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Report No. 18822

# IMPLEMENTATION COMPLETION REPORT

## REPUBLIC OF SLOVENIA

## TECHNICAL SUPPORT AND INVESTMENT PROJECT FOR THE

## PHASEOUT OF OZONE DEPLETING SUBSTANCES

## GEF GRANT NUMBER 28305

January 22, 1999

Europe and Central Asia
Environmentally and Socially Sustainable Development Unit

## WEIGHTS AND MEASURES

Metric System

## REPUBLIC OF SLOVENIA'S FISCAL YEAR (FY)

January 1 - December 31

## CURRENCY EQUIVALENTS
(as of June 30, 1998)

| | | |
|---|---|---|
| Currency Unit | = | Slovenian Tolar (SIT) |
| US$1 | = | 169.5777 SIT |

## AVERAGE EXCHANGE RATES
Slovenian Tolar per US$

| 1994 | 1995 | 1996 | 1997 | 1998 until August 31 |
|---|---|---|---|---|
| 128.8086 | 118.5185 | 135.3654 | 159.6893 | 169.6274 |

| | |
|---|---|
| Vice President: | Johannes Linn, ECAVP |
| Country Director: | Roger Grawe, ECC07 |
| Sector Director: | Kevin Cleaver, ECSSD |
| Sector Leader, Environment: | Michele E. De Nevers, ECSSD |
| Responsible Staff: | Krisztina Kiss, Program Team Leader (ECSSD) |

ABBREVIATIONS AND ACRONYMS

| | | |
|---|---|---|
| CEE | - | Central and Eastern Europe |
| CFC | - | Chlorofluorocarbon |
| CIS | | Commonwealth of Independent States |
| COE | - | Chamber o Economy of Slovenia |
| CTC | - | Carbon Tetrachloride, a regulated substance |
| DME | - | Dimethyl Ether |
| FI | - | Financial Intermediary |
| FSU | - | Former Soviet Union |
| GEF | - | Global Environment Facility |
| GET | - | Global Environment Trust |
| GIS | - | Geographic Information System |
| GOS | - | Government of Slovenia |
| GWP | | Global Warming Potential |
| HCFC | - | Hydrochlorofluorocarbon |
| HFC | - | Hydrofluorocarbon |
| ICB | - | International Competitive Bidding |
| IS | - | International Shopping |
| LCB | - | Local Competitive Bidding |
| LIB | - | Limited International Bidding |
| LS | - | Local Shopping Procedures |
| LS | - | Local Shopping |
| MEPP | - | Ministry of Environment and Physical Planning |
| MFMP | - | Multilateral Fund for the Implementation of the Montreal Protocol |
| MP | - | Montreal Protocol on Substances that Deplete the Ozone Layer |
| NBF | - | Not Bank-Financed |
| NCB | - | National Competitive Bidding |
| NS | - | National Shopping |
| OD | - | Operational Directive |
| ODP | - | Ozone Depleting Potential |
| ODS | - | Ozone Depleting Substances |
| OORG | - | Ozone Operation Resource Group |
| PAA | - | Project Administration Agreement |
| PCE | - | Perchloroethylene |
| PIM | - | Project Implementation Manual |
| PIU | - | Project Implementation Unit |
| PU | - | Polyurethane |
| SDR | - | Special Drawing Right |
| SEF | - | Slovenian EcoFund |
| SOE | - | Statement of Expenditures |
| SIT | - | Slovenian Tolar |
| STAP | - | Scientific and Technical Advisory Panel |
| TAG | - | Technical Advisory Group |
| TCE | - | 1,1,1-Trichloroethane |
| UNEP | - | United Nations Environment Program |
| USD | - | United States Dollar |
| 3R | - | Recovery, Reclamation and Recycling |

**IMPLEMENTATION COMPLETION REPORT**

**REPUBLIC OF SLOVENIA**

**TECHNICAL SUPPORT AND INVESTMENT PROJECT FOR THE PHASEOUT OF OZONE DEPLETING SUBSTANCES GEF GRANT NUMBER 28305**

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**REPUBLIC OF SLOVENIA**

**TECHNICAL SUPPORT AND INVESTMENT PROJECT FOR THE PHASEOUT OF OZONE DEPLETING SUBSTANCES GEF GRANT NUMBER 28305**

# PREFACE

This is the Implementation Completion Report (ICR) for the Technical Support and Investment Project for the Phaseout of Ozone Depleting Substances in the Republic of Slovenia, for which a GEF Grant (Grant # 28305) in the amount of SDR 4.2 million equivalent was approved on November 9, 1995 and made effective on December 27, 1995.

The Grant was closed six months later than originally envisaged, June 30, 1998 instead of December 31, 1997. It was fully disbursed and the last disbursement date was October 27, 1998.

The ICR was prepared by Krisztina Kiss, Program Team Leader, Eastern Europe and Central Asia Region, ECSSD, and Mr. David Gibson, Consultant. It was reviewed by Ms. Michele de Nevers, Sector Leader for Environment, ECSSD, Mr. Gottfried Ablasser, Portfolio Manager, ECSSD and Mr. Mahesh Sharma, Senior Regional Coordinator, ENVGC.

Preparation of the ICR was begun during the Bank's final supervision and project completion mission, which took place from May 4-8, 1998. It is based on material in the project file and discussions with the Director of the EcoFund, the Project Implementation Unit, officials of the Ministry of Environment and Physical Planning and other relevant entities. The recipient participated in the preparation of the ICR by contributing their own project completion report.

**IMPLEMENTATION COMPLETION REPORT**

**REPUBLIC OF SLOVENIA**

**TECHNICAL SUPPORT AND INVESTMENT PROJECT FOR THE PHASEOUT OF OZONE DEPLETING SUBSTANCES GEF GRANT NUMBER 28305**

# EVALUATION SUMMARY

## INTRODUCTION

i. The Republic of Slovenia was among the first group of countries eligible for Global Environment Facility (GEF) grant funds to launch a comprehensive Ozone Depleting Substances (ODS) phaseout program. In 1993, the Government of Slovenia (the Government) requested World Bank assistance for the preparation of a GEF funded ODS Phaseout Project (the Project). When the Project closed in mid-1998, it was the second successfully completed ODS phaseout project worldwide. GEF support provided the necessary incentives for Slovenia's early adoption of ODS phaseout activities, which have yielded environmental and economic benefits.

### Project Objectives

ii. The principal objective of the Project was to assist Slovenia in the cost-effective phaseout of ODS consumption as mandated by the Montreal Protocol (the Protocol) and its amendments and adjustments. Specific objectives included: a) the progressive phaseout of chlorofluorocarbon (CFC) consumption in Slovenia through adoption of new cost-effective CFC-free technologies; and b) institutional strengthening to improve the capability of the Ministry of Environment and Physical Planning (MEPP) in managing and overseeing ODS phaseout activities.

### Implementation Experience and Results

iii. Overall, the objectives of the Project were fully achieved. Use of primary CFCs was phased out through the implementation of sub-projects for which funding was provided by the GEF on a grant basis to cover the investment costs that enterprises would not have incurred had Slovenia not been a party to the Protocol. In addition, the Project enabled appropriate Western technologies to be identified and introduced into the country. The Protocol is based on the elimination of ODS consumption; the fate of existing stocks of ODS is not considered and signatories are free to manage these in any way they choose. Slovenia's approach reflects that adopted in all Western Countries.

iv. *Project time frame.* The Sub-projects were prepared in 1994, but because of the need to clarify whether Slovenia qualified as an Article 5 developing country, the Grant Agreement was not signed until November 1995. The Project completion date had to be extended by six months to June 30, 1998 because of delays in implementation by Gorenje Servis and Krka; the former because of prior business commitments elsewhere and the latter due to minor changes in sub-project design.

v. *Investment Components.* Projects involving investments in equipment were carried out at LTH (commercial refrigeration equipment), Gorenje Servis (domestic refrigerator service), Krka and Lek (aerosols), Trimo (building panels) and Labod (dry cleaning). All of these were successfully implemented and the enterprises concerned are satisfied with both the technology chosen and the performance of the new plant. Minor technical problems remain to be solved at LTH and Lek and discussions are currently underway between the respective enterprises and their contractors on the measures to be implemented. Notwithstanding the technical problems, both firms have achieved normal production levels with the new technology and their Sub-projects are deemed completed.

vi. All participants benefited from the Project and commercially they are in a stronger position now than at the start of the operation. Loss of markets suffered following the disintegration of Yugoslavia and the ensuing wars have been by and large offset by stronger export performance of LTH, Lek, Krka and Trimo. This was made possible by the adoption of modern non-ODS using technologies under the Project.

**Summary of Findings, Future Operation, and Key Lessons Learned**

vii. The Project is the second of its kind to be completed after the Czech Project. The PIU was fortunate in that it was able to learn from the experience of the Czech PIU with procurement and management through workshops organized by the Bank. This contributed to the exceptionally efficient management of the Project. The Slovenian experience is being shared with the neighbouring countries and is expected to prove invaluable for ongoing GEF funded ODS phase-out projects in Poland and the Commonwealth of Independent States (CIS).

viii. *Legal and Regulatory Framework.* ODS phaseout took place within the framework of Slovenia's obligations under the London Amendment, whose provisions have the force of law in the country. Legislation controlling ODS imports and consumption was promulgated in December 1997 in the form of a ministerial decree. Further regulation is required to make deliberate venting of CFC refrigerant illegal, and for making mandatory a licensing scheme for refrigeration technicians. The PIU is confident that legislation covering these measures will be in place by the first quarter of 1999. The legislation is important for the effective operation of the recovery, reclamation and recycling (3R) scheme[1]. The legislation will cover Slovenia's obligations under the Protocol, which do not include management of the existing stocks of CFC

[1] Whilst Slovenia ratified the London Amendment in 1992, the Copenhagen Amendment to the MP was ratified on October 8, 1998

refrigerants. These amount to about 360 tons of CFC-12, 20 tons of R-502 and 9 tons of CFC-11 contained in existing refrigeration systems throughout the country.

ix. *Major Factors Affecting the Project.* The most significant factor that affected the Project was the time taken to resolve the issue of whether Slovenia should have Article 5 or Article 2 status under the Protocol. This took about 12 months to address and delayed signing of the Grant Agreement until November 1995[2].

x. The regional workshops, launched by the Bank and organized by the PIU, were particularly useful in designing the recovery, reclamation and recycling (3R) scheme. The network of contacts that has been developed will be of particular importance as the proposed 3R scheme gets underway.

xi. *Recipient Participation.* Many of the Project's achievements were due to the exemplary cooperation between the project management entities (EcoFund and the PIU) and Sub-project participants in successfully tackling the challenges that emerged during implementation. LTH, Gorenje Servis, Krka, Lek, Trimo and Labod all adapted quickly to these challenges. LTH has been successfully restructured financially and the new technology has strengthened its market position. Krka, Lek and Trimo introduced new innovations during the implementation of their Sub-projects. Gorenje Servis, on its own launched a public awareness raising campaign and Labod was the first to successfully complete its Sub-project. The performance of the staff of the Slovenian EcoFund (SEF) and the PIU was exceptional throughout the project cycle and could serve as a model for other countries.

xii. *Bank Performance.* The Bank's performance in preparation, appraisal and implementation was satisfactory, despite three changes in task manager over the life of the Project. The Bank's missions were staffed with highly qualified professionals in financial, environmental and technical fields. The priorities of both Slovenia and GEF were appropriately addressed as were those of the Protocol and its related amendments and adjustments. The decision in 1996 to move supervision responsibility for the Project to the Bank's Regional Office in Hungary was welcomed by the Recipients as it overcame some of the problems arising from distance and time. Also, project supervision from the field greatly facilitated the launching and managing of a series of regional workshops with the involvement of the grant recipient countries.

xiii. *Implementation Structure.* The arrangements for coordinating implementation of the Project worked well. The enterprises and, in turn, the PIU and SEF submitted the progress reports to the Bank in a timely fashion. All participating entities eventually welcomed the discipline of Bank reporting requirements and procurement procedures. Enterprises stated that their ODS phaseout Sub-projects would have been delayed without GEF funding. Lek, for instance, was of the view that it would have stopped Byvacin production, were it not for GEF funding. Acquisition of modern technology gave enterprises a strongly needed boost that helped them ride out the difficulties caused by the disintegration of Yugoslavia. GEF funding enabled

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[2] Because her per capita ODS consumption fell below the 0.3kg threshold in 1995, Slovenia was automatically reclassified as an Article 5 country. This is merely a technicality since phaseout was based on the assumption that she came under Article 2.

LTH to acquire cyclopentane foaming technology. Without it, in all likelihood, the enterprise would have lost its share of W. European markets and not survived as a major company.

xiv. *Commercial Motivation.* A high degree of co-operation was displayed by all Sub-project enterprises. In the case of the industrial Sub-projects, the possibility afforded by the Project of re-directing their activities towards new export markets via new technology was a significant factor in ensuring their commitment.

xv. *Sustainability and Future Operations.* All enterprises are financially sound and have successfully implemented their respective Sub-projects based on state-of-the-art non-ODS technologies. They are, therefore, likely to remain in business and the equipment provided under the Project will be used until the end of its useful life. The Project addressed every area of CFCs use, except for a nationwide refrigerant recovery, reclamation and recycling 3R scheme, since the Slovenian market of only two million population was found too small for including the investments of such a scheme in the key investments funded by the grant. A 3R scheme is being planned jointly by Gorenje and LTH, which will collect refrigerant from industrial, commercial and domestic users. Two studies have been carried out to assess the viability of the proposed scheme, based on the findings of which a reclaim center was put into operation in December 1998 at LTH funded by their own sources. Implementation of the scheme will bring Slovenia in line with other countries in receipt of GEF funding for ODS phaseout, where such schemes are either under way or planned. A comprehensive feasibility study carried out by the PIU shows the existing stocks of ODS refrigerant being finally exhausted in 2023. By then, all existing stocks of CFC-12 and R-502 will have been exhausted through unavoidable system leaks. The combined use of refrigerant recycling and retrofit reflects the approach taken by all developed countries where existing refrigerant stocks are recycled for as long as possible.

xvi. The Bank completion mission recommended that the 3R scheme design should incorporate significant financial incentives for refrigeration technicians. Along with the legal provisions required, this should avoid a repetition of the experience of the Czech 3R scheme. Insufficient redemption price paid for recovered refrigerant is considered to be the main reason why the majority of technicians have re-used the refrigerant directly rather than selling it to the scheme's reclaim facility. The involvement of an entrepreneur who runs a successful scheme in the UK is a welcome step in ensuring that the design of the Slovenian scheme is practical.

xvii. *Demonstration Value and Replicability.* Some Sub-projects (Krka, Trimo, Lek) have resulted in innovations, which are expected to be of interest to foreign companies engaged in the same business. Labod has already run workshops to show that the hydrocarbon dry cleaning technology it uses is a cost-effective replacement for the equipment currently used by other companies. Likewise, LTH has run refrigeration training courses for service companies in other parts of the former Yugoslavia. Also, LTH has advised companies in Bulgaria and Macedonia who are procuring equipment similar to theirs for foam sub-projects.

xviii. *Cost Effectiveness.* By comparison with the Protocol's thresholds, the cost effectiveness of the Project was poor. This is due to the disproportionately large size of the industries, compared to Slovenia's population. The industries are large but by the time the Project was

prepared, their output had declined drastically because of the disintegration of Yugoslavia. Thus, in the reference pre-Project year, their ODS consumption was low by comparison with their production capacity. The costs of conversion are proportionate to installed capacity rather than output. The cost effectiveness ratios were provided in the original Sub-project documents approved by GEF in 1995. Actual cost effectiveness ratios are comparable to those predicted in 1995. These are presented in Statistical Table 5H.

xix. Overall the Project progressed exceptionally smoothly and provides an example for other countries involved in ODS phaseout. The PIU provided a high level of management co-ordination that was matched by the level of efficiency and co-operation displayed by the Sub-project enterprises.

xx. *Global significance.* New non-ODS use technology supplied under the Project helped participants consolidate export markets and find new ones. This has contributed to their present sound finances and helped companies weather the loss of markets in the former Yugoslavia.

xxi. *Key lessons learned.* Although the Project proceeded smoothly, the enterprises criticised themselves for lack of planning. All felt their Sub-projects would have benefited from more careful thought before the sub-grant agreements were signed. Equipment omitted through oversight from the original Sub-project designs had to be purchased with funds saved through the procurement of other items and technological developments made by the enterprises during implementation, i.e. that equipment costs got lower than estimated at Project design, Project total costs did not change. PIUs in countries where ODS phaseout projects are under implementation or about to be initiated would benefit from the experience of the Slovenian enterprises.

# IMPLEMENTATION COMPLETION REPORT

# REPUBLIC OF SLOVENIA

# TECHNICAL SUPPORT AND INVESTMENT PROJECT FOR THE PHASEOUT OF OZONE DEPLETING SUBSTANCES GEF GRANT NUMBER 28305

## PART I. PROJECT IMPLEMENTATION ASSESSMENT

## A. PROJECT CONTEXT AND OBJECTIVES

### Project Context

1. The Vienna Convention for the Protection of the Ozone Layer (1985) and the Montreal Protocol (the Protocol) on Substances that Deplete the Ozone Layer, signed in 1987, are international environmental agreements which call for the phaseout of substances that deplete the stratospheric ozone layer (hereafter "regulated substances"). More than 160 countries, accounting for over 95 percent of the world's consumption of these regulated substances, have ratified the Protocol and the Vienna Convention. The Protocol, with its amendments and adjustments, mandates the complete phaseout of production and consumption of a number of ozone depleting substances in developed countries by January 1, 1996. All industrialized countries have initiated comprehensive national programs to develop cost-effective strategies to phase out the use of these substances among various end-user sectors. The largest family of ODS is chlorofluorocarbons (CFCs), which are widely used in industrial applications, including domestic, commercial and industrial refrigeration and air conditioning; flexible and rigid insulation foam; and in numerous other applications such as aerosol propellants, and solvents.

2. Slovenia committed to the complete phaseout of the consumption of regulated substances by 1996, as mandated by the Protocol and its amendments. In July, 1992, Slovenia assumed the obligations of the Protocol, which was initially ratified by the former Yugoslavia on December 26, 1990. Slovenia ratified the London Amendments to the Protocol in December 1992 and the Copenhagen Amendment in October, 1998. Initially, when Slovenia became party of the Protocol, it was classified as an Article 5 country[3]. At the end of 1994 Slovenia with the Bank's support in the clarification process was classified to a non-Article 5 country status and was ineligible for financial assistance from the Multilateral Fund for the Implementation of the Montreal Protocol (MFMP). GEF resources, therefore, were mobilized to finance the Project under the Reduction of the Ozone Layer Depletion component. In 1995, Slovenia's consumption fell below 0,3kg per capita and it was automatically re-classified as an Article 5 country. This is a technicality and has no real significance because the country's strategy was based on the original decision to give Slovenia Article 2 status.

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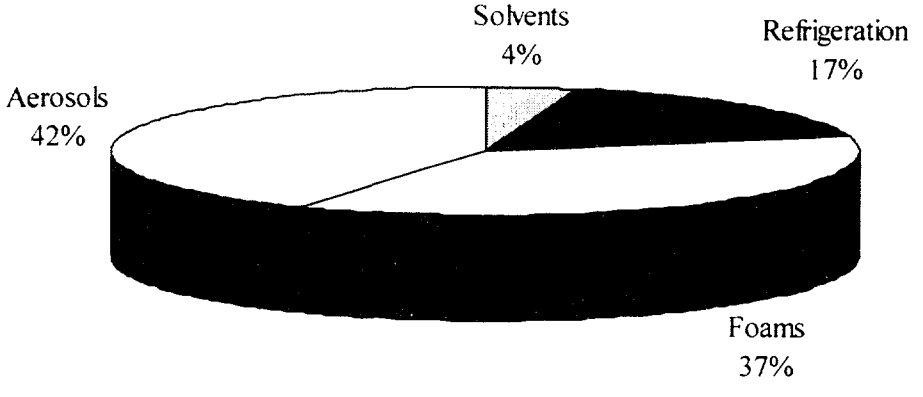
[3] A developing country whose annual calculated level of consumption of the controlled substances in Annex A of the Protocol is less than 0.3kg/capita

3. Slovenia has been actively planning its ODS phaseout strategy since 1992. A comprehensive Country Program based on the Phaseout of Ozone Depleting Substances was completed in June 1994 using the year 1992 as the basis, with Bank assistance (see paragraphs 4. 5. and 6. below). The Program served as the basis for establishing the priorities for the Slovenian Government, and for identifying key policy and regulatory measures which, while supporting a cost effective phaseout, would minimize disruptions to the industrial sector utilizing ODS. The activities funded under this Project (see paragraphs 19. through 37.) are among the priorities identified in the Country Program.

4. In 1993, total usage of regulated ODS was approximately 1,936 metric tons, -- of which 855 tons CFCs represented 848 tons of ozone-depleting-potential (ODP) in weighted tons, -- about 35 percent lower than in 1990 and equivalent to 952.5 ODP in weighted tons. In terms of ODP, 89 percent was accounted for by CFCs, ten percent by 1,1,1-Trichloroethane (TCE) - solvents account for 95 percent of TCE consumption - and the remaining one percent by hydrochlorofluorocarbons (HCFCs)[4]. Usage and consumption of ODS in Slovenia in 1993 are shown in Statistical Tables 5.A. and 5.B. Consequently, the focus of the Country Program and thus the Project was on phasing out the consumption of CFCs. Details relating to the consumption of ODS (CFCs) in 1993 are shown in the chart below:

**Slovenia's consumption of regulated CFCs in 1993**




5. *Phaseout Strategy.* The strategic objective was "to protect human health and the environment against adverse effects resulting from modifications of the ozone layer" (in the words of the Vienna Convention). In order to achieve this, the Protocol's requirement for Slovenia was to eliminate its ODS consumption[5], since there was no ODS production in the country. No requirement to manage existing stocks in any particular way is placed on signatories. The Country Program (mentioned in paragraph 3) described Slovenia's ODS (only CFCs) elimination strategy based on ten investment sub-projects, six of which were finally

[4] These figures were included in the Project Document of October, 1995.

[5] This is defined as Imports + production - export. Slovenia does not produce ODS.

endorsed by GEF for funding[6]. The six participating enterprises were selected on the basis of their capacity to undertake their Sub-projects, their technological leadership positions, or their special situation within the context of ODS consumption (e.g., a sufficiently low level of production exports) and their financial viability. The six investment Sub-projects represented 31 percent, 345 tons of annual ozone depleting potential (ODP) (i.e. 347 tons of CFCs) phaseout of the Country Program (100 percent 1,098 tons of ODP, equivalent to 1,108 tons of CFCs in 1992). Trends in CFC usage in Slovenia by end-use between 1986-1993 are shown in Statistical Table 5.C. All the ODS usage (100 percent of the 1108 tons of the 1992 CFCs usage) under the Country Program was phased out as mandated by the Protocol. Slovenia thus fully met its obligations under the Protocol.[7]

6. The Country Program did not describe a recovery, reclamation and recycling (3R) scheme or make any reference to the use of existing stocks, since that is not required under the Protocol. It described the disposal of refrigerants as a waste management problem that would be taken care of in due course. Since the refrigeration service CFC demand was low by comparison with other sectors, it was not considered a priority. After participation in a Bank sponsored workshop in Budapest, the PIU decided to encourage the establishment of a 3R scheme to recycle the existing stocks of refrigerant (see paragraphs 64. and 73. below). Estimates of the existing stocks of CFC refrigerants are known from the feasibility study made by the PIU to demonstrate the scheme's financial viability. These are about 360 tons of CFC-12, 20 tons of R-502[8] and 9 tons of CFC-11. The annual phaseout amount (by 1998) of CFCs was 340 tons (338.2 ODP tons), which is high by comparison with the existing stocks. This is because the biggest consumer of ODS, a manufacturing industry, was set up to supply the much larger market of Yugoslavia, with a population of 24 million. The existing ODS stocks which consist almost entirely of refrigerants in existing refrigeration systems[9] correspond to Slovenia's population of two million.

7. The Republic of Slovenia was among the first group of countries eligible for grant funding from the Global Environment Facility (GEF) to launch a comprehensive ODS phaseout program. In 1993, the Government of the Slovenian Republic requested World Bank assistance in the preparation of a GEF funded ODS Phaseout Project. Preparation and implementation of the Project took place during the period of economic transition and industrial restructuring. Hence, only those enterprises that were likely to financially survive the transition were deemed eligible for participation in the Project.

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[6] The four non-funded sub-projects were: i) substitution of CFC refrigerants with HFC-134a and substitution of CFC blowing agents with cyclopentane in the production of household refrigerating-freezing appliances, Gorenje GA, Velenje; ii) substitution of CFCs in the production of polyurethane (PU) flexible foams, Plama-Poliuretani, Podgrad; iii) substitution of CFCs in the production of flexible polyethylene and rigid PU foams, Plama-Izoterm, Podgrad; and iv) conversion of 1.1.1-trichloroethane with water based detergent cleaning procedure, Kolektor Idrija. All these sub-projects were financed by the companies themselves and implemented as mandated by the Protocol.

[7] Taking into account all Annex A and Annex B substances of the Protocol (CFCs, halons, 1,1,1-trichloroethane and CC14), all the 2.001 tons of ODS or 1206 tons of ODP projected on the 1992 consumption of the country got phased out.

[8] A blend of CFC-115 (ODP = 0.6) and HCFC-22 (ODP = 0.05) the ODP of R-502 stocks is about 7 tons

[9] Gorenje Servis and LTH - respectively the largest refrigerator and commercial refrigeration service companies, both purchased quantities of CFC refrigerant in 1994 and 1995 to use for the future service of existing equipment. Gorenje has 7 tons of CFC-12 left. LTH has exhausted her stock.

8. *Cost Effectiveness.* The grant cost effectiveness of the Project is poor when compared to the Protocol's threshold figures, but only slightly lower than what was calculated at appraisal. The industries are large but by the time the Project was prepared, their output had declined dramatically because of the disintegration of Yugoslavia. Thus, in the reference pre-Project year, their ODS consumption was low by comparison with their production capacity. The costs of conversion are proportionate to installed capacity rather than output. The cost effectiveness ratios were provided in the original Sub-project documents approved by GEF in 1995. Actual cost effectiveness ratios are comparable to those predicted in 1995 at appraisal. These are presented in Statistical Table 5H.

9. *Rationale for GEF Involvement.* The Project was developed and structured to meet the specific ODS phaseout requirements of Slovenia as outlined in the Country Program and the general project eligibility criteria guidelines of the GEF Scientific and Technical Advisory Panel (STAP). GEF funding was obtained on the basis of Slovenia's eligibility for such assistance, i.e. it was not classified as a developing country according to the Protocol, and hence was deemed ineligible for funding from the Multilateral Fund for the Implementation of the Protocol.

**Project Objectives**

10. The principal objective of the Project was to assist Slovenia in the phaseout of ODS consumption in a cost-effective manner as mandated by the Protocol and its amendments and adjustments. Specifically the Project was to assist Slovenia in: (a) phasing out the consumption of CFCs through adoption of new cost-effective CFC-free technologies; and (b) institutional strengthening to improve the capability of the Ministry of Environment and Physical Planning (MEPP) to manage and oversee the phaseout program.

11. GEF support provided the incentives for the early adoption of ODS phaseout activities. In so doing the country captured additional environmental and economic benefits, which otherwise would have been lost. By focussing on the key sectors and enterprises, the Project was to support the phaseout of the 345 tons of ODP per year.

**Evaluation of Objectives**

12. The objectives of the Project and the strategy within which it was embedded were appropriate according to the requirements of the Protocol and in line with the objectives of the country assistance strategy and the Bank's global goals of environmentally and socially sustainable development. Financial assistance to aid the phaseout of ODS played a pivotal role in enabling Slovenia to meet its obligations under the Protocol.

13. The overall approach to ODS phaseout was essentially the same as the one adopted in other central European countries. Funding was provided to enable non-ODS technologies to be introduced at key enterprises. Owing to the small size of Slovenia, only two Sub-projects could be financed under the Project for local demonstration purposes. Some innovative approaches were developed that have demonstration value beyond Slovenia's borders.

14. The Project milestones were clear since the Project took place within the framework of Slovenian law that banned CFC import from the end of 1995 in line with the country's commitments under the Protocol.

## B. ACHIEVEMENT OF OBJECTIVES

15. The import of ODS into Slovenia has been stopped by law since 1996 in accordance with the requirements of the country's status as an Article 2 member of the Protocol. Start-up of the Project was delayed by about 12 months because of discussions over whether Slovenia was entitled to Article 5 status. Several participants described this as a factor that jeopardized their strategy for conversion, although on balance all felt that GEF's role was critical in speeding up the conversion from ODS use. All consumption of CFCs was phased out through the introduction of alternative technologies. All the objectives of the Project (as described in paragraphs 10. and 11.) have thus been fully met.

16. *Project-wide Factors.* The defining legal framework for the Project was the London Amendment to the Protocol, ratified by Slovenia in 1992. Following this, the Protocol requirements enjoyed the force of law. In July, 1994 the Government of Slovenia adopted the Country Program (see paragraph 5.) for the phaseout of Ozone Depleting Substances, identifying the key investments and regulatory measures to be implemented. All imports[10] of CFC substances ceased by the end of 1995, without any particular phaseout schedule being imposed.

17. Specific ODS legislation was passed in December 1997 in the form of a ministerial decree. This decree controls production, imports, exports and use of ODS and ODS containing products. However, it does not address the wider issues of existing ODS use in the country[11], which was not part of the Project either. Implementation of a 3R scheme will require additional regulation on banning ODS venting in the country (see paragraphs 64. and 71. - *"Future Operation"* and *"Recommendations"* below).

18. *Monitoring.* The Protocol and its amendments require signatories to phase out their production and consumption[12] of ODS. There is no requirement placed on them to estimate or control stocks of ODS which, for non-producing countries like Slovenia, consists mostly of refrigerants lying in working systems. Countries are free to manage existing refrigerant stocks as they wish. Signatories are obliged to report on ODS production and consumption each year. The compliance with the Protocol is monitored by the calculation of the annual consumption in comparison to the consumption in the reference year. The reference year for Article 2 countries is 1986, while for the Article 5 countries the baseline is the average ODS consumption in 1995-

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[10] Slovenia did not produce any ODS.

[11] Estimated current total quantity of CFCs in the existing refrigeration and air conditioning equipment or stored in Slovenia is about 380 ODP tons, which will need reclamation or incineration some time in the future. Of this, the estimated annual amount available for reclamation is about 11.5 tons, about half of which could be reclaimed in the next 15-20 years. Some CFC refrigerants are assumed to have been smuggled into Slovenia to satisfy the refrigeration service demand, but no reliable estimates can be made. This is being reduced by improved training of customs officers and the 3R scheme (see paragraph 70. below) which reduces the basic service demand through recycling.

[12] Protocol definition of consumption is production plus imports minus exports of controlled substances.

1997. The appropriate monitoring indicators for an ODS phaseout project are thus the ODS consumption before, during and after project implementation. Statistical Tables 5D. and 5E. give a complete picture of this consumption, broken down to show the contribution made by each Sub-project to phaseout. In fact, because of increased production since 1994 the *de facto* amount phased out was higher than envisaged for all Sub-projects except Gorenje. Details are presented in Tables 5F and 5G. The Implementation Committee under the Non-compliance Procedure for the Protocol reported in 1998 that Slovenia's ODS phaseout was in compliance with the consumption reduction schedule and fully successful

*Institutional Strengthening Component*

19. *Sub-project 1. Project Implementation Unit.* The Chamber of Economy (COE), the Slovenian EcoFund (SEF) and the MEPP set up an ODS Phaseout Project Implementation Unit (PIU) in 1995. The PIU coordinated the implementation of the Project, oversaw procurement and disbursement in close cooperation with SEF and supervised Project activities according to the requirements of the GEF, the World Bank and the MEPP. As necessary, the PIU arranged for technical assistance and consultants to assist in project implementation, and provided support to facilitate cooperation among governmental institutions and the consumers of ODS. Finally, the PIU assisted small ODS users not covered under the Project and advised the participating enterprises concerning any changes in ODS phaseout strategies and technologies and their implications and trained staff of the enterprises. The PIU and the SEF fulfilled their role an exemplary manner. Funding of this Sub-project out of the grant was however higher than originally envisaged, US$327,196 actually, compared to the US$219,690 original estimate. There were two reasons for this. More technical assistance and involvement of also foreign experts were required during implementation (details on studies, training and workshops are presented in Table 7.) than originally envisaged, and the Project closing date extension meant also that the PIU operation was required for an extended period of time. Technical assistance activities of the PIU under the Project covered the preparation of a manual on good practices in refrigeration and air conditioning, the management of 11 training courses for service technicians for refrigerating-freezing and air conditioning equipment, a workshop for customs officers and inspectors on the implementation of new regulations related to ODS phaseout and control, regional and international workshops, and a study regarding the establishment of a 3R scheme for Slovenia.

*Investment Component*

20. *Sub-project 2. Sub-project for Conversion and Phaseout of ODS at LTH.* LTH is the largest producer of commercial refrigeration appliances in Slovenia. The objectives of the Sub-project were the substitution of CFC refrigerant with HFC-134a and HFC blends, and of CFC-11 blowing agent with cyclopentane. Product development has proceeded smoothly and most units have been converted for either HFC-134a (high and medium temperature applications) or R-404a (low temperature) uses. A small amount of HCFC-22[13] (4.9 tons in 1997) is still used. There

[13] Use of this substance has a small ODP (0.05) is allowed until 2030 under the MP. It is still widely used in the EU as a "transitional substance" although its use in new equipment is liable to be banned in new equipment from 2001 according to proposed EU legislation.

remains a small problem concerning leaks of nitrogen from the storage tank provided under the Project. This is not serious, however, and will be addressed by the plant contractors.

21. LTH provided expert lecturers for a course in refrigerant handling, organized by the PIU. The course was well attended by technicians from LTH and other participating enterprises. A further course is planned to support a 3R scheme (see paragraphs 24. and 64. - *"Future Operation"* below).

22. The heat recuperator was omitted from the original Project design by mistake. This was approved during Project implementation and paid for from cost savings on the purchases of other equipment.[14] Incremental Operating Costs (IOCs) were lower than predicted during Project design.[15].

23. LTH's financial situation had deteriorated, following the loss of Yugoslav markets. As a result the enterprise was unable to obtain the bank guarantee, which was a requirement for grant disbursement under the Project Administration Agreement. This and the need to re-structure the company delayed implementation by about a year.

24. *Sub project 3. Servicing of Refrigerators and Freezers, and Substitution of CFC-12 Refrigerant in Heat Pumps with HFC134-a at Gorenje Servis.* Gorenje Servis is the largest refrigeration service organization for household appliances in Slovenia. Gorenje, the production company of household appliances, phased out CFCs used as refrigerants and polyurethane (PU) foam blowing agent at their own cost[16] and now produce refrigerators foamed with cyclopentane, and charged with eitherHFC-134a or R-600a (isobutane - a flammable hydrocarbon) as refrigerant. The Sub-project involved the provision of equipment to enable Gorenje Servis technicians to service Gorenje's products (e.g. mobile recovery units, charging equipment, leak detectors). Refrigerant recovery equipment was also provided to enable technicians to collect refrigerant instead of venting it and participating in the 3R scheme planned by Gorenje Servis with LTH (see paragraphs 21. and 64. *"Future Operation"*). Conversion to R-600a had not been anticipated in the Project and Lokring pipe sealing tools[17] were added during implementation.

25. Gorenje technicians have participated in the course organized by PIU for technicians' described earlier (see paragraph 20. - LTH Sub-project description). After the start-up delays, implementation has proceeded smoothly. Some delays occurred concerning the certification of recovery cylinders on behalf of the sub-contractor to Ekotez, the supplier of the mobile recovery units, but the certification was acquired in time.

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[14] Equipment omitted through oversight from the original Sub-project designs had to be purchased with funds saved through the procurement of other items, the costs of which got lower since project design, and technological developments made by the enterprises during implementation. The total costs of the Project did not change.

[15] This was due to lower refrigerant and compressor prices than anticipated. The heat recuperator also helped to offset running costs.

[16] The fact that Gorenje exports the bulk of their production to non-GEF eligible countries made them ineligible for a GEF funded manufacturing project.

[17] This is a mechanical method of sealing charging stubs that enables R-6ooa refrigerators to be repaired at householders' premises

26. Gorenje Servis also undertook a public awareness raising campaign. Leaflets were prepared and distributed to households informing them about CFCs and the Ozone Layer problem and the need for using qualified technicians. This, together with another awareness campaign carried out by the Gorenje Holding Company, resulted in a gratifying 20 percent increase in general service work[18]. Such a positive response from the Slovenian public to atmospheric issues bodes well for further awareness campaigns planned by the PIU (see paragraph 74. below).

27. *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. The objective of the sub-project was to phase out the use of about 80 tons of CFCs aerosol propellants and substitute them with dimethyl ether (DME) in colognes and hydrocarbon aerosol propellants in all other products. A new explosion proof wrapping machine had to be procured under the Project. This was not included in the original Project design, but made necessary by Slovenian flammable gas regulations. It was financed from unallocated funds.

28. No technical problems were encountered in implementation. The flexible DME/liquid petroleum gas (LPG) filling line arrangement is unusual but works well. Incremental Operational Savings (IOSs) have turned out to be lower than estimated (IOSs 4.9 US cents/unit compared to the estimated 5.4 US cents/unit).

29. *Sub-project 5. Substitution for CFC Propellants in the Production of Pharmaceuticals at Lek Chemical and Pharmaceutical Co.* Lek is one of the largest aerosol manufacturers in Slovenia. The company produced pharmaceuticals in Ljubljana, and cosmetics in Lendava, a town about 200 km from Ljubljana. LEK had converted its cosmetic aerosol production in Lendava to hydrocarbon aerosol propellant (HAP) in 1993 in advance of Slovenian legislation. The objective of the Sub-project was to phase out the use of 157 tons of CFCs aerosol propellants and substitute them with hydrocarbon aerosol propellants in the production of pharmaceuticals. The Sub-project involved conversion of a CFC based medical aerosol facility in Ljubljana where Byvacin (a spray antibiotic) was produced. Other equipment provided under the Project was a storage tank for n-Pentane. This is used in conjunction with the LPG (already in use) to reduce the propellant pressure and achieve an even distribution of the Byvacin antibiotic on the skin surface. One relatively straightforward technical problem concerning the cooling unit of the air conditioning system was left for Lek to resolve with the mechanical contractors. Implementation of the Sub-project proceeded smoothly. The HAP based Byvacin has achieved spectacular results in export markets and has virtually restored LEK business position to pre-1989 levels.

30. IOSs were estimated at US$80,000 at completion, compared to US$192,360 IOCs at preparation. Savings were largely due to technological developments Lek made during implementation. A new binary product formulation was developed that eliminated the need for one component and enabled the filling process to be simplified.

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[18] For the 3 months June-August 1998 compared to the same period in 1997.

31. A garment sterilizer was approved during Project implementation. Under Slovenian law, Byvacin production can be modified only if the latest regulations regarding sterilization are met.[19] Lek had originally intended to satisfy this requirement by outsourcing the work to a local hospital, but this did not prove to be a cost effective. Since the existing equipment would not meet the latest regulations, a new one was purchased from savings made on the procurement of other equipment (see footnote 12.).

32. *Sub-project 6. Elimination of CFC-11 in the Production of Light Building Panels at Trimo.* Trimo is Europe's largest manufacturer of light building panels. PU foam is used as an adhesive to bond the mineral wool fibers to the metal walls of the panels. The Sub-project involved the provision of equipment to enable the adhesive to be foamed with carbon dioxide in place of CFC-11. In addition to the adaptation of the technological equipment of adhesive application and new double belt line, a new extension to the factory was partly funded to accommodate the longer curing time required for the carbon dioxide foamed panels after manufacture and before removal to storage. The new arrangements for this Sub-project required a mechanical handling facility for removing the panels from the conveyor for which a forklift truck was envisaged in the original Project. This was changed to a gantry crane[20] and was funded by unallocated funds, cost savings from Sub-projects and their own funds. Implementation has proceeded smoothly and no technical problems remain.

33. Trimo is a classic example of a so-called "triple win" Project[21]. A review of production methodology occasioned by the Project catalyzed the product re-design described below (see paragraph 44. - *"Innovation"* below).

34. *Sub-project 7. Substitution for CFCs with Aliphatic Hydrocarbons in Dry Cleaning at the Labod Company.* The country's largest dry cleaning business used CFC-11 and CFC-113 for cleaning fine garments. This was replaced under the Sub-project by an aliphatic hydrocarbon ($C_{11}H_{24}$). The technology employed was of Japanese origin, modified by the Germans to fully address safety issues. The modified technology allows potentially explosive hydrocarbon (HC)/air concentrations to be monitored electronically in the equipment, which is disconnected automatically if the Lower Explosive Limit (LEL) is approached.

35. Since the cleaning fluid is liquid at ambient temperatures (boiling range 180-200 Deg.C), any leaks of the cleaning fluid out of the machine would be of a stable liquid, so flammable air/HC concentrations cannot easily develop in the work area where the machine is located.

36. No special safety training was included in the Sub-project apart from that provided by the equipment manufacturer during commissioning, when employees were made aware of the

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[19] In effect the relevant European Directive applies. This requires that the most up-to-date methods for equipment testing be employed. These are set out in "Validation of Steam Cycles" (Technical Monograph #1) published by the Parental Drug Assn. Inc. The old Fedagari FOF/4 sterilizer cannot meet these requirements.

[20] Calculations made by Trimo showed that panels would suffer excessive deflection if supported only at the center

[21] i.e. one which yields technical as well as economic and financial benefits . Trimo's development reversed Trimo's fortunes by greatly increasing their export potential, bringing potential tax revenue and foreign exchange benefits to Slovenia as a whole.

explosion risks and the response of the automatic safety equipment to these risks. There has been virtually no change in operating procedures, except that operators are now required to wear gloves when removing garments from the cleaning drum and placing them in the drier.

37. Negative Incremental Operating Costs (IOCs)[22] were calculated in the Sub-project and deducted from the investment grant. Implementation of this Sub-project has proceeded smoothly.

38. *Global Benefits.* IOCs were significantly lower than originally envisaged for Sub-projects implemented by Labod, Lek and Krka[23]. All other enterprises provided evidence of actual Incremental Operating Costs incurred. These were verified by the Bank's technical evaluation mission for the preparation of the ICR[24].

39. One significant benefit was shared by all companies apart from Labod and Gorenje Servis. All other participants were major producers for whom the former Yugoslavia was the largest market. The civil war in Bosnia and Herzegovina and Croatia that followed the dissolution of Yugoslavia in 1991 had a devastating effect on business. Exposure to new non-ODS technologies, however, enabled these enterprises to acquire a foothold in new European markets that at least partly offset their loss of the Yugoslav market and enabled them to stay in business. In Lek's case the success of Byvacin in the export market has virtually restored their turnover to pre-1989 levels. Krka's present turnover of 1.5m units is a fraction of the 6m units per year they enjoyed at their peak, but is largely due to new export markets. Trimo has added Russia and the Czech Republic to their traditional local and German markets. Their export strength is partly due to a significant technical innovation (see paragraph 44. – "Innovation" below) and compliance of their product with the latest German fire standards[25]. Conversion to non-ODS technology enabled LTH to increase its exports to Croatia, Macedonia, Czech Republic and Russia. Exports to Germany, France, Netherlands, Italy and the UK, however, have declined because of increased competition within the EU.

40. Many Sub-projects have enjoyed benefits that will facilitate Slovenia's accession to the European Union (EU)[26]. By conforming to ISO 14001 (validation is currently being sought), Trimo will satisfy EU criteria in respect of environmental compliance. Its equipment meets stringent noise and dust emission standards and a new EU regulation on the size of fiber dust particles allowed in the workplace. In order to sell products in the EU, LTH needed to test products according to European (EN) standards[27]. Best international practice in terms of safety and the environment was employed on all Sub-projects, and no additional investments will be

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[22] There was no disbursement category for IOCs, the calculation however was important for calculating the needed grant amount (in the summary table of the 1995 Project Document).

[23] These were anticipated and project funding adjusted accordingly.

[24] Krisztina Kiss (Task Team Leader) and David Gibson (independent technical consultant) visited Slovenia from in September 1998 to verify project completion.

[25] DIN 4002. The cost of certification was met by the Project.

[26] *Slovenia initiated the process of becoming an associate member of the EU in 1997.* Full membership is expected in 2003. Screening of Slovenian legislation for EU compatibility will start in January 1999.

[27] Test results have to be deposited at approved EU institutions for inspection by interested parties

needed when Slovenian legislation is harmonized with EU law in 1999. The exception to this is LTH, where HCFCs will continue to be used as refrigerants. The use of HCFCs in new refrigeration systems of the type made by LTH is likely to be prohibited in 2001 under proposed EU legislation. Replacement of HCFCs by HFC refrigerants in new equipment production is straightforward. Since it already uses HFCs (HFC-134a; R-404a) in other production, LTH will experience little difficulty in converting the remainder of its production. Investment costs will be minimal and related to small design changes that LTH might anyway make in the course of normal product development. The Project's objective, however, was to meet the requirements of the Protocol not of the EU legislation.

41. No other Sub-projects employ HCFCs or any other substance for which controls are proposed in EU legislation.

42. The discipline of Bank procurement procedures and reporting requirements was welcome by all participants. Conversion to non-ODS technology coupled with moving premises was the largest project undertaken by the family-run firm of Labod, since the company was founded. Bank guidance was invaluable. The requirement of International Shopping brought them in touch with technologies superior to those with which they were familiar with and the Sub-project benefited as a result. Even for mature enterprises like Krka, Trimo, Lek and LTH, the discipline of Bank procedures was finally welcomed, though at the outset it was seen as a problem. Krka, LTH and Lek freely admit that better planning would have resulted in smoother project implementation.

43. LTH, Gorenje Servis, the SEF and the PIU welcomed the opportunity of networking afforded by workshops launched by the Bank and organized by the PIUs of countries where ODS phaseout projects were underway (Czech Republic, Hungary and Slovenia). Krka has characterized the Bank's technical input on aerosols as invaluable[28].

44. *Innovation.* All Sub-projects were innovative in the sense that Western European technologies of choice were introduced into Slovenia. Labod is the only dry cleaning company in Slovenia using a hydrocarbon based cleaning fluid, though this is fairly standard technology in Western Europe. In the case of the two aerosol Sub-projects (Krka and Lek), hydrocarbon aerosol propellant was already being used, though in both cases the Sub-projects resulted in unusual developments with demonstration potential for other medium sized producers. Krka's flexible DME/Liquid Petroleum Gas filling line is thought to be unique. Lek developed a new product formulation that dispensed with the use of beeswax and simplified the filling procedure for their spray antibiotic.

45. At Trimo, the Project served as a catalyst for in-house technical developments that have generated interest worldwide[29]. LTH is testing hydrocarbon based refrigerants[30] in its equipment

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[28] Gino Nardini - OORG reviewer and president of the Mexican Aerosol Institute.

[29] Technicians from several European countries, Japan, Russia and Saudi Arabia have visited Trimo to learn more of this development.

[30] These are expected to follow HFCs which are significant Global Warming agents. Hydrocarbons have negligible Global Warming Potential (GWP) but are flammable which creates the major barrier to their use.

but is wary of premature innovation. It sees its interests being best served by staying in step with Western European practice. However, the experience of re-designing the equipment for HFC refrigerants will stand the company in good stead for eventual transition to hydrocarbon based refrigerants.

46. *Demonstration Value and Replicabiliy.* The innovations by Krka, Lek and Trimo described above are all potentially interesting to other enterprises in similar industries converting from ODS. They are the only such producers in Slovenia however. Krka and Lek have made innovations that are theoretically interesting for other medium sized cosmetic/pharmaceutical producers. Trimo has already had visits from overseas building panel producers interested in its technique.

47. Labod has a significant potential to demonstrate hydrocarbon based dry cleaning to about 300 other dry cleaning enterprises in Slovenia. Without exception these use Perchloroethylene (PER). Labod can demonstrate that transition to hydrocarbon cleaning is cost effective as well as desirable for health and environmental reasons[31]. The enterprise has already hosted one workshop where it shared the experiences with 70 local dry cleaners. Labod's experience shows that not only are the equipment cheap but that it also reduces operating costs. It ought to be clear to other Slovenian operators that transition to hydrocarbon based equipment makes good business sense when replacing existing equipment.

48. LTH's cyclopentane based foaming installation is standard, but is of interest to other PU foam users in the region. LTH has already been visited by companies in Macedonia and Bulgaria procuring equipment for similar GEF funded projects. The company has transferred its experience in new refrigerant handling, retrofit and recovery to service companies in Croatia, Bosnia and Macedonia.

49. In general, Project implementation proceeded very smoothly. The high level of co-ordination and effective project management by the PIU combined with the efficiency and commitment of the enterprises can well serve as a model for other countries.

50. *Safety.* All Sub-projects, except Trimo, involved the use of flammable fluids, as foaming agents (LTH), aerosol propellants (Krka, Lek), cleaning fluid (Labod) and refrigerants (Gorenje Servis). These Sub-projects have all addressed the safety aspects, adopting measures that represent best international practice. A combined Environmental and Safety Statement was required by the Ministry of Environment and Physical Planning as a condition of grant disbursement for each Sub-project. The Statement specified safety and environmental legislation to be followed for each Sub-project.

51. A Permit to Operate was also required before normal production could be resumed, which was issued by the local authority after prior approval by the health and the fire protection inspectorates.

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[31] PER is thought to be a carcinogen which also contributes to Tropospheric Ozone (smog) formation

52. Local safety experts have been involved. Gorenje's repair technique for R-600a based refrigerators has been approved by Kova, a safety specialist consulting company. Technicians at Krka receive refresher courses in safety equipment operation[32] and hydrocarbon sensors are re-calibrated every two years. Operators undergo annual short refresher courses in-house, which cover safe equipment operation. All enterprises have a safety manual[33] and have identified safety representatives whose specific task is to monitor behavior in the workplace and identify safety problems, if any.

53. *GEF Involvement.* All enterprises stated that their Sub-projects would have been delayed or cancelled had the GEF grant funding not been available. Labod would not easily have found the $200,000 funding required from their net profit of $60,000 per year. Borrowing from local banks would have taken even longer than the GEF Project preparation and self-financing was not an option. LTH stated that conversion would have been impossible without GEF help[34]. Krka said their Sub-project would have taken much longer because GEF funding via the Bank was quicker and less complicated than acquiring a conventional loan from a local bank. Trimo stated that the availability of the GEF grant shortened the time taken by its Sub-project by two or three years.

54. The Project served as a catalyst for a number of technical innovations described above (see paragraphs 44. and 46. above). Without the grant, Gorenje Servis would have deferred the 3R scheme, although it would have funded conversion to servicing non-ODS refrigerators from its own resources. Lek admitted that without GEF funding it would have ceased Byvacin production with the probable loss of about 20 jobs. This would have been ironic given the success of Byvacin spray. Instead, 20 additional jobs have been created in one of the highest unemployment areas in the country.

## C. MAJOR FACTORS AFFECTING THE PROJECT

55. From a technical standpoint implementation has proceeded smoothly and all enterprises have indicated that they are fully satisfied with the results. The major external factor affecting project implementation was the time taken to clarify Slovenia's status under the Protocol. Slovenia initially applied for Article 5 status, but was finally classified as an Article 2 member. This process took about 12 months from mid-1994. The Grant agreement was finally signed in November 1995. (Slovenia is now technically an Article 5 country - see note to paragraph 2.).

56. The PIU was able to benefit from the regional workshops described above (see paragraph 38. - "*Global Benefits*") especially in designing the 3R scheme as well as from the other countries' experience with project management and implementation. The exceptionally smooth implementation of the Slovenian Project was due in part to these workshops. Contacts made during these events will also be useful as the 3R Scheme is developed (see paragraph 64. –

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[32] At the Slovenian Electrical Association

[33] Krka and Lek have updated their existing safety manuals to take account of the expansion of their hydrocarbon based filling activities, and the new hydrocarbon storage facilities provided under the project

[34] They could probably have funded transition to new refrigerants, but not cyclopentane foaming. Their performance in European markets would have been at risk and their survival as a major company unlikely

"*Future Operation*" below). The Czech and Hungarian experience with such schemes will provide valuable input as detailed design of the Slovenian scheme is undertaken.

## D. PROJECT SUSTAINABILITY

57. Under the Project state-of-the-art technologies were introduced. The hydrocarbon based technologies used in most Sub-projects removes Stratospheric Ozone Depletion and Global Warming concerns, but hydrocarbon's are not completely benign because, as Volatile Organic Compounds (VOCs), they contribute to Smog formation[35]. Only one enterprise (Trimo) uses environmentally harmless technology. Some (Labod, Gorenje Servis) use technologies which are unlikely to be superseded in the foreseeable future. Processes at Krka and Lek are likely to be changed in the medium term as VOC issues are addressed. Krka is considering using CO2 as a propellant and already use hand pump dispensers for insecticide[36]. This will require only modifications to their existing hydrocarbon aerosol propellant filling equipment.

## E. BANK PERFORMANCE

58. The Bank's performance in preparation, appraisal and implementation was satisfactory, despite three changes in task manager over the life of the Project. The Bank's missions were staffed with highly qualified professionals in financial, environmental and technical fields. The priorities both of Slovenia and GEF were appropriately addressed as were those of the Protocol and its related amendments and adjustments. The decision at the mid-term to move supervision responsibility for the Project to the Bank's Regional Office in Hungary was welcome by the Recipient, as it overcame some of problems arising from time difference and distance. Also launching and managing a series of regional workshops dealing with policy issues and incentives for example for the 3R scheme with the involvement of the grant recipient countries of the region for exchange of experiences and good practices was found to be by all participants.

59. The working relationships of the groups involved in the Project, namely the Bank, the grant Recipient institutions, the MEPP, the SEF, the PIU, and the six enterprises were excellent. Bank missions ensured that rules regarding GEF eligibility criteria, and procurement and financial reporting guidelines, were being followed and provided useful guidance on technical issues, project management, and institutional strengthening advice to the PIU, the financial intermediary and the grant recipient enterprises.

## F. RECIPIENT PERFORMANCE

60. Many of the Project's achievements were due to the exemplary cooperation between the project management entities (SEF and the PIU) and the participating enterprises. This enabled them to successfully tackle the challenges that emerged during implementation. LTH, Gorenje Servis, Krka, Lek, Trimo and Labod all adapted quickly to these challenges. LTH was

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[35] Tropospheric Ozone

[36] Curiously in some markets *any* aerosol is perceived by customers as environmentally damaging and pump dispensers are more popular.

successfully restructured financially and the new technology strengthened its market position, Krka, Lek and Trimo introduced new innovations during implementation of their Sub-projects. Gorenje Servis, on its own, launched a public awareness raising campaign and Labod was the first to successfully complete its Sub-project. The whole staff of the SEF and the PIU were highly committed, good professionals, whose input was critical for the exceptionally effective project management and coordination. The experience could serve as a model for other countries.

61. All main legal covenants were met in a timely fashion. The closing date was extended once by six months. The extension was required because of delays in implementation, procurement and some changes in Sub-project designs, and difficulties regarding the proper design of the 3R scheme, which was not part of the original Project and is expected as future action. All of the Slovenian agencies involved with the Project performed in an exemplary fashion. Approval of the anticipated legislation on banning the venting of CFCs will enable the private sector to carry out refrigerant reclaim efficiently and economically. Project implementation and reporting was punctual and efficient. The SEF and the PIU organized an exhibition on the results of the Project and on awareness raising regarding ozone layer protection at a major fair in Ljubljana at end of October, 1998.

## G. ASSESSMENT OF OUTCOME

62. Overall, the performance of the Project has been very good. Not only have satisfactory technical solutions been identified and successfully implemented, but the business position of all enterprises has also improved as a direct result of the Project. To date economic costs to Slovenia have been zero, and the Project appears to be a classic example of a "triple win" scenario[37]. Owing to Slovenia's position as a former member of the Yugoslav Federation, with industries configured for supplying this region of 24 million people, its position, as these markets disappeared could have been dire. The Project provided a timely opportunity for a section of Slovenia's industrial output to be re-directed towards the relatively stable markets of Western Europe. The social and economic benefits of this for the development of Slovenia, an economy in transition, are significant.

63. *Efficacy.* The importance of the institutional component in supporting the Country Program and the phaseout of ODS in Slovenia needs to be stressed. The PIU's involvement during preparation and its management and coordination activities at the country level, and the provision of exchange of information and knowledge, resulted not only in smooth Project implementation, but in the complete phaseout of ODS in Slovenia as required by the Protocol. The PIU initiated and supported the ODS phaseout at companies which were not included in the GEF financed Project. It adopted the ODS phaseout legislation including the ODS import/export licensing system, the introduction of which is required by the Montreal Amendment to the Protocol (1997). The ratification of the Copenhagen Amendment to the Protocol is also a Project output, since the PIU provided the knowledge and expertise to the MEPP in the preparation of

[37] This is currently true. Disposal of domestic refrigerators *will* entail a significant economic cost when the 3R scheme is implemented. See later - "Future Actions".

the necessary documentation and supported the MEPP in meeting other requirements under the Protocol (e.g. reporting to the Protocol Secretariat).

## H. FUTURE OPERATION

64. Trimo, Krka and LTH are all actively considering further developments in product design. These have been described above under *"Innovation"*. No Bank support is envisaged or required for these Sub-projects, as these are deemed viable by the companies themselves.

65. Slovenia has just ratified the Copenhagen Amendment to the Protocol and will soon pass legislation banning the deliberate venting of CFC refrigerants. Further ODS regulation needed to support the proposed 3R scheme is discussed below (see paragraph 73.).

66. The countrywide 3R scheme represents the major future activity and the only one that relates to ODS consumption[38]. Such a scheme, in compliance with the National Environmental Action Program, involves the collection and re-processing of refrigerants from service operations, retrofitting commercial and industrial systems with non-ODS refrigerants, and the disposal of domestic refrigerators. The scheme would be based on the establishment of one reclaim center at LTH's premises at Skofja Loka, the main supporter of the scheme along with Gorenje Servis.

67. Two studies have so far been carried out to determine the best approach. The first concluded that reclaim in Slovenia was more cost effective and logistically viable than exporting recovered refrigerant abroad. Regulations will prevent cross border transport of waste products. Already today there are quotas and special permits are needed for the cross border transport of refrigerants. Based on a conservative cash flow analysis, the scheme has been found to be viable. The scheme could reach a target of 5.7 tons reclamation per year. The second study was carried out by a British reclaim expert[39] who runs a successful refrigerant reclaim company in the UK. This endorsed the findings of the Slovenian study and focussed on the detailed organization of the scheme in which the expert participated. As a result in December 1998 a reclaim center was commissioned at LTH and was fully financed out of the company's own funds. Some R22 has already been reclaimed. This good start is also an indication that the reclaim center operation will be viable.

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[38] A countrywide refrigerant recycling scheme where refrigerant is collected instead of being vented to atmosphere and processed for re-use in special equipment.

[39] Derek Capper. CEO of Refrigerant Products Ltd., Manchester.

68. The role of a 3R scheme is threefold: i) to permanently reduce the demand for all refrigerants, [40] ii) to specifically reduce the demand for CFC refrigerant currently being partly met by illegal imports[41]and iii) to reduce the economic cost of retrofitting the country's stock of refrigeration equipment by extending the period over which this takes place. The feasibility study carried out by the PIU made estimates of the existing refrigerant stocks based on the known production of refrigeration equipment over three decades (see paragraphs 6. and 19. above). If the 3R scheme works as predicted, stocks of CFC-12 and R-502 will fall to zero by 2023. By this time 32 tons of HCFC-22 will have been recycled, in addition to 183 tons of CFC-12 and 14 tons of R-502. Small stocks of CFC-11 (about 9 tons) are contained in working centrifugal refrigeration systems. Experience elsewhere suggests that there will be no market for reclaimed CFC-11.

69. The destruction of CFC refrigerants through incineration figures in the proposed 3R scheme only to the extent that different refrigerants mistakenly recovered into the same bottle, will be incinerated in case such mixtures cannot be separated and reclaimed. If no market for the CFC-11 can be found, this too will be incinerated.

70. The 3R scheme will reduce the demand for new CFC-12, which might be met by illegal imports from Ukraine and Croatia. Customs officers have been informed about regulatory measures and techniques of detecting ODS.

71. *Recommendations.* The basic approach is correct, though there is an essential difference between Slovenia and Western Countries that should be addressed in the design of the scheme. The principle difference is the relative value of CFC refrigerants compared to a mechanic's wage. The value of CFC is approximately constant everywhere in Europe[42] whereas mechanics' wages vary considerably. A Slovenian mechanic earns about 20 percent of the wages of his/her British counterpart. Mechanics' wages in the Czech Republic are comparable to those in Slovenia and the performance of the Czech scheme has provided a valuable lesson in how these schemes function. Levels of refrigerants recovered there are very high by world standards, but almost none is reclaimed as individual technicians by-pass the reclaim centre and re-use refrigerants directly. This has the effect of shortening the life of the refrigeration equipment in which it is used[43]. Technicians do this because they can earn the equivalent of about one day's wages for each kilogram of CFC-12 collected, whereas the reclaim centre offers only a fraction of this. Ironically shortening the life of equipment imposes a significant economic cost to the economy, whereas the rationale of a 3R scheme is precisely to reduce the economic cost of phasing out ODS refrigerants.

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[40] 10-15% of the GWP problem is thought attributable to the direct emission of refrigerants. The GWP of replacement refrigerants is in most case of the same order as the CFCs they replace

[41] This reduces the demand for new refrigerant at the sources, Russia, China and India

[42] About $US20/kg for CFC-12.

[43] Hermetic compressors are particularly sensitive to contaminated refrigerant.

72. Design of the 3R scheme should be predicated on returning the greater part of the value added in recycling to the refrigeration mechanics, who actually recover it[44]. Gorenje's 29 technicians could earn an extra US$ 500/year if they could retain about US$ 4 after each kg of refrigerant is reclaimed. Representing about 5 percent of annual earnings, such a bonus is sufficient to generate the cooperation necessary to the scheme's success.

73. Although a financial incentive is the key to successful operation, further regulatory measures are required to support the 3R scheme. A new regulation making refrigerant recovery and technician licensing mandatory is expected by the first quarter of 1999. Training in recovery and retrofit techniques is important; the PIU has already made progress in this by organizing a technician training course, and another is planned for 1999. The idea of the "green card[45]" could be profitably borrowed from the Hungarian 3R Scheme.

74. The financial analysis of the proposed scheme is based on high recovery rates, up to 50 percent of the annual refrigerants in use. Achieving these targets would require retrofitting existing equipment at a fairly high rate[46]. Commercial refrigeration end-users will be heavily targeted by an upcoming PARC, planned by the PIU. It will make a convincing case for early retrofit of CFC based systems, as well as encouraging end-users to demand that technicians working for them are qualified.

75. The Slovenian customs should make every effort to reduce the eventual smuggling of CFC refrigerants. This is a notoriously difficult task, as the experience of the Western Countries shows. The imminent agreement by the Russian Federation to cease production in 2001 should ease the situation in the medium term, although frantic efforts at stockpiling can be expected in the intervening period.

## I. KEY LESSONS LEARNED

76. Trimo would have started earlier and Krka would have received more funding if both enterprises had planned more carefully[47]. Lek expended effort unnecessarily by making procurement packages too small and using both its own and Bank procurement procedures. Gorenje would not have purchased specific refrigerant charging equipment had it known that the parent company was going to introduce R-600a refrigerators into the market.

77. These elements point to the clearest lesson that can be drawn from the Slovenian Project - careful planning pays dividends. The PIU and participants benefited greatly from the Bank

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[44] Net of the 3R scheme running costs.

[45] An identity card that identifies the holder as having undergone a refrigerant handling course.

[46] The possibilities of recovering refrigerant from ordinary service work are small. Retrofit and recovery together form a mutually dependant dynamic, with refrigerant recovered from retrofitted systems supplying the service requirement of non-retrofitted systems after re-processing. Eventually the stock of CFC refrigerant dwindles to zero through unavoidable system leaks. However, the scheme continues to operate indefinitely reducing the demand for non-ODS refrigerants, most of which are global warming agents.

[47] Ironically LTH reported that had their project *not* been delayed they would have incorporated new refrigerant developments into their production.

organized workshops described earlier, but these were held once the Project was under way. That better planning was required was a consistent self-criticism made by all Sub-project enterprises.

78. This is a major lesson that can be passed on to other countries at an earlier stage of project preparation such as the CIS. The PIUs should encourage participating enterprises to study their Sub-projects in detail and make sure that every eligible item is covered and that a feasible implementation plan is prepared well ahead of time.

79. The Bank procurement procedures should be explained in detail along with the benefits of seeking to widen the scope of tendering. Enterprises should be discouraged from trying to use local suppliers they know where this is not appropriate. Labod was grateful that the need for international tendering brought it in touch with a superior version of hydrocarbon cleaning technology that the company did not know existed.

**IMPLEMENTATION COMPLETION REPORT**

**REPUBLIC OF SLOVENIA**

**TECHNICAL SUPPORT AND INVESTMENT PROJECT FOR THE**

**PHASEOUT OF OZONE DEPLETING SUBSTANCES**

**GEF GRANT NUMBER 28305**

# PART II. STATISTICAL TABLES

## Table 1: Summary of Assessments

| A. Achievement of Objectives | Substantial (✓) | Partial (✓) | Negligible (✓) | Not applicable (✓) |
|---|---|---|---|---|
| Macro Policies | ☐ | ☐ | ☐ | ☑ |
| Sector Policies | ☑ | ☐ | ☐ | ☐ |
| Financial Objectives | ☐ | ☐ | ☑ | ☐ |
| Institutional Development | ☐ | ☑ | ☐ | ☐ |
| Physical Objectives | ☐ | ☑ | ☐ | ☐ |
| Poverty Reduction | ☐ | ☐ | ☐ | ☑ |
| Gender Issues | ☐ | ☐ | ☐ | ☑ |
| Other Social Objectives | ☐ | ☐ | ☐ | ☑ |
| Environmental Objectives | ☑ | ☐ | ☐ | ☐ |
| Public Sector Management | ☐ | ☑ | ☐ | ☐ |
| Private Sector Development | ☐ | ☑ | ☐ | ☐ |
| GEF Objectives | ☑ | ☐ | ☐ | ☐ |

| B. Project Sustainability | Likely (✓) | Unlikely (✓) | Uncertain (✓) |
|---|---|---|---|
| | ☑ | ☐ | ☐ |

(Continued)

| C. Bank Performance | Highly Satisfactory (✓) | Satisfactory (✓) | Deficient (✓) |
|---|---|---|---|
| Identification | ☐ | ☑ | ☐ |
| Preparation Assistance | ☐ | ☑ | ☐ |
| Appraisal | ☑ | ☐ | ☐ |
| Supervision | ☑ | ☐ | ☐ |

| D. Recipient Performance | Highly Satisfactory (✓) | Satisfactory (✓) | Deficient (✓) |
|---|---|---|---|
| Preparation | ☑ | ☐ | ☐ |
| Implementation | ☑ | ☐ | ☐ |
| Covenant Compliance | ☑ | ☐ | ☐ |
| Operation (ODS Phaseout) | ☐ | ☑ | ☐ |

| E. Assessment of Outcome | Highly Satisfactory (✓) | Satisfactory (✓) | Unsatisfactory (✓) | Highly unsatisfactory (✓) |
|---|---|---|---|---|
| | ☐ | ☑ | ☐ | ☐ |

**Table 2: Related Bank Loans/Credits**

| Loan/credit/grant/study title | Purpose | Year of approval | Status |
|---|---|---|---|
| *Preceding operations* | | | |
| 1. Environment – Air Pollution Abatement Program | Reduce ambient concentration $PM_{10}$ and sulfur dioxide | FY 1996 | Implementation under way |
| *Following operations* | | | |
| 3. GEF Grant for the preparation of Biodiversity Strategy, Action Plan, and National Report | Biodiversity protection/Nature conservation | FY 1999 | Study under preparation |
| 4. Land Cadastre | Improving land registration and tax collection | FY 2000 | Under preparation |

**Table 3: Project Timetable**

| Steps in Project Cycle | Date Planned | Date Actual/ Latest Estimate |
|---|---|---|
| Identification (Executive Project Summary) | 11/93 | 11/93 |
| Preparation | 06/94/ | 06/94/ |
| Appraisal | 05/95 | 05/95 |
| Negotiations | 09/95 | 09/95 |
| Board Presentation | 10/95 | 11/95 |
| Signing | 11/95 | 11/95 |
| Effectiveness | 11/95 | 12/95 |
| Project Completion | 12/97 | 06/98 |
| Grant Closing | 12/97 | 06/98 |

**Table 4: Loan/Credit/Grant Disbursements: Cumulative Estimated and Actual**
***(US$ million)***

| | FY95 | FY96 | FY97 | FY98 |
|---|---|---|---|---|
| Appraisal estimate | 0.00 | 4.20 | 5.70 | 6.20 |
| Actual | 0.00 | 1.84 | 4.99 | 5.88[a] |
| Actual as % of estimate | | 44 | 88 | 95 |
| Date of final disbursement | | | | 10/27/98 |

Note:
(b) - Total grant proceeds including foreign exchange loss.

**Table 5: Key Indicators for Project Implementation**

**A. Usage of ODS in Slovenia in 1993 Broken Down by Substances**

| **Substance** | **Total Use (tons)** | **Ozone depleting potential (ODP)** | **Total Use (ODP tons)** |
|---|---|---|---|
| **Annex A, Group I** | | | |
| CFC-11 | 399.5 | 1.0 | 399.5 |
| CFC-12 | 355.9 | 1.0 | 355.9 |
| CFC-113 | 31.0 | 0.8 | 24.8 |
| CFC-114 | 66.6 | 1.0 | 66.6 |
| CFC-115 | 2.0 | 0.6 | 1.2 |
| **Subtotal** | 855.0 | | 848.0 |
| **Annex A, Group II** | | | |
| Halon 1211 | 0 | 3.0 | 0 |
| Halon 1301 | 0 | 10.0 | 0 |
| Halon 2402 | 0 | 6.0 | 0 |
| **Subtotal** | 0 | | 0 |
| **Annex B, Group I** | | | |
| Other CFCs | 0 | 1.0 | 0 |
| **Annex B, Group II** | | | |
| CCl4 | 0.7 | 1.1 | 0.8 |
| **Annex B, Group III** | | | |
| MCF | 984.0 | 0.1 | 98.4 |
| **Annex C, Group I** | | | |
| HCFCs[a] | 96.0[a] | 0.055[a] | 5.3[a] |
| **TOTAL** | 1935.7 | | 952.5 |

Note:
(a) - ODP for HCFC-22 was used for the determination of ODP usage of HCFC's

## B. Consumption[a] of ODS in Slovenia in 1993 According to UNEP Formats

| Substance | Consumption (metric tons) | ODP | ODP Consumption (ODP tons) | ODP kg per capita* |
|---|---|---|---|---|
| **Annex A, Group I** | | | | |
| CFC-11 | 153.0 | 1.0 | 153.0 | |
| CFC-12 | 371.0 | 1.0 | 371.0 | |
| CFC-113 | 23.0 | 0.8 | 18.4 | |
| CFC-114 | 51.0 | 1.0 | 51.0 | |
| CFC-115 | 1.5 | 0.6 | 0.9 | |
| **Total** | 599.5 | | 594.3 | |
| **Annex A, Group II** | 0 | | 0 | |
| **Annex A, Total** | 599.5 | | 594.3 | 0.299 |
| **Annex B, Group I** | 0 | | 0 | |
| **Annex B, Group II** | 0.7 | 1.1 | 0.8 | |
| **Annex B, Group III** | 809.0 | 0.1 | 80.9 | |
| **Annex B, Total** | 809.7 | | 81.7 | 0.041 |

Note:
--Population in 1993: 1 989 408
(a) - The difference in the data for ODS consumption according to UNEP formats and actual used quantity is due to different definitions of consumption and methods of presentation of data. The former is the consumption calculated as production plus imports minus exports of ODS (UNEP guidelines), and the latter is the real usage in the manufacturing of goods, including ODS which had been imported but not used before 1993.

## C. Trends in CFC Usage in Slovenia by End Use, 1986-1993, Tons (% distribution)

| Year End Uses | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 |
|---|---|---|---|---|---|---|---|---|
| Refrigerants | 311 (11%) | 252 (10%) | 241 (9%) | 238 (10%0 | 346 (17%) | 281 (18%) | 195 (18%) | 150 (17%) |
| Aerosols | 1133 (42%) | 1153 (46%) | 1281 (48%) | 1089 (45%) | 884 (44%) | 710 (46%) | 436 (39%) | 357 (42%) |
| Foams | 1244 (45%) | 1088 (43%) | 1083 (41%) | 1029 (43%) | 728 (36%) | 511 (33%) | 432 (39%) | 317 (37%) |
| Solvents | 37 (1-2%) | 25 (1%) | 50 (2%) | 45 (2%) | 50 (2-3%) | 54 (3%) | 45 (4%) | 31 (4%) |
| **TOTAL** | **2725** | **2518** | **2655** | **2401** | **2008** | **1556** | **1108** | **855** |

Note:
-- In the period 1986-1989 the data regarding CFC usage as refrigerants do not comprise those for maintenance purposes. It is impossible to estimate the fraction for servicing in Slovenia and in other republics of former Yugoslavia. From 1990 onwards, the data regarding refrigerants comprise those for servicing purposes for the Slovenian market.

## D. ODS Consumption

| Company | 1992 Actual | CFC Consumption in Tons | | | | |
|---|---|---|---|---|---|---|
| | Use Tons | 1994 | 1995 | 1996 | 1997 | 1998 |
| LTH | 68.9 | 22.2 | 17.0 | 12.0[a] | 0 | 0 |
| Gorenje Servis | 9.6 | 4.8 | 4.2 | 0[b] | 0[b] | 0[b] |
| KRKA | 79.0[c] | 60.8 | 17.9 | 0 | 0 | 0 |
| LEK | 157.0 | 146.0 | 151.8 | 0 | 0 | 0 |
| Trimo | 22.4 | 16.3[d] | 16.2[d] | 9.7[d] | 0 | 0 |
| Labod | 3.5 | 2.3 | 3.1 | 0 | 0 | 0 |
| **Total** | **340.4** | **252.4** | **210.2** | **21.7** | **0** | **0** |

Note:
(a) - Imported by the company itself in December 1995 or bought on the Slovenian market in 1996, used only for service purposes.
(b) - There has been no imports of CFCs, although the company is still using CFC for service purposes from the stockpiled amount made prior the phaseout date (imported by the producer of household appliances). The stock is estimated to 7 tons.
(c) - 1993 Actual Use in Tons
(d) - Calculated on the basis of the used amount of premixed polyol. The use in premixed polyol was not reported to UNEP. -- Slovenia's total consumption of ODS (Annex A and Annex B substances of the Protocol) reported to UNEP was 625.81 ODP tons in 1994, 402.51 ODP tons in 1995, 0.65 ODP tons in 1996, 0.392 ODP tons in 1997.

## E. ODS Phased out

| Company | 1992 Actual Use of CFCs | CFCs phaseout | | | | | Total actual ODS phaseout |
|---|---|---|---|---|---|---|---|
| | | 1994 | 1995 | 1996 | 1997 | 1998 | |
| LTH | 68.9 | 46.7 | 5.2 | 5.0 | 12.0 | 0 | 68.9 |
| Gorenje Servis | 9.6 | 4.8 | 0.6 | 4.2 | 0 | 0 | 9.6 |
| KRKA | 79.0[a] | 18.2 | 42.9 | 17.9 | 0 | 0 | 79.0 |
| LEK | 157.0 | 11.0 | -5.8 | 151.8 | 0 | 0 | 157.0 |
| Trimo | 22.4 | 6.1 | 0.1 | 6.5 | 9.7 | 0 | 22.4 |
| Labod | 3.5 | 1.2 | -0.8 | 3.1 | 0 | 0 | 3.5 |
| **Total** | **340.4** | **88** | **42.2** | **188.5** | **21.7** | **0** | **340.4** |

Note:
(a) - 1993 Actual Use in Tons

## F. ODS (CFCs) Production Weighted Phaseout ODS tons

| | Estimated in FY[a] | | | | | Amount Phased out based on actual production[b] | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Investment Sub-projects | '94 | '95 | '96 | '97 | '98 | '94 | '95 | '96 | '97 | '98 |
| 2. LTH | 20.7 | 41.4 | 66.6 | 68.9 | 68.9 | 46.7 | 51.9 | 56.9 | 68.9 | 68.9 |
| 3. Gorenje Service | 0 | 0 | 9.6 | 9.6 | 9.6 | 4.8 | 5.4 | 6.3 | 7.0 | 7.0 |
| 4. KRKA Kozmetika | 0 | 0 | 39.0 | 79.0 | 79.0 | 103.3 | 142.0 | 88.3 | 88.3 | 88.3 |
| 5. LEK | 0 | 0 | 157.0 | 157.0 | 157.0 | 0 | 0 | 68.0 | 194.8 | 162.7 |
| 6. Trimo | 0 | 0 | 7.5 | 22.4 | 22.4 | 6.5 | 5.7 | 17.7 | 33.0 | 35.1 |
| 7. Labod | 0 | 0 | 3.5 | 3.5 | 3.5 | 1.2 | 0.4 | 3.5 | 3.5 | 3.5 |
| **Total** | **20.7** | **41.4** | **283.2** | **340.4** | **340.4** | **162.5** | **205.4** | **240.7** | **395.5** | **365.5** |

Note:
(a) – Estimated phaseout was calculated:

- against the actual CFC use in 1992 (LTH, Gorenje Servis, Lek, Trimo, Labod) or in 1993 (Krka). The figures for Trimo and Gorenje Servis do not correspond exactly to the Project Document, since in this the phaseout for Trimo and Gorenje Servis sub-projects was estimated on the basis of predicted production level/service demand in the first year of full operation of the alternative technology.

(b) –Actual phaseout was estimated on the basis of the:

- actual use against the 1992 use of CFC (LTH, Gorenje Servis, Labod)
- actual use against the calculated amount according to the annual production level of aerosol units/panels (Krka, LEK, Trimo). These figures are the total demand for propellant based on production *net* of CFC actually used. The figure thus represents the CFC that *would* have been used had the Project not been implemented.

## G. ODS (CFCs) Production Weighted Phaseout ODP tons

| | Estimated in FY[a] | | | | | Amount Phased out based on actual production[b] | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Investment Sub-projects | '94 | '95 | '96 | '97 | '98 | '94 | '95 | '96 | '97 | '98 |
| 2. LTH | 20.7 | 41.4 | 66.6 | 67.4 | 67.4 | 46.7 | 51.9 | 56.9 | 67.4 | 67.4 |
| 3. Gorenje Service | 0 | 0 | 9.6 | 9.6 | 9.6 | 4.8 | 5.4 | 6.3 | 7.0 | 7.0 |
| 4. Krka Kozmetika | 0 | 0 | 39.0 | 79.0 | 79.0 | 103.3 | 142.0 | 88.3 | 88.3 | 88.3 |
| 5. LEK | 0 | 0 | 157.0 | 157.0 | 157.0 | 0 | 0 | 68.0 | 194.8 | 162.7 |
| 6. Trimo | 0 | 0 | 7.5 | 22.4 | 22.4 | 6.5 | 5.7 | 17.7 | 33.0 | 35.1 |
| 7. Labod | 0 | 0 | 2.8 | 2.8 | 2.8 | 1.0 | 0.3 | 2.8 | 2.8 | 2.8 |
| **Total** | **20.7** | **41.4** | **282.5** | **338.2** | **338.2** | **162.3** | **205.3** | **240.0** | **393.3** | **363.3** |

Note:
(a) – Estimated phaseout was calculated:

- against the actual CFC use in 1992 (LTH, Gorenje Servis, Lek, Trimo, Labod) or in 1993 (Krka). The figures for Trimo and Gorenje Servis do not correspond exactly to the Project Document, since in this the phaseout for Trimo and Gorenje Servis sub-projects was estimated on the basis of predicted production level/service demand in the first year of full operation of the alternative technology.

(b) –Actual phaseout was estimated on the basis of the:

- actual use against the 1992 use of CFC (LTH, Gorenje Servis, Labod)
- actual use against the calculated amount according to the annual production level of aerosol units/panels (Krka, LEK, Trimo). These figures are the total demand for propellant based on production *net* of CFC actually used. The figure thus represents the CFC that *would* have been used had the Project not been implemented.

## H. Cost Effectiveness of the Slovenia ODS Phaseout Project[a]

| Company | Grant Cost Effectiveness, Estimates of October, 1995 | 1997 ODS Phaseout Actual | GEF Grant Actual Use | Grant Cost Effectiveness Actual | Montreal Protocol Threshold |
|---|---|---|---|---|---|
| | US$/kg | in tons | US$ millions | US$/kg | US$/kg |
| LTH | 22.19 | 68.9 | 1.754 | 25.46 | 15.21 |
| Gorenje Servis | 11.00 | 9.6 | 0.126 | 13.13 | Not applicable |
| KRKA | 4.48 | 79.0 | 0.414 | 5.24 | 4.40 |
| LEK | 12.68 | 157.0 | 1.777 | 11.32 | 4.40 |
| Trimo | 36.87 | 22.4 | 1.153 | 51.47 | 9.53 |
| Labod | 63.96 | 3.5 | 0.181 | 51.71 | Not available |
| **Total** | **15.60** | **340.4** | **5.405** | **15.88** | |

Note:
(a)-As a comparison the actual grant cost effectiveness of the Czech ODS Phaseout project was 0.98US$/kg based on the 1997 ODS phaseout figure. The same for the Hungary and Poland projects under implementation is around 6US$/kg and for the Ukraine project that starts now, is around 13US$/kg.

## Table 6: Key Indicators for Project Operation

*No operation indicators were defined in the project document*

## Table 7: Studies, Training and Workshops Included in the Project

| Study | Purpose as defined at appraisal/redefined | Status | Impact of study |
|---|---|---|---|
| Chamber of Economy of Slovenia | Country Program for the Phaseout of ODS in Slovenia (was not GEF financed) | Implemented | Key regulatory measures and investment projects identified. Investment projects submitted for GEF funding. |
| Chamber of Economy of Slovenia | Good Practices in Refrigeration and Air conditioning – manual | Implemented | Manual prepared for training courses on good practices in refrigeration. |
| Chamber of Economy of Slovenia | Reclamation of Refrigerants in Slovenia | Implemented | Based on the results of this study a decision was taken to introduce a 3R Scheme in Slovenia. |
| Refrigerants Products Limited, UK | Slovenia 3R Scheme | Implemented | The study supported the outcomes of the study already prepared by COE. |
| Dewpoint Consultants, UK | Technical Evaluation of ODS Phaseout Project | Implemented | Technical evaluation and preparation of ICR. |

| ODS Phaseout Project | Workshop and Training Activities | Date | Venue |
|---|---|---|---|
| Sub-project 1. | Implementation of Regulatory Measures on ODS Phaseout and Control | June 1997<br>Local workshop | Ljubljana |
| Organized by Sub-project 1. related to Sub-project 7. | Alternatives for Ozone Depleting Substances in the Solvent Sector | October 1997<br>Regional workshop | Ribno |
| Organized by Sub-project 1. Related to Sub-projects 2.and 3. | Training on Good Practices in Refrigeration and Air Conditioning. | Eight (8) courses in 1997 and three (3) in 1998. Participation of 211 service technicians. | Ljubljana and other cities in Slovenia |

## Table 8: Project Costs and Financing

### Table 8A: Project Costs

| | Appraisal estimate (US$ million) | | | Actual (US$ million) | | | Out of which financed by the GEF grant (US$ million) |
|---|---|---|---|---|---|---|---|
| Item | Local costs | Foreign costs | Total | Local costs | Foreign costs | Total | |
| Sub-project 1.PIU (including financial intermediary fee and contingency) | 1.032 | | 1.032 | 0.495 | 0.008 | 0.503 | 0.479 |
| Sub-project 2. LTH | 2.948 | 1.084 | 4.032 | 2.003 | 1.207 | 3.210 | 1.754 |
| Sub-project 3. Gorenje Service | 0.358 | 0.109 | 0.467 | 0.371 | 0.096 | 0.467 | 0.126 |
| Sub-project 4. Krka | 0.508 | 0.167 | 0.675 | 0.322 | 0.703 | 1.025 | 0.414 |
| Sub-project 5. Lek | 1.749 | 0.436 | 2.185 | 1.310 | 0.520 | 1.830 | 1.777 |
| Sub-project 6. Trimo | 0.673 | 0.475 | 1.148 | 0.776 | 0.841 | 1.617 | 1.153 |
| Sub-project 7. Labod | 0.000 | 0.179 | 0.179 | -0.037(a) | 0.220 | 0.183 | 0.181 |
| Total | 7.268 | 2.450 | 9.718 | 5.240 | 3.595 | 8.835 | 5.884 |

Note:
(a) - Negative value is due to incremental operational savings deducted from local costs.

### Table 8B: Project Financing

| | Appraisal estimate (US$ million) | | | Actual (US$ million) | | |
|---|---|---|---|---|---|---|
| Item | Local costs | Foreign costs | Total | Local costs | Foreign costs | Total |
| 1. GEF Grant | 3.750 | 2.450 | 6.200 | 3.274 | 2.610 | 5.884 |
| 2. Counterpart funds (enterprises,) | 3.518 | 0.000 | 3.518 | 1.966 | 0.985 | 2.951 |
| Total | 7.268 | 2.450 | 9.718 | 5.240 | 3.595 | 8.835 |

## Table 9: Economic Costs and Benefits

*No economic analysis of project was estimated at appraisal*

## Table 10: Status of Legal Covenants
## Republic of Slovenia
## ODS Phaseout Project

| Grant Agree-ment | Section | Covenant Type | Present Status | Original Fulfillment Date | Revised Fulfillment Date | Description of Covenant | Comments |
|---|---|---|---|---|---|---|---|
| Grant | 4.01. (a),(b),(c) | 1, 2 | C | Yearly | | Accounting and Auditing Program | In compliance |
| Grant | 6.01 (a),(b) | 8 | C | 12/27/95 | | Effectiveness | In compliance |

Covenant types:

1. = Accounts/audits
2. = Financial performance/revenue generation from beneficiaries
3. = Flow and utilization of project funds
4. = Counterpart funding
5. = Management aspects of the project or executing agency
6. = Environmental covenants
7. = Involuntary resettlement
8.= Effectiveness

Present Status:

C = covenant complied with
CD = complied with after delay
CP = complied with partially
NC = not complied with

## Table 11: Compliance with Operational Manual Statements

| Statement number and title | Describe and comment on lack of compliance |
|---|---|
| | No lack of compliance was observed. |

## Table 12: Bank Resources: Staff Inputs

| Stage of project cycle | Planned | | Revised | | Actual | |
|---|---|---|---|---|---|---|
| | Weeks | US$ | Weeks | US$ | Weeks | US$ |
| Preparation to appraisal | 13.5 | 47,100 | 22.2 | 58,300 | 15.1 | 32,600 |
| Appraisal | 1.0 | 9,700 | 1.5 | 12,900 | 1.6 | 7,700 |
| Negotiations through Board approval | 5.5 | 19,500 | 5.5 | 19,500 | 4.8 | 15,900 |
| Supervision | 30.8 | 99,000 | 30.1 | 43,100 | 31.8 | 39,200 |
| Completion | 5.5 | 11,700 | 5.5 | 11,500 | 5.7 | 8,700 |
| Total | 56.3 | 187,000 | 60.1 | 145,300 | 59.0 | 107,100 |

## Table 13: Bank Resources: Missions

| Stage of project cycle | Month/ Year | No. of Persons | Days in Field | Specialization[1] | Performance Rating[2] Implem. Status | Performance Rating[2] Developm. objectives | Types of Problems[3] |
|---|---|---|---|---|---|---|---|
| Identification | 01/94 | 3 | 2 | E, T, F | | | |
| Pre-appraisal | 10/94 | 3 | 3 | E, T | | | |
| Appraisal | 05/95 | 4 | 3 | E, T, P, L | | | |
| Negotiations | 09/95 | 3 | | E, P, L | | | |
| Supervision 1. | 11/95 | 2 | 3 | E, T | 1 | 1 | |
| Supervision 2. | 04/96 | 2 | 3 | E, T | 1 | 1 | |
| Supervision 3 | 10/96 | 2 | 3 | E | 1 | 1 | |
| Supervision 4. | 01/97 | 2 | 5 | E, P | 1 | 1 | |
| Supervision 5. | 09/97 | 2 | 4 | E, P | 2 | 1 | P, D |
| Supervision 6. & Completion | 05/98 | 2 | 5 | E, P | 1 | 1 | |
| Technical Evaluation Visit | 09/98 | 2 | 5 | E, T | 1 | 1 | |
| Total | | | 62 | E, T, P, L | 1 | 1 | |

1 - Key to Specialized staff skills:

F=Financial Analyst
E=Environmental Economist
N=Engineer
T=Technical Specialist
P=Procurment Specialist
L=Lawyer

2 - Key to Performance Ratings:

1=Minor or No Problems
2=Moderate Problems
HS=Highly Satisfactory
S=Satisfactory

3 – Key to Types of Problems:

P=Procurement
D=Disbursement behind schedule

Appendix A.

**SUPERVISION AND COMPLETION MISSION**

**May 4-8, 1998**

**AIDE-MÉMOIRE**

## *I. Introduction.*

1. A World Bank mission consisting of Krisztina Kiss, Team Leader and György Novotny, Procurement Specialist between May 4-8, 1998 visited Slovenia for the supervision of the Ozone Depleting Substances Phaseout Project. The mission visited one ongoing sub-project site: Gorenje Servis. The meetings with Messrs. Marko Slokar, State Secretary and Janko Zerjav, Government Counselor of the Ministry of Environment and Physical Planning (MEPP) and with LTH representatives were held at the Slovenian EcoFund (SEF). The mission would like to express its thanks to the State Secretary of MEPP, the representatives of the SEF, the Project Implementation Unit (PIU) and of the visited company for the well organized program, effective discussions, good cooperation and hospitality. This Aide Memoire becomes official only upon the approval of Bank Management in Washington, D.C.

## *II. Status of the Project*

2. Overall Implementation status of the project. Out of the six investment sub-projects, four have been completed, the draft sub-project completion reports have been prepared and discussed with the mission. The implementation of Krka and Gorenje Servis sub-projects are still ongoing but will be completed by the end of June 1998.

3. Disbursed rate of the grant including the Special Account is 93% as of end of April, 1998. The disbursed and committed ratio including the Special Account is 100% as of May 8, 1998.

4. The project represents 31% (345 tons until end of 1997) of ozone depleting potential (ODP) of the country program (100%, 1108 tons). 334 tons, 97% of the above 31% of ODP is actually phased out.

5. The PIU and EcoFund, the financial intermediary and Ljubljanska Banka, its subcontractor for banking services, operate extremely well and in very good cooperation with all participants of the Project. The audit of the Special Account and all project records is being done by Auditors KPMG Slovenia, and the audit report will be submitted to the Bank by end of June 1998.

## *III. Major Issue: The Recovery, Recycling and Reclamation (3R) Scheme for Refrigerants.*

6. Slovenia signed the Montreal Protocol and its related London Amendment in 1992, but the national legislation for entire coverage has not been made. Venting of refrigerants is still not illegal in Slovenia and there is no regulation on the proper collection, storage and use of CFCs. This legislation needs to be made urgently to allow for the proper utilization and operation of the equipment procured under the project and the 3R scheme. It is important for Slovenia to catch-up with the proper legislation related to the protection of the ozone layer in the EU accession process, especially since the EU Directives are even stricter than the Montreal Protocol. Also Slovenia has yet to ratify the Copenhagen Amendment of the Montreal Protocol.

7. Only production and imports of controlled substances as well as products containing CFCs and the usage of CFCs in new equipment have been prohibited in Slovenia from January 1, 1998. The major private sector participants of the 3R scheme are LTH, Gorenje Servis and other service technicians. There is a significant quantity of R12 in the existing refrigeration and air conditioning equipment in Slovenia (estimated annual amount available for reclamation is about 11.5 tons and the total amount is about 180 tons, -- figures from the study mentioned below in this paragraph), which will need reclamation or incineration at a certain time in the future. Additionally, companies providing refrigeration services have stocks of new R12 sufficient for several years. It is clear that the reclamation service of refrigerants has to be provided for the Slovenian market. A preliminary study has been prepared by Slovenian consultants under the management of the PIU and the EcoFund and on consultation with LTH and Gorenje on the "Reclamation of Refrigerants in Slovenia". The study was reviewed by and discussed with the mission. As also the study suggests, there are two alternative solutions for the reclamation of refrigerants for Slovenia: i) establish a reclamation plant at LTH to serve the whole country; ii) collect, store and transport R12 for reclamation to reclamation plants in Hungary or the Czech Republic. Both alternative solutions require government measures to be taken in order to get the 3R scheme started and operating sustainably.

8. A cost recovery scheme needs to be set up for the recovery and temporary storage of refrigerants from old appliances collected by LTH, Gorenje Servis and other service entities, and to support the start-up phase of reclamation and for incineration. The introduction of a product fee for new refrigeration appliances could form the basis of funds for the recovery of costs of the companies carrying out the service. Similarly the costs of reclamation will need to be paid for, preferably by the users.

9. A proper and feasible financing scheme needs to be worked out to provide for sufficient incentives for the servicemen to take the recovered refrigerant for reclamation and not to refill it without proper cleaning. The refill of recycled but not reclaimed refrigerants would lead to early damage of the appliances and this way to additional external costs for the whole of the country. -- LTH and Gorenje informed the mission that they will write a letter to the minister of environment, listing the Government legislative and related enforcement measures that are needed for them to start and sustainably operate the 3R scheme. -- Mr. Derek Capper, Consultant will be hired by the PIU to review the preliminary study on "Reclamation of Refrigerants in Slovenia" and give advise to all the participants of the 3R sub-section regarding the

establishment of proper incentives and financing of the 3R scheme. Mr. Derek Capper's Terms of References and Contract will be prepared by the PIU before his visit planned for end of May, 1998.

10. A nationwide Public Awareness Raising Campaign (PARC) related to the ozone layer protection issues, with special respect to actions that everybody can take to protect the ozone layer, will need to be launched and carried out under the management and coordination of MEPP to make sure that everybody involved in the issue will understand well how to take an active part in contributing to the phaseout process and to enhance the enforcement of the legal regulatory framework. All entities participating in the 3R scheme for refrigerants and halons should actively contribute to the PARC. --The mission was informed by Mr. Marko Slokar, State Secretary that a major waste management campaign funded by MEPP (20 million SIT) will soon be launched by MEPP, under which the public awareness raising related to old refrigeration appliances will be covered. Gorenje produces 50,000 brochures on public awareness raising regarding the use of controlled refrigeration substances and will disseminate them through their service and sales network, key customer club and special exhibitions at fairs. Gorenje initiative is very useful. It will however reach a limited number of people. The mission therefore strongly recommended that all refrigeration and fire protection sub-sector entities should, with joint efforts and under a Government umbrella, implement the PARC. The most effective media for public awareness raising is through TV before the news time.

11. The capacities of customs, and environmental and other competent authorities need to be reinforced so that the possible illegal market and illegal imports of R12 can be phased out.

12. PHARE provided 120,000 ECU for a study "Development of an Implementation Program for the Slovenian Waste Management Strategy" covering also the legislative framework for the disposal, dismantling and recycling scheme, inter alia, for old cars, refrigerators and other old household appliances. The study would serve as preparation for legislation making and implementation. The first part of the Draft Progress Report of the study prepared by Halcrow was given to the mission and was also briefly discussed with the mission. The final report will be completed by end of July 1998 to serve the basis of waste legislation to conform with EU Directives.

13. MEPP informed the mission that legislation on Waste Management has been drafted and will get passed probably in this year. The new legislation regarding the handling of appliances in use, will also be important and therefore is related to proper operation of the 3R scheme.

## *IV. Sub-projects' Status, Issues, Agreed Next Steps:*

### *IV.1. Project Implementation Unit, Institutional Strengthening Sub-project.*

14. The PIU performance in project coordination and management of technical assistance has been very effective. The cooperation among the main project management entities, i.e. the PIU, Eco Fund, MEPP, the participating companies and World Bank officials is excellent. Two thirds of service technicians under partial funding by GEF already received training and certificates. The remaining servicemen will need to pay full costs for the training to be made in the future.

15. Series of Regional Workshops for knowledge dissemination, exchange of experience, good practices, transfer of know-how and replicability of project results. The Bank has launched a series of regional workshops for the GEF grant recipient countries in the region for the exchange of experience and good practices for the phaseout of ODS. The first workshop for the PIUs and company representatives of the refrigeration and fire protection sub-sectors of the Czech, Slovenian and Hungarian Projects was held in Budapest in May 1997. The workshop was considered very useful and successful, the relevant counterparts of the Czech and the Slovenian ODS Phaseout Projects have adopted in practice what was learnt at the workshop. The second workshop on alternative technologies in the solvents sub-sector and on project management was held by the Slovenian EcoFund and the PIU in Bled and Ljubljana in October, 1997, this time also with the involvement of the relevant Polish counterparts. The third regional workshop on ODS phaseout was held in Prague on March 4-6, 1998, opened by Mr. Erik Geuss, Deputy Minister of the Ministry of Environment. The workshop dealt with the 3R scheme, refrigerants in the commercial, industrial and refrigerated transport sectors and on preparation of the recipient's contribution to the ICR, on project completion and outcome evaluation with the participation of seven countries receiving GEF grants for ODS phaseout purposes (Czech Republic, Slovenia, Hungary, Poland, Belarus, Russia and Slovakia). Lecturers from the UK, Austria and Belgium were invited to present their countries' strengths of the 3R schemes. The fourth workshop is planned to be held in Warsaw, Poland or Germany in October 1998 probably on Public Awareness Raising re. ODS Phaseout. If possible, it will be connected to the Nuremberg refrigeration fair. The fifth will be held in Moscow or Kiev. Further workshop venues and topics will be identified in due course. -- It would be extremely important and useful that the relevant Slovenian counterparts could continue to participate in the future workshops to transfer their know-how and experience.

### *IV.2. LTH Sub-project.*

16. LTH completed its sub-project according to the original design, and related modifications. LTH prepared and submitted its draft sub-project completion report, which was reviewed and discussed with the mission.

17. Currently the service unit of LTH operates as a cost center. The servicing, including the operation and maintenance of the reclamation plant should operate as a profit center. LTH will submit a letter to the minister of environment detailing the need of the proper regulatory environment to start-up and sustainability operate the 3R scheme, with special respect to the fact that LTH is willing to procure a reclamation plant after the closing of the Project. The plant will serve the reclamation needs of the whole of the country.

### *IV.3. Gorenje Servis Sub-project.*

18. Gorenje Servis will complete all investments and servicemen training by end of June 1998. Gorenje made a very good initiative to launch an awareness raising campaign for their customers. A nationwide campaign however as described in paragraph 5. of the Aide Memoire would be more effective. Gorenje will write a letter to the minister of environment on the need of the proper regulatory environment to start-up and sustainably operate the 3R scheme.

Upon completion, Gorenje Servis will prepare their sub-project completion report as their contribution to the ICR and will submit it to the PIU by end of June , 1998.

### *IV.4. Krka Sub-project.*

19. The draft sub-project completion report was submitted to and discussed with the mission. Krka still has to install the last delivery of wrapping equipment which will take place by end of May 1998. The company will successfully complete their sub-project before the closing date.

### *IV.5 Lek, Trimo, and Labod Sub-projects.*

20. All three sub-projects were successfully completed, the sub-project completion reports were drafted and submitted to the mission. The mission reviewed and discussed all the draft sub-project completion reports. Based on the mission's comments the final sub-project completion reports will be submitted to the PIU as early as possible but latest by the end of June, 1998.

## *V. Implementation Completion Report, Recipient's Evaluation of Project Implementation*

21. All the grant recipient companies will have to prepare and submit their Sub-project Completion Reports by end of June, 1998 according to the disseminated and discussed guidelines. The PIU will submit the Bank the draft Recipient's Contribution to the Implementation Completion Report by end of July, 1998 and the final by end of August, 1998. Bank Guidelines and Directives for the preparation of the Recipient's Contribution to the Implementation Completion Report (ICR) were discussed with the PIU. The Recipient's responsibilities in the preparation of the ICR are indicated in the Bank's Operational Manual Statement and Good Practices (GP) for ICR Preparation. Copies of all relevant parts of the Bank Procedures (BP) and GP were given earlier to the Grant Recipient. As indicated in BP 13.55 and GP 13.55, the Recipient's ICR should include a summary not exceeding 10 pages, together with the supporting background information and annexes.

22. Project Cost and Financing Plan: To enable a comparison of appraisal and actual project costs and financing plans, the Recipient should update the relevant tables of Schedule A, B, C, D and The Summary Table (Summary of Sub-project Data and Costs) of the Project Document.

23. To enable the Bank to complete the draft of Part I of the ICR, it was agreed that the recipient would ensure that information in relation to the grant and technical assistance components is sent to the Bank together with the updated ODS phaseout, project costs and financing tables.

24. Outputs and schedule: To enable the timely submission of the final ICR, including both the Recipient's and the Bank's parts to the Bank's Board of Directors by December 31, 1998, as required, it was agreed that the following timetable would be followed: the PIU to send the Bank by July 31, 1998 the background information on sub-project components, the ODS phaseout, project cost and financing tables, the implementation / disbursement schedule, and the summary table of all technical assistance and consultancy components.

25. Coordination of ICR Preparation. The following persons would coordinate the preparation of the Recipient's and the Bank's preparation of the ICR:

For the Recipient: Ms. Janja Leban , Head of the Project Implementation Unit
For the World Bank: Ms. Krisztina Kiss

26. A completion visit including the technical evaluation of the Project with the involvement of David Gibson, Consultant is scheduled for end of June or July 1998.

Ljubljana, May 8, 1998.
Krisztina Kiss, Program Team Leader

Appendix B.

# THE GRANT RECIPIENT'S CONTRIBUTION TO THE IMPLEMENTATION COMPLETION REPORT

**Project Implementation Unit**

# SLOVENIA

## TECHNICAL SUPPORT AND INVESTMENT PROJECT FOR THE PHASEOUT OF OZONE DEPLETING SUBSTANCES

**GEF Grant No. 28305**

**October, 1998**

## CURRENCY EQUIVALENTS
(as of June 30, 1998)

| | | |
|---|---|---|
| Currency Unit | = | Slovenian Tolar (SIT) |
| US$ 1 | = | 169.5777 SIT |

## AVERAGE EXCHANGE RATES
Slovenian Tolar per US$

| 1994 | 1995 | 1996 | 1997 | Till August 31, 1998 |
|---|---|---|---|---|
| 128.8086 | 118.5185 | 135.3654 | 159.6893 | 169.6274 |

## REPUBLIC OF SLOVENIA'S FISCAL YEAR (FY)
January 1 – December 31

## ABBREVIATIONS AND ACRONYMS

| | | |
|---|---|---|
| CEE | - | Central and Eastern Europe |
| CFC | - | Chlorofluorocarbon |
| COE | - | Chamber of Economy of Slovenia |
| DC | - | Direct Contracting |
| DME | - | Dimethyl Ether |
| FA | - | Financial Agent |
| GEF | - | Global Environment Facility |
| GET | - | Global Environment Trust |
| GWP | | Global Warming Potential |
| HCFC | - | Hydrochlorofluorocarbon |
| HFC | - | Hydrofluorocarbon |
| IBRD | - | International Bank for Reconstruction and Development |
| ICB | - | International Competitive Bidding |
| ICR | - | Implementation Completion Report |
| IS | - | International Shopping |
| LIB | - | Limited International Bidding |
| MEPP | - | Ministry of Environment and Physical Planning |
| MFMP | - | Multilateral Fund for the Implementation of the Montreal Protocol |
| MP | - | Montreal Protocol on Substances that Deplete the Ozone Layer |

| | | |
|---|---|---|
| NBF | - | Not Bank-Financed |
| NS | - | National Shopping |
| ODP | - | Ozone Depleting Potential |
| ODS | - | Ozone Depleting Substances |
| PAA | - | Project Administration Agreement |
| PIU | - | Project Implementation Unit |
| PU | - | Polyurethane |
| SDR | - | Special Drawing Rights |
| SEF | - | Environmental Development Fund of the Republic of Slovenia |
| SIT | - | Slovenian Tolar |
| UNEP | - | United Nations Environment Program |
| 3R | - | Recovery, Recycling and Reclamation |

# TABLE OF CONTENTS

# PREFACE

This is the Implementation Completion Report (ICR) for the Technical Support and Investment Project for the Phaseout of Ozone Depleting Substances in Slovenia, for which Global Environment Trust Grant Agreement (GET Grant No. 28305) in the amount of SDR 4,200,000 equivalent was signed on November 13, 1995 between the Republic of Slovenia and the International Bank for Reconstruction and Development acting as implementing agency of the Global Environment Facility (GEF). The Grant Agreement was declared effective on December 27, 1995.

The grant was closed on June 30, 1998 instead of December 31, 1997 the original closing date. 100 percent of the grant was disbursed and the last disbursement date was August 11, 1998.

The ICR was prepared by Mrs. Janja Leban, PIU Manager, Senior Consultant, Chamber of Economy of Slovenia and Mrs. Vesna Vidič, Assistant Director, the Environmental Development Fund of the Republic of Slovenia. It was reviewed by Mr. Janko Žerjav, PIU member, Counselor to the Government of the Republic of Slovenia, Ministry of Environment and Physical Planning.

Preparation of this ICR began after the World Bank final supervision and project completion mission in May, 1998. It is based on documentation on sub-projects implementation and discussions with participating enterprises responsible for sub-projects implementation. Participating enterprises contributed to the ICR by preparing their own sub-projects completion reports.

# EVALUATION SUMMARY

## INTRODUCTION

The phaseout of Ozone Depleting Substances (ODS) in Slovenia took place within the framework of the obligations incurred by the ratification of the London Amendments to the Montreal Protocol in 1992. In July 1994, the Government of Slovenia adopted the Country Program for the Phaseout of Ozone Depleting Substances in Slovenia where key investments and regulatory measures were identified. Slovenia was ineligible for financial assistance from the Multilateral Fund for the Implementation of the MP, therefore GEF assistance was requested. The activities proposed for GEF funding are among those priorities identified in the Country Program.

### Project Objectives

The principal objective of the Project was to assist Slovenia in the phaseout of ODS consumption in a cost effective manner as mandated by the Montreal Protocol and its amendments and adjustments. Specific objectives of the Project were to assist Slovenia to: (i) support 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) to manage and oversee the phaseout of ODS in Slovenia.

By focussing on the key sectors and enterprises, the project was to phase out 345 tons of ODP per year related to 1992 consumption.

### Achievement of Objectives

The project consisted of (i) an Institutional Strengthening Component; and (ii) an Investment Component comprising six (6) Sub-Projects in the following areas and six (6): production of commercial refrigeration appliances (LTH), servicing of household refrigerating-freezing appliances (Gorenje Servis), aerosols (Krka and Lek), foams-light building panels (Trimo), solvents-dry cleaning (Labod Company).

The overall objectives of the Project were fully achieved. The consumption of CFC was phased out through the introduction of long term alternative technologies. In addition, the

Project helped the enterprises to keep their existing market and/or to obtain the new ones, what was the urge after the breakdown of former Yugoslav market, and in some cases even to increase the sale of ODS free products.

In December 1997 a ministerial decree was adopted. The decree controls production, import, export, placement into circulation and use of ODS and ODS containing products. It does not address venting into the atmosphere and the treatment of used ODS and ODS in existing products and devices. Therefore additional legislation is expected to be adopted by the first quarter of 1999. In October 1998 the Copenhagen Amendments were ratified.

**Project Sustainability and Future Operation**

The chosen non-ODS technologies are considered to be long term solutions. The enterprises will continue to use them in the future. This is ensured by the fact that the import of CFCs, products containing CFCs and usage of CFCs in new equipment is forbidden by the law.

The technologies introduced are based on state-of-the-art approaches to each type of activity. As the alternative technologies, they have better environmental performances, although e.g. in the case of HFC used as refrigerants they contribute to the global warming due to the increased GWP. Since there are no other more acceptable alternatives for the refrigerants used in commercial appliances, at present HFCs are considered to be the best solution and further technology changes are not expected for the next at least 5-6 years. Any hazard due to the use of inflammable substances e.g. cyclopentane as foaming agent or LPG as propellant is minimized by the introduction of appropriate safety measures.

In order to respect the objectives of the Protocol as a whole, the 3R scheme is planned to be established in the future with reclamation unit located at LTH. The future operation of Gorenje Servis project and part of LTH project depends on the adoption and enforcement of proper legislation, prohibiting venting of ODS refrigerants, and on the establishment and operation of nation-wide 3R scheme. Without this legislative measures support, Gorenje Servis and LTH could not be competitive to other service organizations.

**Performance of Participating Entities**

The working relations with the World Bank staff and technical consultants were excellent throughout the whole project cycle. The World Bank gave all needed support regarding technical questions, procurement, project management and disbursement. Although the World Bank task manager was changed three times, this had no negative influence on the Project implementation. The transfer of responsibilities for overseeing the Project implementation to Budapest, resulted in even closer cooperation with the World Bank staff and PIUs in other countries of Central and Eastern Europe, in which GEF ODS phaseout projects are being implemented. Especially welcomed were the regional workshops launched by the

World Bank and organized by PIU in each country, which gave the PIU, SEF and other participants the opportunity for exchange of experiences in project implementation, management, procurement and other issues related to ozone depletion, in particular the design of the 3R scheme.

Excellent co-operation was also established between PIU, SEF and all participating enterprises as well as other entities involved in the country. PIU and SEF provided to participating enterprises all needed support on a day by day basis, especially at project preparation and at the beginning of project implementation. The enterprises respected guidelines and all requested procedures, responded timely to all PIU and SEF requests.

**Implementation Experience and Results**

Very close and good cooperation between PIU, SEF, participating enterprises and all other involved entities, exchange of information, knowledge and experiences resulted in smooth project implementation.

All enterprises welcomed the World Bank procurement procedures, although sometimes time consuming, at the end resulted in better prices of purchased equipment and services. All enterprises obtained additional knowledge in procurement procedures and project management that will be used in their forthcoming projects.

During the Project implementation the enterprises gained new experiences in technical knowledge, that could be shared with other companies in Slovenia and abroad. The implementation of Trimo project represents a technological achievement in the worldwide range. Labod is the first company in dry cleaning sector in Slovenia installing dry cleaning machine using hydrocarbons as a solvent. Krka project is interesting due to the flexibility of the filling line, which can work with either DME or hydrocarbons. Lek developed new product formulation for the antibiotic spray. LTH obtained experiences in new refrigerants handling, recovery and retrofit procedures. The new cyclopentane foaming equipment is of interest to other PU foam users in the region.

**Conclusion and Recommendations**

Slovenia is the second country in the region of Central and Eastern Europe and worldwide successfully completing the ODS phaseout project financed by GEF.

The overall objectives of the Project were fully achieved. The consumption of CFC was phased out through the introduction of alternative technologies. The Project speeded up ODS phaseout activities at enterprises which were not included in the Project.

The technologies introduced are based on the state-of-the-art approaches to each type of activity. They are considered to be long term solutions. Due to flammability of some alternative substances appropriate safety measures were introduced.

The Project helped the enterprises to keep their existing market or to obtain the new ones, and in some cases even to increase the sale of ODS free products.

Additional knowledge in procurement procedures and project management, as well as new experiences in technical knowledge was obtained.

The regional workshops launched by the World Bank proved to be very important. On the basis of the experiences of other countries (Czech Republic, Hungary) and lessons learned, a nation-wide 3R scheme is being designed.

The series of training courses on good practices in refrigeration organized by PIU for service technicians were considered as very useful and successful, the established cooperation with the participants is expected to continue, especially in the planned future activities, retrofitting and operation of the 3R scheme. Appropriate public awareness raising campaigns are expected to continue as a future activity.

As our recommendation we can stress that careful project preparation and elaboration of the project in detail, in advance, is crucial for its smooth implementation. Very close and good day-to-day cooperation between all participating entities, exchange of information, knowledge and experiences are also important for smooth project implementation.

# PART I. PROJECT IMPLEMENTATION ASSESSMENT

## A. INTRODUCTION

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 chlorofluorocarbons (CFCs), halons and other ozone depleting substances (ODS). The Protocol was signed in 1987 in Montreal and has since been ratified by more than 160 countries worldwide. The Montreal Protocol with its amendments and adjustments calls for a complete phaseout of production and consumption of a number of ozone depleting substances (ODS) in developed countries by January 1, 1996.

In July 1992, Slovenia succeeded to the ratification of the Vienna Convention for the Protection of the Ozone Layer and the Montreal Protocol, that were ratified by former Yugoslavia in 1990. In December 1992, Slovenia ratified the London Amendments. The Copenhagen Amendments were ratified in October, 1998. Slovenia was ineligible for financial assistance from the Multilateral Fund for the Implementation of the MP, therefore GEF assistance was requested.

Slovenia has been actively planning its ODS phaseout strategy since 1992. In July 1994, the Government of Slovenia adopted the Country Program for the Phaseout of Ozone Depleting Substances in Slovenia where key investments and regulatory measures were identified. The activities proposed for GEF funding are among those priorities identified in the Country Program.

## B. PROJECT OBJECTIVE

The principal objective of the Project was to assist Slovenia in the phaseout of ODS consumption in a cost effective manner as mandated by the Montreal Protocol and its amendments and adjustments. Specifically the Project was to assist Slovenia to:

(i) support 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) to manage and oversee the phaseout of ODS in Slovenia.

GEF support should provide an incentive for the early adoption of ODS phaseout activities and should capture additional environmental and economic benefits which otherwise would have been lost or delayed. By focussing on the key sectors and enterprises, the project was to phase out 345 tons of ODP per year related to 1992 consumption.

## C. PROJECT DESCRIPTION

The project consisted of (i) an Institutional Strengthening Component (Sub-Project No.1); and (ii) an Investment Component comprising six Sub-Projects (Sub-Projects No.2-7). Below is a description of each of these components.

a) Sub-Project 1: Project Implementation Unit for the Phaseout of Ozone Depleting Substances.

Together with the COE and SEF the MEPP should set up an ODS Phaseout Project Implementation Unit (PIU). The PIU should coordinate the implementation of the Project, oversee procurement and disbursement in close cooperation with SEF and supervise project activities according to the requirements of the World Bank and the MEPP. As necessary, the PIU should arrange the technical assistance and consultants to assist in project implementation, and provide support to facilitate cooperation among governmental institutions and the consumers of ODS.

b) Sub-Project 2: 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 were: (i) substitution of CFC refrigerant with HFC-134a and HFC blends; and (ii) substitution of CFC-11 blowing agent with cyclopentane. The company started the project with its own funds in July 1992, and should finish it by December 1996. The result of the project was to be the annual phaseout of 67.4 ODP tons of CFCs.

c) Sub-Project 3: Servicing of Refrigerators and Freezers and Substitution of CFC-12 Refrigerant in Heat Pumps with HFC-134a at Gorenje Servis.

Gorenje Servis is the largest service company in Slovenia and has exclusive rights for servicing Gorenje appliances during the warranty period. Service repairs of Gorenje Servis represent about 30 percent of repairing household refrigerating freezing appliances in the Slovenian market. The objectives of the project were: (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 (iii) substitution of CFC-12 with HFC-134a in the production of heat pumps. The result of the project was to be the annual phaseout of 11.4 ODP tons of CFCs.

d) 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 objective of the project was 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 company started the project with its own financing in 1993, and should finish it in July 1996.

e) Sub-Project 5: Substitution of CFC Propellants in the Production of Pharmaceuticals at LEK.

Lek, Pharmaceutical and Chemical Company, 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 for cosmetic aerosols, and in 1993 the use of CFCs was excluded from the production of cosmetic aerosols. The objective of the project was to phase out the use of 157 tons of CFCs aerosol propellants and substitute them with hydrocarbon aerosol propellants in the production of pharmaceuticals. The project should be finished by mid-1996.

f) 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 $m^2$, is the largest European manufacturer of light building panels filled with mineral wool. Trimo panels are metal sandwichs filled with mineral wool and glued with a polyurethane (PU) foam. The objective of the project was to permanently eliminate the CFC-11 consumption in Trimo's production process by replacing the CFC-11 with $CO_2$ based foaming agent for its polyurethane adhesives.

g) Sub-Project 7: Substitution of 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) were cleaned using CFC. Labod used 3.5 tons of CFC-113 per year, thus representing about 72 percent of CFC use in dry cleaning. The objective of the project was to phase out 3.5 tons of CFCs by replacing CFC with aliphatic hydrocarbons.

## D. PROJECT IMPLEMENTATION AND MAJOR FACTORS AFFECTING THE PROJECT

| | |
|---|---|
| 1993 - 1994 | The Country Program for the Phaseout of Ozone Depleting Substances in Slovenia was prepared and key investments and regulatory measures identified. Slovenia was classified as a non-Article 5 party to the MP. |
| 1995 | The Project was approved to be financed by GEF and the Grant Agreement was signed and declared effective. The Project should be carried out through MEPP, SEF and COE signing the Project |

| | |
|---|---|
| | Administration Agreement and establishing an ODS phaseout Project Implementation Unit. SEF was determined as a financial agent. |
| 1996 | The Sub-grant Agreements between SEF and all six participating enterprises were signed. |
| | Environmental and Safety Statements as a condition for the disbursement of funds according to the Grant Agreement, were issued by MEPP, except for Gorenje Servis Sub-project. |
| | All conditions for disbursement were fulfilled by four out of six investment sub-projects. The conditions for disbursement were not fulfilled by (i) Gorenje Servis due to non-issuance of Environmental and Safety Statement; and (ii) LTH due to non-issuance of bank guarantee, which was required as an additional condition for disbursement by Project Administration Agreement and Sub-grant agreement. |
| | The participating enterprises started with procurement procedures and the first disbursements of GEF funds were made. |
| 1997 | Gorenje Servis obtained the Environmental and Safety Statement and fulfilled the conditions for grant disbursement. |
| | LTH obtained the bank guarantee and the implementation of the sub-project started. |
| | The implementation of the majority of the sub-projects was completed. Through the implementation it turned out that some changes in sub-projects design and therefore some additional works/equipment were needed. These were approved by the World Bank to be co-financed by GEF funds. |
| | Due to changes in sub-projects design and delays in sub-projects implementation the closing date was extended to June 30, 1998. |
| 1998 | The project was completed. 100 percent of GEF funds were disbursed. |

In general, the Project implementation proceeded smoothly without major problems. All purchased equipment was tested during the trial production, and it proved to operate satisfactory. The outstanding problems concerning $N_2$ leakage (LTH) and the cooling unit of the air conditioning system (Lek) is being resolved.

The enterprises respected Slovenian legislation concerning environmental protection and safety at work as foreseen in the Environmental Safety Statement. According to the Building Construction Act, most of enterprises had to obtain a permit to operate which is a condition for starting and operating a technological process. Safety at work is ensured by appropriate organizational and technical solutions, as well as by ensuring regular training of staff.

The major factor affecting the Project was the enforcement of the London Amendments and Adjustments on the basis of which the import of CFCs was already restricted in 1996. In most cases the participating enterprises had to introduce temporary solutions before the long-term solutions could be performed as planned by the Project.

The factor, which influenced the sub-projects implementation positively, was Slovenian internal additional requirement for disbursement of grant funds. It was the bank guarantee. Since it cost some money, in a way, it forced participating enterprises to implement their sub-projects very seriously and to speed up the sub-projects completion in order to meet the condition for bank guarantee expiration.

An additional factor influencing Project implementation was the regional workshops. Slovenian representatives actively participated in three (3) regional workshops launched by the World Bank and organized by PIUs in each country (Hungary, Czech Republic, Slovenia). All participants welcomed the workshops giving the opportunity for exchange of information and experiences. Slovenians benefited especially in getting the idea how to design its 3R scheme.

Below is a description of each sub-project implementation.

a) Sub-Project 1: Project Implementation Unit for the Phaseout of Ozone Depleting Substances.

The PIU in close cooperation with SEF was coordinating the Project implementation and overseeing procurement and disbursement. It was providing information and advice to ODS users and ministries. A manual on good practices in refrigeration and air conditioning was prepared and eleven training courses for service technicians of refrigerating-freezing and air conditioning equipment were executed. A workshop for custom officers and inspectors on the implementation of new regulations related to ODS was executed in June 1997. In October 1997, a regional workshop on the alternatives for ODS in the solvent sector was organized for Slovenia, Hungary, Czech Republic and Poland. A study Reclamation of Refrigerants was prepared on the basis of which a decision on the establishment of the 3R (Recovery, Recycling, Reclamation) scheme was taken. After the successful completion, the results of the Project were presented on the Slovenian Environment Protection Fair in October 1998.

b) Sub-Project 2: Conversion and Phaseout of Ozone Depleting Substances at LTH.

The selection of the majority of equipment suppliers was executed in the first half of 1996. LTH could not conclude any supply contracts until March 1997, since the company went through financial difficulties and the issuance of their bank guarantee was delayed. After this was obtained, the sub-project implementation proceeded smoothly. The increase in GEF contribution due to the decrease in export to the GEF non-eligible countries and financing of additional items (e.g. storage of cyclopentane and nitrogen, heat recuperator) were approved.

The sub-project implementation was completed successfully by the end of 1997. The CFC phase out was completed, but a small amount of HCFC is still used.

c) Sub-Project 3: Servicing of Refrigerators and Freezers and Substitution of CFC-12 Refrigerant in Heat Pumps with HFC-134a at Gorenje Servis.

The implementation of the sub-project started with a substantial delay, which was due to organizational matters, lack of capacities for the finalization of the project documentation and because the company was looking for the proper technical solution to meet both HFC-134a and isobutane use products servicing. In October 1997 the company started with the procurement procedures and in May and June 1998 the purchased equipment was given to service technicians. Due to introduction of isobutane refrigerant on the Slovenian market an additional item was approved to be financed. The public awareness raising campaign in the form of leaflets and joint TV spot with Gorenje Holding proved to be very effective, since the demand for Gorenje Servis services has increased. 7 tons of CFC were phased out. 2.6 tons of CFC will still be in use, while 1-1.5 tons of CFC is expected to be recovered during servicing and sent to the reclamation unit.

d) Sub-Project 4: Conversion of Aerosol Production to CFC-Free Propellants at Krka Kozmetika.

After the delay in the start-up the project implementation was proceeding smoothly. The new equipment was successfully included in the production process and a gas station was built. There were some slight changes in the project design, additional equipment (e.g. wrapping machine for finished aerosols in PE foil) was approved to be cofinanced. The ODS phaseout was completed.

e) Sub-Project 5: Substitution of CFC Propellants in the Production of Pharmaceuticals at LEK.

The implementation was proceeding smoothly, although through the implementation it turned out that some changes in project design as well as additional equipment (e.g. sterilizer) were needed. The project resulted in the complete phaseout of CFC in the production of pharmaceutical aerosols in 1996. In addition, there are some savings compared to the approved grant amount.

f) Sub-Project 6: Elimination of CFC-11 in the Production of Light Building Panels at Trimo.

The project implementation was proceeding with no major problems, although the whole investment of which the small part was related to CFC phaseout, was very demanding. The installation of the manufacturing line, a crucial part of the project, started in May and was completed in September 1997. Through the implementation of the sub-project, Trimo has

established, that technological equipment in maturing chamber for light building panels was needed and was partially financed by GEF. ODS phaseout has been completed.

g) Sub-Project 7: Substitution of CFCs with Aliphatic Hydrocarbons in Dry Cleaning at the Labod Company.

The implementation was very smooth. The HC machine was installed in October 1996. The Labod project was the first successfully completed investment Sub-project. 3.5 tons of CFC-113 was phased out.

## E. ACHIEVEMENT OF OBJECTIVES

The overall objectives of the Project were fully achieved. The consumption of CFC was phased out through the introduction of long term alternative technologies.

The institutional strengthening through the whole project cycle resulted not only in a transition to ODS free alternatives in enterprises included in the Project, but also sped up ODS phaseout activities at enterprises which were not included in the Project[48].

Due to the Project, other requirements imposed by the Protocol have being fulfilled e.g. monitoring of ODS consumption and reporting to UNEP.

In December 1997 a ministerial decree was adopted. The decree controls production, import, export, placement into circulation and use of ODS and ODS containing products. It does not address venting into the atmosphere and the treatment of used ODS and ODS in existing products and devices. This regulation is expected by the first quarter of 1999. The Project resulted in other benefits too e.g. incremental operating savings in Krka, Lek and Labod, increase in demand for Gorenje Servis services, new experiences and knowledge (from the technological point of view, procurement and project management), which can be forwarded to other companies in Slovenia and other countries.

In addition, the Project helped the enterprises to keep their existing market and/or to obtain the new ones, what was the urge after the breakdown of former Yugoslav market, and in some cases even to increase the sale of ODS free products: Trimo expects slightly more favorable business results, Lek increased the production of pharmaceutical aerosols, the production of LTH products has started increasing after the decline in the previous years. The Project has helped to promote the environmentally friendly behavior of the participating enterprises.

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[48] In 1992, the consumption of CFC was 1108 tons, out of which the Project represented 31%. The projects of most other enterprises did not fulfill eligibility criteria for GEF funding.

## F. PROJECT SUSTAINABILITY AND FUTURE OPERATION

The chosen non-ODS technologies are considered to be long term solutions. The enterprises will continue to use them in the future. This is ensured by the fact that the import of CFCs, products containing CFCs and usage of CFCs in new equipment is forbidden by the law.

The technologies introduced are based on state-of-the-art approaches to each type of activity. As the alternative technologies, they have better environmental performances, although e.g. in the case of HFC used as refrigerants they contribute to the global warming due to the increased GWP. Since there are no other more acceptable alternatives for the refrigerants used in commercial appliances, at present HFCs are considered to be the best solution and further technology changes are not expected for the next at least 5-6 years. Any hazard due to the use of inflammable substances e.g. cyclopentane as foaming agent or LPG as propellant is minimized by the introduction of appropriate safety measures.

The 3R scheme was not a part of the Project. In order to respect the objectives of the MP as a whole, the 3R scheme is planned to be established in the future with reclamation unit located at LTH. The future operation of Gorenje Servis project and part of LTH project depends on the adoption and enforcement of proper legislation, prohibiting venting of ODS refrigerants, and on the establishment and operation of nation-wide 3R scheme. Without this legislative measures support, Gorenje Servis and LTH could not be competitive to other service organizations.

As future action needed is to continue training courses for service technicians on good practices in refrigeration and air conditioning as well as to continue the performance of wider public awareness raising campaigns.

## G. PERFORMANCE OF PARTICIPATING ENTITIES

The working relations with the World Bank staff and technical consultants were excellent through the whole project cycle. The World Bank gave all the needed support regarding technical questions, procurement procedures, project management and disbursement of grant funds. Although the World Bank task manager was changed three times, this had no negative influence on the Project implementation. The transfer of responsibilities for overseeing the Project implementation to Budapest, resulted in even closer cooperation with the World Bank staff and PIUs in other countries of Central and Eastern Europe, in which GEF ODS phaseout projects are being implemented. Especially welcomed were the regional workshops launched by the World Bank and organized by PIU in each country, which gave the PIU, SEF and other participants the opportunity for exchange of experiences in project

implementation, management, procurement and other issues related to ozone depletion, in particular the design of the 3R scheme.

Excellent cooperation was also established by all participating enterprises and other entities involved in the country. PIU and SEF provided to participating enterprises all needed support on a day by day basis, especially at project preparation and at the beginning of project implementation. The enterprises respected guidelines and all requested procedures, and responded timely to all PIU and SEF requests.

## H. IMPLEMENTATION EXPERIENCE AND RESULTS

Very close and good cooperation between PIU, SEF, participating enterprises and all other involved entities, exchange of information, knowledge and experiences resulted in smooth project implementation.

All enterprises experienced for the first time the implementation of projects that are financed by grant funds. All stressed the importance of good and careful project preparation, clear definition of packages and elaboration of the project in details before starting the implementation.

All enterprises welcomed the World Bank procurement procedures, although sometimes time consuming, at the end resulted in better prices of purchased equipment and services. All enterprises obtained additional knowledge in procurement procedures and project management that will be used in their forthcoming projects.

During the Project implementation the enterprises gained new experiences in technical knowledge, that could be shared with other companies in Slovenia and abroad.

The implementation of Trimo project represents a technological achievement in the worldwide range. There are very few similarly designed technological lines for the production of light building panels with mineral wool filling. Manufacturers of such products have not solved important technological and environmental problems yet, and are interested in possible solutions based on experience of this project.

Since Labod is the first company in the dry cleaning sector in Slovenia, which has installed dry cleaning machines using hydrocarbons as a solvent, new experiences and knowledge have been shared with other companies during seminars and workshops.

The Krka project is interesting due to the flexibility of the filling line, which can work with either DME or hydrocarbons. Lek developed new product formulation for the antibiotic spray.

LTH obtained experiences in new refrigerants handling, recovery and retrofit procedures, which has already been interesting for companies in Bosnia, Macedonia and Croatia. The new cyclopentane foaming equipment is of interest to other PU foam users in the region.

Since the Gorenje Servis equipment is in use from the end may 1998, there are no special experiences yet.

The active participation at the regional workshops launched by the World Bank has been very important for the future operation of Slovenia Project. On the basis of the experiences of other countries (Czech Republic, Hungary) and lessons learned, Slovenia has designed its 3R scheme, the implementation of which is expected in 1999.

The series of training courses on good practices in refrigeration were considered very useful and successful, the established cooperation with the participants is expected to continue, especially in the planned future activities, retrofitting and operation of the 3R scheme.

## I. CONCLUSION AND RECOMMENDATIONS

Slovenia is the second country in the region of Central and Eastern Europe and worldwide successfully completing the ODS phaseout project financed by GEF.

The overall objectives of the Project were fully achieved. The consumption of CFC was phased out through the introduction of alternative technologies. The Project sped up ODS phaseout activities at enterprises which were not included in the Project.

The technologies introduced are based on the state-of-the-art approaches to each type of activity. They are considered to be long term solutions. Due to flammability of some alternative substances, appropriate safety measures were introduced.

The Project helped the enterprises to keep their existing market or to obtain the new ones, and in some cases even to increase the sale of ODS free products.

Additional knowledge in procurement procedures and project management, as well as new experiences in technical knowledge was obtained.

The regional workshops launched by the World Bank proved to be very important. On the basis of the experiences of other countries (Czech Republic, Hungary) and lessons learned, a nation-wide 3R scheme is being designed.

The series of training courses on good practices in refrigeration organized by PIU for service technicians were considered very useful and successful, and the established cooperation with the participants is expected to continue, especially in the planned future activities, retrofitting and operation of the 3R scheme.

Since a ministerial decree adopted in December 1997 does not cover all Montreal Protocol requirements, additional legislation to support the planned 3R scheme is expected by the first quarter of 1999. In October 1998 the Copenhagen Amendments were ratified.

As a recommendation it should be stressed that careful project preparation and elaboration of the project in detail, in advance is crucial for its smooth implementation. V ery close and good day-to-day cooperation between all participating entities, exchange of information, knowledge and experiences are also important for smooth project implementation.

# PART II: STATISTICAL TABLES

**Table 1: Timetable of Key Project Processing Events**

| | Planned | Actual |
|---|---|---|
| (a) Time Taken to Prepare: | | 20 months |
| (b) Prepared by: | | MEPP, COE and World Bank |
| (c) First Presentation to the Bank: | | November 1993 |
| (d) Appraisal Mission Departure: | | May 1995 |
| (e) Negotiations: | September 1995 | September 1995 |
| (f) Board Approval: | October 1995 | November 1995 |
| (g) Signature of Grant Agreement: | November 1995 | November 1995 |
| (h) Date of Effectiveness: | November 1995 | December 1995 |
| (i) Date of Completion: | June 1997 | June 1998 |
| (j) Date of Closing: | December 1997 | June 1998 |

## Table 2: Project Implementation Schedule

| | | Planned | Actual |
|---|---|---|---|
| Date of Signature: | | November 1995 | November 1995 |
| Date of Effectiveness: | | November 1995 | December 1995 |
| Date of Completion: | | June 1997 | June 1998 |
| I. Institutional Strengthening Component | | | |
| Sub-Project 1 | Project Implementation Unit for the Phaseout of Ozone Depleting Substances | 1994-1997 | 1994-1998 |
| II. Investment Component | | | |
| Sub-Project 2 | Conversion and Phaseout of Ozone Depleting Substances at LTH. | | |
| | Component for Substitution of CFC Refrigerant with HFC-134a | August 1996 | December 1996 |
| | Component for Substitution of CFC Blowing Agent with Cyclopentane | December 1996 | December 1997 |
| Sub-Project 3 | Servicing of Refrigerators and Freezers and Substitution of CFC-12 Refrigerant in Heat Pumps with HFC-134a at Gorenje Servis | | |
| | Component for Servicing of Refrigerators, Freezers, and Heat Pumps in which CFC-12 is used as Refrigerants (Includes Recovery) | December 1995 | June 1998 |
| | Component for Servicing of CFC-free Refrigerators and Freezers (HFC-134a used as Refrigerant) | December 1995 | June 1998 |
| | Component for Substitution of CFC-12 as Refrigerant with HFC-134a in the Production of Heat Pumps | December 1995 | June 1998 |
| Sub-Project 4 | Conversion of Aerosol Production to CFC-Free Propellants at Krka Kozmetika. | | |
| | Phase 1 - Installing Explosion Proof Aerosol Filling Machine and Safe Room for Filling Hazardous Propellants | May 1993 | May 1993 |
| | Phase 2 - Storage for Flammable Propellants and Reconstruction of Finished Goods Warehouse | July 1996 | June 1997 |
| | Phase 3 - Stretchbanding Machine | - | May 1998 |
| Sub-Project 5 | Substitution of CFC Propellants in the Production of Pharmaceuticals at LEK. | | |
| | Provision of Technical Information and Documentation | August 1995 | July 1996 |
| | Civil Engineering and Installation | December 1995 | December 1997 |

| | | | |
|---|---|---|---|
| | Works | | |
| | Installation of Equipment | November 1995 | November 1997 |
| | Training in Operation of Equipment | February 1996 | November 1997 |
| Sub-Project 6 | Elimination of CFC-11 in the Production of Light Building Panels at Trimo. | | |
| | Modification and Upgrading the Double Belt Line | July 1996 | September 1997 |
| | Equipping the Warehouse with a Panel Transportation System | September 1996 | November 1997 |
| Sub-Project 7 | Substitution of CFCs with Aliphatic Hydrocarbons in Dry Cleaning at the Labod Company. | | |
| | Installation of Equipment | December 1995 | October 1996 |

## Table 3a: CFC Phaseout in Tons

| Investment Sub-project | Estimated in FY | | | | | Actual in FY | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | '94 | '95 | '96 | '97 | '98 | '94 | '95 | '96 | '97 | '98 |
| 2. Conversion and Phaseout of Ozone Depleting Substances at LTH. | 20.7 | 41.4 | 66.6 | 68.9 | 68.9 | 46.7 | 51.9 | 56.9 | 68.9 | 68.9 |
| 3. Servicing of Refrigerators and Freezers and Substitution of CFC-12 Refrigerant in Heat Pumps with HFC-134a at Gorenje Servis. | 0 | 0 | 11.4 | 11.4 | 11.4 | 4.8 | 5.4 | 6.3 | 7.0 | 7.0 |
| 4. Conversion of Aerosol Production to CFC-Free Propellants at Krka Kozmetika. | 0(a) | 0(a) | 39(a) | 79(a) | 79(a) | 103.3(b) | 142.0(b) | 88.3(b) | 88.3(b) | 88.3(b) |
| 5. Substitution of CFC Propellants in the Production of Pharmaceuticals at LEK. | 0 | 0 | 157 | 157 | 157 | 0 | 0 | 68 | 194.8 | 162.7 |
| 6. Elimination of CFC-11 in the Production of Light Building Panels at Trimo. | 6.5 | 5.7 | 7.6 | 27.4 | 35.1 | 6.5 | 5.7 | 17.7 | 33.0 | 35.1 |
| 7. Substitution of CFCs with Aliphatic Hydrocarbons in Dry Cleaning at the Labod Company. | 0 | 0 | 3.5 | 3.5 | 3.5 | 1.2 | 0.4 | 3.5 | 3.5 | 3.5 |
| **TOTAL** | **27.2** | **47.1** | **285.1** | **347.2** | **354.9** | **162.5** | **205.4** | **240.7** | **395.5** | **365.5** |

Note: (a) - The phaseout was estimated on the basis of the actual CFC use in 1993 (79 tons).
(b) - The calculation is based on the annual production of the aerosol units each year and on the estimation, how much CFC would be used for this production (in 1994, the alternatives were already introduced in some products) , diminished for the CFC actually used.

## Table 3b: CFC Phaseout in ODP Tons

| Investment Sub-project | Estimated in FY | | | | | Actual in FY | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | '94 | '95 | '96 | '97 | '98 | '94 | '95 | '96 | '97 | '98 |
| 2. Conversion and Phaseout of Ozone Depleting Substances at LTH. | 20.7 | 41.4 | 66.6 | 67.4 | 67.4 | 46.7 | 51.9 | 56.9 | 67.4 | 67.4 |
| 3. Servicing of Refrigerators and Freezers and Substitution of CFC-12 Refrigerant in Heat Pumps with HFC-134a at Gorenje Servis. | 0 | 0 | 11.4 | 11.4 | 11.4 | 4.8 | 5.4 | 6.3 | 7.0 | 7.0 |
| 4. Conversion of Aerosol Production to CFC-Free Propellants at Krka Kozmetika. | 0(a) | 0(a) | 39(a) | 79(a) | 79(a) | 103.3(b) | 142.0(b) | 88.3(b) | 88.3(b) | 88.3(b) |
| 5. Substitution of CFC Propellants in the Production of Pharmaceuticals at LEK. | 0 | 0 | 157 | 157 | 157 | 0 | 0 | 68 | 194.8 | 162.7 |
| 6. Elimination of CFC-11 in the Production of Light Building Panels at Trimo. | 6.5 | 5.7 | 7.6 | 27.4 | 35.1 | 6.5 | 5.7 | 17.7 | 33.0 | 35.1 |
| 7. Substitution of CFCs with Aliphatic Hydrocarbons in Dry Cleaning at the Labod Company. | 0 | 0 | 2.8 | 2.8 | 2.8 | 1.0 | 0.3 | 2.8 | 2.8 | 2.8 |
| **TOTAL** | **27.2** | **47.1** | **284.4** | **345.0** | **352.7** | **162.3** | **205.3** | **240.0** | **393.3** | **363.3** |

Note: (a) - The phaseout was estimated on the basis of the actual CFC use in 1993 (79 tons).
(b) - The calculation is based on the annual production of the aerosol units each year and on the estimation, how much CFC would be used for this production (in 1994, the alternatives were already introduced in some products) , diminished for the CFC actually used.

## Table 4a: Disbursement of GEF Grant (US$)

| Sub-Project Title and Description | Actual | | | TOTAL |
|---|---|---|---|---|
| | FY96 | FY97 | FY98 | |
| 1.Project Implementation Unit for the Phaseout of Ozone Depleting Substances | 136,006.58 | 118,110.61 | 73,078.96 | 327,196.15 |
| 2.Conversion and Phaseout of Ozone Depleting Substances at LTH. | 0.00 | 1,387,978.05 | 365,897.82 | 1,753,875.87 |
| 3.Servicing of Refrigerators and Freezers and Substitution of CFC-12 Refrigerant in Heat Pumps with HFC-134a at Gorenje Servis. | 0.00 | 0.00 | 125,688.62 | 125,688.62 |
| 4.Conversion of Aerosol Production to CFC-Free Propellants at Krka Kozmetika. | 0.00 | 363,928.02 | 50,000.00 | 413,928.02 |
| 5.Substitution of CFC Propellants in the Production of Pharmaceuticals at LEK. | 919,250.56 | 754,634.76 | 102,661.33 | 1,776,546.65 |
| 6.Elimination of CFC-11 in the Production of Light Building Panels at Trimo. | 553,545.79 | 467,155.86 | 132,762.43 | 1,153,464.08 |
| 7.Substitution of CFCs with Aliphatic Hydrocarbons in Dry Cleaning at the Labod Company. | 175,350.44 | 5,336.25 | 0.00 | 180,686.69 |
| FA Fee | 57,852.97 | 51,491.40 | 42,561.12 | 151,905.49 |
| **TOTAL** | **1,842,006.34** | **3,148,634.95** | **892,650.28** | **5,883,291.57** |

| | Estimated | | | Actual | | |
|---|---|---|---|---|---|---|
| | FY96 | FY97 | FY98 | FY96 | FY97 | FY98 |
| Annual | 4,200,000 | 1,500,000 | 500,000 | 1,842,006.34 | 3,148,634.95 | 892,650.28 |
| Cumulative | 4,200,000 | 5,700,000 | 6,200,000(a) | 1,842,006.34 | 4,990,641.29 | 5,883,291.57(a) |
| Cumulative as % of total GEF grant | 68 | 92 | 100 | 31 | 85 | 100 |

Note: (a) - The Grant was 100% disbursed. Date of final disbursement: August 11, 1998. US$ 316,708.43 currency exchange loss, because of changed exchange rate between SDR and US$.

## Table 4b: Disbursement of GEF Grant By Procurement Method and Category (US$)

| Category | Estimates by Procurement Method | | | | | Total | Actual by Procurement Method | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | LIB | IS | NS | DC | Other | | LIB | IS | NS | DC | Other | |
| 1. Works | - | | 1,591,580 | | | 1,591,580 | - | - | 1,471,932 | 62,584 | - | 1,534,516 |
| 2. Goods | 1,083,820 | 1,562,130 | 180,200 | 125,270 | - | 2,951,420 | 1,150,654 | 1,836,514 | 40,177 | 281,186 | - | 3,308,531 |
| 3. Consultancies | - | | | | 625,800 | 625,800 | - | - | - | - | 561,143 | 561,143 |
| 4. Miscellaneous | | | | | | | | | | | | |
| 4.1 PIU | | | | | 219,690 | 219,690 | - | - | - | - | 327,196(a) | 327,196 |
| 4.2 FA Fee | | | | | 155,064 | 155,064 | - | - | - | - | 151,905 | 151,905 |
| 4.3 Contingency | - | | | | 656,446 | 656,446 | - | - | - | - | - | - |
| **TOTAL** | **1,083,820** | **1,562,130** | **1,771,780** | **125,270** | **1,657,000** | **6,200,000** | **1,150,654** | **1,836,514** | **1,512,109** | **343,770** | **1,040,244** | **5,883,291** |

Note: (a) - Includes DC for consultants, providing technical assistance and NS for procuring computers.

## Table 5A: Project Costs (US$ Million)

| Sub-Project Title and Description | Estimated | | | | | Actual | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Financed by Slovenia | Local by GEF | Foreign by GEF | Sub-Project Costs (a) | Proposed GEF Grant | Financed by Counterparts | Local by GEF | Foreign by GEF | Sub-Project Costs (a) | GEF Grant |
| 1. Project Implementation Unit for the Phaseout of Ozone Depleting Substances | 0.000 | 0.220 | 0.000 | 0.220 | 0.220 | 0.024 | 0.319 | 0.008 | 0.351 | 0.327 |
| 2. Conversion and Phaseout of Ozone Depleting Substances at LTH. | 2.536 | 0.412 | 1.084 | 4.032 | 1.496 | 1.456 | 0.794 | 0.960 | 3.210 | 1.754 |
| 3. Servicing of Refrigerators and Freezers and Substitution of CFC-12 Refrigerant in Heat Pumps with HFC-134a at Gorenje Servis. | 0.342 | 0.016 | 0.109 | 0.467 | 0.125 | 0.341 | 0.030 | 0.096 | 0.467 | 0.126 |
| 4. Conversion of Aerosol Production to CFC-Free Propellants at Krka Kozmetika. | 0.321 | 0.187 | 0.167 | 0.675 | 0.354 | 0.611 | 0.283 | 0.131 | 1.025 | 0.414 |
| 5. Substitution of CFC Propellants in the Production of Pharmaceuticals at LEK. | 0.192 | 1.557 | 0.436 | 2.185 | 1.993 | 0.053 | 1.257 | 0.520 | 1.830 | 1.777 |
| 6. Elimination of CFC-11 in the Production of Light Building Panels at Trimo. | 0.127 | 0.546 | 0.475 | 1.148 | 1.021 | 0.464 | 0.437 | 0.716 | 1.617 | 1.153 |
| 7. Substitution of CFCs with Aliphatic Hydrocarbons in Dry Cleaning at the Labod Company. | 0.000 | 0.000 | 0.179 | 0.179 | 0.179 | 0.002 | 0.002 | 0.179 | 0.183 | 0.181 |
| **Subtotal for Component 1-Sub-Project 1** | **0.000** | **0.220** | **0.000** | **0.220** | **0.220** | **0.024** | **0.319** | **0.008** | **0.351** | **0.327** |
| **Subtotal for Component 2-Sub-Project 2-7** | **3.518** | **2.718** | **2.450** | **8.686** | **5.168** | **2.927** | **2.803** | **2.602** | **8.332** | **5.405** |
| **Subtotal for Components 1-2** | **3.518** | **2.938** | **2.450** | **8.906** | **5.388** | **2.951** | **3.122** | **2.610** | **8.683** | **5.732** |
| FA Fee | 0.000 | 0.155 | 0.000 | 0.155 | 0.155 | 0.000 | 0.152 | 0.000 | 0.152 | 0.152 |
| Contingency | 0.000 | 0.657 | 0.000 | 0.657 | 0.657 | - | - | - | - | - |
| **TOTAL** | **3.518** | **3.750** | **2.450** | **9.718** | **6.200** | **2.951** | **3.274** | **2.610** | **8.835** | **5.884** |

Note: (a) - The Sub-project Costs are calculated as: (i) Incremental Capital Costs + Incremental Operating Costs; and (ii) Incremental Capital Costs - Incremental Operating Savings.

## Table 5B: Project Financing (US$ Million)

| Item | Estimates (US$ Million) | | | Actual (US$ Million) | | |
|---|---|---|---|---|---|---|
| | Local Costs | Foreign Costs | Total | Local Costs | Foreign Costs | Total |
| 1. GEF Grant | 3.750 | 2.450 | 6.200 | 3.274 | 2.610 | 5.884 |
| 2. Counterpart funds (enterprises, ...) | 3.518 | 0.000 | 3.518 | 1.966 | 0.985 | 2.951 |
| **TOTAL** | **7.268** | **2.450** | **9.718** | **5.240** | **3.595** | **8.835** |

## Table 6: Studies and Workshops Included in the Project

**Sub-project 1. Project Implementation Unit for the Phaseout of Ozone Depleting Substances**

| **I. Studies** | **Prepared by** | **Date of Preparation** | **Study Impact** |
|---|---|---|---|
| Country Program for the Phaseout of ODS in Slovenia | Chamber of Economy of Slovenia | June 1994 | Key regulatory measures and investment projects identified. Investment projects submitted for GEF funding. |
| Good Practices in Refrigeration and Air conditioning - manual | Chamber of Economy of Slovenia | March 1997 | Manual prepared for training courses on good practices in refrigeration. |
| Reclamation of Refrigerants in Slovenia | Chamber of Economy of Slovenia | June 1998 | Based on the results of this study a decision was taken to introduce a 3R Scheme in Slovenia. |
| Slovenia 3R Scheme | Refrigerant products Limited, UK | June 1998 | The expertise supported the outcomes of the study already prepared by COE. |
| Technical Evaluation of ODS Phaseout Project | Dewpoint Consultants, UK | September 1998 | Technical evaluation and preparation of ICR. |
| **II. Workshops** | | | |
| Implementation of Regulatory Measures on ODS | Local workshop for custom officers and inspectors. | | Ljubljana, Slovenia, June 1997 |
| Alternatives for Ozone Depleting Substances in the Solvent Sector | Regional workshop in a series of workshops, launched by the World Bank. Participation of: Czech Republic, Hungary, Poland, Slovenia. | | Ribno, Slovenia, October 1997 |
| Training on Good Practices in Refrigeration and Air Conditioning | Series of 4-days courses for service technicians. | | Eight (8) courses in 1997 and three (3) in 1998. Participation of 211 service technicians. |

## Table 7: Summary of Sub-projects Data and Costs (US$ Million)

| Sub-Project Title and Description | Estimated | | | | | | Actual | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Annual Phaseout (ODP tons) | Share of Export (%) | Incremental Capital Costs | Incremental Operating Costs | Sub-Project Costs [a] | Proposed GEF Grant | Annual Phaseout (ODP tons) | Share of Export (%) | Incremental Capital Costs | Incremental Operating Cost | Sub-Project Costs [a] | GEF Grant |
| 1. Project Implementation Unit for the Phaseout of Ozone Depleting Substances | - | - | 0.033 | 0.187 | 0.220 | 0.220 | - | - | 0.023 | 0.328 | 0.351 | 0.327 |
| 2. Conversion and Phaseout of Ozone Depleting Substances at LTH. | 67.4 | 44 | 2.838 | 1.194 | 4.032 | 1.496 | 67.4 | 31 | 2.901 | 0.309 | 3.210 | 1.754 |
| 3. Servicing of Refrigerators and Freezers and Substitution of CFC-12 Refrigerant in Heat Pumps with HFC-134a at Gorenje Servis. | 11.4 | 0 | 0.125 | 0.341 | 0.467 | 0.125 | 7.0 | 0 | 0.126 | 0.341 | 0.467 | 0.126 |
| 4. Conversion of Aerosol Production to CFC-Free Propellants at Krka Kozmetika. | 79.0 | 0 | 1.068 | (0.393) | 0.675 | 0.354 | 88.3 | 0 | 1.221 | (0.196) | 1.025 | 0.414 |
| 5. Substitution of CFC Propellants in the Production of Pharmaceuticals at LEK. | 157.0 | 0 | 1.993 | 0.192 | 2.185 | 1.993 | 194.8 | 0 | 1.909 | (0.079) | 1.830 | 1.777 |
| 6. Elimination of CFC-11 in the Production of Light Building Panels at Trimo. | 27.4 | 13 | 1.053 | 0.095 | 1.148 | 1.021 | 33.0 | 13 | 1.511 | 0.106 | 1.617 | 1.153 |
| 7. Substitution of CFCs with Aliphatic Hydrocarbons in Dry Cleaning at the Labod Company. | 2.8 | 0 | 0.218 | (0.038) | 0.179 | 0.179 | 2.8 | 0 | 0.224 | (0.041) | 0.183 | 0.181 |
| **Subtotal** | - | - | **7.328** | **1.578** | **8.906** | **5.388** | - | - | **7.915** | **0.768** | **8.683** | **5.732** |
| FA Fee | - | - | - | 0.155 | 0.155 | 0.155 | - | - | - | 0.152 | 0.152 | 0.152 |
| Contingency | - | - | - | 0.656 | 0.657 | 0.657 | - | - | - | - | - | - |
| **TOTAL** | **345.0** | | **7.328** | **2.389** | **9.718** | **6.200** | **393.3** | | **7.915** | **0.920** | **8.835** | **5.884** |

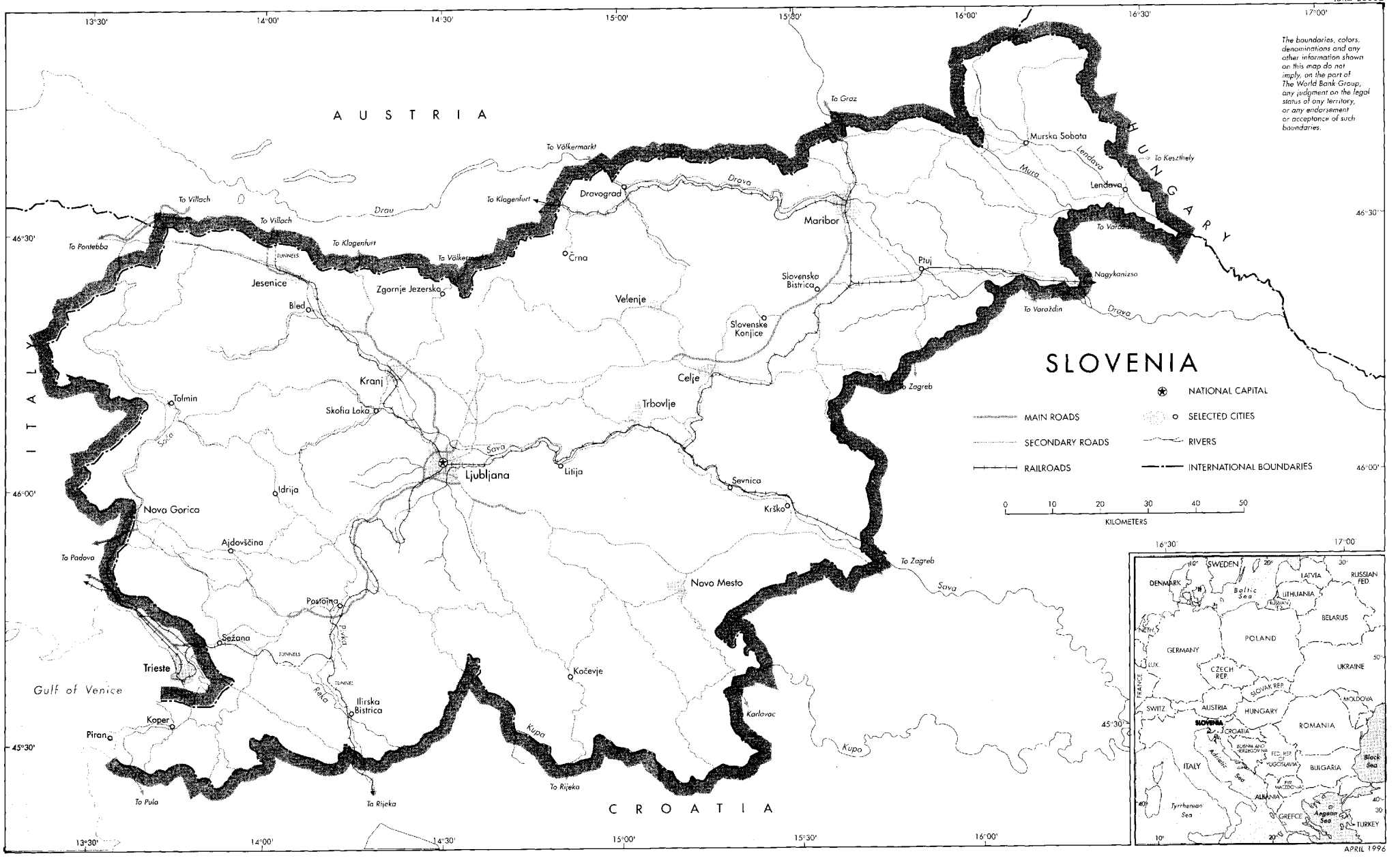
Note: (a) - The Sub-project Costs are calculated as: (i) Incremental Capital Costs + Incremental Operating Costs; and (ii) Incremental Capital Costs - Incremental Operating Savings.

Appendix C.

Map

MAP SECTION

IBRD 26882




APRIL 1996