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**Bulgaria**  
**Ozone Depleting Substances Phase-out Project**

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Project Document  
October 1995



THE WORLD BANK

## **GEF Documentation**

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Global Environment  
Coordination Division  
Environment Department  
World Bank  
1818 H Street, NW  
Washington, DC 20433  
Telephone: (202) 473-1816  
Fax: (202) 522-3256

**BULGARIA**  
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October 1995

Agriculture and Environment Operations Division  
Country Department I  
Europe and Central Asia Regional Office

## CURRENCY EQUIVALENTS

Currency unit = Bulgarian Leva (BL)  
US\$1.00 = 68.095 BL (September 15, 1995)

## UNITS AND MEASURES

metric ton = Ton (T) = 1000 kg

## ACRONYMS

CFC	-	Chlorofluorocarbons
EIA	-	Environmental Impact Assessment
FPB	-	First Private Bank
GDP	-	Gross Domestic Product
GEF	-	Global Environment Facility
HFC	-	Hydrofluorocarbon
IBRD	-	International Bank for Reconstruction and Development
IS	-	International Shopping
LIB	-	Limited International Bidding
LFA	-	Local Financial Agent
LS	-	Local Shopping
MOE	-	Ministry of Environment
MPEC	-	Montreal Protocol Executive Committee
NGOs	-	Non Governmental Organizations
ODS	-	Ozone Depleting Substance
OORG	-	Ozone Operations Resource Group
OTF	-	Ozone Task Force
SDR	-	Special Drawing Rights
STAP	-	Scientific and Technical Advisory Panel
TA	-	Technical Assistance

## BULGARIA - FISCAL YEAR

January 1 - December 31

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## **Part I: Project Summary**





## **BULGARIA**

### **OZONE DEPLETING SUBSTANCES PHASE-OUT PROJECT**

#### **GRANT AND PROJECT SUMMARY**

<b>Recipient:</b>	Republic of Bulgaria	
<b>Executing Agency:</b>	Ministry of Environment (MOE)	
<b>Beneficiaries:</b>	Enterprises using Ozone Depleting Substances (ODS), Refrigeration Institute, and MOE	
<b>Total Project Cost:</b>	<b><u>Component</u></b>	<b><u>US \$ million</u></b>
	Foams	6.1
	Refrigeration	4.9
	Solvents	0.7
	TA/Institutional Strengthening	1.5
	Fee to Local Financial Agent	<u>0.3</u>
	<b>TOTAL</b>	<b><u>13.5</u></b>
<b>Financing Plan:</b>		
	Enterprise Contribution	3.0
	GEF grant (equivalent to SDR 7.1 million)	10.5
<b>On Lending Terms:</b>	Grant	
<b>Economic Rate of Return:</b>	N/A	



## **BULGARIA**

### **OZONE DEPLETING SUBSTANCE PHASE-OUT PROJECT**

#### **I. COUNTRY/SECTOR BACKGROUND**

1. The Montreal Protocol is an international agreement to reduce the consumption of chlorofluorocarbons (CFCs) and halons that deplete the ozone layer. The Protocol was adopted in September 1987 and has been ratified by 128 countries marking the first occasion in which developed and developing countries have agreed on a global strategy to address a shared environmental problem. The Montreal Protocol was amended in London (June 1990) and Copenhagen (November 1992) which requires the phase-out of additional substances<sup>1</sup> that deplete the ozone layer. Countries signatory to the Protocol and its amendments have agreed to and are taking significant steps in phasing-out the use of ODS which is commonly used in refrigerator and air conditioner manufacturing, foam production, and as solvents for industrial washing.

2. Bulgaria ratified the Montreal Protocol in October 1989 and is committed to meet the Protocol's requirement of phasing out CFCs, which accounts for 90% of the ODS consumption in the country, by January 1996. Montreal Protocol considers consumption as production, exports, and imports. Since Bulgaria does not produce or export CFCs, restricting CFC imports will allow the country to comply with Montreal Protocol requirements. To this effect, enterprises using CFCs have prepared sub-projects for technology conversion that will allow the use of non-CFC substances. However, due to lack of resources in the current Bulgarian transitional economy enterprises have not yet been able to implement their sub-projects. Thus, the Government of Bulgaria has requested the Global Environment Facility (GEF) to finance investments for the technology conversion and technical assistance. Although Bulgaria remains committed to meet the ODS phase-out deadline, it is not realistic to expect that all enterprises will be able to convert their technology on time. Bulgaria, along with other Eastern European countries in a similar situation, is expected to request the Montreal Protocol Executive Committee (MPEC) for an extension in the phase-out schedule. Given Bulgaria's pro-active role in ODS phase-out activities, it is quite likely that the MPEC will grant the extension.

3. The annual halon consumption has already been minimized to 2 tons and Bulgaria, like other countries, plans to achieve a zero halon consumption level when effective non-halon technology in fire fighting equipment is developed. Although Bulgaria is not a signatory to the London and Copenhagen amendments and as a result not required to phase-out the chemicals included in the amendments, it is also making long-term plans to phase-out these chemicals. The priority, however, remains in the phase-out of CFCs which is the focus of this project.

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1/ Methyl Chloroform, Carbon Tetrachloride, Hydro Chlorofluorocarbons, and Methyl Bromide

4. Bulgaria is currently sharing many of the problems common to the economies in transition. Per capita GDP declined about 50% between 1989 and 1994, and the industrial sector's contribution to the GDP dropped from 51% in 1990 to 35% in 1993. Due to the decline in the industrial sector where most enterprises are not running at full capacity, the CFC consumption has had a dramatic drop of 80% between 1989 and 1994. The drop in the consumption is also attributed to the technology conversion that has already taken place in the non-pharmaceutical aerosol and flexible foam sub-sectors to non-CFC alternatives. In 1994, the CFC consumption in Bulgaria was 487 tons of which 50 tons were used in the essential pharmaceutical aerosol sector that has no phase-out schedule as per the Montreal Protocol. The remaining 437 tons of CFCs were used in refrigeration servicing (100 tons), refrigeration manufacturing (105 tons), refrigeration foams (73 tons), polyurethane foams (36 tons), and solvents (123 tons).

## II. ODS PHASE-OUT STRATEGY

5. Bulgaria with bilateral assistance from the Government of Denmark prepared a Country Program that outlines the ODS consumption pattern and presents a phase-out strategy that includes key policy actions and investments that would substantially reduce the ODS consumption. The Country Program has received wide support from various Ministries, including Ministries of Environment, Finance, and Industry, the Customs Department, the participating enterprises, and non-governmental organizations (NGOs). The phase-out strategy has been reiterated as a Government objective in Bulgaria's Environmental Strategy Study<sup>2</sup>. The Government has created an Ozone Task Force (OTF) in the Ministry of Environment (MOE) to develop, implement, and monitor the phase-out program. Key elements of the phase-out strategy are highlighted below:

- imposing sector specific ban on ODS consumption where non-ODS technology is proven and commercially available. For example, the ODS consumption in the refrigeration, foam, and solvent sectors will be banned while in the pharmaceutical aerosol sector the ban will be imposed after a suitable alternative to CFC use is available;
- developing an ODS license system, as in European Union, to control and monitor imports and use in the country. Licenses would be issued to importers, end-users, and refrigeration servicing enterprises;
- identifying enterprise needs to convert to non-ODS technology, developing sector specific action plans for a timely phase-out, and providing technical assistance in preparing sub-projects for technology conversion;
- requesting Global Environment Facility to finance the incremental costs of technology conversion for key sub-projects that would substantially reduce the ODS consumption; and

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<sup>2/</sup> Environmental Strategy Study - Update and Follow-Up, Gray Cover Report, December 30, 1994.

- developing enforcement mechanisms with a system of fines and regular enterprise inspection to ensure compliance as per the Montreal Protocol guidelines.

### III. PROJECT OBJECTIVE

6. The objective of the project is to assist Bulgaria's transition into non-CFC technology as required under the Montreal Protocol. The project will help Bulgaria reach its objective by: a) supporting priority sub-projects, identified in the Country Program, for technology conversion to non-CFC materials; b) initiating CFC recovery, reclamation, and recycling operation; and c) strengthening the institutional capacity of the OTF to implement the Country Program.

### IV. PROJECT DESCRIPTION

7. The project consists of technology conversion in 12 sub-projects in seven enterprises and technical assistance and training component involving 4 sub-projects in the Institute of Refrigeration and the Ministry of Environment. Some of the CFC consuming enterprises, included in the Country Program, are undergoing financial difficulties due to the present Bulgarian economic situation. Thus, the Bank performed a financial viability analysis to ensure project sustainability by including enterprises in the project that are viable and do not show signs of closure.

8. Most enterprises included in the Country Program have been included in the project with three exceptions. Enterprises DZU and Opticoelectron were excluded from the original list of enterprises proposed in the Country Program because of poor financial standing and uncertain future. VMZ-compressors, a new enterprise with no production so far, was also excluded from the Country Program list since it did not meet Montreal Protocol criteria of having an existing ODS consumption pattern, to be phased out. It is expected that the Government of Bulgaria will review the future of these three enterprises with the Montreal Protocol Executive Committee in the context of requesting extension on the phase-out schedule.

9. The present consumption of 437 tons of CFCs, scheduled to be phased out as per Montreal Protocol guidelines, will be reduced by 83% by this project. The remaining 72 tons of ODS is consumed by DZU (maximum capacity 60 tons), Opticoelectron (maximum capacity 3 tons) and a number of small non-refrigeration foam enterprises with limited CFC use. The non-refrigeration foam enterprises are converting to non-CFC technology without GEF assistance since the technology conversion process is simple and does not entail major investments.

10. All sub-projects included in the project have been reviewed and approved by specialists from the GEF Scientific and Technical Advisory Panel (STAP) who confirmed the consistency of the project with Montreal Protocol guidelines and Country Program objectives. In addition, the Bank's Ozone Operations Research Group (OORG) has reviewed and approved the technology used, cost effectiveness, ODS replacement substance, implementation time-frame, and incremental operating costs for all sub-projects. On September 22, 1995 the GEF approved the sub-projects included in this document for grant financing from the Global Environment Trust Fund.

### Technology Conversion

11. The technology conversion consists of sub-projects in the refrigeration, foam and solvent sectors in seven enterprises. A more detailed description of each sub-project is provided in Annex 2.

- (a) Refrigeration: The sector comprises of five sub-projects where HFC-134a will be used as a refrigerant instead of CFC-12. The sub-projects will support design testing and retrofitting of refrigerator and compressor production lines to use the replacement refrigerant (HFC-134a). The sub-projects belong to enterprises MRAZ, Frigo, Brist, and Klimat and will reduce a total of 99 tons in annual ODS consumption.
- (b) Foam: The sector comprises of six sub-projects where cyclopentane will be used as a foam blowing agent instead of CFC-11 in one polyurethane and five refrigeration plants. The sub-projects will support design testing, evaluating energy efficiency of refrigerators with a cyclopentane foaming process, and retrofitting of the production line. Adequate safety equipment will also be installed since cyclopentane is an explosive and flammable substance. The sub-projects belong to enterprises Vazhod, Klimat, MRAZ, Frigo, Brist, and Zem and will reduce a total of 115 tons in annual ODS consumption.
- (c) Solvents: There is one sub-project in this sector where CFC-113, used to wash ball bearings, will be replaced by water, corrosion inhibitors, and kerosene. The sub-project will support testing to determine the volume mix of the replacement washing substances, retrofitting the production line, and installing ventilation for kerosene. The sub-project belongs to enterprise VMZ-ball bearings and will reduce a 52 tons in annual ODS consumption.

### Technical Assistance and Institutional Strengthening

12. The following sub-projects involve the Institute of Refrigeration and the institutional strengthening component of the OTF in the Ministry of Environment.

- (a) Institute of Refrigeration: There are three sub-projects with the Institute that will address: i) development of a CFC-recycling program; ii) training refrigeration technicians use non-ODS refrigerants and providing adequate equipments for the recycling program; and iii) retrofitting reliability testing equipments for HFC-134a type refrigerators, compressors, and condensing units. These sub-projects will help reduce the ODS consumption in the service sector by 100 tons.
- (b) Institutional Strengthening: This component involves technical assistance and training to the OTF to implement, monitor and enforce the Country Program. The sub-project will provide for consultants who will assist the OTF on technical, industrial safety, procurement, accounting, and administrative needs. Details of institutional strengthening are provided in Annex 2.

13. Industrial safety in the use of cyclopentane in foam production is an important concern and has been addressed by: a) including adequate safety equipments during project preparation; b) additional sub-project review by experts; c) Bank review, with assistance from experts, of the procurement packages. Industrial safety concerns will be further addressed in the Environmental Impact Assessments (EIAs) that will include a section on health and safety plan for each sub-project. The EIAs will have to be approved prior to project implementation by the Ministry of Environment.

## V. PROJECT COSTS AND FINANCING

14. The estimated total project cost is US \$ 13.5 million which includes goods and services, technical assistance and training, price and physical contingencies (15%), and fee (3%) for First Private Bank, the local financial agent (LFA) as shown below in Table 1. Details of project costs are shown in Schedule A. The project will be financed by a US \$ 10.5 million grant (SDR 7.1 million equivalent) from the GEF Trust Fund and US \$ 3.0 million contribution from the enterprises. All costs are incremental in nature and have been calculated in accordance with Montreal Protocol guidelines. Specifically, the requested grant is only for items and activities included in the Indicative List of Eligible Incremental Costs adopted by the Meeting of the Parties to the Montreal Protocol. The unit cost estimates are higher than those reviewed by the Council. The difference is explained by: i) the US Dollar exchange rate movements against the Deutsche Mark since the project was prepared; and ii) upgrading of safety equipments to meet international industrial safety standards.

## VI. PROJECT IMPLEMENTATION RESPONSIBILITIES

15. The four-person Ozone Task Force (OTF) within the Ministry of Environment would have overall responsibility for project implementation. The OTF has been established since

1992 and has had responsibility for development of the Country Program for ODS phase-out. The OTF will also seek technical assistance as needed from the Refrigeration Institute. Experts from both the Refrigeration Institute and the regional offices of the Ministry of Environment have technical expertise in the refrigeration and foam subsectors and a well-established working relationship with the enterprises. The Institutional Development component of the project will also provide resources to the OTF for training and technical assistance. The project implementation schedule and responsibilities of the OTF, First Private Bank and the enterprises are outlined in Annex 1. The Government agreed to these implementation arrangements during negotiations.

Table 1 Project Costs and Financing			
Category	Project Cost (US \$ mln.)	Project Financing (US \$ mln.)	
		GEF	Enterprise
Foams	6.1	4.5	1.6
Refrigeration	4.9	3.5	1.4
Solvents	0.7	0.7	-
TA/Institutional Strengthening	1.5	1.5	- <sup>a</sup>
Local Financial Agent Fee [3 %]	0.3	0.3	-
<b>TOTAL</b>	<b>13.5</b>	<b>10.5</b>	<b>3.0</b>
a: Total of \$ 15,285			

### Implementation

16. Since the project is expected to be completed within 3 years, much of the "upstream" implementation work, including preparation of procurement packages and initial contacts with suppliers has already been completed. Enterprises have already identified space requirements and production arrangements for the equipment to be installed. The Refrigeration Institute is preparing a detailed monthly program for training of refrigeration service technicians. The focus of implementation will be on procurement and installation of the non-ODS equipment as quickly as possible. It is expected that the grant will become Effective in December 1995 and the project will be completed by April 30, 1998. Procurement and disbursement arrangements are indicated in Schedule B.



### Monitoring and Evaluation

17. The OTF will have overall responsibility for monitoring project progress and it will submit quarterly progress reports to the Bank. The objective of the progress reports will be to monitor sub-project activities and assess the effectiveness of the GEF grant in assisting with ODS phase-out. The participating enterprises and the First Private Bank will provide information on a regular basis to the OTF for the progress report. The format of the progress report is provided in the Project Implementation Manual. The OTF will continue to monitor ODS consumption and phase-out on a regular basis and provide the status of ODS consumption to the officials of the Montreal Protocol and GEF when required. With assistance from the Regional Directorates the OTF will be responsible for preparing and enforcing environmental and safety regulations regarding use of the new equipment. It will also be responsible for preparation of a Project Completion Report, to be completed within six months after the end of project implementation.

### Retroactive Financing

18. Consistent with the November 1994 GEF guidelines used to develop this project, expenditures incurred by enterprises on the sub-projects after October 31, 1993 and before the date of grant signing are eligible for retroactive financing. GEF will allow 40% of the grant or US \$ 4.2 million to be used for retroactive financing for sub-project expenditures. However, based on the enterprise expenditures so far it is expected that retroactive financing will be limited to about 15% of the total grant amount. Expenditures are eligible for retroactive financing if the procurement process outlined in Schedule B is followed, the procurement is on a competitive basis against acceptable specifications, and all records are available for Bank's review.

### Accounts and Audits

19. A private Auditor, acceptable to the Bank, would: (a) audit First Private Bank, OTF, and enterprise sub-project accounts; (b) apply auditing standards and procedures satisfactory to the Bank that conform to generally accepted auditing practices; (c) carry-out auditing work in a timely manner; and (d) render an audit opinion not later than six months after the end of each fiscal year. The Auditor would provide preliminary assistance in financial management and application of modern auditing procedures to First Private Bank staff as necessary, including assistance in setting-up the format of maintaining sub-project accounts. The First Private Bank will be responsible for employing private auditor(s) and will also be responsible for paying the auditors fees.

### Supervision

20. Supervision by a Bank team will take place semi-annually following the submission of the progress report by the OTF. The supervision missions would be composed of the task manager and a financial specialist, to be supported by ODS specialists as needed, and will require about 12 staff weeks in the first year and 10 staff weeks thereafter.

## VII. PROJECT SUSTAINABILITY

21. The project will help the Government of Bulgaria in meeting its goal, outlined in the Country Program, to phase-out the use of CFCs by compensating enterprises for incremental costs incurred during the process of technology conversion. The Country Program is supported by a broad spectrum of interested parties, including the Ministries of Environment, Trade and Foreign Trade Relations, Economic Development, Regional Development and Construction, Finance, Labor and Social Security, Industry, participating enterprises, and NGOs. Technology conversion will allow enterprises to be competitive both in the domestic and export markets since enterprises involved in the project have an export market that varies from 10 to 65% (Annex 2, Attachment 1). Only one of the enterprises, involved in the project, is privately owned. However, sustainability has been ensured by a financial viability analysis of the enterprises, which currently receive no budgetary support from the State. The presence of a well defined market, a credible business plan, prospects of maintaining a positive cash flow from operations, and technical capabilities were used as criteria for selecting enterprises. The Institutional Strengthening component of the OTF will enable them to continue monitoring ODS phase-out activities as per the strategy outlined in the Country Program.

## VIII. LESSONS FROM BANK PROJECTS

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

## IX. RATIONALE FOR BANK AND GEF INVOLVEMENT

23. This project has been developed and structured based on specific ODS phase-out requirements in Bulgaria (as outlined in the Country Program) and the general project eligibility criteria guidelines of the Montreal Protocol and the GEF Scientific and Technical Advisory Panel (STAP). Funding for this stratospheric ozone layer protection project is requested from the GEF on the basis that Bulgaria:

- (a) is eligible for GEF assistance;
- (b) is not classified as a developing country and is not eligible for funding from the Multilateral Fund for the Implementation of the Montreal Protocol;
- (c) has completed the preparation of a Country Program; and
- (d) has ratified the Vienna Convention and Montreal Protocol.

24. Funding for this project has been obtained from the GEF on the basis that: a) Bulgaria is eligible for GEF assistance and the project satisfies the ODS phase-out objective of GEF; b) GEF provides assistance to countries like Bulgaria which despite low per capita GDP are not considered as developing countries as per the Montreal Protocol and thus not eligible to receive funds from the Multilateral Fund for the Implementation of the Montreal Protocol; c) Bulgaria has completed and submitted the Country Program by which it has committed itself to follow the Montreal Protocol ODS phase-out schedule; and d) the GEF grant assistance will allow enterprises to convert to non-ODS technology and help them to remain in business.

## X. PROJECT BENEFITS

25. The project will contribute to global efforts to protect the ozone layer that will benefit human health and the environment. The GEF grant financing will assist Bulgaria to meet its obligations to the Montreal Protocol. The project will phase-out an annual consumption of 365 tons of CFCs which corresponds to a 83% reduction in use of CFCs that are scheduled to be phased out. The technology conversion will allow Bulgarian enterprises to conform to international standards and retain and expand their domestic and export markets.

## XI. PROJECT RISKS

26. There are no significant technical risks associated with the project, since the proposed technology is being successfully used in many West European countries and experienced suppliers would supply, test, and install the equipments. The risk of inadequate implementation capacity of the OTF is addressed by the institutional strengthening component of the project which will provide training and technical assistance to the OTF. In addition, the OTF will be supported by the First Private Bank as well as a local procurement agent for effective implementation.

27. There is a risk of closure of enterprises due to poor financial standing in the transitional state of the Bulgarian economy. However, the Bank conducted a thorough financial viability analysis of enterprises and non-viable enterprises have not been included in the project. The enterprises included in the project have a market for their goods, have registered increases in first quarter 1995 revenues compared to the same period 1994, and have prospects of maintaining a positive cash flow from operations. The careful selection of enterprises minimizes the risk of providing GEF assistance to enterprises that may cease operations due to poor financial standing.

28. The project may be delayed due to slow Parliamentary ratification of the grant agreement between the Bank and the Government of Bulgaria. The Government recognizes that the project has to meet a critical deadline and will try to expedite the ratification process of the agreement which will not include any major policy issues.

## XII. ENVIRONMENTAL ASPECTS

29. The project provides significant global environmental benefits with the reduction of the ODS use. There are no major environmental concerns associated with the installation or operation of non-ODS technologies and the Bank has classified the project as category B that requires limited environmental analysis. The limited environmental risks are associated with the use of cyclopentane, a flammable substance, in the foam sector and the potential increase in wastewater in the solvents sector.

30. All sub-projects will follow the industrial safety guidelines recommended by the suppliers and the safety equipments proposed in the sub-projects to handle cyclopentane have been approved by the OORG. The wastewater facility in the solvents sub-project is adequate to treat the additional wastewater. In addition, Environmental Impact Assessments (EIA) as per the Bulgarian Environmental Protection Act will be completed on all sub-projects. The EIAs will include health and safety plans for each sub-project which will address industrial safety concerns in the use of cyclopentane. The Bank and the MOE

will address industrial safety concerns in the use of cyclopentane. The Bank and the MOE will approve all EIAs prior to sub-project implementation. The MOE will monitor and enforce regulations on industrial safety and the environment during project implementation.

### **XIII. AGREEMENTS REACHED AND RECOMMENDATIONS**

31. During negotiations, the Government agreed to the following:

- a) **Project Implementation:** The Ozone Task Force with assistance from the First Private Bank and participating enterprises will be responsible for implementing the project (para. 15).
- b) **Environmental Impact Assessments (EIAs):** Participating enterprises will prepare the EIAs which have to be approved by the Ministry of Environment and the Bank before project implementation (para. 30).
- c) **Procurement Arrangements:** The arrangements outlined in Schedule B of the Project Document will be followed (para. 16).
- d) **Disbursement Arrangements:** The arrangements outlined in Schedule B of the Project Document will be followed (para. 16).
- e) **Retroactive Financing:** Retroactive financing will be limited to SDR 2.8 million or US \$ 4.2 million equivalent. (para. 18).
- f) **Project Monitoring:** The OTF will be responsible for project monitoring and reporting its progress to the Bank. (para. 17).
- g) **Accounting and Auditing:** The First Private Bank will be responsible for employing private auditor(s), acceptable to the Bank, to audit all accounts related to the project (para. 19).
- h) **Industrial Safety:** Industrial safety will be included in the EIAs that have to be approved by the Ministry of Environment and the Bank, prior to project implementation (para. 13).
- i) **Conditions of Effectiveness:** The following three conditions have to be fulfilled for the effectiveness of the grant (Article VI of Legal Agreement):

- i) Project Administration Agreement has to be duly executed by the Parties involved;
- ii) A Legal Opinion has to be provided by the Ministry of Justice to the Bank on the Grant Agreement; and
- iii) At least 3 Sub-grant Agreements have to be duly executed by the parties involved.

32. With the above agreements and conditions, the project would be suitable for a Global Environment Trust Fund grant of SDR 7.1 million, equivalent to US \$ 10.5 million. The Republic of Bulgaria will be the Recipient of the grant while the Bank will act as the Implementing Agency.

**BULGARIA: Ozone Depletion Substance (ODS) Phase-out**  
**Project Cost Estimate**  
**Table A1**

Code	Name	Investment Costs	Technical Assistance	Incremental Operating Costs	BASE COST	15% Contingency (Physical and price)	TOTAL PROJECT COST***
NF1	Vazhod	\$533,929	\$0	\$26,485	\$560,413	\$84,062	\$644,475
NR10	Klimat-comm. refrg.	\$730,646	\$0	\$30,740	\$761,385	\$114,208	\$875,593
NR2	MRAZ-dom refrg.	\$2,056,152	\$0	\$173,979	\$2,230,131	\$334,520	\$2,564,650
NR5	Frigo-comm. refrg.	\$586,811	\$0	\$31,357	\$618,168	\$92,725	\$710,893
NR7	Brist-comm. refrg.	\$557,750	\$0	\$13,438	\$571,188	\$85,678	\$656,866
NR8	Zem-comm/dom refrg.	\$546,250	\$0	\$51,436	\$597,686	\$89,653	\$687,339
<b>Sub-total FOAMS</b>		<b>\$5,011,537</b>	<b>\$0</b>	<b>\$327,434</b>	<b>\$5,338,970</b>	<b>\$800,846</b>	<b>\$6,139,816</b>
NR1	MRAZ-dom refrg.	\$962,283	\$0	\$32,726	\$995,009	\$149,251	\$1,144,260
NR3	MRAZ-comm. refrg.	\$1,944,955	\$0	\$507,119	\$2,452,074	\$367,811	\$2,819,885
NR4	Frigo-comm. refrg.	\$275,425	\$0	\$94,813	\$370,238	\$55,536	\$425,774
NR6	Brist-comm. refrg.	\$150,075	\$0	\$41,620	\$191,695	\$28,754	\$220,449
NR9	Klimat-comm. refrg.	\$158,781	\$0	\$104,282	\$263,063	\$39,459	\$302,522
<b>Sub-total REFRIGERATION</b>		<b>\$3,491,518</b>	<b>\$0</b>	<b>\$780,559</b>	<b>\$4,272,078</b>	<b>\$640,812</b>	<b>\$4,912,889</b>
NS2	VMZ-ball bearings	\$1,018,866	\$0	(\$410,627)	\$608,238	\$91,236	\$699,474
<b>Sub-total SOLVENTS</b>		<b>\$1,018,866</b>	<b>\$0</b>	<b>(\$410,627)</b>	<b>\$608,238</b>	<b>\$91,236</b>	<b>\$699,474</b>
NR12	Inst of Ref-training	\$0	\$269,951	\$0	\$269,951	\$40,493	\$310,444
NR13	Inst of Ref-recycling	\$568,715	\$75,565	\$0	\$644,281	\$96,642	\$740,923
NR14	Inst of Ref-accreditation	\$178,963	\$21,850	\$0	\$200,813	\$30,122	\$230,935
ISC	MOE-Inst. Strngth.	\$44,563	\$162,265	\$0	\$206,828	\$31,024	\$237,852
<b>Sub-total TA/TRAINING</b>		<b>\$792,241</b>	<b>\$529,631</b>	<b>\$0</b>	<b>\$1,321,872</b>	<b>\$198,281</b>	<b>\$1,520,153</b>
<b>TOTAL</b>		<b>\$10,314,161</b>	<b>\$529,631</b>	<b>\$697,366</b>	<b>\$11,541,159</b>	<b>\$1,731,174</b>	<b>\$13,272,332</b>

\*\*\* Does not include fees to First Private Bank

**BULGARIA: Ozone Depletion Substance (ODS) Phase-out  
Project Cost and Financing Plan  
Table A2**

Code	Name	PROJECT COST			PROJECT FINANCING			
		BASE COST	15% Contingency (Physical and price)	TOTAL PROJECT COST	GEF GRANT	3% LFA* Fee	TOTAL GEF GRANT	Enterprise Financing
NF1	Vazhod	\$560,413	\$84,062	\$644,475	\$644,475	\$19,334	\$663,810	\$0
NR10	Klimat-comm. refrg.	\$761,385	\$114,208	\$875,593	\$864,070	\$25,922	\$889,992	\$11,523
NR2	MRAZ-dom refrg.	\$2,230,131	\$334,520	\$2,564,650	\$1,011,728	\$30,352	\$1,042,080	\$1,552,922
NR5	Frigo-comm. refrg.	\$618,168	\$92,725	\$710,893	\$710,893	\$21,327	\$732,219	\$0
NR7	Brist-comm. refrg.	\$571,188	\$85,678	\$656,866	\$656,866	\$19,706	\$676,572	\$0
NR8	Zem-comm/dom refrg.	\$597,686	\$89,653	\$687,339	\$687,339	\$20,620	\$707,959	\$0
<b>FOAMS</b>		<b>\$5,338,970</b>	<b>\$800,846</b>	<b>\$6,139,816</b>	<b>\$4,575,371</b>	<b>\$137,261</b>	<b>\$4,712,632</b>	<b>\$1,564,445</b>
NR1	MRAZ-dom refrg.	\$995,009	\$149,251	\$1,144,260	\$229,154	\$6,875	\$236,028	\$915,107
NR3	MRAZ-comm. refrg.	\$2,452,074	\$367,811	\$2,819,885	\$2,321,935	\$69,658	\$2,391,593	\$497,950
NR4	Frigo-comm. refrg.	\$370,238	\$55,536	\$425,774	\$425,774	\$12,773	\$438,547	\$0
NR6	Brist-comm. refrg.	\$191,695	\$28,754	\$220,449	\$220,449	\$6,613	\$227,062	\$0
NR9	Klimat-comm. refrg.	\$263,063	\$39,459	\$302,522	\$267,941	\$8,038	\$275,980	\$34,581
<b>REFRIGERATION</b>		<b>\$4,272,078</b>	<b>\$640,812</b>	<b>\$4,912,889</b>	<b>\$3,465,252</b>	<b>\$103,958</b>	<b>\$3,569,210</b>	<b>\$1,447,637</b>
NS2	VMZ-ball bearings	\$608,238	\$91,236	\$699,474	\$699,474	\$20,984	\$720,458	\$0
<b>SOLVENTS</b>		<b>\$608,238</b>	<b>\$91,236</b>	<b>\$699,474</b>	<b>\$699,474</b>	<b>\$20,984</b>	<b>\$720,458</b>	<b>\$0</b>
NR12	Inst of Ref-training	\$269,951	\$40,493	\$310,444	\$310,444	\$9,313	\$319,757	\$0
NR13	Inst of Ref-recycling	\$644,281	\$96,642	\$740,923	\$725,638	\$21,769	\$747,407	\$15,285
NR14	Inst of Ref-accreditation	\$200,813	\$30,122	\$230,935	\$230,935	\$6,928	\$237,863	\$0
ISC	MOE-Inst. Strngth.	\$206,828	\$31,024	\$237,852	\$237,852	\$7,136	\$244,987	\$0
<b>TA/TRAINING</b>		<b>\$1,321,872</b>	<b>\$198,281</b>	<b>\$1,520,153</b>	<b>\$1,504,868</b>	<b>\$45,146</b>	<b>\$1,550,014</b>	<b>\$15,285</b>
<b>TOTAL</b>		<b>\$11,541,159</b>	<b>\$1,731,174</b>	<b>\$13,272,332</b>	<b>\$10,244,966</b>	<b>\$307,349</b>	<b>\$10,552,315</b>	<b>\$3,027,367</b>



## **BULGARIA: OZONE DEPLETING SUBSTANCE PHASE-OUT PROJECT**

### **PROCUREMENT AND DISBURSEMENT ARRANGEMENTS**

#### **Procurement**

1. Procurement of goods and services would be made in accordance with 'Guidelines for Procurement under IBRD Loans and IDA Credits' (January 1995). As part of project preparation, the enterprises, First Private Bank, and Ministry of Environment received procurement training to assist them in implementing Bank's procurement procedures. The Ministry of the Environment, with assistance from a procurement agent, will have overall responsibility for procurement. To meet the Montreal Protocol requirement of ODS phase-out, enterprises will have to purchase and install the equipment financed under the project as soon as possible. Thus, the procurement procedures have been designed with special attention to ensure expediency during project implementation. A summary of goods to be procured is shown in Table B1. The Government agreed to these procurement arrangements during negotiations.

2. Goods. To the extent possible, contracts for goods have been grouped to allow for the procurement of larger packages. However, each enterprise would procure its own equipment with assistance and supervision from the OTF and the procurement agent. The equipment procurement is expected to be for: (a) modification of refrigeration production lines; (b) modification of foaming machines and replacement of injection pumps; (c) modification of solvent cleaning systems; (d) up-grading safety systems and testing laboratories; (e) limited office equipment; and (f) training by suppliers to the workers in the participating enterprises that acquire new equipments.

3. Contracts larger than US \$ 400,000 amounting to about US \$ 0.9 million would be procured on the basis of Bank's Limited International Bidding (LIB) process since there are limited number of suppliers for specialized refrigeration and foam manufacturing equipments. Also, for equipment retrofitting there are a limited number of suppliers that can provide equipments compatible with the existing production line. Contracts between US \$ 50,000 and US \$ 400,000 amounting to about US \$ 6.0 million would be procured on the basis of International Shopping (IS) with at least three price quotations from at least two countries. Such an arrangement will allow the enterprises to timely procure the goods and maintain the ODS phase-out schedule. Local Shopping could be applied for contracts less than US \$ 50,000 up to an aggregate of about US \$ 0.2 million based on at least three price

quotations from local suppliers. Enterprises with foreign licensing arrangement would procure from suppliers recommended by the foreign partners. In view of the technical assistance, training, and guarantees provided by the existing licensors, such Direct Contract procurement procedures amounting to about US \$ 2.5 million are acceptable. All procurement involving sole source and other contracts valued above US \$ 400,000 would be subject to prior review by the Bank.

<p align="center"><b>Table B1</b>  <b>Summary of Procurement Arrangements</b>  <b>[in US mln \$'s]</b></p>					
Project Element	Procurement Method			Not Financed by GEF	Total <sup>a</sup>
	ICB	LCB	Other		
Goods and works	- (-)	- (-)	9.6 <sup>b</sup> (9.6)	3.0	12.6 (9.6)
Technical Assistance and Training	- (-)	- (-)	0.6 <sup>c</sup> (0.6)	-	0.6 (0.6)
TOTAL	- (-)	- (-)	10.2 (10.2)	3.0 <sup>d</sup>	13.2 (10.2)
<p>a: Does not include the financial agent fee of \$ 0.3 million to the First Private Bank</p> <p>b: Includes -     \$ 0.9 million for Limited International Bidding                              \$ 6.0 million for International Shopping                              \$ 0.2 million for Local Shopping                              \$ 2.5 million for Direct Contracting</p> <p>c: According to IBRD Guidelines on Consultant Selection</p> <p>d: To be financed by enterprises</p> <p>Figures in parenthesis are respective amounts financed by GEF</p>					

4. Services The project involves consultants' services for: a) developing and conducting a training program for refrigeration technicians in the service sector; and b) technical assistance provided to the OTF. The total value of services required is estimated to be \$ 0.6 million. The training program involves 1,200 technicians to be trained by the Refrigeration Institute within a period of 2 years and is estimated to cost \$ 0.4 million. Sole sourcing to the Refrigeration Institute which has qualified staff and adequate facilities is acceptable, since it is the only Institute in the country that has research and training capacity. The technical assistance provided to the OTF will involve consultant services in such areas as procurement, auditing, and refrigeration and foam technology. The hiring of

consultant services, both for individuals and consulting firms, will be in accordance with the 'Guidelines for the Use of Consultants by World Bank Borrowers and by the World Bank as Executing Agency' (August 1981). All Terms of Reference (TORs) for consulting assignment will be subject to prior review by the Bank. Consulting contracts and Curriculum Vitae (CV) will be subject to prior review by the Bank for contracts valued at US \$ 50,000 and above. The CVs of consultants for contracts below US \$ 50,000 will be approved by the Bank prior to hiring of the consultants.

### Disbursement

5. The Project is expected to be disbursed in less than 3 years and the funds would be channelled through the First Private Bank. Funds would be disbursed against (a) 100% cost of foreign expenditure, ex-factory cost of domestically manufactured goods, technical assistance including service associated with supply of goods, and consulting services; and (b) 85% of expenditures on works and goods procured locally. Disbursements to First Private Bank for financial agent fees would be limited to 3% of the eligible disbursements for each invoice. 100% of such financial agent fees would be paid to the First Private Bank. Allocations of funds to different disbursement categories and an estimated schedule are provided in Table B2 and B3. The Government agreed to these disbursement arrangements during negotiations.

6. In order to facilitate disbursement, a Special Account would be established within the First Private Bank under the terms and conditions satisfactory to the Bank. After effectiveness and upon the Recipient's request, the Bank would make an initial deposit of US\$ 0.6 million which would be increased up to US\$ 1.0 million when disbursements reach US\$ 3.3 million (SDR equivalent of 2.2 million). Requests for replenishment of the Special Account would be made on a quarterly basis, or when the balance in the Special Account is one half of the deposit, whichever occurs first. In addition to the evidence of payments, each replenishment application would be supported by monthly statements of the Special Account which will be reconciled by the OTF. Project expenditures would be monitored by First Private Bank which would provide monthly statements to the OTF. Payments would be made by the First Private Bank following the submission of requests for payment by the OTF and the enterprises.

7. Except for contracts requiring prior Bank review, disbursement would be made against certified statements of expenditure for which detailed documentation would be available for the required audit, and also for review by the Bank supervision missions. The requests for reimbursement would be processed by the First Private Bank. The Bank will accept requests for direct payment to the supplier of goods or services (not through the Special Account) for an amount not less than 20% of the Special Account deposit.

<b>Table B2</b> <b>Disbursement Categories</b> <b>(in US million \$)</b>		
Category	Amount	Percent of Expenditure Eligible for Financing
Goods	9.4	100% of foreign expenditure 100% of local expenditure (ex-factory costs) 85% of goods procured locally
Works	0.2	85%
Consultant Services for Technical Assistance and Training	0.6	100%
Financial Agent Fees	0.3	100%
<b>Total</b>	<b>10.5</b>	-----

<b>Table B3</b> <b>Estimated Disbursement Schedule</b> <b>(in US \$ million)</b>			
	FY 96	FY 97	FY 98
Fiscal Year	4.0	5.5	1.0
Cumulative	4.0	9.5	10.5

**BULGARIA: OZONE DEPLETING SUBSTANCE PHASE-OUT PROJECT**

**KEY PROJECT PROCESSING EVENTS**

- |    |                                 |  |
|----|---------------------------------|--|
| 1. | Time Taken to Prepare:          | 12 months  |
| 2. | Prepared By:                    | S. Sarkar, EC1AE<br>M. Bromhead, EC1AE<br>V. Atur, EC1IT |
| 3. | First Presentation to Bank:     | September 1994 <sup>a</sup>                              |
| 4. | Appraisal Mission Departure:    | April 1995   |
| 5. | Negotiations:                   | September 1995   |
| 6. | Board Approval:                 | November 1995  |
| 7. | Expected Date of Effectiveness: | December 1995  |
| 8. | Expected Date of Completion:    | April 30, 1998   |
| 9. | Project Identification Number:  | BG-GE-39376  |

a: Initial Executive Project Summary Review Meeting

STATUS OF BANK GROUP OPERATIONS IN BULGARIA					
A. STATEMENT OF IBRD LOANS					
(as of June 30,1995)					
Loan No.	Fiscal Year	Borrower	Purpose	Amount in US \$ millions	
				Bank	Undisbursed
3397-BUL	1992	Republic of Bulgaria	Structural Adjustment Loan 1	250.00	
3800-BUL	1995	Republic of Bulgaria	Debt & Debt Service Reduction	125.00	
			Sub-total	375.00	
3384-BUL	1991	Republic of Bulgaria	Technical Assistance	17.00	12.47
3563-BUL	1993	National Electric Co.	Energy/Environment	93.00	80.19
3592-BUL	1993	Bulgarian Telecom. Co.	Telecommunications	30.00	26.99
3631-BUL	1993	Republic of Bulgaria	Private Investment & Export Finance	55.00	43.16
3739-BUL	1994	Republic of Bulgaria	Water Companies Restructuring	98.00	98.00
3771-BUL	1994	Republic of Bulgaria	Agricultural Development	50.00	50.00
			Sub-total	343.00	310.81
		TOTAL		718.00	
		of which repaid		0.00	
		TOTAL now held by IBRD		718.00	
		TOTAL Undisbursed			310.81

STATUS OF BANK GROUP OPERATIONS IN BULGARIA B. STATEMENT OF IFC INVESTMENTS (as of June 30, 1995)					
Obligor	Type of Business	Fiscal Year	Gross Commitments in US \$ million		
			Loan	Equity	Total
Euromerchant	Securities Market Financing Institute	1994	0.00	5.00	5.00
	Total Gross Commitments		0.00	5.00	5.00
	Less Cancellations, Terminations, Exchange Adjustments, Repayments, Writeoffs, and Sales		0.00	0.00	0.00
	Total Commitments now held by IFC		0.00	5.00	5.00
	Total Undisbursed IFC		0.00	4.00	4.00
	Total Outstanding IFC		0.00	1.00	1.00





## **Part II: Technical Annexes**



**BULGARIA: OZONE DEPLETING SUBSTANCE PHASE-OUT PROJECT**

**PROJECT IMPLEMENTATION RESPONSIBILITIES**

1. The responsibilities of the OTF, First Private Bank and the participating enterprises are outlined below. Project implementation is expected to be completed by April 30 1998. An overall project schedule is shown in Table 1-1. At negotiations, the Government of Bulgaria agreed to the implementation arrangements discussed below. Specifically it agreed with the World Bank on a Project Administrative Agreement between the MOE and the First Private Bank defining these responsibilities, and on a Sub-grant agreement to be signed between MOE and each participating enterprise.
2. The OTF in the Ministry of Environment would be specifically responsible for:
  - (i) monitoring overall ODS phase-out activities, including communications with the Montreal Protocol Executive Committee on ODS consumption, imports and exports;
  - (ii) preparing and introducing legislative and administrative measures for ODS phase-out;
  - (iii) recruiting a procurement agent to assist OTF with procurement issues;
  - (iv) overall procurement arrangements, with assistance from the procurement agent, including review of procurement documents prepared by the enterprises, evaluation of bids, and approval of contracts before signature. Review and approval of specific bids would be undertaken by a committee consisting of four members of the OTF, the procurement agent, and two members of the participating enterprise;
  - (v) supervising the First Private Bank which will be responsible for disbursement of all project funds, following approval by the OTF. The First Private Bank will also manage the Special Account and the sub-project accounts, prepare requests for payment to suppliers through the World Bank following approval of contracts by the OTF, and monitor the financial statements of the participating enterprises;

**Table 1-1**  
**BULGARIA: OZONE DEPLETING SUBSTANCE PHASE-OUT**  
**Project Implementation Schedule**

ID	Name	1995			1996				1997				1998		
		Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3
1	Finalize Design	■													
2	Identify Suppliers		■	■											
3	Grant Effectiveness			◆											
4	Procure goods		■	■	■										
5	Install equipment for prototypes			■	■										
6	Manufacture of prototypes				■	■									
7	Testing of prototypes					■	■								
8	Training			■	■	■	■								
9	Production line conversion					■	■								
10	Regular Production						■	■	■	■	■	■	■	■	

- (vi) submitting quarterly project progress reports to the World Bank as per the format outlined in the Project Implementation Manual; and
- (vii) submitting annual audits to the World Bank of those activities of the First Private Bank related to expenditures under the project.

3. The First Private Bank, as the financial agent selected by the OTF for management and disbursement of funds, will be responsible for:

- (i) monitoring financial performance of the enterprises on a quarterly basis to include updated balance sheets and income statements as per the format outlined in the Project Implementation Manual;
- (ii) managing a Special Account for project expenditures on behalf of the OTF and all other sub-project accounts;
- (iii) handling all project disbursements, including payments under contracts approved by the OTF, retroactive financing, operating expenditures and payments made through the World Bank and the Special Account, using disbursement procedures specified in the Grant Agreement between the Bank on behalf of GEF, and the Government of Bulgaria;
- (iv) monitoring all project and sub-project expenditures, including provision of monthly expenditure reports and quarterly progress reports to the Ozone Task Force, and assist the World Bank and the Ministry in supervision of project implementation; and
- (v) employing and paying private auditor(s) acceptable to the Bank to audit all accounts related to the project (Special Account and sub-project accounts).

4. The enterprises will be responsible for implementing the approved sub-projects while conforming with the agreed project scope, the World Bank procurement guidelines, and National Legislation concerning environmental and safety matters including:

- (i) preparing procurement needs and documents including technical specifications, equipment lists, cost estimates and possible suppliers;
- (ii) consulting the procurement agent to be assisting the OTF to ensure that World Bank guidelines on procurement are followed;

- (iii) maintaining records of all requests for offers, cost comparisons, actual purchases, including receipts; and
- (iv) submitting quarterly financial statements and monthly expenditure and progress reports to the First Private Bank and OTF as per the outline provided in the Project Implementation Manual.

## **BULGARIA: OZONE DEPLETING SUBSTANCE PHASE-OUT PROJECT**

### **SUB-PROJECT OUTLINES**

1. Details of all sub-projects have been approved by the World Bank's Ozone Operations Resource Group (OORG), a technical panel and the GEF's Scientific and Technical Advisory Panel (STAP). The sub-projects were approved on the basis of the selected technology, ODS replacement substance, and cost-effectiveness. The scope of work for the sub-projects are outlined below. The level of enterprise export to non-GEF countries is shown in Attachment 1.

#### **MRAZ**

2. MRAZ, the largest manufacturer of refrigerators in Bulgaria, is located in Sofia. The enterprise produces domestic refrigerators (160, 200, 250 and 270 liters) and freezers (70 and 120 liters) and in 1994 manufactured 100,000 units. The enterprise also manufactures hermetic compressors and condensing units for commercial appliances and air conditioning purposes (motor size of 1/3 to 2 horse power) and in 1994 manufactured 60,000 units. About 65% of the products manufactured in MRAZ are exported to various developed and developing countries. The following three sub-projects from the enterprise have been approved by the GEF Council for grant financing.

3. Sub-project NR-1: The objective of the sub-project is to replace CFC-12 by HFC-134A as a refrigerant in domestic refrigerators. The sub-project will help reduce the annual consumption of CFC-12 by 14 MT and the base cost<sup>1</sup> is estimated to be US \$ 995,009. The sub-project involves product engineering and conversion of production lines to use HFC-134a in the refrigerating circuit and will include:

- testing compressor, filter-dryers, and capillary tubes with the use of HFC-134a and also adjusting configuration of refrigerator elements;
- altering two production lines for trial products;
- installing evacuation, charging, leak detection, and recycling equipments for HFC-134a;
- training of the employees to use HFC-134a by the supplier;
- testing 500 trial units for production reliability; and
- conversion of production lines for regular manufacturing after successful testing.

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1/ Base costs include investments, technical assistance and training, and incremental operating costs that are eligible under Montreal Protocol and GEF guidelines.

4. Sub-project NR-2: The objective of this sub-project is to replace CFC-11 by cyclopentane as a foam blowing agent in the insulation foam for refrigerators. The sub-project will help reduce the annual consumption of CFC-11 by 44 MT and the base cost is estimated to be US \$ 2,230,131. The sub-project involves testing and conversion of production line using cyclopentane with adequate safety precautions. The main activities of the sub-project include:

- identifying appropriate technology and suppliers for cyclopentane foam blowing machines and associated safety equipments;
- installing and retrofitting equipments for trial production;
- testing insulation quality (thermal resistance, compression strength, density during expanding, diffusion ageing) with cyclopentane as a foam blowing agent;
- training of employees by suppliers in the use of cyclopentane;
- ensuring industrial safety with proper equipment and installation of safety equipment; and
- converting production line for regular production after successful testing.

5. Sub-project NR-3: The objective of this sub-project is to replace CFC-12 and CFC-502 as refrigerants in hermetic compressors and condensing units for commercial appliances with HFC-134a and HFC-404a that do not deplete the ozone layer. The sub-project will reduce the annual consumption of ODS by 70 MT and the base cost is estimated to be US \$ 2,452,074. The sub-project involves design, testing, and conversion of four production lines and the service department for hermetic compressors and condensing units. The main components of the sub-project include:

- designing and modifying production facilities for trial production of compressors and condensing units;
- testing thermodynamic properties and wear resistance of trial compressors and condensing units. In particular, efficiency of the electric motor, compatibility of materials in contact with HFC-134a, acceptable residual moisture levels, performance of the filter-dryer system, and capacity of the polyol ester oils to absorb water will be determined;
- training technicians in the use of HFC-134a and HFC-blends;
- modifying service activity for proper recovery and recycling of CFC-12;
- technical assistance in identifying non-chlorine based degreasing agent since HFC reacts with chlorine; and
- converting four production lines for compressors and condensing units for regular production.



## **FRIGO**

6. Frigo is located in Slivnitsa and manufactures a large range of commercial refrigerators (low and middle temperature cabinets, display cabinets, freezers, coolers etc.) mainly for the domestic market and in 1994, the enterprise manufactured about 6,000 units. The enterprise also services refrigerators in the region. The following two sub-projects from the enterprise have been approved by the GEF Council for grant financing.

7. Sub-project NR-4: The objective of the sub-project is to replace CFC-12 by HFC-134a in commercial refrigerating appliances. The sub-project will reduce the annual ODS consumption by 5 tons and the base cost is estimated to be US \$ 370,238. The features of the sub-project include:

- designing the production process to inject HFC-134a instead of CFC-12 in the refrigerating cycle for trial runs;
- identification of suppliers and installation of equipment;
- technical assistance and training in handling HFC-refrigerants and ester based lubricants;
- trial production and testing; and
- conversion of production line for regular production after successful testing.

8. Sub-project NR-5: The objective of the sub-project is to replace CFC-11 with cyclopentane in the foam blowing process for insulation foam. The sub-project will reduce the ODS consumption by 12 tons and the base cost is estimated to be US \$ 618,168. The main features of the sub-project include:

- identifying appropriate technology and supplier for foam machines that use cyclopentane;
- retrofitting and installing equipments (polyol/pentane mixing station, cyclopentane tank with mixing spoon, dosing block shield etc.) for trial production;
- modifying plant layout to ensure proper drainage;
- installing adequate safety equipments to address the explosive nature of cyclopentane;
- testing polyurethane foam for conductivity, density, dimensional stability, shrinkage, compressive strength, reactivity, moisture absorption, cell structure and ageing. Also, sample foam cabinets will be tested for heat leakage and cabinet strength;
- training of employees in the use of cyclopentane by the supplier; and
- conversion of the production line for regular production after successful testing.

## **BRIST**

9. Brist is situated in Breznik and specializes in the manufacture of commercial refrigerates (low temperature cabinets, medium temperature display cases, and medium temperature shelves) and in 1994 the enterprise produced about 4,800 units. The enterprise also services refrigerators in the region. The following two sub-projects have been approved by the GEF Council for grant financing.

10. Sub-project NR-6: The objective of the sub-project is to replace CFC-12 with HFC-134a as a refrigerant in commercial refrigerators. The sub-project will reduce the annual consumption of ODS by 3 tons and the base cost is estimated to be US \$ 191,695. The sub-project involves the following activities:

- designing the use of HFC-134a in refrigerating circuits;
- selecting suppliers and equipment installation for test runs;
- testing equipments (evacuating, charging, and leak detection) for refrigerating circuits using HFC-134a;
- trial production and inspection of compressors ;
- training in operation of new equipment with HFC and recovery and recycling of CFC; and
- conversion of production line for regular production after successful completion of the test runs

11. Sub-project NR-7: The objective of the sub-project is to replace CFC-11 as a foam blowing agent with cyclopentane for foams used for insulation of commercial refrigerators. The sub-project will reduce the annual consumption of ODS by 7 tons and the base cost is estimated to be US \$ 571,188. The sub-project includes the following main activities:

- selecting appropriate technology and suppliers for foam machines that use cyclopentane;
- installing equipments (polyol/pentane mixing station and vessel) for test production including safety measures;
- modifying limited areas of production line and drainage system;
- training of employees by the supplier in the use of cyclopentane; and
- converting production line for regular production after successful testing.

## **ZEM**

12. ZEM, located in Blagoevgrad, manufactures household refrigerators along with a variety of mechanical equipments. In 1994, the enterprise produced about 15,000 units mainly for the domestic market. The following sub-project was approved by the GEF Council for grant financing:

13. Sub-project NR-8: The objective of the sub-project is to replace CFC-11 with cyclopentane as a foam blowing agent by retrofitting existing equipments used for manufacturing insulation foam for commercial refrigerators. The sub-project will reduce the annual consumption of CFC-11 by 16 MT and the base cost is estimated to be US \$ 597,686. The main components of the sub-project are:

- identifying technology and supplier for foam machines that use cyclopentane;
- retrofitting and installing equipments such as polyol and pentane mixing station, cyclopentane tank with mixing spoon, dosing block shield etc.;
- modifying the layout of the plant by minor adjustments to the production line and ensuring a proper drainage system;
- installing adequate safety equipments to address the explosive nature of cyclopentane;
- testing polyurethane foam for conductivity, density, dimensional stability, shrinkage, compressive strength, reactivity, moisture absorption, cell structure and ageing;
- training of employees in the use of cyclopentane by the supplier; and
- converting production line for regular production after successful testing.

## **KLIMAT INKOMS**

14. Klimat Inkoms is a privately owned company based in Sofia which manufactures 20 models of commercial refrigerators and in 1994 produced about 8,000 units. The enterprise also services commercial refrigerators in the Sofia area. The following two sub-projects have been approved by the GEF Council for grant financing.

15. Sub-project NR-9: The objective of the sub-project is to replace CFC-11 with cyclopentane as a foam blowing agent by retrofitting existing equipments used for manufacturing insulation foam for commercial refrigerators. The sub-project will reduce the annual consumption of CFC-11 by 8 MT and the base cost is estimated to be US \$ 263,063. The sub-project involves the following activities:

- identifying appropriate technology and suppliers for high pressure foam machines that use cyclopentane and safety equipments;
- installing and retrofitting equipments for trial production and minor modifications of buildings, water installations and drainage systems;
- testing of foam produced by cyclopentane as a blowing agent;
- training of employees in the use of cyclopentane by the supplier;
- ensuring industrial safety with proper foam blowing equipments and installation of safety equipments; and
- converting production line for general production after successful testing.

16. Sub-project NR-10: The objective of the sub-project is to replace the use of CFC-12 and CFC-502 with HFC-134a in the manufacturing of commercial refrigerators. The sub-project will reduce the annual consumption of CFC by 11 MT and the base cost is estimated to be US \$ 761,385. The main activities of the sub-project are:

- identification of appropriate technology and suppliers for the conversion to HFC in the refrigeration circuits;
- modification of equipments used in production, e.g., capillary tube, evaporator etc.;
- manufacture and testing of prototypes;
- training of employees in handling HFC-refrigerants and ester based lubricants; and
- conversion of production line for regular production after successful testing.

## **INSTITUTE OF REFRIGERATION**

17. The Institute is the only Bulgarian research center for refrigerating equipments. Its main activities are: i) designing and manufacturing prototype refrigeration equipments; ii) carrying out performance and safety tests of refrigerators, compressors, and condensing units; iii) monitoring enterprises to ensure that Bulgarian and international refrigeration manufacturing standards are being followed; iv) training technicians in refrigeration service; v) disseminating refrigeration technology information to enterprises; and vi) providing specialized technical assistance to enterprises, if needed. The following three sub-projects from the Institute have been approved by the GEF Council for grant financing.

18. Sub-project NR-12: The sub-project includes establishing a training center at the Institute of Refrigeration to train 1,200 refrigeration technicians in handling HFC refrigerants and recovering CFC's from existing equipments. The project will include the preparation of training facilities and technical assistance in developing the program and the base cost is estimated to be US \$ 269,951. The main features of the sub-project are:

- providing technical assistance for the Institute to design a training program for refrigeration technicians;
- training 1,200 technicians to recover and recycle CFC and handle HFC. The 5 day training for each technician will include information on the effects of CFC and the need for replacement substances, various alternatives to replacing CFCs, operational guidance and practical training in handling HFC refrigerants, and procedures for recovery and recycling of CFCs;
- certifying technicians after successful completion of course; and
- modifying the Institute's laboratory for practical classes.

19. **Sub-project NR-13:** The objective of the sub-project is to train technicians in CFC-12 recovery and recycling methods in service centers. Recycled CFC-12 will be used in servicing CFC refrigerators and will help Bulgaria meet the Montreal Protocol requirement of phasing-out CFC imports. The base cost of the sub-project is estimated to be US \$ 644,281. Sub-projects NR-12 and NR-13 together will reduce the annual import of CFCs by 100 tons. The sub-project NR-13 will help the Institute assemble portable CFC-12 recovery and recycling equipments for CFC-12, which were successfully developed at the Institute. The main components of the sub-project include:

- providing technical assistance on developing the recovery and recycling program;
- assembling about 1,000 portable recycling and recovery units in the Institute which will be given to technicians in the refrigeration service industry; and
- purchasing large storage vessels (1,000 kg capacity) in regional recycling centers, drums (50 kg capacity) in service locations, and cylinders (10 kg capacity) for the service technicians.

20. **Sub-project NR-14:** The objective of the sub-project is provide adequate capacity to the Institute in testing compressors and condensing units using HFC as refrigerants for performance, capacity, reliability, and safety certification. The base cost of the sub-project is estimated to be US \$ 200,813. The sub-project involves modifying the existing testing facility for compressors and condensing units and includes the purchase and installation of the following:

- test stands for testing capacity of compressors and condensing units;
- test stands to measure wear resistance of compressors and condensing units;
- test stands for reliability testing of hermetic compressors; and
- equipment for handling HFC-refrigerants, e.g.. evacuators, chargers, and leak detectors.

## **VAZHOD**

21. Vazhod is located in the city of Trudovez and the enterprise specializes in the production of rigid polyurethane for seats of cars, buses, tractors, and bicycles. There are three production lines of polyurethane in the enterprise and in 1994, the enterprise produced about 210 MT of rigid foam. The following sub-project has been approved by the GEF Council for grant financing.

22. **Sub-project No: NF-1:** The objective of the sub-project is to replace CFC-11 with cyclopentane as an integral foam blowing agent. The sub-project will reduce the annual consumption of CFC-11 by 25 MT and the base cost is estimated to be US \$ 560,413. The key elements of the sub-project include:

- selecting technology and supplier for foam machines that use cyclopentane;
- building a station for preliminary mixing of polyol and pentane allowing room for containers and mixers;
- installing and retrofitting equipments for polyol/pentane dosage for pilot testing;
- installing safety devices, including anti-explosion device for pentane dosing unit, gas detectors, and alarms and ventilators;
- testing pilot series samples for density, volumetric stability, shrinkage, pressing resistance, moisture absorption, cellular structure and ageing;
- training of employees in the use of new equipment and materials by the supplier; and
- converting the pilot testing program for regular production after successful testing.

### **VMZ-BALL BEARINGS UNIT**

23. VMZ is a large enterprise that manufactures a variety of goods including ball bearings, metal cutting machines, bicycles, spark plugs, gas appliance etc. The ball bearing unit operation is located in Sopot and in 1994 produced 32 million ball bearings of which 80% were exported to developing countries. The following sub-project was approved by the GEF Council for grant financing.

24. Sub-project NS-2: The objective of the sub-project is to eliminate the use of CFC-113 and methyl chloroform (MCF) in cleaning operations of ball bearings through the use of aqueous or chlorinated solvents and mineral oil based solutions which do not deplete the ozone layer. The sub-project will reduce the annual consumption of ODS by about 50 tons and the base cost is estimated to be US \$ 608,238. The main features of the sub-project are:

- providing technical assistance in selecting the most suitable ball bearing washing alternatives from water, corrosion inhibitors, kerosene and chlorinated solvents;
- identifying suppliers;
- designing and retrofitting the washing line;
- training of workers on the new technology;
- modifying the existing waste water plant to treat and separate the selected solvents; and
- converting the production line for regular production after successful testing.

### **INSTITUTIONAL STRENGTHENING**

25. The objective of the Institutional Strengthening component is to assist the Ozone Task Force (OTF) in the Ministry of Environment to effectively implement and monitor the ODS phase-out program. The OTF is responsible for the ODS phase-out program in the country and has a variety of tasks including implementing and monitoring ODS phase-out

in industries, reporting the phase-out progress to the Montreal Protocol authorities, GEF, and the Bank, ensuring Bulgarian environmental and industrial safety procedures are followed, supervising First Private Bank, and reviewing the project's procurement and disbursement process.

26. To assist the OTF perform the above duties, technical assistance in the form of consultant services and purchase of limited equipments will be required. The base cost of the sub-project is expected to be US \$ 206,828 and would finance the following:

- international consultants on refrigeration, foams, and solvent washing;
- local consulting services for assistance in procurement;
- training in the safe use of cyclopentane, an explosive chemical;
- secretarial support, translation costs, and fees for accountants and auditors to monitor the progress; and
- office equipments such as computers and printers, photocopiers, fax machine and a vehicle for enterprise visits.

### EXPORTS TO NON-GEF RECIPIENT COUNTRIES

Project Code	Enterprise Name - goods manufactured	Export to non-GEF countries (%)
NF1	Vazhod - flexible foam	< 10
NR10	Klimat - commercial refrigerators	< 10
NR2	MRAZ - household refrigerators	65
NR5	Frigo - commercial refrigerators	< 10
NR7	Brist - commercial refrigerators	< 10
NR8	Zem- commercial/household refrigerators	< 10

#### FOAMS

NR1	MRAZ - household refrigerators	65
NR3	MRAZ - commercial refrigerators	< 10
NR4	Frigo - commercial refrigerators	< 10
NR6	Brist- commercial refrigerators	< 10
NR9	Klimat - commercial refrigerators	< 10

#### REFRIGERANTS

NS2	VMZ- ball bearings	< 10
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#### SOLVENTS

NR12	Institute of Refrg. - service training	not applicable
NR13	Institute of Refrg. - service recycling	not applicable
NR14	Institute of Refrg. - National Accreditation	not applicable
ISC	Ministry of Environment	not applicable

#### TA/TRAINING









IMAGING

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Type: PD



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