 \$/kg. CFC  |    |           |
| IMPLEMENTING ENTERPRISE:    | Halogen Joint Stock Company                                |    |           |
| IMPLEMENTING AGENCY:        | The World Bank   |    |           |
| COORDINATING NATIONAL BODY: | Ministry of Environmental Protection and Natural Resources |    |           |

### PROJECT SUMMARY

The use of CFC's at Halogen will be eliminated through the conversion to hydrocarbon aerosol propellant (HAP). Halogen produced 16.5 million aerosol cans in 1991, corresponding to 5% of Russian aerosol can production. CFC usage was 1,565 MT in 1991, corresponding to 5% of CFC use in the aerosol sector. The project will contain two components: 1) plant conversion including propellant delivery and storage, can filling, and finished product storage, and 2) personnel training to assure safe operation of facilities and storage of products. HAP was selected as the most cost effective alternative evaluated.

## ANNEX 3

SUMMARY AND RECOMMENDATIONS  
OF THE TECHNICAL REVIEW

1. The technical review for the Russia Ozone-Depleting Substances (ODS) Phase-Out Project, as for all ODS projects, consists of two parts: (a) the overall analysis of project and program integrity, priority of subprojects, and consistency with other ODS projects financed by the Multilateral Fund for the Implementation of the Montreal Protocol; and (b) technical analysis of individual subprojects, undertaken by the Ozone Operations Resource Group (OORG). The OORG was established by the World Bank to undertake the analysis of proposed subprojects for funding under the Multilateral Fund. It uses standard criteria against which it judges the technical viability and cost-effectiveness of a given subproject. These criteria include appropriateness of the technology, environmental impact, project costs, implementation time frame, lessons from past experience, safety issues and final recommendations.
2. The STAP technical reviewer felt the project is an urgent priority for ODS phase out in Eastern Europe, and with the revisions suggested, it should be funded as soon as possible. The 2 aerosol subprojects alone will lead to a reduction in annual consumption of as much as 4500 tons of ODS. Their unit abatement costs range from \$0.18 to \$0.37/kg ODP, which is extraordinarily low compared to all other ODS phase out interventions in any sector in any country.
3. At the time of this technical review, the OORG had reviewed the subprojects at least once. Some have been approved by OORG, and as for the remainder, revisions are under discussion with the enterprises and the subprojects will be revised at appraisal, taking into consideration OORG recommendations. The issues raised by OORG related principally to ensuring safety standards for the use of hydrocarbon aerosol propellants after phasing out chlorofluorocarbon propellants and to justifying certain costs (aerosol sector), and to licensing/technology transfer arrangements and the details of the testing and equipment to be used (refrigeration sector).
4. In addition, the reviewer emphasized the need for institutional strengthening, technical assistance and other support necessary to carry out the project successfully.

## RECOMMENDATIONS

5. The OORG comments have already been or are being incorporated into subproject design, with due emphasis on the necessary strengthening and other support to execute the activities. Given the cost-effectiveness and technical feasibility of these interventions, the project should move ahead as rapidly as possible.



**Proposal for Review**

**Project Title:** Slovak Republic: Elimination of Ozone Depleting Substances in the Production of Household Refrigerators and Freezers

**GEF Focal Area:** Reduction of Ozone Layer Depletion

**Country Eligibility:** Montreal Protocol ratified on April 15, 1994  
Entry into Force on July 14, 1994  
(Czechoslovakia originally ratified the Protocol on January 1, 1993)  
GEF eligibility on the basis of IBRD eligibility.

**Total Project Costs:** US\$ 5.5 million

**GEF Financing:** US\$ 3.5 million

**Govt. Counterpart Financing:** None

**Cofinancing/  
Parallel Financing:** IFC is considering assistance with privatization and potential financing for one or both beneficiary enterprises.

**Associated Project:** None.

**GEF Implementing Agency:** The World Bank

**Executing Agency:** International Finance Corporation (IFC)

**Local Counterpart Agency:** Ministry of Environment, Slovak Republic

**Estimated Starting Date:** August 1995

**Project Duration:** 15 months

**GEF Preparation Costs:** No PRIF or PPA resources were used

**SLOVAK REPUBLIC: ELIMINATION OF OZONE DEPLETING SUBSTANCES IN THE PRODUCTION  
OF HOUSEHOLD REFRIGERATORS AND FREEZERS**

**COUNTRY/SECTOR BACKGROUND**

1. **Introduction.** The Vienna Convention for the Protection of the Ozone Layer, 1985 (hereafter "Vienna Convention"), and the Montreal Protocol on Substances that Deplete the Ozone Layer, 1987 (hereafter the "Montreal Protocol") are international agreements which call for the phaseout of substances that deplete the stratospheric ozone layer (hereafter "regulated substances"). Over 80 countries representing over 95% of world consumption of these regulated substances have ratified the Montreal Protocol. The Slovak Republic ratified the Montreal Protocol on April 15, 1994, (with entry into force on July 14, 1994), succeeding to the ratification by the Czech and Slovak Federal Republic (CSFR) in October 1990. The Slovak Republic is fully committed to the complete phaseout of the production and consumption of substances which are regulated by the Montreal Protocol and subsequent London Amendments. The Slovak Republic has been designated a developed country for the purpose of the Montreal Protocol and is therefore not eligible for financial assistance from the Multilateral Fund for the Implementation of the Montreal Protocol (hereafter the "Multilateral Fund" or "MFMP") which has been set up to assist developing countries, with a per-capita ODS consumption of less than 0.3 kg, in the implementation of projects for the phaseout of ozone-depleting substances (ODS). The Slovak Republic is eligible for GEF funding under the Reduction of Ozone Layer Depletion component.
2. As part of an important regional study on environmental issues in Central and Eastern Europe (CEE), a comprehensive Country Program for the Phaseout of ODS in the CSFR (hereafter "Country Program") was undertaken in April 1992 and completed in November 1992. Given that the Slovak Republic is an important consumer of the regulated substances in CEE (CIS excluded), and a producer of household refrigerators supplying the Slovak and Czech Republics, it represents a challenge in developing a comprehensive national strategy to phaseout ODS usage by the year 1996, present Montreal Protocol deadline for developed countries.
3. **ODS Sector Background.** The CSFR's 1991 consumption of regulated ODS has been estimated at 3,934 metric tons (equivalent to 3,759 ozone-depleting-potential [ODP] weighted tons), which amounts to a per-capita consumption of 0.22 kg. It has been estimated that the Slovak Republic's consumption accounts for about 40% of the consumption in the former CSFR, while it does not produce any regulated substances. The 1991 ODS consumption profile for chlorofluorocarbons (CFCs) (referenced in Annex A, Group I, of the Montreal Protocol) for CSFR is as follows: 1600 tons (t) in the aerosol sector (1360 t of CFC-12, 224 t of CFC-11, 9 t of CFC 113 and 7 t of CFC 114), 1057 tons in the solvents and pharmaceutical sectors (mainly CFC-113), and 279 tons of CFC-11 in the flexible foam industry. Usage of Annex A Group II substances (Halon 1211 and 1301) was negligible, less than 10 tons, while consumption of Annex B Group II & III Substances (carbon tetrachloride and 1,1,1-trichloroethane which are common industrial solvents) has been estimated at 893 tons. The use of transitional substances such as HCFC-22 (used mainly in air conditioning applications) has been increasing, with 1991 consumption standing at 48 tons.

## PROJECT OBJECTIVES

4. The principal objective of the project is to assist the Slovak Republic in the phaseout of ODS by early 1996 as mandated by the Montreal Protocol and its amendments and adjustments, in a cost effective manner. Specifically the goals of this project are to eliminate all the CFC-11 used in the domestic refrigerator sector, and about half the CFC-12 used in the domestic refrigerator manufacturing sector of the Slovak Republic.

5. **Project Strategy.** The largest single industrial user of CFC's in the Slovak Republic is the domestic refrigerator industry. This sector consumed a total of 248 metric tons of CFC-11 and 120 tons of CFC-12 in 1993. The implementation of these two projects will reduce this consumption by early 1996, in line with Slovakia's commitments under the Montreal Protocol.

6. **Project Benefits.** The project's major benefit will be to assist the Slovak Republic to achieve its objective of phasing-out the use of ODS as early as is technically feasible. It is expected that the project will contribute to the national objective of reducing ODS consumption of more than 280 tons per year directly after project implementation.

## PROJECT DESCRIPTION

7. The Project consists of two sub-projects. A summary of each sub-project proposals is provided here. Comprehensive descriptions and relevant details are provided in Addendum A.

8. Both sub-projects relate to conversion away from use of CFCs in the manufacture of household refrigerators at the two companies manufacturing refrigerators and freezers in the Slovak Republic. Sub-project 1 will result in the elimination of 107 tons of CFC-11 and 44 tons of CFC-12 for as total of 151 tons per year in 1995 and beyond, while Sub-project 2 will eliminate 132 MT of CFC-11 per year starting in 1996. Details are provided in the sub-project descriptions included in Addendum A.

9. Both projects use widely accepted CFC substitute technologies. One sub-project proposes conversion of the refrigerant from CFC-12 to HFC-134a, and both projects propose conversion of the polyurethane insulation lines to using cyclopentane as the blowing agent instead of CFC-12.

10. Both companies possess considerable technical expertise, and are fully conversant with the technical issues involved. Considerable support in the conversion of the foaming process will be available from the technology suppliers. Technical risks to project success are thought to be almost non-existent.

11. The proposed project employs commercially available and environmentally acceptable technology. In addition, each project sub-component will be subject to local environmental regulations and oversight by IFC/World Bank. The project consists of light industrial projects which would be classified as category B on the basis of the IFC and Bank's project environmental

classification system and based on previous classification of similar projects. Potential environmental impacts include those associated with the flammability and air emissions characteristic of hydrocarbon-based non-ODS substitutes, and site specific impacts associated with manufacturing plant modifications.

12. **Key Project Documents.** The following is a list of documents relevant to the project and which are available on file with ENVGC.

*A. Sub-Project Feasibility Study Documents*

Sub-project 1: Implementation Plan for Freon Free Project, Samsung-Calex Co. Ltd., Slovak Republic, September 1994.

Sub-project 2: Full Substitution of the CFC-11 in the Refrigerator and Freezer Thermal Insulation made from the Rigid Polyuretan Foam, Calx Co. Ltd., Slovak Republic, September 1994.

*B. Technical Reviews*

- OORG STAP review of polyurethane foam conversion for both sub-projects, October and November 1994.
- OORG STAP review of refrigerant conversion for Sub-project 1, November 1994.
- Peer review of the two sub-projects, November 1994.

**RATIONALE FOR GEF FINANCING**

13. The project has been prepared and structured on the basis of specific ODS-phaseout requirements in the Slovak Republic and the project eligibility criteria guidelines, rules, and procedures, set forth by the Executive Committee of the MFMP and the GEF Scientific Technical Assessment Panel. Funding for this stratospheric ozone layer protection project is being sought from the GEF on the basis that the Slovak Republic:

- is eligible for GEF;
- is not classified as an Article 5 country and is not eligible for funding from the Multilateral Fund for the Implementation of the Montreal Protocol;
- has completed the preparation of a Country Program;
- has succeeded to the CSFR on the ratification of the Vienna Convention and Montreal Protocol on April 15, 1994, with entry into force as of July 14, 1994.

14. The sub-projects are consistent with international efforts in the field of ODS phaseout efforts and are deemed to be effective and required interventions in order to quickly and successfully phaseout the use of the regulated substances.

15. Another benefit is the replicability of project preparation and implementation mechanisms which will result from the processing and implementation of this first ozone-related project to be presented under the GEF for the conversion away from ODS in the Slovak Republic. In addition, this is among the first set of projects presented under GEF for the conversion of household refrigerator manufacture. The ultimate benefit of this project will therefore include accelerated phaseout of ODS in many CEE countries which may adopt policies and implement projects on the basis of the Slovak Republic's experience.

#### SUSTAINABILITY AND PARTICIPATION

16. The Project will be implemented within a limited time frame and with a defined budget. ODS phaseout projects which are successfully implemented will have a permanent ODS phaseout effect, which is further supported by the requirements of the Montreal Protocol to completely phaseout by the year 1996.

17. The Slovak government is currently drafting legislation that will (a) create a legal requirement within the Slovak Republic to cease using ODS, and (b) provide financial relief in terms of duties, taxes, etc., to the enterprises undertaking conversion away from ODS.

18. Strong sub-project ownership by the participating enterprises was encouraged very early in the project preparation phase. All sub-project documents were prepared by the participating enterprises with the support of the IFC/World Bank and its consultants. In addition, the enterprises have undertaken to provide/generate additional financing required to complete the capital-intensive component of the conversion. After the first year, the increase in operating costs will be reflected in the costing of the refrigerators and freezers.

#### LESSONS LEARNED AND TECHNICAL REVIEW

19. The proposed project is only the second GEF funded ODS phase out project to be initiated and, therefore, direct IFC/World Bank experience and associated lessons are limited. However, the World Bank, as an Implementing Agency of the MFMP (and the IFC as an associated Executing Agency) has implemented ODS phase out projects in many countries utilizing grant funding from the MFMP. A number of lessons have been learned from experience with these projects, and those of relevance were incorporated in the preparation of this project. These include the a) importance of a national phase out policy or Country Program as a basis for assuring commitment and ownership by the client country; b) value of strong enterprise/government linkages to achieve phase out objectives; c) value of project ownership at an early stage by the enterprises to achieve phase out objectives; and d) importance of technical support in the preparation and review of sub-projects.

20. External technical review of the sub-projects was undertaken by two OORG reviewers: G.M.F. Jeffs of ICI Polyurethanes reviewed the technical aspects of insulation conversion for both sub-projects (October and November 1994), and Lambert Kuijpers of the Dutch Technical University reviewed the conversion of the refrigeration circuits proposed in Sub-project 1 (November 1994). Internal technical review was conducted by Douglas Fenton, an engineer with IFC's Technical and Environment Department (November 1994). Mr. Fenton was also the technical specialist on IFC's financial appraisal team which conducted an in-depth appraisal of one of the beneficiary companies in March 1994 – as part of the debt/equity package being considered by IFC at the time.

#### PROJECT FINANCING AND BUDGET

21. The total project costs are \$5.5 million which include the initial incremental capital costs and incremental operating costs for one year (including contingencies, but not including customs duties, excise, and other taxes). Of this, one sub-project will cost \$3.1 million, and the second will amount to \$2.4 million. Across the two projects, capital costs will amount to \$3.6 million, and incremental operating costs for one year will be \$1.9 million.

22. It is proposed that of the total project cost of about \$5.5 million, \$3.5 million be funded by the GEF under its Reduction of Ozone Layer Depletion component. This will fund \$2.3 million in incremental capital costs and \$1.2 million in incremental operating costs. The funding requested from GEF reflects compliance with the rules, procedures and guidance provided by the MP Executive Committee.

23. Funds will be provided as a grant from the GEF to the two enterprises in the Slovak Republic. The funds would be transferred by IFC under agreement with the two enterprises and with approval of the Slovak Government which has endorsed this project. The remainder of the project costs will be provided by the enterprises themselves.

24. Preparation of this project cost about \$25,000, which was provided from IFC's GEF administrative budget. No additional PDF funds were utilized for the preparation of this project.

#### INCREMENTAL COSTS

25. Each sub-project involves incremental costs which would not have occurred in the absence of the Montreal Protocol. The estimated costs are to be considered incremental costs net of any potential savings. All estimated costs for the sub-projects have been determined to meet the definition of incremental costs (as determined by the London Amendment to the Montreal Protocol) as well as policies of the MFMP. These projects, are therefore, eligible for grant funding.

26. Although the eligible incremental costs amount to \$5.5 million, only \$3.5 million is being requested from GEF so as to account for partial foreign ownerships of the beneficiary enterprises, as well as to account for exports to countries ineligible for GEF assistance. The \$3.5 million will fund \$2.3 million in incremental capital costs and \$1.2 million in incremental operating costs. The funding

requested from GEF reflects compliance with the rules, procedures and guidance provided by the MP Executive Committee.

27. The alternate technologies were chosen based on several criteria including costs and viability. Although HFC-134a does have a GWP, the use of this gas in refrigerators is small and is unlikely to have a significant impact on global warming, especially when compared to the amount of CFCs being eliminated. In terms of cost, the hydrocarbon alternative for refrigeration is viable and will cost at least the same as the chosen alternative, if not more. Because the foreign joint venture partner has substantial experience with HFC-134a, this was chosen as the preferred alternative by the enterprise.

28. The Unit Abatement Cost (UAC) across both projects is \$7.54/kg/year. It should be noted that the UACs have been calculated using the entire project costs, i.e., including the costs not funded by GEF. UACs for the individual sub-projects, including separate UACs for the refrigeration and insulation components, are provided in the detailed descriptions included in Addendum A.

#### ISSUES, ACTIONS, AND RISKS

29. The CSFR's reduction in ODS consumption since 1989 has largely been a result of an economic slowdown and the collapse of the COMECON trading block. GDP finally showed a positive rate of growth in 1994 for both Republics of the former CSFR, after nearly a 25% decline since 1990. This is projected to continue, with the Slovak Republic likely to show a slower rate of growth than the Czech Republic. In addition, recent reduction in ODS consumption in the Slovak Republic have also come about because of refrigerator manufacturers initiating conversion away from use of CFC, either to alternatives or reduced-CFC formulations. However, in an economic upturn, the purchase of consumer goods such as refrigerators and air conditioning equipments usually increase. The consumption of ODS could begin to increase again if no phaseout plan is implemented. The final economic cost to the country of the complete ODS-phaseout could be significantly higher if no effort is made to actively pursue the complete and early phaseout of ODS.

30. Political, economic, and social changes in the Slovak Republic are likely to continue over the lifetime of this project. This brings to bear certain risks which must be addressed in both the design and implementation phase of the project. For example, the management structures and ownerships of the two companies which would be assisted under this project may change in view of privatization efforts being pursued by the Slovak government. One of the firms was established as a joint-venture with a foreign company, but with majority state ownership, while the other is wholly state-owned. However, both firms are currently discussing the possibility of further privatization. The IFC is also discussing a loan with the joint-venture company for expansion and modernization activities. Regardless of the outcome of the loan discussions, ongoing IFC supervision and review of the two projects will mitigate any risks associated with unexpected financial or management difficulties at any of the two companies.

31. Initial concerns over the possibility of market distortions which would adversely influence the trends in ODS consumption and phaseout have subsided. The concern was based on fears that dumping of ODS, which had been detected in many countries, could spread before the final ODS

production ban in developed countries. Mitigation measures on this front reside in the introduction of regulations (addressing import/export and usage), which ban the use of ODS in the various applications as the substitutes become available. These regulations are currently being drafted and reviewed by the Slovak government.

#### INSTITUTIONAL FRAMEWORK AND PROJECT IMPLEMENTATION

32. IFC (in arrangement with The World Bank) will be the executing agency for this project and will work with the two recipient of grant funds and the Slovak Ministry of Environment. The funds for implementation of the projects will be transferred to the enterprises by IFC after grant agreements have been signed between the enterprise and IFC. IFC will appraise the projects and oversee the implementation of the projects with ongoing supervision and review.

33. All procurement by the enterprises will follow competitive procurement guidelines consistent with MFMP requirements. All local works will be subject to normal local bidding procedures.

#### PROJECT MONITORING AND EVALUATION

34. The implementation of the project will be monitored and evaluated in the course of project supervision. In addition, the grant agreements signed by IFC after project approval with the companies will require periodic reports and certification of compliance with the various tenets of the grant agreement, which incorporate GEF requirements.

35. Safety issues related to the project have been addressed separately in the document.



## **Annex A: Technical Opinion**

### **SLOVAK REPUBLIC: ELIMINATION OF OZONE DEPLETING SUBSTANCES IN THE PRODUCTION OF HOUSEHOLD REFRIGERATORS AND FREEZERS**

#### **SUMMARY OF TECHNICAL OPINION**

1. Both sub-projects were reviewed in November, 1994. The STAP review was undertaken by a member of the Ozone Operations Research Group (OORG). The OORG was established by the World Bank to undertake the analysis of proposed sub-projects for funding the Multilateral Fund for the Montreal Protocol. It utilizes standard criteria against which to judge the technical viability and cost-effectiveness of sub-projects, as well as appropriateness of technology, environmental impact, project costs, implementation timeframe and safety issues.
2. The Samsung-Calex sub-project was approved immediately. The second sub-project, involving HFC-13A conversion was required for safety reasons.

#### **ADDRESSING REVIEWERS' COMMENTS**

3. The costs presented in this document exclude costs of a helium leak detectors requested by one of the enterprises (and included in feasibility study produced by the company). These costs were not approved by the OORG reviewer. Although the company has decided to still buy these detectors, these are not included in the costs shown here and will not be claiming as part of the grant. The contingency and UAC for the sub-project were also appropriately adjusted.
4. The incremental operating costs are estimates based on actual incremental costs during initial trials. As pointed out by the OORG technical reviewer, these costs may actually come down in the future as cyclopentane technology evolves. Although this may not necessarily happen by the end of 1996, financial arrangements with the enterprise will ensure that incremental operating costs are reimbursed based on actual costs incurred.

#### **AVAILABILITY OF ORIGINAL TECHNICAL REVIEWS**

5. The original technical reviews are available on file with Vikram Widge of IFC's Environment Division and the task manager for this project (fax # 202-676-9495), or from ENVGC, the World Bank (fax # 522-3256)

## ADDENDUM A: SUMMARY DESCRIPTION OF SUB-PROJECTS

### SUB-PROJECT 1: ELIMINATION OF ODS USED IN THE PRODUCTION OF HOUSEHOLD REFRIGERATORS

#### Background

1. The production of refrigerators and freezers in the Slovak Republic consumed 451 MT of CFCs in 1991. This consumption was associated with the production of refrigerators and freezers by the Calnex Co., which was the only manufacturer in the Slovak Republic at the time. The consumption of CFCs declined to 248 MT in 1993, principally as a result of introducing 50% reduced CFC-11 foaming techniques. In the same year, two separate companies were formed from the previous single enterprise.

#### Company

2. Samsung-Calnex is a joint venture company formed in 1993 between Calnex (owned 100% by the Slovak government and also the proposer of sub-project 2) and the Samsung Corporation of South Korea. National Slovak ownership of the joint venture (through Calnex' holding) is 55%. Samsung-Calnex acquired about 250,000 of the 600,000 units/year production capacity possessed by the parent company. The new company initiated a program to modernize production which is also nearing completion. In addition, the company is planning to expand its production capacity and IFC is considering a loan to assist Samsung-Calnex in this venture.

3. Production in 1993 was about 254,000 units, 19% of which were sold on the domestic market, about 35% to the Czech republic, and the remainder mainly exported to Western European countries. This production consisted entirely of existing Calnex models. In late 1994, four new Samsung models were introduced to replace some of the existing models in production.

#### Project Objectives

4. The company intends to phase out CFC use entirely in accordance with the strategy described in the Czechoslovak country program. This involves replacing CFC-11 with cyclopentane as the foaming agent and CFC-12 refrigerant use with HFC-134a, thereby enabling Samsung-Calnex to market a 100% CFC free refrigerator. Given that the greater part of their production is destined for countries which have banned the import of CFC containing appliances, this move is of the utmost importance for Samsung-Calnex.

#### Project Description

5. The proposed project entails eliminating use of CFC-11 and CFC-12 in the production of refrigerators at Samsung-Calnex. Production of refrigerators and freezers is being converted to using HFC-134a as the refrigerant and cyclopentane as the blowing agent. The project is divided into two phases: the first phase provides for modification of existing equipment for the cabinet

foam blowing line to use cyclopentane, and changes in refrigerant charging equipment, supply pumps, and leak detection equipment to successfully convert to using HFC-134a compressors. The second phase consists of replacing the door foaming line to be able to use cyclopentane as the current equipment, unlike the cabinet foaming line, is not amenable for use with just modifications.

6. The first phase of the project has already been implemented, namely replacement of CFC-11 by cyclopentane as the foaming agent in the cabinet foaming line, and the switch over to using HFC-134a as the refrigerant. The second phase, i.e., conversion to cyclopentane for the door foaming line and consolidation of HFC-134a use is underway and is planned for completion end-1994/early-1995. In effect, retroactive funding will ultimately be required for both phases.

7. The use of HFC-134a in place of CFC-12 as refrigerant involves the purchases of new charging equipment, leak detectors and a refrigerant supply pump. Changes to production largely involve ensuring that dehydration and oil handling procedures are adequate to cope with the acutely hygroscopic nature of the polyol ester oil used in HFC-134a based refrigerators.

8. The use of cyclopentane in place of CFC-11 as a foaming agent requires changes in product design because of the lower insulating value of cyclopentane blown foam, and the modification of foaming machinery and factory premises to accommodate the flammability of this hydrocarbon. This is discussed in more detail below.

9. Offers were sought from three equipment suppliers. The equipment supplier chosen (OMS) was selected as the result of a rigorous bid selection process which fulfills GEF and MP competitive procurement requirements.

(a) Modification of Existing Foaming Equipment

This involves the replacement of some components such as foaming heads which cannot be adapted to the safety requirements of the new process, and the modification others such as jig heaters which must be automatically de-energized when cyclopentane is introduced into the foaming jigs. The foaming heads must be equipped with a device which injects nitrogen into the molds to displace any remaining cyclopentane.

(b) Addition of New Equipment Items

Because of its flammability, concentrations of cyclopentane in air must be kept well below its flammability threshold in the factory area. In order to achieve this, areas where leaks can take place are enclosed in airtight booths which are maintained at negative pressures by a ventilation system that also has to be installed.

In addition, the cyclopentane/air concentration is continuously monitored by an alarm system that sounds an alarm and de-energizes production equipment when cyclopentane

concentrations exceed given thresholds. This system is equipped with a large number of sensors located throughout the area where foaming is taking place.

(c) Storage, Distribution, and Layout

New external storage for the foaming agent must be provided on account of its flammability. Also its distribution route through the factory must be changed to eliminate any possibility of accidental rupture.

(d) Modification of Refrigerator Design

Thicker insulation must be incorporated to ensure that energy efficiency of the new production is as good as that of the old CFC-12 refrigerators.

### Principal Project Cost Elements

#### Incremental Capital Costs<sup>1</sup>

##### Phase 1

|                                       |           |
|---------------------------------------|-----------|
| Modification of Cabinet Foaming Line  | \$596,100 |
| Cyclopentane Storage and Distribution | \$115,700 |
| Purchase of Equipment for             |           |
| Conversion to HFC-134a Refrigerant    | \$67,800  |
| Refrigerator Testing                  | \$15,600  |
| Training                              | \$11,600  |
| Sub-Total                             | \$806,800 |

##### Phase 2<sup>2</sup>

|                                    |           |
|------------------------------------|-----------|
| New Door Foaming Line              | \$780,000 |
| Purchase of Equipment for          |           |
| Conversion to HFC-134a Refrigerant | \$143,790 |
| Sub-Total                          | \$923,790 |

|                    |             |
|--------------------|-------------|
| Total Capital Cost | \$1,730,590 |
|--------------------|-------------|

<sup>1</sup> Costs presented here do not include import duties, excise or any other local taxes.

<sup>2</sup> The costs presented here exclude costs of a helium leak detectors requested by the company (and included in proposal available as documentation). These costs were not approved by the OORG reviewer. Although the company has decided to still buy these detectors, they will not be claiming these costs as part of the grant. The contingency and UAC have also been appropriately adjusted.

### Incremental Operating Costs<sup>3</sup>

Costs based on production for 1995 \$920,700

Total Project Costs US\$ 3.1 million  
(including 15% contingency)

GEF FINANCING REQUESTED<sup>4</sup> US\$ 1.1 million

### ODS Reduction and UAC

10. A total of 107 tons of CFC-11 and 44 tons of CFC-12 per year will be eliminated from production following project implementation by the end of 1994. The Unit Abatement Cost (UAC) for the project as a whole is \$8.11/kg/year. (\$14.48/kg for the refrigeration part and \$5.49/kg for the foam part). These UACs are within acceptable limits of other similar MP-funded projects.

### Safety Management

11. OMS, the equipment supplier selected by Samsung-Calex, are highly experienced in the provision of cyclopentane foaming systems. They have worked closely with Samsung-Calex to ensure the safe operation of the plant installed in Phase 1. A comprehensive safety management scheme is in place whereby an independent safety team are empowered to order production to shutdown if safety standards are breached. OMS will also be Samsung-Calex' "technical partner" for cyclopentane safety issues.

### Implementation Schedule

12. The first phase of the project is complete. The second phase is currently being implemented and is likely to be complete by end of 1994. Full production of ODS-free refrigerators is anticipated by the start of 1995.

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<sup>3</sup> The incremental operating costs are estimates based on actual incremental costs in the first half of 1994. As pointed out by the OORG technical reviewer, these costs may actually come down in the future as cyclopentane technology evolves. Although this may not necessarily happen by the end of 1995, financial arrangements with the enterprise will ensure that incremental operating costs are reimbursed based on actual costs incurred. The company had originally requested incremental costs for 1994 and 1995 - however, based on MFMP policy of allowing incremental costs for a maximum of one year for refrigeration projects, incremental operating costs for only 1995 are being requested.

<sup>4</sup> The request for GEF financing is based on 55% Slovak ownership and reductions for exports to countries ineligible for grants. The eligible project costs have been reduced by 45% to account for foreign ownership. Based on last three years of sales data (1992-1994), Samsung-Calex exported an average of 47% of its production to industrialized countries (i.e., non-Article 5 and non-EITs). The costs were further pro-rated by 63% ( $100 - 47 + 10$ ) to account for these exports.

**SUB-PROJECT 2: FULL SUBSTITUTION OF CFC-11 IN THE REFRIGERATOR AND FREEZER THERMAL INSULATION**

**Background**

13. The production of refrigerators and freezers in the Slovak Republic consumed 451 MT of CFCs in 1991. This consumption was associated with the production of refrigerators and freezers by the Calex Co., which was the only manufacturer in the Slovak Republic at the time. The consumption of CFCs declined to 248 MT in 1993, principally as a result of introducing 50% reduced CFC-11 foaming techniques. In the same year, two separate companies were formed from the previous single enterprise.

**Company**

14. Calex is a 100% state-owned company. In 1993, a new company was formed as a joint venture with Samsung of South Korea. The original production capacity of the single company was about 600,000 units per year. After the formation of the joint venture, production capacity is now 350,000 – the remaining production facilities having been acquired by the joint venture company.

15. Production in 1993 was about 223,000 units, 39% of which were sold on the domestic market, about 38% to the Czech republic, 9% to other Eastern European countries, and the remainder mainly exported to Western European countries.

**Project Objectives**

16. The company intends to phase out CFC use entirely in accordance with the strategy described in the Czechoslovak country program. This involves replacing CFC-11 with cyclopentane as the foaming agent. This project will result in the conversion of the foaming process at the company's most modern production line. No further GEF funding will be requested to accomplish the conversion of the foaming process on the other lines. Replacement of CFC-12 refrigerant use with HFC-134a will be undertaken separately and funding for that is not requested as part of this project. The conversion of the refrigerant circuit will enable Calex to market a 100% ODS-free refrigerator. Given that the greater part of their production is destined for countries which have banned the import of CFC containing appliances, this move is of the utmost importance for Calex.

**Project Description**

17. The use of cyclopentane in place of CFC-11 as a foaming agent requires changes in product design because of the lower insulating value of cyclopentane blown foam, and the modification of foaming machinery and factory premises to accommodate the flammability of this hydrocarbon. The project consists of the following principal components:

(a) Modification of Existing Foaming Equipment

The general layout of the refrigerator foaming equipment will have to be changed. This will involve the replacement of some components such as foaming heads which cannot be adapted to the safety requirements of the new process, and other modifications, such as, jig heaters which must be automatically de-energized when cyclopentane is introduced into the foaming jigs.

(b) Addition of New Equipment Items

Because of its flammability, concentrations of cyclopentane in air must be kept well below its flammability threshold in the factory area. In order to achieve this, areas where leaks can take place are enclosed in airtight booths which are maintained at negative pressures by a ventilation system that also has to be installed.

In addition the cyclopentane/air concentration is continuously monitored by an alarm system that sounds an alarm and de-energizes production equipment when cyclopentane concentrations exceed safety thresholds. The system is equipped with several sensors located throughout the foaming area, both inside and outside the booths mentioned above.

(c) Storage, Distribution, and Layout

New external storage for the foaming agent must be provided on account of its flammability. Also its distribution route through the factory must be changed to eliminate any possibility of accidental rupture.

(d) Modification of Refrigerator Design

Thicker insulation must be incorporated to ensure that energy efficiency of the new production is as good as that of the old CFC-12 refrigerators.

**Principal Project Cost Elements**

**Incremental Capital Costs<sup>5</sup>**

|   |           |
|---|-----------|
| Investigation and Project Works         | \$36,000  |
| Reconstruction of Production Technology | \$801,680 |
| Local Equipment and Civil Works         | \$123,530 |
| Building and Construction Modifications | \$195,550 |
| Modification of Refrigerator Design     | \$22,000  |
| Refrigerator Testing                    | \$18,400  |

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<sup>5</sup> Costs presented here do not include import duties, excise or any other local taxes.

|                                    |           |
|------------------------------------|-----------|
| Worker Training                    | \$76,470  |
| Additional fire fighting equipment | \$146,000 |

|                            |                    |
|----------------------------|--------------------|
| <b>Total Capital Costs</b> | <b>\$1,419,630</b> |
|----------------------------|--------------------|

#### Incremental Operating Costs<sup>6</sup>

|                                    |           |
|------------------------------------|-----------|
| Costs based on production for 1996 | \$646,500 |
|------------------------------------|-----------|

|   |                         |
|---|-------------------------|
| <b>Total Project Costs</b><br>(including 15% contingency) | <b>US\$ 2.4 million</b> |
|---|-------------------------|

|  |                         |
|--|-------------------------|
| <b>GEF FINANCING REQUESTED<sup>7</sup></b> | <b>US\$ 2.4 million</b> |
|--|-------------------------|

#### ODS Reduction and UAC

18. A total of 132 tons of CFC-11 will be eliminated in 1996 following completion of the project. This will rise to 176.5 MT as capacity production is reached. The Unit Abatement Cost (UAC) for the project is \$6.89/kg/year. This UAC is within acceptable limits of other similar MP-funded projects.

#### Safety Management

19. Cannon, S.p.A., the equipment supplier selected by Callex, are highly experienced in the provision of cyclopentane foaming systems. They and the local consultants employed by Callex, Kovoprojektka, will work with Callex both during and after project implementation to ensure the safe operation of the plant. A comprehensive safety management plan has been described by Callex whereby an independent safety team are empowered to order production to shutdown if safety standards are breached. Both companies will be Callex' "technical partner" for cyclopentane safety issues.

#### Implementation Schedule

20. Building reconstruction and line modification will commence within three months of the grant funds being made available. Final product and line testing will be completed within nine

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<sup>6</sup> As pointed out by the OORG technical reviewer, these costs may actually come down in the future as cyclopentane technology evolves. Although this may not necessarily happen by the end of 1996, financial arrangements with the enterprise will ensure that incremental operating costs are reimbursed based on actual costs incurred.

<sup>7</sup> The request for GEF financing is based on 100% Slovak ownership and no reductions for exports to countries ineligible for grants. Based on last three years of sales data (1992-1994), Callex exported an average of only 10% of its production to industrialized countries (i.e., non-Article 5 and non-EITs). The proposed grant for Callex has not been prorated because up to 10% of exports to such countries is allowed.



months after start (along with worker training), allowing production to commence within a year or so after project approval.

**Proposal for Review**

|                           |  |
|---------------------------|--|
| Project Title:            | Slovenia: Project for the Phaseout of Ozone Depleting Substances   |
| GEF Focal Area:           | Ozone Depletion  |
| Country Eligibility:      | Slovenia succeeded to Montreal Protocol ratification of the former Yugoslavia in July 1992 and has formerly ratified later amendments. GEF Eligibility on basis of IBRD eligibility. |
| Country:                  | Slovenia   |
| Total Project Cost:       | US\$9.5 million  |
| GEF Financing:            | US\$6.2 million  |
| Counterpart Financing:    | US\$3.3 million  |
| Associated Project:       | None   |
| GEF Implementing Agency:  | World Bank   |
| Executing Agency:         | World Bank   |
| Local Counterpart Agency: | Slovenian Ministry of Environment and Physical Planning and Investment Sub-Project beneficiaries   |
| Estimated Starting Date:  | September 1995   |
| Project Duration:         | Two Years  |
| GEF Preparation Costs:    | No PRIF or PPA resources were used   |

## SLOVENIA: PROJECT FOR THE PHASEOUT OF OZONE DEPLETING SUBSTANCES

### COUNTRY/SECTOR BACKGROUND/CONTEXT

1. The Vienna Convention for the Protection of the Ozone Layer (1985) and the Montreal Protocol on Substances that Deplete the Ozone Layer (1987) are international agreements which call for the phaseout of substances that deplete the stratospheric ozone layer.
2. In July of 1992, Slovenia succeeded to the ratification of the former Yugoslavia of the Montreal Protocol which initially ratified the Protocol on December 26, 1990. In December of 1992, Slovenia ratified the London Amendments to the Montreal Protocol, but it has yet to formally ratify the Copenhagen Amendments. However, Slovenia has not been designated as an Article 5 country under the Montreal Protocol, and is therefore not eligible for financial assistance from the Multilateral Fund for the Implementation of the Montreal Protocol. It is eligible for IBRD financing, and Global Environment Facility (GEF) resources will therefore be required to finance the Project. The investments funded under this project were identified as part of the development of the Slovenia Country Program. The investments funded under this project were identified as part of the development of the Slovenia Country Program.
3. All ODS in Slovenia are imported from the European Union, mainly the United Kingdom, Germany, France, the Netherlands, and Italy. In addition, approximately 38% of ODS used in Slovenia were exported in final products in 1993, and thus the export market has effectively dictated the phaseout of ODS in some enterprises in advance of national legislation. The decline in ODS consumption from 1986-1992 was greatest in aerosols (62%) and foams (65%). In refrigeration, technology advances have not been so rapid, with a phaseout of 37%.
4. In 1993, usage of regulated ODS was approximately 1,936 metric tons. Compared to 1990, total annual ODS use has fallen by 35%, and was equivalent to 952.5 ozone-depleting-potential (ODP) in weighted tons in 1993. In terms of ozone-depleting-potential, 89% is accounted for by Chlorofluorocarbons (CFCs), 10% by 1,1,1 Trichloroethane (TCE), and the remaining 1% by Hydrochlorofluorocarbons (HCFCs). Consequently, the focus of the project should be on phasing out the use of CFCs. Aerosols and foams account for 42% and 37% of CFC use, while refrigerants and solvents account for 17% and 4%, respectively. For TCE, solvents account for 95% of consumption.

### PROJECT OBJECTIVES

5. The principal objective of the Project is to assist Slovenia in the phaseout of ODS, as mandated by the Montreal Protocol and its amendments and adjustments, in a cost effective manner. More specifically, the goals of this Project are to: (i) initiate the phaseout of the consumption of chlorofluorocarbons (CFCs) through adoption of new cost-effective CFC-free technologies; and (ii) through institutional strengthening improve the capability of the Ministry of Environment and

Physical Planning (MEPP), the Slovenian EcoFund (SEF), and the Chamber of Economy (COE) to manage and oversee the phaseout of ODS in Slovenia.

6. By focussing on the key sectors and enterprises, the project will phaseout 345.3 tons of ODP per year, or roughly 36% of ODP-weighted ODS consumption in Slovenia. Approximately 68% of the phaseout under the Project will be accomplished through the two Aerosols Sub-Projects (Krka and Lek), with an additional 20% to be phased out at LTH in refrigeration and foams.<sup>1</sup>

#### PROJECT DESCRIPTION

7. The proposed project will consist of (i) an Investment Component comprising six Sub-Projects; and (ii) an Institutional Strengthening Component. Both Components have been designed in close cooperation between the Chamber of Economy (COE), the Ministry of Environment and Physical Planning (MEPP), the Participating Enterprises, the World Bank, and international consultants. The MEPP, SEF, and COE will be primarily responsible for the implementation of the Institutional Strengthening Component, and the Participating Enterprises for the Sub-Projects which will comprise the Investment Component. Table 1 provides a summary; the Sub-Projects are briefly described in the following.

#### PROJECT DESCRIPTION AND COSTS

8. The project consists of (i) an Institutional Strengthening Component; and (ii) an Investment Component comprising six Sub-Projects. Below is a description of each of these components. Comprehensive Sub-Project descriptions are provided in the Technical Report.

#### INSTITUTIONAL STRENGTHENING COMPONENT

9. Sub-Project 1 -- Project Implementation Unit for the Phaseout of Ozone Depleting Substances. Together with the Chamber of Economy and Slovenian EcoFund (SEF), the MEPP will set up an ODS Phaseout Project Management unit (PIU) to be supported by a Technical Advisory Group (TAG). The PIU will be established in the SEF and coordinate the implementation of the Project, oversee procurement and disbursement for Sub-Projects 2-7 in compliance with World Bank guidelines, and supervise project activities according to the requirements of the World Bank and the MEPP. As necessary, the PIU will arrange for technical assistance and consultants to assist in project implementation, and provide support to facilitate cooperation among government institutions and the producers and consumers of ODS. Finally, the PIU will be responsible for calling meetings

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<sup>1/</sup> It should be noted that the largest consumer of CFCs in Slovenia (Gorenje -- Refrigeration and Foams Sector) is not covered under the Project since the company exports roughly 95% of its production, and is therefore ineligible for GEF assistance. Annual ODP phaseout at Gorenje is estimated to be 338 tons.

of the TAG, which will be responsible for providing technical support to ODS consumers and producers in the implementation of investment Sub-Projects aimed at ODS Phaseout. Funding for this Sub-Project amounts to US\$220,000 to cover salaries, office equipment, ODS monitoring, and the cost of hiring international consultants for supervision and review during implementation of the Sub-Projects.

#### INVESTMENT COMPONENT

10. This component covers six investment Sub-Projects -- 1 refrigeration and foams, 1 refrigeration, 2 aerosols, 1 foams, and 1 solvents -- for a total of \$9.5 million, of which \$6.2 million is proposed to be financed by the Global Environment Facility. This component will lead to the annual phaseout of 345 tons of ODP -- 68% in aerosols, 31% in refrigeration and foams, and 1% in solvents. A variety of ODS-phaseout technologies will be implemented, with three Sub-Projects (Krka, Lek, and LTH) accounting for 72% of the GEF financing, and 88% of the ODP phaseout. Also included in the investment component is the cost of the project implementation unit.
11. **Sub-Project 2 -- Project for Conversion and Phaseout of Ozone Depleting Substances at LTH.** LTH is the largest producer of commercial refrigeration appliances in Slovenia. The objectives of the project are: (i) substitution of CFC refrigerant with HFC-134a; and (ii) substitution of CFC-11 blowing agent with HCFC-141b, and finally cyclopentane. The project started in July 1992, and will be finished by the end of 1995 or early 1996. The substitution of CFC refrigerant with HFC-134a is being performed. The choice of HFC-134a technology is based on several criteria, including cost and viability. Though HFC-134a has a much higher GWP than the other major alternative (hydrocarbons), the small quantity of HFC-134a used in a refrigerator would result in incremental global warming that is very small compared to that produced during the generation of electricity used during the life time of the refrigerator. The substitution of CFC-11 blowing agent has been/will be realized as follows: Phase I (50% reduced use of CFC-11) in July 1992; Phase II (HCFC-141b) in August 1993; and Phase III (cyclopentane) by end of 1995 or early 1996. GEF Financing is not sought for Phases I and II, but only the Phase III conversion to cyclopentane. The total incremental cost of the refrigeration component is US\$ 1,607,258, while the total incremental cost of the foams component is US\$ 2,424,696. The total incremental cost of the project is US\$4,031,954, of which it is proposed that US\$ 1,492,724 is financed by the GEF grant. The result of the project will be the annual phaseout of 26.0 tons of ODP-weighted consumption of CFC-12 and CFC-502 in refrigeration, and 41.4 tons of CFC-11 in foam.
12. **Sub-Project 3 -- Servicing of Refrigerators and Freezers, and Substitution of CFC-12 Refrigerant in Heat Pumps with HCFC-22 at Gorenje Servis.** Gorenje Servis is the largest service organization in Slovenia and has exclusive rights for servicing Gorenje appliances during the warranty period. The service network of Gorenje Servis consists of 10 service stations with 29 qualified service technicians. In 1993 there were 25,500 service repairs on refrigeration appliances. Service repairs of Gorenje Servis represent about 30 percent of the Slovenian market. The objectives of the project are: (i) servicing the refrigerating-freezing appliances and heat pumps which contain CFC-12 as refrigerant and its recovery; (ii) servicing the refrigerating-freezing appliances which contain HFC-134a as refrigerant and its recovery; and (iii) substitution of CFC-12 with HCFC-134a

in the production of heat pumps. The total incremental cost of the refrigeration component is US\$ 336,547, while the total incremental cost of the heat pumps component is US\$ 123,442. The total incremental cost of the project is US\$ 459,989, of which it is proposed that US\$ 118,680 is financed by the GEF grant. The result of the project will be the annual phaseout of 10.2 tons of ODP-weighted consumption of CFC-12 in refrigeration, and 1.2 tons of CFC-12 in heat pumps.

13. **Sub-Project 4 -- Conversion of Aerosol Production to CFC-Free Propellants at Krka Kozmetika.** Krka is a major producer of aerosols for cosmetic and technical applications in Slovenia. The average number of aerosols produced from 1986 to 1990 was 6 million units, of which about one third was perfume in glass bottles. The consumption of CFCs in 1992 was 123 tons, representing 28.2 percent of the CFC consumption in the aerosol sector. The objective of the project is to phase out the use of 79 tons (1993) of CFCs aerosol propellants and substitute them with Dimethyl Ether (DME) in perfumes and colognes, and hydrocarbon aerosol propellants in all other products. The project started in 1993, and will be finished in July 1995. Operational savings of US\$ 393,140 will be realized over the life of the project, and the incremental capital cost of the project is US\$ 1,068,452. The total incremental cost of US\$ 675,312 is proposed to be financed by the GEF grant. The result of the project will be the annual phaseout of 79.0 tons of ODP-weighted consumption of CFC-11 and CFC-12.

14. **Sub-Project 5 -- Substitution for CFC Propellants in the Production of Pharmaceuticals at LEK Pharmaceuticals.** Lek Pharmaceuticals is one of the largest aerosol manufacturers in Slovenia. It is the only one that manufactures drugs in aerosol form, in addition to cosmetic aerosols. In 1990 Lek started to use propane-butane gas as propellant, and in 1993 the use of CFCs was excluded from the production of cosmetic aerosols. The mixture of CFC-11 and CFC-12 in a ratio 1:1 is used as propellant. The consumption of CFCs in 1992 was 157 tons, representing 36 percent of the CFC consumption in the aerosol sector. The proposed program involves the substitution for CFCs with propane-butane. The objective of the project is to phase out the use of 157 tons (1992) of CFCs aerosol propellants and substitute them with hydrocarbon aerosol propellants in the production of pharmaceuticals. The project started in the fourth quarter of 1994, and will be finished in late 1995 or early 1996. The total incremental cost of the project is US\$ 2,184,980, of which it is proposed that US\$ 1,992,600 is financed by the GEF grant. The result of the project will be the annual phaseout of 157.0 tons of ODP-weighted consumption of CFC-11 and CFC-12.

15. **Sub-Project 6 -- Elimination of CFC-11 in the Production of Light Building Panels at Trimo.** Trimo, with its annual production capacity of 600,000 m<sup>2</sup>, is the Europe's largest manufacturer of light building panels. Trimo panels are metal sandwich filled with mineral wool and glued with a polyurethane (PU) foam. About 40-60 percent of its production is exported, mainly to the European Union and the states of the Former Soviet Union. It consumed 22 tons of CFC-11 in 1992 in the production of light building panels. The objective of the project is to permanently eliminate the CFC-11 consumption in Trimo's production process by replacing the CFC-11 with CO<sub>2</sub> based foaming agent for its polyurethane adhesives. The conversion must assure the equivalent physical and mechanical properties and quality of Trimo sandwich panels. The scheduled completion time for equipping the warehouse with a panel transportation and storage system is four months, and for modifications and upgrades on the double belt line it is seven months. The total project duration

is scheduled at eleven months including the training, start-up, and trial production runs. The total incremental cost of the project is US\$ 960,000 of which it is proposed that US\$ 784,800 is financed by the GEF grant. The result of the project will be the annual phaseout of 27.7 tons of ODP-weighted consumption of CFC-11.

16. Sub-Project 7 -- Substitution for CFCs with Aliphatic Hydrocarbons in Dry Cleaning at the Labod Company. The Labod Company is the biggest dry-cleaning company in Slovenia. Leather clothes (30 tons/year), and silk clothes and similar fine materials (25 tons/year) are cleaned by CFC procedures. Labod uses 3.5 tons of CFC-113 per year, thus representing about 72 percent of CFC use in dry cleaning. Labod represents 8 percent of CFC use in the solvent sector. The objective of the project is to phase out 3.5 tons of CFCs by replacing CFC procedures with aliphatic hydrocarbons. Operational savings of US\$ 38,577 will be realized over the life of the project, and the incremental capital cost of the project is US\$ 217,677. The total incremental cost of US\$ 179,100 is proposed to be financed by the GEF grant. The result of the project will be the annual phaseout of 2.8 tons of ODP-weighted consumption of CFCs. The new technology could also be used as a training or demonstration center for other dry cleaning facilities which will need to phase out ODS.

#### KEY PROJECT DOCUMENTS

17. Slovenia completed a Country Program in fulfillment of its obligations under the Montreal Protocol. The project proposed here is based on the findings of the Country Program. Other documents include detailed sub-project descriptions which include financial and technical data, and the technical reviews of these subprojects undertaken by specialists from the Ozone Operations Research Group (OORG). As well, a detailed technical annex has been prepared in draft for this project. All of these documents are available from the Regional Coordinator, ENVGC; fax: 522-3256.

#### RATIONALE FOR FUNDING UNDER THE GLOBAL ENVIRONMENT FACILITY

18. The Project would form a part of Slovenia's ODS phaseout program some of which might not be implemented without Bank involvement. In addition to promoting the phaseout of ODS, one rationale for the project is that it will reduce the economic dislocation associated with ODS phaseout by assisting those enterprises which will be required to change their production technologies. The proposed project is consistent with the Implementation Guidelines and Criteria established by the Executive Committee of the Montreal Protocol (MPEC), for which the Bank is an implementing agency. The project will be developed and structured on the basis of specific ODS phaseout requirements in Slovenia, and the project eligibility criteria guidelines set forth by the Multilateral Fund for the Implementation of the Montreal Protocol and the GEF.

## SUSTAINABILITY AND PARTICIPATION

19. The investment program will focus on priority sectors and cost-effective measures which were defined in the Country Program for the phaseout of ODS, and will be complemented by changes in policies and regulations to ensure compliance with ODS phaseout targets (e.g., penalties for violation of regulations, obligatory reporting and monitoring requirements). Limited availability of ODS and ODS dependent components will work to ensure sustained future use of non-ODS technology. This will be primarily attributable to the phaseout of ODS production in Europe.
20. As part of the development of the Country Program, the Ministry of Environment undertook consultations with a broad spectrum of enterprises and interested parties, including other ministries: industry, economics, finance, NGOs, industry associations and others. Enterprises were given the opportunity to participate in the project as long as they could provide the necessary data for project staff to evaluate their financial viability, technological capabilities and eligibility for financial assistance. Consultations with enterprises and other interested parties continued through a series of country workshops held under the aegis of the Montreal Protocol on project identification, preparation and implementation, as well as during actual project design.
21. The Project will be implemented within a limited time-frame. ODS phaseout projects which are successfully implemented will have a permanent ODS phaseout effect, and be in compliance with the requirements of the Montreal Protocol. In order to ensure long-term sustainability of the various project components, policy and regulatory measures, already under consideration by the MEPP, will be introduced early in the project implementation period.

## LESSONS FROM PREVIOUS BANK INVOLVEMENT AND TECHNICAL REVIEW

22. ODS Phaseout Projects utilizing GEF resources are being developed concurrently in the Czech Republic, Slovakia, Hungary, and other countries. Implementation arrangements based on environment ministry implementation with local financial agent assistance in fund administration have been established for most ODS phaseout operations, and these have been used in the design of the Project.
23. The project was reviewed by technical specialists from the STAP roster as well as who serve on the Ozone Operations Research Group (OORG). The OORG was initially set up by the World Bank to review sub-project proposals for funding by the Multilateral Fund of the Montreal Protocol. By having OORG specialists review the Slovenia project, consistency with Montreal Protocol technical criteria as well as cost-effectiveness benchmarks is ensured. All eight investment sub-projects have been cleared by the reviewers. The institutional strengthening sub-component is being revised by the Ministry to conform to recommendations made by both OORG reviewers and ENVGC's Montreal Protocol staff.



## PROJECT FINANCING AND BUDGET

24. It is proposed that the Project cost of \$9.5 million be funded in the amount of \$6.2 by the Global Environment Facility (GEF). Funds would be provided as a grant from the Global Environment Trust Fund (GET) to the Government of Slovenia. The estimates for project costs and the size of the GEF Grant to be requested will be finalized during Appraisal (planned for May 1995). It is expected that the total grant request will be \$6.2 million taking into account exports to non-GEF countries, the financial intermediary fee, contingencies, and the possibility that one Sub-Project prepared by UNDP (Polluretani/Izoterm) may be included under the Project at a later date.

## INCREMENTAL COSTS

25. The Sub-Projects involve eligible incremental costs (i.e., those capital and operating costs which would not have occurred in the absence of the Montreal Protocol) and non-incremental costs (i.e., those costs which would have occurred regardless of the presence of the Montreal Protocol). All estimated costs for the Sub-Projects which are determined to meet the definition of incremental costs (as determined by the London Amendments to the Montreal Protocol) will be eligible for grant funding subject to the final eligibility criteria to be established by the GEF. The Grant will only fund that portion of project costs which are agreed to be incremental, and for which financing is available while the Participating Enterprises will be expected to finance the associated non-incremental costs of the Project.

26. The project's major benefit will be to assist Slovenia to achieve its objective of completely phasing-out the use of ODS as early as is technically feasible. The project will help the Government implement an accelerated ODS phaseout program by providing financing for priority Sub-Projects which will result in the phaseout 345 tons of ODP annually (or about 36 percent of Slovenia's total ODP-weighted use of ODS).

27. The project consists of Sub-Projects which will contribute to maximizing the useful life of equipment which currently rely on the availability of CFC for their continued use. This will contribute to reducing the country's economic cost of phasing out the use of the regulated substances by converting equipment to alternative uses and technologies. In addition, the project will enable export-oriented firms to maintain their export markets by adjusting in a timely manner to non-ODS products as requested by importers from industrialized countries.

## ISSUES, ACTIONS, AND RISKS

28. Management structures and ownerships of most of the companies which would be assisted under this project could change in the future. Nevertheless, the risks associated with the potentially difficult financial health of some companies would be mitigated through a project review process. Although the financial viability of each of the Participating Enterprises is considered to be healthy, the situation could change in the future. The financial situation of each of the Participating Enterprises will therefore be reassessed during Appraisal to better ensure project sustainability.

29. Monitoring of compliance with ODS regulations will be of paramount importance for project success. Under the Institutional Strengthening Component, the MEPP will be responsible for monitoring the use and phaseout of ODS in Slovenia. To address this problem, the MEPP will need to ensure that a system of fines is in place to discourage their use, and that use of ODS is strictly monitored and enforced.

30. Other issues and actions which will need to be addressed includes project implementation procedures. Specifically, the PIU will need to be up and running with a staff of 2-3 persons by the time the project is approved, and a Project Administration Agreement (PAA) governing the working relationship between the Slovenian EcoFund and the MEPP is needed. For the PAA, the model used in the Czech Republic ODS phaseout project (funded by the GEF pilot facility) will be followed and has already been shared with the relevant authorities.

#### INSTITUTIONAL FRAMEWORK AND PROJECT IMPLEMENTATION

31. The Ministry of Environment and Physical Planning (MEPP), through its Project Implementation Unit (PIU), will act as general program coordinator for the Project. The MEPP will liaise with other ministries on policies and industrial strategy issues, and, through its PIU, be responsible for day-to-day management of project implementation.

32. The Slovenia EcoFund (SEF) will serve as the Project Implementation Unit (PIU) for the Project, and be assisted by the Chamber of Economy (COE) which has effectively served as the project coordinator up until now. Furthermore, because the EcoFund is uniquely positioned to also perform the services which are normally required from a Financial Intermediary, it was agreed that no formal Financial Intermediary will be selected for the Project at this time.<sup>2</sup> Instead, as necessary, the SEF will contract out these services to a local bank in the event that it is not capable of performing all of the responsibilities normally required of a Financial Intermediary. The PIU proposal to be prepared by the SEF will include an estimate of its costs which clearly show estimates for (i) the role normally prescribed for a PIU (a total dollar amount is requested), and (ii) the role normally prescribed for a Financial Intermediary (as a percentage of the total amount of the Investment Sub-Projects);

33. A Project Administration Agreement (subject to Bank review) will be established between the SEF and the MEPP. For each Sub-Project a Sub-Grant Agreement between the SEF and each of the Participating Enterprises will be prepared. The Sub-Grant Agreement will include reporting provisions, annexes on disbursement, and provisions related to environmental protection and worker safety. Standard Bank disbursement procedures will be followed, with established limits on initial deposit and replenishment levels, statements of expenditures, and Bank review levels.

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<sup>2/</sup> The Slovenian EcoFund will be actively involved in the implementation of the Slovenia Environment Project currently being prepared by the World Bank, and thus its dual role as the PIU and Financial Intermediary for the ODS Phaseout Project will serve to strengthen the Ecofund and coordination between the two projects through the experience which will be gained.

34. To ensure smooth disbursement, early involvement of the SEF in supervision will be required. A Project Implementation Manual (PIM) has been provided, and includes the relevant Bank guidelines on procurement, disbursements, use of consultants, financial reporting, auditing, sample bidding documents, and other project-specific documents, such as the Terms-of-Reference for the Financial Intermediary. In addition, a one week training course on project implementation and management was held in Budapest in mid-January 1995, and was attended by staff of the COE and the SEF.

35. **Environmental Aspects.** Each project sub-component will be subject to local environmental regulations and Bank project environmental review procedure. The Project consists of light industrial projects which would be classified as category B on the basis of the Bank's project environmental classification system (OD 4.01) and based on previous classification of similar projects. For each sub-project, an annex on environmental and safety procedures was attached to the sub-project document which was reviewed by the technical reviewers.

36. Although the overall project objective is protection of the environment by reducing the emission of ODS, the change to non-ODS technologies or substitution of ODS with other chemicals may involve other environmental risks. Sub-Projects may employ flammable substitutes or, in the case of solvent Sub-Projects, increase wastes. Sponsoring enterprises will be responsible for providing an environmental impact assessment (EIA) as required by Slovenian law. In addition, the MEPP will ensure that information on international safety standards and procedures will be requested from the suppliers, and that these standards and procedures will be applied to the use of new substances by all Participating Enterprises.

#### **TIMING OF PREPARATORY ACTIVITY**

37. The following steps are planned for project processing:

- Project Appraisal -- May 1995
- Yellow Cover Review Meeting -- June 1995
- Negotiations -- July 1995
- Board Approval -- August 1995
- Signature of Grant Agreement -- September 1995

TABLE I

Slovenia ODS Phaseout<sup>1</sup> - Summary of Sub-Project Data and Costs

| Sub-Project   | Sector                       | Types of ODS Used           | Annual ODP Phaseout <sup>1</sup> | Incremental Capital Cost <sup>2</sup> | Incremental Operating Cost <sup>2</sup> | Total Project Cost             | Requested GEF Grant            |
|---|------------------------------|-----------------------------|----------------------------------|---------------------------------------|---|--------------------------------|--------------------------------|
| Project Implementation Unit   | Institutional                | -                           | -                                | \$220,000                             |   | \$220,000                      | \$220,000                      |
| LTH   | Refrigeration and Foam       | CFC-12<br>CFC-502<br>CFC-11 | 67.4                             | \$2,837,995                           | \$1,193,959                             | \$4,031,954                    | \$1,492,724                    |
| Gorenje Servis  | Heat Pumps and Refrigeration | CFC-12                      | 11.4                             | \$118,680                             | \$341,309                               | \$459,989                      | \$118,680                      |
| Krka  | Aerosols                     | CFC-11<br>CFC-12            | 79.0                             | \$1,068,452                           | (\$393,140)                             | \$675,312                      | \$675,312                      |
|   | Aerosols                     | CFC-11<br>CFC-12            | 157.0                            | \$1,992,600                           | \$192,380                               | \$2,184,980                    | \$1,992,600                    |
| Trimo   | Foam                         | CFC-11                      | 27.7                             | \$872,000                             | \$88,000                                | \$960,000                      | \$784,800                      |
| Labod   | Solvent                      | CFC-113                     | 2.8                              | \$217,677                             | (\$38,577)                              | \$179,100                      | \$179,100                      |
| Financial Intermediary Fee (to be paid to Slovenian EcoFund) <sup>3</sup> |                              |                             |                                  |                                       |   |                                | \$163,896                      |
| Contingency <sup>3</sup>  |                              |                             |                                  |                                       |   |                                | \$546,322                      |
| <b>Total</b>  |                              |                             | <b>345.3</b>                     | <b>\$7,327,404</b>                    | <b>\$1,383,931</b>                      | <b>\$8,711,335<sup>1</sup></b> | <b>\$6,173,434<sup>1</sup></b> |

1/ Ozone-Depleting-Potential (ODP) is a concept which has been developed to aggregate the impacts of all ozone depleting substances (ODS) on the ozone layer. Since not all ODS are equally damaging to the ozone layer, their effects on the ozone layer must be weighted by the appropriate damage factor. For example, CFCs are ten times as damaging as 1,1,1-Trichloroethane (TCE), so TCE only receives a weight of 0.10.

2/ Incremental costs are defined as those costs of ODS phaseout which would not have been incurred in the absence of the Montreal Protocol. Estimates of incremental capital and operating costs are based on the methodology developed by the Multilateral Fund of the Montreal Protocol.

3/ Financial Intermediary Fee (expected to be 3%) and Contingency (expected to be 10%) to be determined during Appraisal to ensure that total project cost does not exceed \$9.5 million and GEF Grant does not exceed \$6.2 million. In addition, another Sub-Project which was prepared by UNDP (for up to \$2 million) may be added depending on the availability of GEF financing.

ANNEX A: SUMMARY OF TECHNICAL OPINION

SLOVENIA: PROJECT FOR THE PHASEOUT OF OZONE DEPLETING SUBSTANCES

1. The technical review of the Slovenia Ozone Phaseout Project was undertaken by technical reviewers who are both listed on the STAP roster and are members of the World Bank's Ozone Operations Research Group (OORG). The OORG was set up to undertake analysis of proposed sub-projects for funding under the Multilateral Fund for the Montreal Protocol. It utilizes standard criteria against which to judge the technical viability and cost effectiveness of a given sub-project. These include: appropriateness of the technology, environmental impact, project costs, implementation timeframe, lessons from experience, safety issues and final recommendations.
2. For Slovenia, all eight investment sub-projects have been cleared for implementation by the technical reviewers. At the time of the initial OORG review (November, 1994), several subprojects needed revisions. Since then, the enterprises have been appraised of these needed modifications/clarifications, and have incorporated them in the revised proposals.
3. The one component which is still undergoing revision is the institutional strengthening component. The reviewers suggested that the project implementation unit be streamlined; this is being considered by the Government.