

GEF IMPACT EVALUATION

Impact Evaluation Information Document No. 17

**GEF Impact Evaluation of the Phase-Out of Ozone-Depleting
Substances in Countries with Economies in Transition.**

Volume One: Theory of Change

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18. GEF Impact Evaluation of the Phase-Out of Ozone-Depleting Substances in Countries with Economies in Transition. Volume Two: Country Reports

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List of acronyms and terms

A2	Article 2 Party of the Montreal Protocol, non-Article 5 Party, industrialised country
A5	Article 5 Party of the Montreal Protocol, developing country
BAU	Business as usual
CEIT	Country with Economy in Transition; plural CEITs
CFCs	Chlorofluorocarbons (ODS controlled by the Montreal Protocol)
CIS	Commonwealth of Independent States, a regional organization whose participating countries are former Soviet Republics.
Consumption	As defined under the Montreal Protocol, ODS consumption = production + imports – exports
CTC	Carbon tetrachloride (ODS controlled by the Montreal Protocol)
GDP	Gross Domestic Product (as a measure of the economy)
EU	European Union
EUEs	Essential use exemptions, mainly relating to CFCs
F-gases	Fluorinated gases: HFCs, PFCs, SF ₆ (greenhouse gases controlled by the Kyoto Protocol)
GDP	Gross Domestic Product
GEF	Global Environment Facility
GHG	Greenhouse gas
GWP	Global Warming Potential
HFCs	Hydrofluorocarbons (Fluorinated gases controlled by the Kyoto Protocol)
HCFCs	Hydrochlorofluorocarbons (ODS controlled by the Montreal Protocol)
IPCC	Intergovernmental Panel on Climate Change of WMO and UNEP (UNFCCC)
MB	Methyl bromide (ODS controlled by the Montreal Protocol)
MCF	Methyl chloroform, also known as 1,1,1-trichloroethane or TCE (ODS controlled by the Montreal Protocol)
MDI	Metered-dose inhaler, a pharmaceutical product for treating asthma
MLF	Multilateral Fund of the Montreal Protocol
Mt CO ₂ eq	Million tonnes carbon dioxide equivalent
NOU	National Ozone Units
ODP	Ozone Depletion Potential, an index of a molecule's impact on ozone in the ozone layer
ODP-t	Tonnes weighted by a chemical's ozone depletion potential
ODS	Ozone depleting substance
QPS	Quarantine and pre-shipment uses of methyl bromide
\$	US dollars in this report
t	Tonnes
t.b.d.	To be decided
t CO ₂ eq	Tonnes carbon dioxide equivalent
TEAP	Technology and Economic Assessment Panel of the Montreal Protocol
TOC	Theory of Change
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNIDO	United Nations Industrial Development Organization
UNOPS	United Nations Office of Project Services
UVB	Ultra-violet Radiation B
WMO	World Meteorological Organization

1

CONCLUSIONS AND RECOMMENDATIONS

1. This report is divided into two volumes. Volume One provides conclusions and recommendations, background, methodology, portfolio description, a summary of the impact evaluations in four case study countries, an assessment of the implementing and donor agencies, and a Theory of Change assessment of the GEF financial assistance that was provided to 18 Countries¹ with Economies in Transition (CEITs). Volume Two provides detailed Impact Evaluations of GEF-supported activities in each of the CEITs.
2. This chapter provides for the background of the GEF support to CEITs and a summary of the impact evaluation methodology, followed by conclusions and related recommendations to the GEF Council and the governments of the CEITs.

1.1 BACKGROUND

3. The ozone layer is part of the earth's atmosphere and contains high concentrations of ozone (O₃). This layer absorbs approximately 93 to 99 per cent of the sun's high frequency ultraviolet radiation which, if allowed to pass through, would end life on earth. The ozone layer is mainly located in the lower stratosphere approximately 10 to 50km above the surface of the earth.
4. The ozone layer can be destroyed by free radical catalysts such as nitric oxide (NO), hydroxyl (OH), atomic chlorine (Cl) and atomic bromine (Br). While there are natural sources for these ozone depleting substances (ODS)², the concentrations of chlorine and bromine have increased over the last decades due to the release of large quantities of manmade organohalogen compounds, especially chlorofluorocarbons (CFCs) and bromofluorocarbons which have been used mainly in refrigeration, air conditioning and agricultural treatment products. These are highly stable compounds and are capable of surviving in the stratosphere, where chlorine and bromine radicals are liberated by the action of ultraviolet light. Each radical is then free to catalyze a chain reaction breaking down ozone. A single chlorine atom is able to react with up to 100,000 ozone molecules. The breakdown results in insufficient ozone molecules being available to absorb ultraviolet radiation.
5. The environmental effect of ODS was first observed in the mid-1980s over the Antarctic stratosphere where ozone levels dropped by up to 60 – 70 per cent of their pre-1975 levels. In the mid-latitudes ozone levels have dropped by approximately three to six per cent. The consequences of ozone depletion are increases in ultraviolet-B (UV-B) radiation reaching the earth's surface, which in turn leads to increases in health and environmental problems; such as skin cancers³, immune system suppression and cortical cataracts; damage to plants,

1 EU CEITs: Bulgaria, Czech Rep., Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia, Slovenia. Non-EU CEITs: Armenia, Azerbaijan, Belarus, Kazakhstan, the Russian Federation, Tajikistan, Turkmenistan, Ukraine and Uzbekistan.

2 Such as volcanic aerosols.

3 A study of people living in Punta Arenas at the southern tip of Chile showed a 56% increase in malignant melanoma and 46% increase in non-melanoma skin cancers over a period of seven years, along with decreased ozone and

including crop production caused by the reduction in photosynthesis; reduction in diversity of important marine species such as Plankton and Phytoplankton. Reduction in Phytoplankton also contributes to global warming as they play a significant role in oceanic carbon storage.

6. It was primarily the impact on human health and crop production of a damaged ozone layer which led to inter-governmental action, culminating in the development of the Vienna Convention for the Protection of the Ozone Layer in 1985 and subsequently the Montreal Protocol on Substances that Deplete the Ozone Layer in 1987; both of which aimed to gradually phase-out production and consumption⁴ of ODS.
7. Although the GEF is not linked formally to the Montreal Protocol, its' Ozone Layer Depletion Focal Area and the subsequent strategic revisions are an operational response to the Montreal Protocol and its Adjustment and Amendments. The strategic objective of the Focal Area is to protect human health and the environment by assisting countries in phasing out the consumption and production, and in preventing releases, of ODS while enabling alternative technologies and practices according to countries' commitments under the Montreal Protocol. The expected long-term impact of the GEF interventions is to contribute to the return of the ozone layer to pre-1980 ozone levels, which is expected by 2065.
8. GEF focuses on providing support to developed countries of the Montreal Protocol, specifically CEITs that are not eligible for funding under the Multilateral Fund (MLF) of the Montreal Protocol, which targets only developing countries. Since the early 1990s, the GEF has allocated nearly US\$183 million to 18 countries, through 21 national and five regional projects.
9. The overall objective of this Impact Evaluation is to evaluate the impact of the GEF finance in the Ozone portfolio of projects on the phase out of ODS in CEITs. It has five sub-objectives:
 - 1) To evaluate the impact of GEF Ozone portfolio investments in CEITs to reduce **ODS production**;
 - 2) To evaluate the impact of GEF Ozone portfolio investments in CEITs to reduce **ODS consumption**;
 - 3) To assess the **sustainability** of GEF investments in terms of maintaining ODS phase-out in CEITs;
 - 4) To assess the extent to which the GEF investments **catalyzed** further changes in behaviour and decisions of stakeholders, in particular the private sector;
 - 5) To compare these parameters with a limited number of projects on the phase out of ODS in MLF-funded countries.
10. The Ozone Layer Depletion Focal Area was selected for an Impact Evaluation report based on the maturity of the projects; relatively homogeneous objectives in projects implemented separately by the World Bank, and the United Nations Development Programme (UNDP) – United National Environment Programme (UNEP); and the availability of quantitative and qualitative data. This made it possible to adopt a portfolio-wide Impact Evaluation approach as opposed to focusing on discrete projects.

1.2 DESIGN AND METHODOLOGY

11. This ODS phase out Impact Evaluation was developed and implemented by staff from the

increased UV-B levels. See Abarca, J.F., Casiccia, C. (2002) Skin cancer and ultraviolet-B radiation under the Antarctic ozone hole: Southern Chile, 1987 – 2000. Photodermatology & Photomedicine. 18, 294 – 302.

4 "Consumption" in this report follows the terminology of the Montreal Protocol Article 1: Definitions, which defines Consumption as "production plus imports minus exports of controlled substances"

GEF Evaluation Office and from Touchdown Consulting, Brussels.

12. The evaluation combined three approaches to investigate impact from several perspectives, using a mix of quantitative and qualitative methods of data collection and analysis: an overall Theory of Change approach; in-depth field case studies to assess the whether the Theory of Change approach had accurately described the process; and before and after measures of ODS consumption and production in CEITs for a comparison among the countries supported internal comparison, as well as an external comparison with a matched sample of MLF-supported countries.
13. The Theory of Change approach was applied early in the evaluation development. It was based on an initial meta-analysis of GEF ODS strategies, project documentation and available evaluations. The majority of the projects lacked a log-frame as they were developed between 10 and 15 years ago, when log-frame analysis was not a GEF requirement at that time. Consultations were then held with the GEF Secretariat, Implementing Agency staff, Evaluation Offices, national government stakeholders and enterprises. The function of the consultation was to provide an opportunity for stakeholders to give inputs at an early stage prior to the Theory of Change being applied and tested in the field case study approach.
14. In-depth case studies were conducted in four CEITs: the Russian Federation, Ukraine, Kazakhstan and Uzbekistan. A further 10 field case studies were conducted as part of the parallel UNDP-UNEP terminal evaluations, which addressed similar issues in the other Eastern European, Baltic and Central Asian countries. Four countries were examined through desk review alone.
15. In the absence of available control groups for an experimental or quasi-experimental design, before and after measures of CEIT's consumption and production were undertaken. In addition, four MLF countries were examined to compare ODS Consumption and production⁵ and cost-effectiveness with a matched set of CEIT countries.
16. The evaluation team conducted in-depth interviews using standardized, semi-structured guides and questionnaire surveys with government, research institutes and private sector enterprises. Quantitative assessment was also conducted to substantiate the internal and external comparisons of ODS Consumption phase-out, compared with a Business-As-Usual (BAU) approach where ODS Consumption and Gross Domestic Product (GDP) increased together. A cost-effectiveness analysis was undertaken to compare World Bank and UNDP - UNEP project performance.
17. A number of limitations constrained the Impact Evaluation of the phase out of ODS:
 - Incomplete annual data relating to the Consumption of ODS by CEITs and the MLF comparison group countries. Although countries were required in the Montreal Protocol to submit data on Consumption of classes of ODS annually, many did not do so every year. Data gaps forced the evaluation to assess only CFC and halon across CEITs and MLF countries, since these substances showed more consistency in annual reporting. This limitation was not serious because CFC and halon are amongst the most important of the ODS in terms of being among the most ozone depleting and have been the most commonly produced and consumed.
 - A time-series regression analysis would have been a useful tool to explore the impact over time of the GEF funding on ODS phase-out. Two main obstacles prevented such an analysis. Firstly, the consumption data were incomplete, as mentioned above and secondly, only the World Bank could provide information on

5 Sourced from the UNEP Ozone Secretariat

- disbursement of funds on an annual basis. As a result, a time-series regression analysis was not conducted. Correlation analysis of ODS Consumption, GDP and GEF funding was used as a broad measure of the relationship between funding and change in ODS consumption in CEITs assisted by the GEF.
- Data on GEF funding across CEITs and co-financing available in the GEF database are not always consistent with data obtained from implementation completion reports (ICR) of the World Bank and UNDP-UNEP projects documents. Where possible, the actual disbursements have been used for external and internal comparison of ODS phase-out activities in the ODS consumption sector.

1.3 CONCLUSIONS

Conclusion 1: *GEF support for the phase out of consumption and production of ozone-depleting substances in countries with economies in transition has made a contribution to global environmental benefits*

18. The CEITs had a baseline consumption of about 304,000 ODP-tonnes in 1986, amounting to 17% of the global total. However, much of this consumption was reduced significantly by the early 1990s because of the poor economic conditions following the collapse of communism. GEF funding was provided at the time CEIT economies were recovering in the mid-1990s and aimed to prevent a return to 'business as usual' with regard to use of ODS. The assessment of the relationship between GDP and ODS consumption indicated for the CEITs that GEF financing contributed to a decoupling of the relationship between GDP growth and ODS consumption growth. This was achieved by project interventions that provide the foundation for the following key 'impact drivers' (see also Conclusions 2 – 5):

19. **Impact Driver 1: Government commitment to ODS phase-out** as indicated by – development and implementation of policy and legislation to phase out consumption and promote ODS free alternatives; government institutional capacity to manage ODS phase-out; government customs and border security measures to curtail illegal trade in ODS; and recycle, reclamation and re-use programmes.

- EU-CEITs have, in general, performed better with regard to ex-post project government commitment due to EU accession which has contributed to regular updates of legislation and policy to phase-out ODS, and *inter alia* activities to reduce illegal trade in ODS;
- In the Non-EU CEITs government commitment was weaker in several governments, such as the Russian Federation and Ukraine which lacked National Ozone Units. Hence, ex-post policy and legislative updates have not occurred in many countries. Illegal trade in ODS was indicated by many Non-EU CEITs to be a significant challenge to phase-out.

Impact Driver 2: Private enterprise sustainability and commitment to phase out ODS: As indicated by enterprise financial and economic status ("*going concern status*") in refrigeration production, foam, aerosol, solvent industries and refrigeration and air conditioning servicing industry; and ex-post private enterprise investments in non-ODS technologies and processes:

- GEF financing provided for important technological and production changes which enabled firms to comply with the Montreal Protocol and maintain and / or gain market share and thus make profits; and
- Of the 71 firms visited and surveyed, 54 of them were still '*going concerns*' as of 2009.

20. The CEITs consumption changed from about 21,000 ODP-tonnes in 1996 (1.2% of global baseline) to 1,665 ODP-tonnes in 2007 (0.1% of global baseline). The GEF portfolio contributed to the elimination of about 19,260 ODP-tonnes of annual consumption, and contributed to 1.1% of the global benefit to the ozone layer. The Russian Federation was the only CEIT still producing ODS at the time the funding commenced and under a special initiative within the project investment, the GEF contributed to a phase-out of nearly 29,000 ODP-tonnes of production capacity.
21. The ODS consumed by the CEITs in 1996 also produced approximately 147 million tonnes CO₂-eq per year, falling to 42 million tonnes CO₂-eq per year in 2007. The GEF portfolio contributed to avoided GHG emissions equivalent to approximately 105 million tonnes CO₂-eq per year, or 1.155 Giga-tonnes of CO₂. This was equivalent to approximately 10 – 25% of the total CO₂ phase out commitments under the present Kyoto Protocol.

Conclusion 2: Legislative and policy changes supporting ODS phase-out provided a foundation for success and ensured sustainability

22. The evaluation found that legislative and policy changes to restrict import and export of ODS; ban; mandate recovery and recycling of ODS; and ensure training of technicians in the refrigeration sector played a critical role in providing relevant signals to the private sector and individual consumers to move into more environmentally friendly alternative chemicals and technologies. Legislative and policy changes were observed to be most successful in those CEITs that are now part of the European Union (EU). These countries tended to have legislation in place before or soon after the beginning of the GEF project intervention and all of them continued to update their legislation after joining the EU, which has led to further reductions in ODS and more restrictive measures than those required by the Montreal Protocol.
23. In contrast, in the non-EU CEITs many of the projects were slow to develop and implement legislative and policy changes because the institutional infrastructure necessary to carry out such changes was not in place. The lack of legislation and policy led to problems in controlling ODS, particularly in relation to trade and customs controls. This resulted in consumption of ODS exceeding Montreal Protocol limits for many years. Since projects have been completed in the non-EU-CEITs institutional capacities have been reduced, with insufficient focus on updating of legislation to address emerging issues such as the HCFC phase-out which was recently accelerated in developed countries in 2007 by the Parties to the Montreal Protocol.

Conclusion 3: The private sector commitment to ODS phase-out was a critical driver for the success of the GEF investments in countries with economies in transition

24. The GEF ODS portfolio has been characterized by strong private sector involvement from the early stages of project design through implementation. The umbrella structure of the projects developed by the Implementing Agencies based on targeted sub-project investments with the private sector, which provided co-finance, were efficiently executed and contributed to the rapid phase-out of ODS and implementation of alternative technologies and chemicals. This approach was necessary, given the difference in industrial processes and uses of ODS. Key highlights of the results achieved by industrial sector were as follows (see Chapter 7 and Volume 2):

- Refrigeration industry: the evaluation surveyed 22 companies that receiving

investment from the GEF and found that 13 were still *'going concerns'* in 2009. The companies reported GEF finance was relevant and assisted in providing new technologies that enabled conversion to non-ODS production and achievement of phase-out targets. The GEF financing had been provided at a time (in the late 1990s and early 2000s) when the market was changing quickly and it contributed to companies remaining competitive and profitable, as well as phasing out CFC use. Hence, the investment was good for profit and good for the environment.

- Several companies, such as NORD (Ukraine), Snaige (Lithuania) and Atlant (Belarus), expanded their operations through internal and acquisitive based growth after the GEF investment. They believed the initial GEF investments allowed them to capture market share which enabled growth therefore demonstrating a catalytic effect.
- Foam, aerosol and solvent industries: the evaluation surveyed 33 companies (11 in each industry sector). Thirty-two of them reached their individual ODS phase-out targets with 26 of the surveyed companies still *'going concerns'* in 2009. Some reported the GEF investment contributed to a quick and timely conversion to non-ODS production technologies which in turn contributed to improved profitability.
- Refrigeration and air conditioning servicing industry: the evaluation surveyed 16 companies of which 15 were still *'going concerns'* in 2009. These companies received ODS recycling and recovery equipment through the project and the majority of this equipment was still in use (after nearly 10 years of use). The companies reported that quantity of ODS recycled and re-used was falling as old ODS based equipment had been replaced with non-ODS alternatives, indicating positive changes in market and consumption patterns. However, one outstanding threat observed was the stocks of unwanted and decommissioned ODS (CFCs) held by private companies in drums or other containers, which was at risk of leaking. Over time, this would diminish the global environmental benefit that had accrued as a result of the GEF investment.

25. Macro-analysis of the results (see Chapter 6) in some of the CEITs showed that financing the phase out of environmentally-damaging technology can be undertaken without damage to the economy of the country. In effect, GDP continued to rise annually as the economies improved, while at the same time ODS Consumption declined as ODS technology was replaced with non-ODS technology. The commercial performance of many of the businesses improved as a result, which demonstrated that the conversion to non-ODS technology had been good for business as well as the environment.

Conclusion 4: Illegal trade threatens to undermine gains in ODS reduction in the non-European Union countries with economies in transition

26. Efforts to combat illegal trade are not yet fully effective and many of the non-EU-CEITs exhibit a lack of technical and legal capacity to curtail such trade, particularly in Kazakhstan, Tajikistan, the Russian Federation, Turkmenistan and Ukraine.
27. Illegal trade threatens to undermine gains in ODS phase out. The existence of old CFC-based equipment has created an ongoing demand for illegal imports of CFCs for refrigeration and air conditioning. Interceptions of illegal trade in ODS, most of which is reported to originate in China have become frequent in countries such as Kazakhstan and Uzbekistan. Illegal trade in ODS was frequently reported by representatives of companies and government customs officials interviewed, which supports similar findings by specialist bodies such as the World

Customs Organization.

28. ODS-containing products such as refrigerators and air-conditioning equipment can be imported unknowingly which increases the demand for ODS that has already been restricted or banned in the importing country. This is a particular problem when ODS has been used in a part of the exported equipment, such as the insulation foam. The specifications usually do not provide information on the use of ODS during the manufacture of the entire product.
29. The Parties to the Montreal Protocol have agreed three times as many Decisions in the last eight years on ways to combat illegal trade as they had in the previous twelve years of the Protocol's existence, which is a measure of the growing concern that countries have for illegal trade. ODS trade that is transhipped through one country to another is particularly problematical as procedures and responsibility for monitoring such shipments are less well-defined than for single country destinations.

Conclusion 5: Halon recovery and banking has been neglected in the non-European Union countries with economies in transition

30. Halon is an ODS used in fire fighting agents. Its production has ceased globally because of its severe ozone-depleting properties which destroys about six-times more ozone than CFC chemicals. Globally, halon has been decommissioned from many installations where a suitable alternative exists, and the 'used' halon has been stored for fire fighting applications where an alternative has yet to be developed. Halon is therefore a global resource that has been managed and conserved in well-sealed storage facilities or banks in many countries.
31. The EU-CEITs had management plans in place for halon for many years, and have been actively decommissioning halon and replacing it with alternatives, according to legislative requirements. Quantities decommissioned and banked are reported annually. In the non-EU-CEITs, however, there was little evidence of any active management of halon, or policies and measures that required action to replace halon with alternatives. For example, halon is still used to protect the majority of the pumping stations on the gas pipeline from Russian to Europe through Ukraine, despite the availability of a non-ODS alternative for this purpose. Funding had been provided by the GEF for equipment, training of technicians and management plans in most Non-EU-CEITs. In many countries the equipment provided was not being used. In the Russian Federation, the halon programme was not implemented because the proposed purchase of recovery and banking equipment did not comply with the procurement procedures of the World Bank. Halon use is not currently monitored in most of the non-EU CEITs and existing databases were reported to be out of date. Failure to invest in halon management and banking is an oversight in the GEF ODS programme.

Conclusion 6: In some countries the National Ozone Units ceased to function after GEF support ended and this may prevent measures being put in place to address the remaining threats to the ozone layer

32. The EU-CEITs in the early and mid-1990s depended on international aid to finance ODS reduction and phase out programmes. This is not the case today with the improvement of their economies and links to financial programmes in the EU, that provide sustainable support to address the remaining challenges of ODS phase-out, such as HCFCs, banking and safe destruction of ODS.
33. The non-EU-CEITs, however, are not in this position. Many of them have continually faced funding shortages that threaten the existence of the National Ozone Units (NOUs) that were established to manage, reduce and phase out ODS. Kazakhstan had an NOU that was funded by external contracts rather than the central budget, Ukraine and the Russian Federation had no identifiable Ministry staff that were actively managing policies and measures on ODS, and Turkmenistan was also dependent on external funding. The GEF approved additional

finance for some of these CEITs in 2007, but administrative barriers to disbursement have resulted so far in only one being funded. As a result, the NOUs in the non-EU-CEITs reported difficulties in completing the tasks assigned by the Implementing Agencies.

34. Delays in funding, communication difficulties and administrative burdens have hampered the development and implementation of new programmes. This is leading to increased threats or risks to the successful phase out of the remaining ODS and in particular HCFCs, and to actions to address destruction of banks of unwanted ODS stockpiles.
35. Unwanted CFC stockpiles were reported as a serious problem by many enterprises in the Non-EU-CEITs, as there were no facilities available to destroy it. Prolonged storage in decentralised facilities increased the risk of 'disappearing benefits' as ODS leaks out of storage containers or is dumped by private sector stakeholders. Over time, this will undermine the work that has been undertaken by servicing companies.

1.4 RECOMMENDATIONS TO GEF COUNCIL

Recommendation 1: The GEF should consider further investment and capacity development to assist countries with economies in transition to address the remaining threats to the ozone layer

36. Three threats remain to be mitigated: illegal trade in ODS; phase-out of HCFCs and halon; and lack of destruction facilities for banks of unused CFCs and other ODS.
37. The GEF could consider the following actions, particularly in the non-EU CEITs:
 - Investment projects to assist the government and private sector to recover and recycle HCFCs and increase the market penetration of non-ODS, low or zero Global Warming Potential (GWP) alternatives in the refrigeration and foam sectors;
 - Investment in destruction facilities to provide government and the private sector with appropriate options for safe and cost-effective disposal of obsolete ODS;
 - Capacity development for NOUs and customs authorities to function more effectively. This may include *inter alia* further support to update legislation and policy, ODS and non-ODS refrigerant detection equipment, training and technical assistance to improve enforcement to reduce illegal trade in ODS.
38. These actions would present opportunities for the GEF to attain double global environmental benefits - not only for the ozone layer, but also for the climate. This is because ODS is both ozone depleting and global warming. Furthermore, destruction of ODS would create synergies with the ongoing efforts to safely destroy stockpiles of persistent organic pollutants (POPs) in many of the CEITs. Hence, there may be opportunities for the GEF to finance development of joint ODS – POPs destruction facilities.

Recommendation 2: The GEF should learn from the positive private sector engagement in the reduction of Ozone Layer Depletion focal area and incorporate similar approaches into its efforts to engage the private sector in other focal areas

39. The portfolio of projects assessed as part of the impact evaluation exhibited strong engagement with the private sector, which contributed to the attainment of global environmental benefits and financial benefits to the enterprises involved. Such strong performance is not observed in other GEF focal areas. As the GEF is now placing greater emphasis on private sector partnerships going forward into GEF-5, it is important that experiences and lessons from the ODS projects are examined and where possible incorporated into other focal area operations.
40. Some lessons for consideration identified by the evaluation include:

- Undertaking a viability test directed at measuring organizational, economic and financial sustainability, which provides the foundation for targeted and informed green business investments;
- Focusing on a wide range of firms – small, medium and large enterprises from start-ups to established firms with a track-record for product innovation and profitability;
- Targeting a few specific sectors for green business investments which best align environmental goals of the GEF and financial (profit) growth possibilities;
- Keeping bureaucratic procedures to a minimum, bearing in mind that firms often require quick decisions on investment;
- Identifying champions who have innovative product ideas, technical and political skills, as the work in the ODS portfolio demonstrated that private enterprise ‘champions’ were critical for producing good business and environmental results;
- Investing in countries that have government policies and procedures which actively support green business and the ‘*ease of doing business*’ in these countries.

1.5 RECOMMENDATIONS TO NON-EUROPEAN UNION COUNTRIES WITH ECONOMIES IN TRANSITION

Recommendation 1: Countries should consider making improvements in the implementation of legislation, policies and standards on all aspects of ozone layer protection

41. Legislation and policy implementation is essential for phase out of ODS consumption and for providing the basis for market transformation through the introduction of alternative technologies and chemicals. This is particularly important in non-EU-CEITs which face greater challenges than the EU-CEITs in phasing out HCFCs and reducing illegal trade in ODS.
42. Countries could consider drafting new or updating existing legislation and policies on the following aspects of ODS phase out:
 - Recovery, recycling and reporting on ODS;
 - Establishing private enterprise standards and requirements, particularly in sectors such as refrigeration and air conditioning servicing sector;
 - Import bans for ODS and ODS-containing equipment, and / or licensing and quotas for ODS imports and exports;
 - Setting appropriate penalties or deterrents for illegal trade;
 - Establishing and promoting the activities of professional refrigeration associations.
43. A critical ingredient for effective implementation of legislation and policy is baseline government funding for NOUs. Experience from the EU-CEITs indicates that post-completion government funding is resulting in continued phase-out of ODS and lowered threats and risks to the ozone layer.

Recommendation 2: Countries’ existing efforts to prevent illegal trade need to be further strengthened

44. Many approaches could be implemented to combat illegal trade. The most important is to reduce the national demand for ODS by encouraging the installation of equipment that is ODS-free, which removes the servicing demand for ODS by using economic and financial instruments and promoting voluntary commitments in the end-user sector. Many countries encouraged enterprises to substitute their CFC-based equipment for non-ODS alternatives, thereby reducing the demand for CFCs.
45. Other approaches to reduce illegal supply of ODS and ODS-containing equipment could

include:

- Training and workshops for customs officers and inspectorates on a regular basis to maintain and improve detection capacities;
- Implementation of customs codes for all of the common ODS and blends to enable customs to differentiate legal from illegal trade
- Establishment of 'send-and-receive' communications between countries to monitor all shipments of ODS, including details of any ODS contained in the equipment;
- Use of specialised equipment to differentiate legal from illegal ODS;
- Certified laboratory methods for confirming the nature of the ODS intercepted;
- Participation in regional meetings and networks to collate, evaluate and share intelligence on illegal trade as a basis for agreement on further action;
- Awareness-raising of illegal trade in ODS among private enterprises and the general public.

46. These activities need to be supported by legislation that empowers customs officers to take appropriate actions against smugglers and suppliers of illegal ODS.

Recommendation 3: Countries need to take further action to manage and bank halon

47. Experiences from countries that have successfully banked and managed halon indicated that the following approaches could be adopted:

- Development of a halon management plan that includes identification of the quantities of halon installed for different purposes by location, the quantities that can be replaced by alternatives, and a timetable for decommissioning the installed halon;
- Equipment and facilities for recovery and reclamation of halon, with appropriate training for technicians to ensure safe management;
- Accounting and reporting procedures showing quantities decommissioned, reclaimed, stored and recycled;
- Promoting market mechanisms that enable responsible management of the available stock of halon.

48. Non-EU-CEIT countries could also considering making more use of UNEP's [halon trader](#) website which offers the potential to use funds derived from sales of halon to support national halon recovery and banking operations.

49. Further emphasis on development of appropriate legislation and policy is important to provide a stable foundation for halon management plan development and implementation.

2

BACKGROUND

2.1 THE OZONE LAYER PROBLEM

1. The ozone layer is part of the earth's atmosphere and contains high concentrations of ozone (O_3). This layer absorbs approximately 93 to 99 per cent of the sun's high frequency ultraviolet radiation which, if allowed to pass through, would end life on earth. The ozone layer is mainly located in the lower stratosphere approximately 10 to 50km above the surface of the earth.
2. The ozone layer can be destroyed by free radical catalysts such as nitric oxide (NO), hydroxyl (OH), atomic chlorine (Cl) and atomic bromine (Br). While there are natural sources for these ozone depleting chemicals⁶, the concentrations of chlorine and bromine have increased over the last decades due to the release of large quantities of manmade organohalogen compounds, especially chlorofluorocarbons (CFCs) and bromofluorocarbons.
3. The emergence of ozone depleting chemicals occurred in the 1920s with the discovery of the CFC dubbed 'freon' by the US scientist Thomas Midgley Jr, some 50 years before their impacts on the ozone layer were recognized. CFC compounds replaced hazardous materials such as sulphur dioxide and ammonia as coolants in refrigerators and air conditioners, and were also adapted for use as:- propellants in aerosol sprays; feed-stocks for plastic production; extinguishing agents for fire fighting; solvents for electronic components; blowing agents and in numerous other applications. CFC chemicals were also notably long-lasting and did not harm humans, and hence were, for many decades, considered 'wonder chemicals'⁷.
4. The importance of the ozone layer in terms of shielding life on earth from the harmful effects of the sun's ultra-violet radiation was also well known by atmospheric science, but the link between CFC's and ozone depletion did not emerge until the mid-1970s. In 1974, Mario Molina and F. Sherwood Rowland hypothesized⁸ that when CFC's reach the upper atmosphere they decompose under ultra-violet radiation and release chlorine atoms which subsequently react with and destroy as many as 100,000 ozone molecules. This hypothesis was confirmed through the late 1970s and early 1980s through scientific experiments and observation of the ozone layer, notably leading to the discovery of the 'ozone hole' over Antarctic stratosphere where ozone levels dropped by up to 60 – 70 per cent of their pre-1975 levels. In the mid-latitudes ozone levels have dropped by approximately three to six per cent. Since, the discovery of the damaging effect of CFC's many other chemicals have been recognized as having damaging effects on the ozone layer, including halo-alkanes,

⁶ Such as volcanic aerosols.

⁷ See Andersen et al (2007) Technology Transfer for the Ozone Layer: Lessons for Climate Change. Earthscan & Global Environment Facility. London & Washington DC.

⁸ Molina. M. & Rowland, F.S. (1974) Stratospheric sink for Chlorofluoro-Methane: Chlorine atom-catalyzed destruction of ozone. Nature, vol 249, pp 810 – 812.

methyl bromide, carbon tetrachloride and hydrochlorofluorocarbons⁹.

5. Scientific evidence defined the key problem by relating CFC's and other chemicals with stratospheric ozone depletion and increased ultra-violet radiation penetration into the lower atmosphere. Penetration of ultra-violet radiation is linked to serious human health impacts e.g., skin cancers¹⁰, damage to plants, including crop production caused by the reduction in photosynthesis and reduction in diversity of important marine species such as Plankton and Phytoplankton. Reduction in Phytoplankton would also contribute to global warming as they play a significant role in oceanic carbon storage. After the discovery that CFCs and other chemicals had a destructive effect on the ozone layer there was a need to establish a standard baseline measurement for each chemicals potential to damage the ozone layer, as not all substances had the same effect. The established benchmark was ozone depleting potential (ODP) of a particular substance. The baseline reference chemical selected was CFC-11 which had an ODP of 1.0, and other chemicals such as halo-alkanes were indexed against CFC-11. Table 1 shows the ODP values for the key ozone-depleting substances discussed in this report.
6. It was primarily the human health and crop production threat which led to inter-governmental action which culminated in the development of Montreal Protocol on Substances that Deplete the Ozone Layer in 1987. However, the link between ozone depleting chemicals and climate change has also increased dramatically in recent years with the recognition that many of those chemicals also have significant global warming potential (GWP)¹¹ many hundreds to thousands of times greater than carbon dioxide (see Section 7.9: Benefit to the Environment). Table 1 shows the GWP values for the key ozone-depleting substances and their alternatives discussed in this report.

⁹ Now covered by amendments to the Montreal Protocol

¹⁰ For example, UNEP estimate that for every 1% loss of the ozone layer there is 2 – 3% increase in the incidence of skin cancers. A recent study of people living in Punta Arenas at the southern tip of Chile showed a 56% increase in malignant melanoma and 46% increase in non-melanoma skin cancers over a period of seven years, along with decreased ozone and increased ultraviolet-B radiation levels. See Abarca, J.F., Casiccia, C. (2002) Skin cancer and ultraviolet-B radiation under the Antarctic ozone hole: Southern Chile 1987 – 2000. *Photodermatology, Photoimmunology & Photomedicine* 18 (6), 294 – 302.

¹¹ Global warming potential is a measure of how much a given mass of greenhouse gas is estimated to contribute to global warming. It is a relative scale which compares a gas in question to that of the same mass of CO₂ (whose GWP is 1).

Table 1: Ozone-Depleting Potential (ODP) and Global Warming Potential (GWP) for key substances cited in this Impact Report

Substance	Short name	Examples of use in this report	ODP ¹	GWP ²	Source ³
Chlorofluorocarbon	CFC-11	Foam insulation, Aerosols	1.0	4,750	IPCC 2007
Chlorofluorocarbon	CFC-12	Refrigerant, Aerosols	1.0	10,900	IPCC 2007
Chlorofluorocarbon	CFC-113	Solvent	0.8	6,130	IPCC 2007
Halon	Halon-1211	Fire protection	3.0	1,890	IPCC 2007
Halon	Halon-1301	Fire protection	10.0	7,140	IPCC 2007
Halon	Halon-2402	Fire protection	6.0	1,640	IPCC 2007
Hydrochlorofluorocarbon	HCFC-22	Refrigerant, Aerosols	0.055	1,810	IPCC 2007
Hydrochlorofluorocarbon	HCFC-141b	Foam insulation	0.11	725	IPCC 2007
Methyl bromide	MB	Pesticide / fumigant	0.6	5	IPCC 2007
Hydrofluorocarbon	HFC-134a	Refrigerant, Aerosols, Foam	0	1,430	IPCC 2007
Hydrocarbon R290	Propane C ₃ H ₈	Refrigerant, Aerosols	0	3.3	IPCC 2007
Hydrocarbon R600A	Isobutane C ₄ H ₁₀	Refrigerant	0	20	RTOC 2007
Hydrocarbon	Cyclopentane C ₅ H ₁₀	Foam insulation	0	Not available	NR

¹ ODP - The ODP or Ozone Depletion Potential. The potential for a single molecule of the refrigerant to destroy the Ozone Layer. All refrigerants use CFC-11 as a datum reference where CFC-11 has an ODP = 1.0. The higher the value of the ODP - the more damaging the refrigerant is to the ozone layer and the environment.

² GWP - The GWP, or Global Warming Potential. A measurement (usually measured over a 100-year period) of how much effect a refrigerant will have on Global Warming in relation to carbon dioxide. CO₂ has a GWP = 1. The higher the value of GWP - the more damaging the refrigerant is for the environment.

³ IPCC 2007 = Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Chapter 2, page 212-215.

RTOC 2007 = TEAP Refrigeration Technical Options Committee 2006 Assessment Report published in 2007. TEAP is the Montreal Protocol's Technology and Economic Assessment Panel

2.2 MONTREAL PROTOCOL AND THE ROLE OF THE GLOBAL ENVIRONMENT FACILITY

2.2.1 Montreal Protocol

7. The Montreal Protocol came into force on 1 January 1989. In 2009, 191 countries have signed the Protocol¹². The key Articles of the Protocol are shown in BOX 1.

BOX 1: KEY ARTICLES IN THE MONTREAL PROTOCOL

Article 2:	Mandates the phase-out of ODS by Parties [countries] according to a pre-scribed timetable;
Article 4	Obliges all Parties to ban trade in ODS with non-Parties, as well as specifying obligations for control between Parties.
Article 5	Permits developing countries which consume ODS in quantities less than specified limits to delay implementation of control measures by a specified number of years. All developing countries under Article 5 who are Parties are eligible for funding from the Multi-lateral Fund (Article 10) in order to assist them in reaching compliance with the Protocol.
Article 7	Mandates baseline and annual report from Parties of both production and consumption of ODS.
Article 8	Provides the basis for action in the case of non-compliance of a Party.
Article 9	Requires Parties to conduct research and development and to exchange information on ODS substitutes.
Article 10	Establishes the financial mechanism – the Multi-Lateral Fund for the implementation of the Protocol for Article 5 Parties.

8. The stated purpose of the treaty is that the signatory states:

“ ...Recognizing that world-wide emissions of certain substances can significantly deplete and otherwise modify the ozone layer in a manner that is likely to result in adverse effects on human health and the environment, ... Determined to protect the ozone layer by taking precautionary measures to control equitably total global emissions of substances that deplete it, with the ultimate objective of their elimination on the basis of developments in scientific knowledge ... Acknowledging that special provision is required to meet the needs of developing countries.. shall accept a series of stepped limits on CFC use and production ...”

9. The treaty is structured around several groups of halogenated hydrocarbons that have been shown to play a role in ozone depletion. All of these ozone depleting substances contain either chlorine, fluorine or bromine. For each group of ozone depleting chemicals, the treaty

¹² Article 2 countries [parties] are developed countries and CEIT; Article 5 countries are developing countries. Almost all countries have ratified the Montreal Protocol with the exceptions being San Marino, Andorra and Timor-Leste (as of June 2008).

provides a timetable on which the production of those substances must be phased out and eventually eliminated. Since 1989, the Protocol has undergone seven revisions or Amendments¹³ which have placed further restrictions on Parties on ozone-depleting substances.

2.2.2 Multi-lateral Fund (MLF)

10. The Protocol established Multi-lateral Fund (MLF) as a financial mechanism to support the phase-out of ODS production and consumption in developing countries. Article 5 (developing countries) are eligible for support from the MLF, but Article 2 (developed countries) are not. The implementing agencies for the MLF are The World Bank, UNDP, UNEP and UNIDO, and as of March 2007 over 5,520 projects were approved with funding of US\$2.1 billion in assistance to 143 developing country parties.

2.2.3 Global Environment Facility Role to Support ODS phase-out

11. When the Protocol was approved in 1987, the countries of Eastern Europe and republics of the former Soviet Union were not classified as developing countries under Article 5 of the Protocol and therefore had to fulfil the same phase-out schedule as developed countries. However, with the collapse of communism in 1989 and 1990 the countries had limited financial and technical resources to allow them to meet the phase-out schedule, but they were not eligible for funding from the MLF. The Global Environment Facility (GEF) agreed support the implementation of Montreal Protocol for Countries with economies in transition (CEIT) of Eastern Europe and the former Soviet Union republics. Although the GEF is not formally a financial mechanism for the Montreal Protocol, the operational strategy for ODS is congruent with the Montreal Protocol, its amendments and adjustments.
12. The GEF developed an initial focal area operational strategy to address ODS in 1995 with the goal:

“to contribute to measures that protect human health and the environment against adverse effects resulting, or likely to result from, human activities that modify or are likely to modify the ozone layer”

2.3 GEF OPERATIONAL STRATEGY 1995

13. The strategy focused on short-term investment measures and enabling activities in CEITs to achieve ODS phase-out emphasizing:
 - The greatest reduction of ozone depleting substances for the lowest cost within each receipt country;
 - Avoidance of non-compliance with agreed control measures under the Montreal Protocol;
 - Complete phase-out of ozone depleting substances (except in essential uses) in entire countries or sectors; and
 - Achievement of additional global environmental benefits in other GEF focal areas.
14. Based on emerging experiences goal and strategy were refined further during the GEF-3 and GEF-4 replenishment periods:

¹³ Seven revisions, in 1990 (London Amendment added Methyl chloroform (MCF) and Carbon tetrachloride (CTC) and tightened phase-out schedule), 1991 (Nairobi), 1992 (Copenhagen Amendment added Hydro-chlorofluorocarbons (HCFCs) and Methyl-bromide and further accelerated phase-out schedules), 1993 (Bangkok), 1995 (Vienna), 1997 (Montreal), and 1999 (Beijing).

“to protect human health and the environment by assisting countries to phase-out consumption and production and prevent releases of ozone depleting substances according to their commitments to the Montreal Protocol phase-out schedules while enabling energy efficient alternative technologies and practices.” GEF-4 Focal Area Strategy

15. During GEF-3 and 4 the funding has been targeted at capacity development for methyl-bromide and HCFC phase-out, mostly through regional project interventions (see Chapter 7).

3

EVALUATION FRAMEWORK

3.1 OBJECTIVE AND KEY QUESTIONS

1. The objectives and questions for the evaluation were derived from a preliminary review of the GEF ozone strategies, existing project documentation and evaluation as well as discussions with members of the GEF Secretariat and the Implementing Agencies.
2. The overarching objective of the impact evaluation was: To evaluate the impact of GEF Ozone portfolio of projects on Ozone Depleting Substances phase-out in countries with economies in transition
3. The evaluation had five sub-objectives:
 - 1) To evaluate the impact of GEF Ozone portfolio investments in CEIT to reduce ODS production;
 - 2) To evaluate the impact of GEF Ozone portfolio investments in CEIT to reduce ODS consumption;
 - 3) To assess the sustainability of GEF investments in terms of maintaining ODS phase-out in CEIT¹⁴;
 - 4) To assess the extent to which the GEF investments catalyzed further changes in behaviour and decisions of stakeholders¹⁵;
 - 5) To compare these parameters with a limited number of projects on the phase out of ODS in MLF-funded countries
4. For sub-objectives (1) through (4) the evaluation compares impacts across CEITs that received GEF funding (internal comparison), and (1) and (2) with Multi-lateral Fund countries (matched to four GEF countries selected for in-depth field assessments).
5. The conduct of the evaluation was guided by the following questions:
 - 1) What was the intended series of causal linkages in GEF Ozone portfolio, which were expected to generate impacts?
 - 2) What were the impacts of the GEF Ozone portfolio investments¹⁶ on consumption of ODS across the CEIT?
 - To what extent have comparison countries achieved reduction in the consumption of ODS?
 - 3) What were the impacts of the GEF Ozone portfolio investments on production of ODS across the CEIT?
 - To what extent have comparison country achieved reduction in the production of ODS?

¹⁴ In doing so, the evaluation pays attention to issues of trade and illegal trade of ODS.

¹⁵ The focus is on the private sector follow on investments and results of capacity development and technical assistance

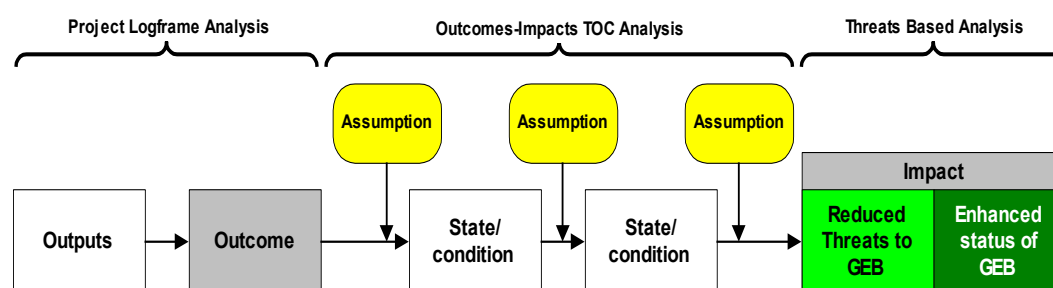
¹⁶ By project 'investments' we mean investments in technologies to change production and consumption and also capacity development and institutional strengthening *inter alia*

- 4) What were the important features of the project / country context(s), which interacted with the causal linkages to determine results achieved?
 - 5) How did the project approaches respond to the country context to generate results?
 - 6) To what extent have GEF Ozone portfolio results been sustained?
 - What are the main risks to sustainability?
 - 7) To what extent have results in the comparison country been sustained?
 - What are the main risks to sustainability?
 - 8) To what extent have GEF Ozone project results been catalyzed by other stakeholders?
 - To what extent has catalysis occurred in the comparison country?
 - 9) What are the key lessons from the GEF Ozone portfolio investments?
 - What are the important opportunities and challenges for ODS phase-out in CEIT?
 - How do these opportunities and challenges compare with the experiences of the MLF?
 - How far these opportunities and challenges are ODS specific and can/cannot provide useful lessons learned to other Focal Areas?
6. An evaluation matrix was developed to link the questions to particular aspects of the methodology, data collection requirements and indicators (Annex 1).

3.2 EVALUATION DESIGN

7. The evaluation design combined three approaches to investigate impact¹⁷ from several perspectives drawing on quantitative and qualitative data collection methods and analyses: a theory of change (TOC); in-depth field case studies to assess the veracity of the TOC; and lastly before and after measures of ODS consumption and production in CEITs and the comparison sampled of MLF countries.
8. The TOC approach is an impact evaluation tool that maps out the logical sequence of means – ends linkages underlying a project (or portfolio of projects) and thereby makes explicit both the expected results or impacts of the project; outcomes to impacts necessary for certain states or conditions to exist (impact drivers); assumptions that have to hold true to achieve impact; and threats mitigated in order for impacts to be sustainably achieved over the long-term. Figure 1 below shows a generic theory of change model.

Figure 1: Generic Theory of Change



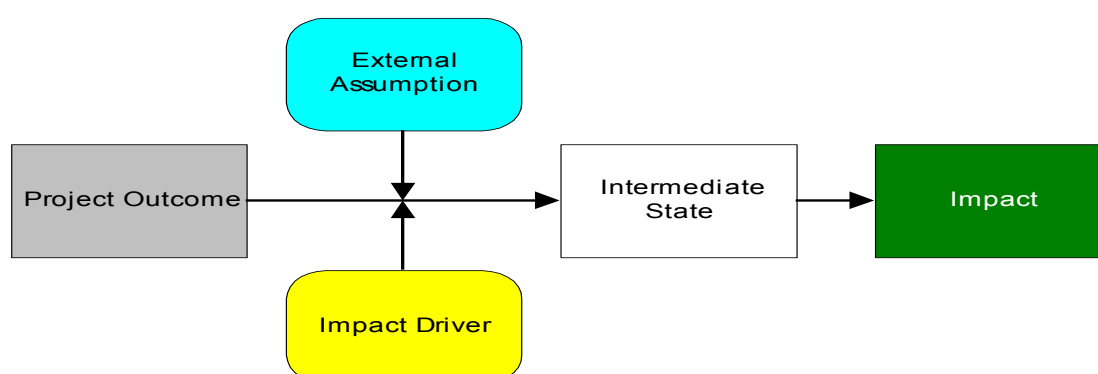
9. The TOC design was applied early in the evaluation development because the majority of the projects lacked a log-frame as they were developed between 10 and 15 years ago (log-

¹⁷ These designs and methods will be elucidated in greater detail in the Terms of Reference for the evaluation and by the consultants as part of their tasks.

frames were not a GEF requirement at that time). Hence, an initial meta-analysis was undertaken of GEF ODS strategies, project documentation and available evaluations to draft an initial TOC. Consultations were then held with the GEF Secretariat, Implementing Agency staff, Evaluation Offices¹⁸ and national government stakeholders. The function of the consultation was to provide an opportunity for stakeholders to give inputs at an early stage prior to the TOC being used desk and field based data collection.

10. The TOC was initially used in the desk review of all completed projects with evaluations to review outcomes to impacts with a particular focus on identifying 'impact drivers' and also assumptions. Impact drivers are critical factors or conditions that are essential for a project to move from outcomes to delivery of impact. External assumptions are external events that negatively affect the ability of the project to reach impacts (Figure 2). Intermediate states are transitional conditions between project outcomes and impacts in which major barriers to achievement of impacts have been overcome.

Figure 2: Outcomes to Impacts: Impact Drivers and Assumptions



11. The basic principle being that if impact drivers are not present then it is unlikely the project will produce impacts. Furthermore external assumptions may intervene to prevent impact drivers from producing an impact. In the case of ODS this might be an event such as illegal trade or the price competitiveness of ODS alternatives which are largely beyond the boundary of the project. Previous impact evaluations conducted by the GEF Evaluation Office found that impact drivers and external assumptions are often implicit and hence it is essential that such drivers are explicitly identified during the impact evaluation process in order to understand why (or why not) an impact has been produced. Therefore, a significant focus of the desk study and the case study fieldwork was focused on drivers and assumptions¹⁹.
12. The ODS TOC documents outcomes documenting the position reached at the end of the project; assumptions and impact drivers; intermediate states; threats and / or risks; and impact(s) (see Figure 3). The TOC was used to guide the initial desk review of projects and in the case study fieldwork.
13. In-depth case studies were conducted in four countries that have received GEF support. A further ten field case studies were conducted, as part of the parallel UNEP/UNDP Terminal Evaluation of ODS projects, and addressed similar issues, but within a shorter timeframe. In each case study the following issues were qualitatively assessed and / or considered:
 - Processes that caused (means – end linkages) ODS consumption and / or

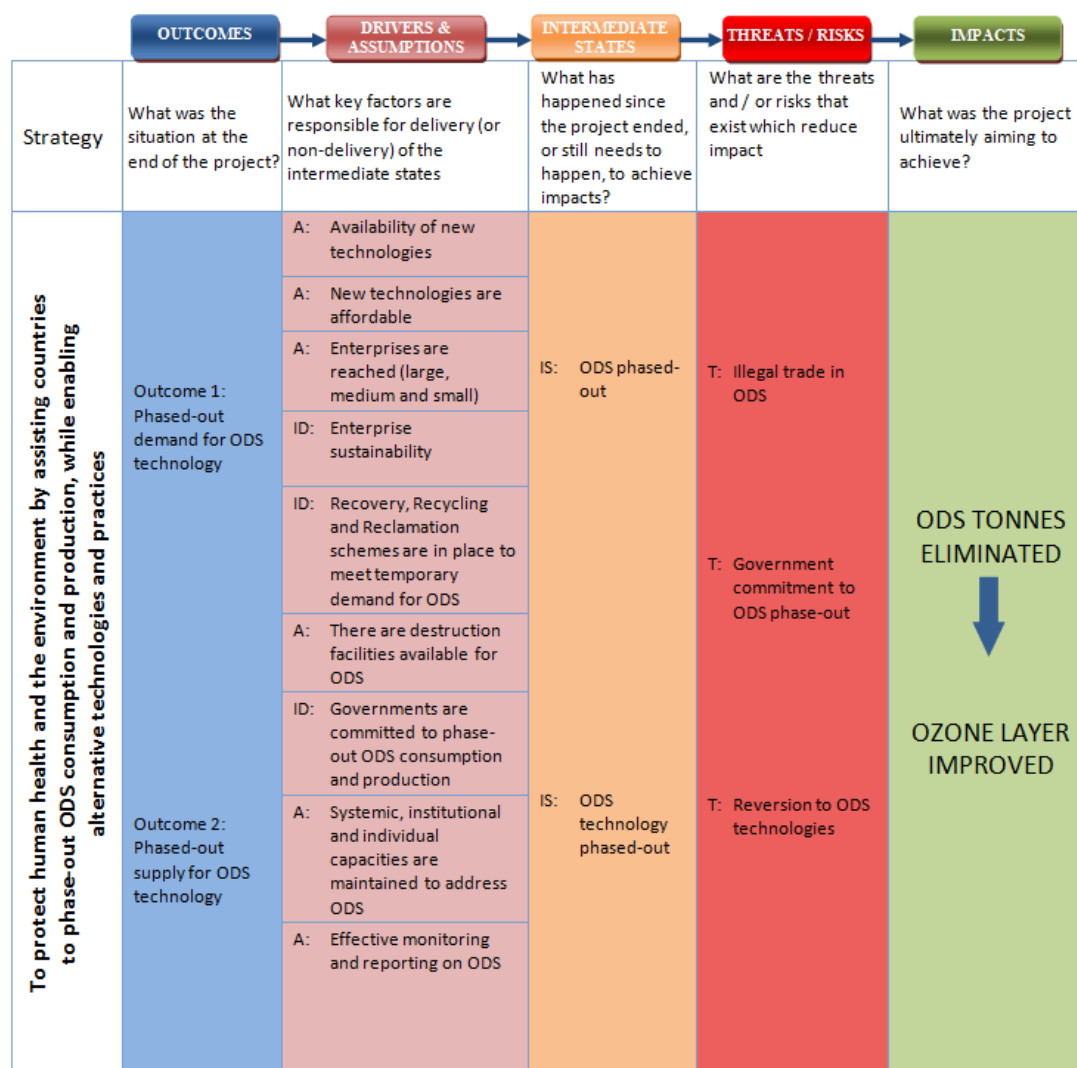
¹⁸ Comments on the approach paper and TOC were received from UNDP Evaluation Office, UNEP Evaluation Office and UNIDO Evaluation Office.

¹⁹ A more detailed methodological discussion of TOCs and impact drivers is available on the [GEF Evaluation Office website](#)

production phase-out

- Government Policy measures and incentives
- Capacity development
- Private sector / enterprise involvement
- Alternative technologies and knowledge dissemination (including awareness)
- Assessment of the theory of change outcome – intermediate states and impact drivers / assumptions and threats that support or thwart impacts.
- Identification of gaps and opportunities

Figure 3: The ODS Outcomes-Impacts theory of change Before-and-After Measures



14. In absence of available control groups for an experimental or quasi-experimental design (see 3.6 Limitations) before and after measures of CEITs consumption and production and also comparator MLF countries drawing on available quantitative panel data on ODS consumption and production²⁰ which were used to establish the long-term trends since 1986 (baseline) to present.

²⁰ Sourced from the UNEP Ozone Secretariat

3.3 EVALUATION METHODOLOGY

15. The key approach adopted for the evaluation was to **mix both qualitative and quantitative methods** consistent with the combined-designs described above. Qualitative methods were used during the evaluation preparation and case studies for the development and testing of the TOC in the field case studies. The primary aim of conducting a significant amount of qualitative data collection was to thoroughly understand how and why changes in ODS consumption and / or production had occurred and related this to observable quantitative data which showed what had occurred. Quantitative methods were used for the before and after measures and but also for the questionnaire survey analyses. The questionnaire survey was devised after the completion of field case studies in order to validate and confirm key issues arising out of the qualitative data collection. In these ways, the approach adopted conformed to current practices in impact evaluation to mix-qual and quant methods (see Chapter 7).
16. A second key approach of the evaluation used to reduce internal and external threats to validity was **triangulation** both within and between country case studies. Practically, this was achieved through covering a consistent range of issues with specific stakeholders, government NOUs, customs officials, private sector (and specific private sector operators such as in refrigeration production, servicing and recycling, foam manufacture and fire protection systems). Practically, through all evaluation team members taking notes to allow for rapid post-processing and discussion of data collection which assisted in solidifying key evidence and discarding circumstantial or anecdotal evidence as case studies progressed.

3.3.1 Qualitative Methods

17. A detailed external literature review was undertaken covering the non-GEF literature on such issues as current status of ozone atmospheric science (based on scientific panel submission to the Montreal Protocol) and effects of ozone depletion on ecosystem functioning, links to climate change and human health; Montreal Protocol and MLF activities; and existing external evaluation materials on non-GEF ODS activities.
18. A desk review of all GEF ODS completed projects was completed prior to the case study fieldwork. At that stage only the GEF-World Bank ODS projects had evaluations and project implementation correspondence (e.g., aide-memoirs) available for review. The reviews were structured to identify key outputs and outcomes as well as to identify impact drivers and any explicitly detailed or implicit assumptions. Hence, this process played a key role in informing the development of the TOC as well as providing a basis for case study fieldwork.
19. The evaluation team established a structured data base²¹ of the external and internal secondary data which was used for preparation for fieldwork and also for triangulation with case study primary data sources.
20. Semi-structured interviews and focus groups were the primary means of data collection for the case studies with all stakeholders. The evaluation team prepared a semi-structured interview guides prior to commencing case study field work (see Annex 2 for interviews with government representatives; and Annex 3 for interviews with enterprise representatives). These interviews were supplemented with the collection of secondary data from private sector beneficiaries (e.g., brochures, access to records) and also direct observation of private sector workshops containing *inter alia*; stocks of ODS alternatives and ODS (legal and illegal); spare parts (such as compressors); foaming agents; fire suppression systems; storage facilities for recovered / reclaimed ODS; production facilities for a range of goods such as refrigerators, soft and rigid foams and solvent degreasing agents. In many cases the

²¹ Established as part of the Overall Performance Study IV "Egnyte" database.

evaluation team was also permitted to take photographs of private sector facilities (see Volume 2).

21. A survey questionnaire was developed and sent to NOUs. It was based on the qualitative data collected through the semi-structured interviews and focus groups and used to verify and validate responses to key issues such as Government institutions for ODS management and monitoring; customs and exercise and trade issues (Annex 4). It was sent to NOUs in either Russian or English to facilitate understanding.

3.4 QUANTITATIVE METHODS

3.4.1 General methodology

22. Quantitative methods were used to conduct internal and external comparisons of consumption and production data obtained from the Ozone Secretariat database. The database is the result of Parties submitting reports to the Secretariat, in accordance with Article 7 of the Montreal Protocol. Article 7 requires all Parties to report by 30 September each year the import, production and export of ODS in the previous calendar year.
23. The first stage of the quantitative analyses was to collect consumption and production data across several ODS chemicals. It focused on CFCs and halon in Annex A Group I, Annex A Group II and Annex B Group I, as for the countries in this report they represented the more than 95% of the ODS Consumption reported by Parties and, moreover, they formed the most complete data set. The reporting years were from 1986 until 2007, as 2007 was the last and most complete year of reporting on ODS Consumption.
24. Parties that do not report Consumption annually are in non-compliance with the requirements of the Montreal Protocol. In such cases, or where there are discrepancies in reporting or if a Party has exceeded the ODS Consumption limit agreed in the Protocol, the Ozone Secretariat invites Parties to attend a meeting of the Protocol's Implementation Committee. The Committee aims to reach agreement with the Party on a resolution pathway and the time that will be required to achieve compliance.
25. Most of the CEITs in this Impact Report appeared before this Committee prior to the funding from the GEF to financially assist these countries to normalise their ODS Consumption. The number of non-compliance Decisions, as a result of discussions with the Implementation Committee before and after the GEF financial assistance, were quantified as one of the measures used to demonstrate the value of the GEF Finance.
26. Initial analyses were conducted on internal comparison of ODS consumption amongst the 18 CEITs to examine the level of ODS consumption across these countries looking at key factors such as implementing agency, amount of funding each country received, overall cost-effectiveness, intensity and efficiency of implementation. Although none of the CEITs were Member States of the European Union (EU) at the time of the projects, nine of them subsequently acceded to the EU after 1 May 2004. For the purposes of this evaluation, the CEITs were categorised as those that are now members of the EU ('EU-CEITs'), in contrast with those that are not members of the EU ('Non EU-CEITs').
27. Second analyses were conducted to gain an external comparison – GEF versus MLF-funded Article 5 countries Brazil, Cameroon, Egypt and Romania, which received funding under the Montreal Protocol for the reduction of ODS consumption and/or production. Four comparison countries, Kazakhstan, the Russian Federation, Ukraine and Uzbekistan, were selected from the 18 CEITs. These two groups of comparison countries were matched on the basis of ODS consumption, population and gross domestic product (GDP). An external comparison was conducted using the four CEIT countries and the corresponding MLF countries using similar indicators used in the internal analysis. The statistical analysis

assessed the relationship between reported ODS Consumption and Gross Domestic Product (GDP, in the national currency) before and after the GEF funding, through the application of the Pearson product-moment correlation coefficient. The results of these analyses are reported in Chapter 6.

28. Thirdly, a correlation analysis was used to assess the broad relationship between ODS consumption, GDP and GEF funding to determine the extent to which the funding had decoupled GDP from ODS Consumption. This analysis was conducted across the four CEIT and four MLF comparison countries and reported in Chapter 6.

3.5 SCOPE AND SAMPLING

29. The scope of the evaluation was focused on those projects that were either completed or mature. Hence it was possible to consider all the national projects across the 18 CEITs that received GEF funding. By doing so the impact evaluation was able to take a portfolio wide approach as opposed to focusing on one or two projects only. The similarities between Implementing Agency projects in terms of having similar objectives, activities, components, outputs and goals (expected impacts) also provided a sound basis for pursuing a portfolio-wide approach.
30. Some of the more recently approved regional projects focusing on capacity development for methyl bromide and HCFC phase out could not be fully considered, because they were not yet completed.
31. The sampling for the impact evaluation case studies given the small overall sample size of 18 countries and 26 project (19 national and 7 regional) a randomized sample would have served little purpose given the need to compare and contrast a range of experiences. Hence the selection was based on a number of factors such as funding and size of programme, completion dates, and the need for internal comparison between Implementing Agencies (World Bank, UNDP-UNEP).
32. The selection of the comparison MLF-funded developing countries also needed to be considered. Four CEITs were selected for in-depth field case studies and a further 10 for 'light' field case studies through collaboration with the UNDP-UNEP ODS Terminal Evaluation process. A further four countries were assessed through desk review and telephone / email based interviews and discussions with NOUs. The CEITs in this evaluation, their categorisation and type of evaluation are shown in Table 2.

Table 2: CEITs according to categorisation as EU-CEIT or Non-EU-CEITs, and type of evaluation

EU-CEITS	Type	Non EU-CEITS	Type
Bulgaria	Mission	Armenia	Mission
Czech Republic	Desk Study	Azerbaijan	Mission
Estonia	Mission	Belarus	Desk Study
Hungary	Mission	Kazakhstan	Mission
Latvia	Mission	Russia	Mission
Lithuania	Mission	Tajikistan	Mission
Poland	Mission	Turkmenistan	Mission
Slovakia	Desk Study	Ukraine	Mission
Slovenia	Desk Study	Uzbekistan	Mission

3.6 DESIGN AND METHODOLOGICAL LIMITATIONS

3.6.1 Design Limitations

33. At the beginning of the scoping process for the evaluation it had been hoped to combine a TOC with an experimental or quasi-experimental design approach through the identification of appropriate control or non-treatment groups. In the case of ODS, this would have involved identification of countries of similar economic and social characteristics to the CEITs that had not received funding from the GEF or the MLF and ideally were not Parties to the Montreal Protocol. However, no such suitable countries existed. As of July 2008 only Timor-Leste and the Principality of San Marino remained non-parties to the Montreal Protocol. All other countries were Parties, hence no suitable control groups could be identified and this ruled out experimental or quasi-experimental designs. The best alternative²² adopted was the combination of TOC with basic before and after measures with internal and external comparisons.

3.6.2 Methodological Limitations

34. The main limitation encountered during the evaluation was incomplete data sets relating to consumption of ODS by CEITs and the MLF comparison group countries. Due to data ambiguities contained within published datasets relating to the reporting of zero consumption and / or non-reporting (also reported as zero) the evaluation was forced to limit analyses to two chemical groups (a) Chlorofluorocarbons and (b) Halon, as these had the most complete Consumption data sets up to 2007, which was the last full year of reporting by Parties.
35. As CFCs and Halons are some of the most prevalent ODS chemicals they are good indicators of overall ODS consumption and production phase-out this was not a significant limitation to the evaluation. However, where there were gaps in the data interpolation was used to generate missing consumption and production figures. For countries which lacked consumption figures for non-consecutive years, consumption figures were interpolated in a linear fashion by summing the consumption before and after the missing year and dividing the sum by two. GDP growth rates were obtained from the International Monetary Fund website. Further details are provided in Chapter 6.
36. A time-series regression analysis would have been a useful tool determining the attribution and contribution of GEF funding to ODS phase-out by using a series of ODS consumption data prior to and after the GEF intervention. Two main obstacles, however, prevented such an analysis. One was the incomplete consumption data mentioned above and also the nature of how the funding was provided. While the ODS consumption figures were available on a yearly basis, many consumption figures were not reported. Even after utilizing interpolation techniques, consumption data was still indeterminable for certain years. Also, while consumption was reported yearly, funding was provided as a lump-sum at the beginning of the GEF intervention and disbursed in several tranches. GEF funding was allocated to CEIT countries with the intention countries would utilize it gradually until the eventual phase-out of ozone depleting substances. Even if data ODS consumption had been complete, since the consumption was reported yearly it was time-series in nature while the key explanatory variable, total GEF funding, was not. This would have made it extremely difficult to properly interpret the causal relationship between GEF funding and consumption. As a result a time-series regression analysis was not conducted.
37. While some factors have been considered in our analysis, many relevant variables such as the pricing of substances, various infrastructural and governance indicators have not been

²² Taking into account time available and resources dedicated to the evaluation.

included. While their inclusion would have been ideal, much of data on these variables were not readily accessible. In addition, time and resource constraints made it difficult to gather data within limited time allocated to this impact evaluation. Hence, the quantitative analysis of the relationship between GEF funding and the level of ODS consumption may be biased due to the omission of such variables.

38. Data on GEF funding across CEITs and co-financing available in the GEF database are not always consistent with data obtained from implementation completion reports (ICR) of the World Bank and UNDP/UNEP projects documents. The ICRs present data on project budget estimates for GEF funding and co-financing at appraisal, and actual GEF funds spent and co-financing at the project closure. The actual disbursements have been used for external and internal comparison of ODS phase-out activities in the ODS consumption sector (see Chapters 4 and 6).

3.7 EVALUATION IMPLEMENTATION AND CONSULTATION

39. The impact evaluation was conducted by an independent consulting company based in Belgium²³ and led by GEF Evaluation Office staff based in Washington DC and Switzerland. GEF Operational Focal Points and National Ozone Units in CEITs were involved in the planning the execution of the evaluation, and in countries where field missions were conducted they were closely involved in the planning of the country visits. Evaluation materials were developed and submitted to stakeholders in advance of the meetings, which included:
 - The Approach Paper, in English and Russian, that described the background the work and the aims of the Impact Evaluation;
 - An Evaluation Matrix (Annex 1) that developed the interview questions and approach to answer key criteria in the Evaluation;
 - Semi-Structured Interview Guides for government (Annex 2, as an example of the Guide used for government interviews) and enterprise interviews (Annex 3 as an example of the Guide used for enterprise interviews);
 - A Survey Questionnaire in English and Russian (Annex 4).
40. In total, 126 Semi-Structured Interview Guides were produced, and many in English and Russian in order to aid understanding.
41. Consultation, both informal and formal was an integral part of the impact evaluation. Formal consultation began at the circulation of the draft approach paper to GEF agencies, MLF Secretariat and countries, followed by pre-fieldwork consultations at the Montreal Protocol at the Meeting of the Parties in Doha in November 2008. Further informal consultations were conducted during the write-up of the draft report through March – July 2009 with the evaluation team circulating draft country case study findings for preliminary and informal feedback. The team followed up with countries again at the Montreal Protocol's Open-Ended Working Group Meeting of the Parties in Geneva in July 2009. Such mechanisms ensured that the key evaluation findings were sufficiently cross-checked and areas of agreement and differences on data were flagged early.
42. The draft report was disseminated to stakeholders in English and Russian (Chapter 1 and 5 only) in August prior to workshop. Written comments on the draft report were invited at that time. A workshop to discuss the draft report and its conclusions was held in Tashkent, Uzbekistan 7-8 September 2009. The four countries selected for in-depth fieldwork were

²³ The consulting team consisted of Russian and English speakers with combined ODS experience of 60 years.

requested to attend the meeting, alongside members of the GEF agencies and GEF Secretariat. Participants and stakeholders provided comments and recommendations which were taken into account in producing the final report (see Annex 5 for Comments; See Annex 6 for list of participants).

43. A timetable of key activities in the Impact Evaluation is available in Annex 7.

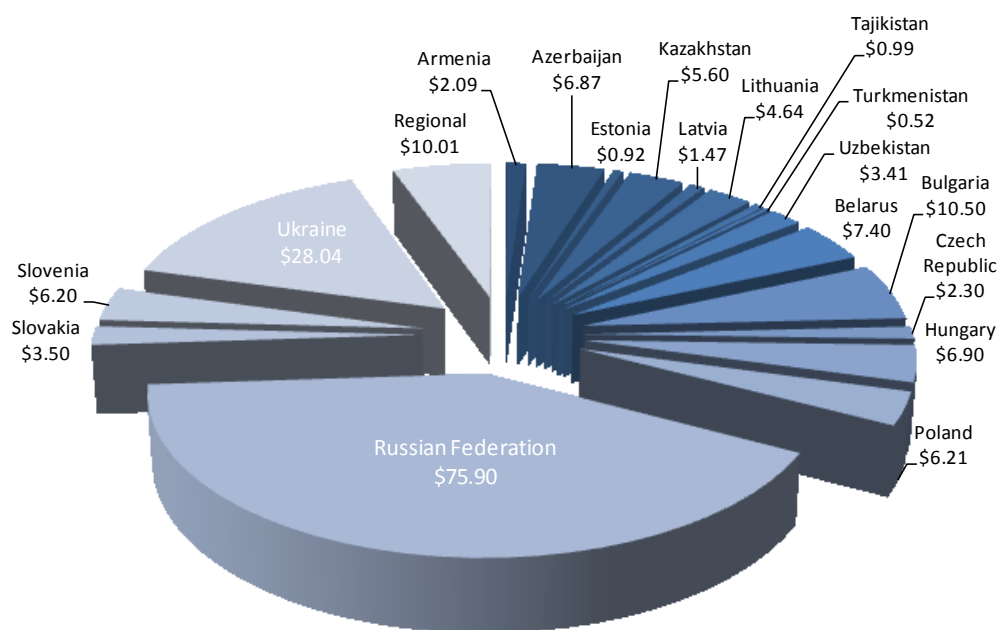
4

GEF PORTFOLIO ON OZONE DEPLETING SUBSTANCES

4.1 PORTFOLIO DESCRIPTION

1. In the past 18 years the GEF approved \$183.47 million²⁴ in grant financing to the CEITs in the phase out of ODS to 18 countries and 26 projects with approximately \$187.6 million²⁵ total approved co-financing provided by governments and the private sector, and other stakeholders. Total approved funding amounted to \$371 million, with approximately 60% of the total funding was directed at ODS phase-out activities in the Russian Federation and Ukraine which reflected levels of consumption and / or production in those countries (see Figure 4 and Figure 5).

Figure 4: Approved GEF Funding to Countries with Economies in Transition (\$, million)



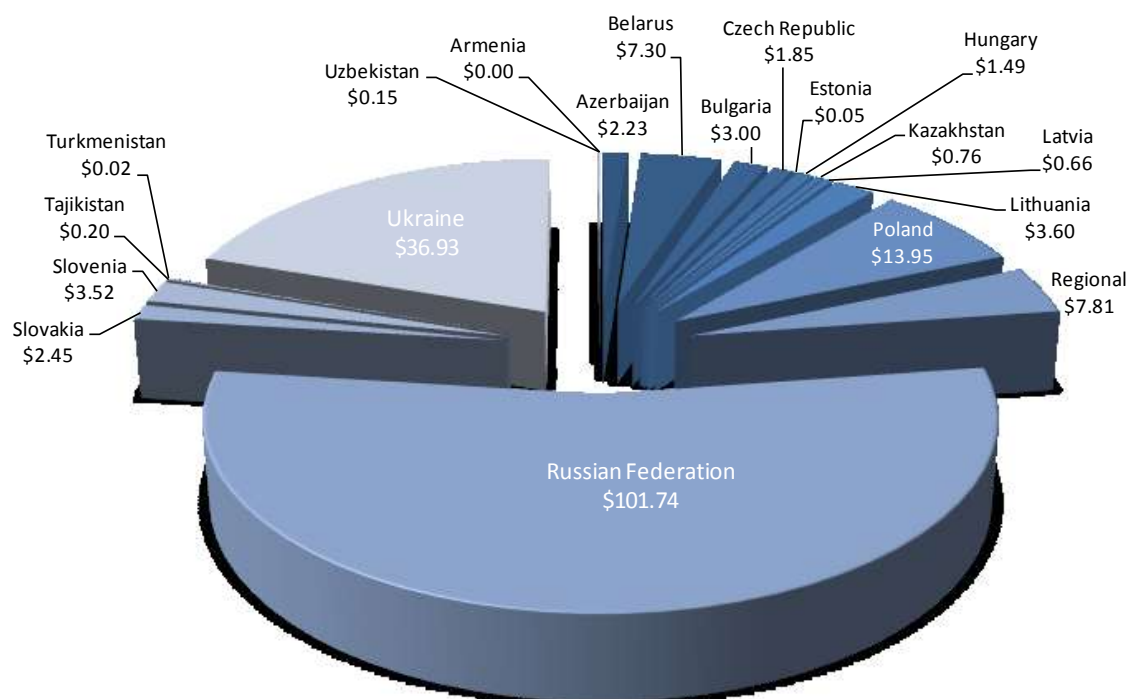
2. The GEF Implementing Agencies for the ODS projects were UNDP, UNEP and The World Bank. UNDP-UNEP jointly implemented most of the projects in the Baltic, Caucasus's and Central Asian regions and received approximately \$36.5 million from the GEF for ODS consumption reduction purposes. UNDP (through UNOPS) implemented the investment sub-projects aimed at the private sector and UNEP provided capacity development assistance to Government and the private sector. The World Bank implemented projects received a total of US\$146.95 million, with the geographical and thematic focus on those Eastern European countries and the Russian Federation which had the most significant ODS consumption and production capacity with the primary focus on investment sub-projects to assist the private

²⁴ This included \$18 million from bilateral donors for phase-out of production in the Russian Federation.

²⁵ Co-financing figures at the time of CEO Endorsement.

sector in phase-out of ODS.

Figure 5: Approved co-financing to Countries with Economies in Transition (in Millions of US\$)



3. About 97% of the GEF funded operations have been delivered through full-sized projects totalling \$178.12 million with the remainder medium sized-projects receiving 3%, which is equivalent to \$5.3 million. The use of full-sized project modalities reflected the specific characteristics of the ODS issues across many of the countries requiring relatively large investments and capacity development activities. Medium-sized projects have been used in some of the smaller countries such as Estonia, Tajikistan and Turkmenistan and also for additional capacity development to prepare for phase-out of HCFCs and methyl bromide.

4.2 EVOLUTION OF GEF FUNDING FOR ODS

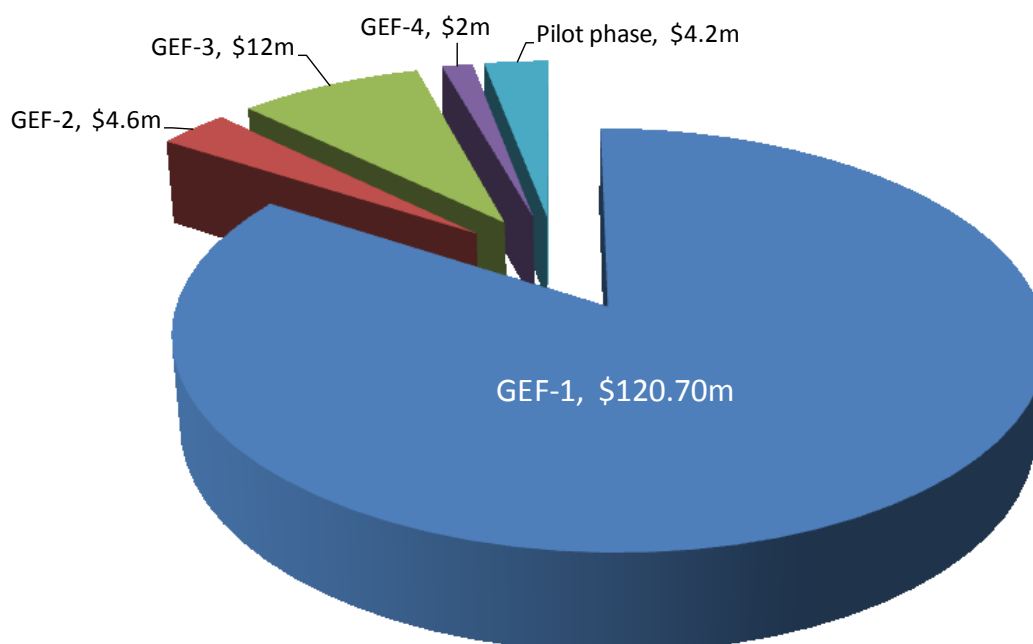
4. The GEF ODS funding began in the pilot phase (1991 – 1994) with an initial country operation, implemented by The World Bank in the Czech Republic and a regional monitoring and research project implemented by UNDP, with a total investment of \$4.2 million.
5. The Parties requested the Protocol's Technology and Economic Assessment Panel to establish an Ad Hoc Working Group to examine the existing ODS uses and quantity in the CEITs, and to estimate the cost of the phase out of ODS. The Working Group presented its report in November 1995²⁶. The approach to arrive at an overall estimate was to use the overall and sector distribution ODS consumption in CEITs and the cost-effectiveness threshold values established by the Executive Committee of the Multilateral Fund in industrial sectors and sub-sectors. This approach led to the overall amount in order of \$400 million. The assumption was made that market forces would result in the phase-out of one third of 1994 consumption with remaining two thirds of US \$265 million to be funded by international funds.²⁷

²⁶ Report of the TEAP Ad-Hoc Working Group on CEIT Aspects, UNEP, November 1995

²⁷ Report of the TEAP Ad-Hoc Working Group on CEIT Aspects, UNEP, November 1995, Chapter 5, Page 38

6. In response by the GEF to the need to phase out ODS in CEITs, the GEF-1 (1995 – 1998) replenishment periods saw a considerable growth in ODS funding for projects across Eastern Europe and Russia, mainly implemented by the World Bank, with a total approved investment of about US\$120.7 million. The GEF-2 (1998 – 2002) replenishment period saw a marked decrease in funding for ODS as major investments in Eastern Europe and Russia were already underway or completed. However, UNDP-UNEP began to implement projects began in the Baltic, Caucasus and Central Asian regions, with a total investment of \$44.57 million. ODS received \$12 million and \$2 million in the GEF-3 (2002 – 2006) and GEF-4 (2006 to present) replenishment periods respectively. The decline in funding reflects the completion of major operations to phase-out ODS consumption, with a relatively modest amount of new funding approved to assist CEITs for HCFC phase-out (Figure 6).

Figure 6: Approved GEF ODS Funding by Replenishment Phase (\$, million)



7. Based on an assessment of the completed projects with evaluations containing data on actual expenditures, the total actual GEF funding was \$138 million representing approximately 75% of initial budget estimates of \$183.47 million. Actual co-financing of \$76 million was 40% of estimated amount of \$187 million at project approval. Table 3 shows estimated and actual funding and co-financing.

Table 3: Approved and actual GEF funding and co-financing in the CEIT ODS consumption sector

Country	Implement-ing Agency	Co-finance (\$, million)	Co-Financing Actual (\$, million)	GEF Grant (\$, million)	GEF Funding Actual (\$, million)
Armenia	UNDP/UNEP	0.000	0.077	2.087	2.087
Azerbaijan	UNDP/UNEP	2.226	2.226	6.867	7.045
Belarus	World Bank	7.300	7.990	7.400	6.790
Bulgaria	World Bank	3.000	3.800	10.500	9.644
Czech Rep.	World Bank	1.848	1.179	2.300	2.831
Estonia	UNDP/UNEP	0.045	0.045	0.919	0.750
Hungary	World Bank	1.493	1.573	6.900	6.498
Kazakhstan	UNDP/UNEP	0.760	0.748	5.603	5.433
Latvia	UNDP/UNEP	0.659	0.000	1.468	1.345
Lithuania	UNDP/UNEP	3.595	3.595	4.645	4.692

Country	Implement-ing Agency	Co-finance (\$, million)	Co-Financing Actual (\$, million)	GEF Grant (\$, million)	GEF Funding Actual (\$, million)
Poland	World Bank	13.953	13.456	6.214	5.882
Russian Fed.	World Bank	101.735	24.300	75.900	44.580
Slovakia	World Bank	2.453	3.290	3.500	2.660
Slovenia	World Bank	3.518	2.951	6.200	5.884
Tajikistan	UNDP/UNEP	0.195	0.194	0.989	0.817
Turkmenistan	UNDP/UNEP	0.023	0.022	0.515	0.361
Ukraine	World Bank	36.930	3.974	28.040	21.247
Uzbekistan	UNDP/UNEP	0.153	0.153	3.412	3.170
Regional	UNDP/UNEP	7.803	6.803	10.013	6.533
Total		187.689	76.376	183.472	138.249

8. In most countries, the approved co-financing matched the actual expenditures one. The co-financing was overestimated in Russia by 76% and Ukraine by about 90%. The approved GEF grants were close to actual costs in all CEITs, except Russia where savings resulted from cancellation of several sub-projects and favourable exchange rate movements. In Slovakia, \$0.84 million was not disbursed due to insolvency of the enterprise.

4.3 DESIGN AND IMPLEMENTATION

9. In providing assistance to the CEITs, the GEF cooperated closely with the Implementation Committee of the Montreal Protocol by making project financing dependent on approval by the Committee. Ratification of the London Amendment of the Protocol demanding phase-out of all major ODS was a precondition for receiving GEF assistance²⁸. The dates of ratification of Montreal Protocol and its amendments by CEITs are shown in Table 4.
10. The Implementation Committee negotiated specific benchmarks with a particular CEIT Government that were incorporated in action plans and approved by the Parties in their Decisions to secure the earliest compliance of CEITs with the Montreal Protocol. Some of these Decisions contained specific recommendations seeking assistance from the GEF. The Parties took 38 decisions in respect of 15 CEITs. Many of these Decisions suggested that sanctions could be applied in the event that the CEIT did not comply with the course of action that had been agreed between the CEIT and the Parties to the Montreal Protocol. The performance of each CEIT, in relation to its agreed Decision, was followed up by the Implementation Committee at its regular meetings. Even though many of the CEITs were late complying with date- and quantity- specific requirements in these Decisions, sanctions were never applied by the Parties to any of the CEITs.
11. CEITs were required to produce a country programme for the phase-out of ODS²⁹. Country programmes included baseline data for production and consumption of ODS, analyses of industrial and domestic uses of ODS, and also availability and suitability of alternative chemicals and technologies. Based on these assessments, identification of relevant sub-projects to be funded under the GEF project were proposed in the country programmes. For the majority of CEITs country programmes related only to consumption³⁰. In general, project criteria applied in GEF CEITs projects mirrored those of the MLF.
12. The GEF funding in individual CEITs was determined on the basis of each country's level of

²⁸ Under the 1995 GEF Operational Strategy

²⁹ This was an identical precondition to those countries receiving support from the MLF.

³⁰ Of the CEITs only four were producers of ODS – Czech Republic, Poland, Russia and Ukraine.

ODS consumption and specific priorities identified in respective country programmes, government commitments, co-financing and other factors, such as political and economic development priorities at the time the formulation of specific sub-projects and components. The GEF projects in CEITs were designed as 'umbrella projects' consisting of several sub-projects or components which were more or less stand-alone. These were developed jointly by the country National Ozone Units (NOUs) and the GEF Implementing Agencies. The NOUs were a part of the institutional framework that promoted legislation, including ODS import licensing system and reinforcement of the legislation through interaction and training of custom officers. The NOUs were responsible for the collection and reporting of national ODS consumption data.

13. The World Bank project designs and implementation have tended to emphasize investment sub-projects addressing particular sectors such as refrigeration, aerosols and / or foams working with the emerging private sector in the former Soviet Union and Soviet bloc. Less attention was paid (in terms of financing) in design and implementation to capacity development such as training for customs and excise. UNDP-UNEP CEIT projects involved a division of labour in both design and implementation: UNDP (with UNOPS) was responsible for investment sub-projects with the private sector and UNEP lead country programme preparation, institutional strengthening, awareness raising and training activities.
14. The World Bank did not have its own procurement office. Therefore, in order to implement investment sub-projects, the Bank relied on national Project Implementation Units (PIU) that were established and staffed in each CEIT to provide project supervision, procurement, administration and financial management. The PIU staff comprised national consultants and consulting companies that underwent a rigorous initial training programme to be able to cope with financial and procurement rules established in the World Bank. PIUs were capable in some cases of developing new sub-projects during implementation improving the responsiveness of the projects to changing local socio-economic and political contexts. The PIU existed as temporary institutions and were dissolved at the closure of the projects. The World Bank worked closely with national banks using them as financial intermediaries in channeling financial resources to beneficiaries.
15. UNDP was responsible for formulation and implementation of investment sub-projects with the private sector involving the United Nations Office for Project Services (UNOPS) for procurement and project management that relied mainly on international consultants. UNDP widely engaged its country offices that provided interactions with governments and also served as financial institutions supporting UNDP investment activities and UNEPs institutional strengthening and training components.
16. UNEP was a lead agency in the country program preparation and in implementation of institutional strengthening and capacity building, awareness raising and training activities. UNEP was responsible for establishing NOUs that in many cases were pivotal in the implementation of the national ODS phase out programmes.

Table 4: Status of ratification of the Montreal Protocol and its Amendments by CEITs

Country	Vienna Convention	Montreal Protocol	London Amendment	Copenhagen Amendment	Montreal Amendment	Beijing Amendment
Azerbaijan	12 June 1996	12 June 1996	12 June 1996	12 June 1996	28 September 2000	
Belarus	20 June 1986	31 October 1988	10 June 1996	13 March 2007	13 March 2007	13 March 2007
Bulgaria	20 November 1990	20 November 1990	28 April 1999	28 April 1999	24 November 1999	15 April 2002
Czech Rep.	01 January 1993	01 January 1993	18 December 1996	18 December 1996	05 November 1999	09 May 2001
Estonia	17 October 1996	17 October 1996	12 April 1999	12 April 1999	11 April 2003	11 April 2003
Hungary	04 May 1988	20 April 1989	09 November 1993	17 May 1994	26 July 1999	23 April 2002
Kazakhstan	26 August 1998	26 August 1998	26 July 2001			
Latvia	28 April 1995	28 April 1995	02 November 1998	02 November 1998	14 June 2002	09 July 2004
Lithuania	18 January 1995	18 January 1995	03 February 1998	03 February 1998	17 March 2004	17 March 2004
Poland	13 July 1990	13 July 1990	02 October 1996	02 October 1996	06 December 1999	13 April 2006
Russian Fed.	18 June 1986	10 November 1988	13 January 1992	14 December 2005	14 December 2005	14 December 2005
Slovakia	28 May 1993	28 May 1993	15 April 1994	08 January 1998	03 November 1999	22 May 2002
Slovenia	06 July 1992	06 July 1992	08 December 1992	13 November 1998	15 November 1999	23 January 2003
Tajikistan	06 May 1996	07 January 1998	07 January 1998	07 May 2009	07 May 2009	07 May 2009
Turkmenistan	18 November 1993	18 November 1993	15 March 1994	28 March 2008	28 March 2008	28 March 2008
Ukraine	18 June 1986	20 September 1988	06 February 1997	04 April 2002	04 May 2007	04 May 2007
Uzbekistan	18 May 1993	18 May 1993	10 June 1998	10 June 1998	10 June 1998	10 June 1998

5

SUMMARIES OF THE COUNTRY REPORTS OF THE CASE STUDY CEITs

1. The Country Reports contain the results of interviews and desk reviews of 18 CEITs in the GEF portfolio (see Volume 2: Country Reports). In addition, in-depth case studies were conducted in four CEITs: Kazakhstan, the Russian Federation, Ukraine and Uzbekistan. The results of these case studies are summarised in this Chapter.

5.1 KAZAKHSTAN SUMMARY

5.1.1 BACKGROUND

2. Kazakhstan became independent of the Soviet Union in 1991. Kazakhstan experienced significant economic growth, partly due to its large reserves of oil, gas and minerals. In 1997, ODS were used for refrigeration (61% of the total ODS), foam (22%), fire protection (16%) and solvents (1%). Kazakhstan did not produce ODS, but imported them from the Russian Federation.
3. In order to comply with the Montreal Protocol, Kazakhstan was supposed to phase-out the imports of halons by January 1994, and to phase-out by January 1996 its imports of CFCs and two other types of ODS. However, import of these ODS continued after the phase-out date. Imports in 1996 amounted to 878 ODP-tonnes of halons, 826 ODP-tonnes of CFCs, and 33 ODP-tonnes of two other types of ODS.
4. The Montreal Protocol discussed this problem and in 2001 adopted a Decision³¹ in which Kazakhstan made commitments to establish a national system for licensing imports and exports of ODS, to ban imports of ODS-using equipment, and to phase-out imports of ODS by the following dates: carbon tetrachloride and methyl chloroform by 2002, halons by 2003, and CFCs and methyl bromide by 2004. Following this agreement, in 2005 the Montreal Protocol noted³² with concern that Kazakhstan had not implemented the ban on ODS-using equipment, and that CFC consumption occurred in 2004. Kazakhstan was requested to submit a full national plan for addressing ODS.

5.1.2 INPUTS

5. GEF provided financial resources of \$5,433,452 to assist Kazakhstan to phase out 679 ODP-tonnes of ODS in order to comply with the Montreal Protocol's requirements. This was supplemented by \$110,000 from the government and about \$638,839 from enterprises. The GEF project period ran from 2000 to 2005, with one extension. UNDP-UNEP were the implementing agencies.
6. The project was developed and initially coordinated by a National Ozone Unit (NOU) in the environmental Ministry. Later a National Ozone Office (equivalent to a NOU) was set up in the Climate Change Coordination Centre (CCCC), which implemented ozone projects. CCCC is funded by commercial contracts with the environmental Ministry, clients and grants from international donors. It competes with another institute for funds. So the institutional

³¹ Decision XIII/19 on Compliance with the Montreal Protocol by Kazakhstan (Ozone Secretariat 2006).

³² Decision XVII/35 on Potential non-compliance in 2004 by Kazakhstan (Ozone Secretariat 2006).

strengthening funds of GEF are important for ozone work. However, the NOU has political support and is well connected to other departments and bodies.

7. The GEF project focused on CFCs and halons, and carried out the following activities: (1) Provided training and equipment for servicing refrigeration appliances and re-using existing CFCs; (2) Eliminated the use of CFCs in the production of foam and liquid oxygen and nitrogen; (3) Collected and re-used halons; (4) Strengthened the government's capacity to manage the phase-out of ODS, including the training of Customs officers.

5.1.3 IMPACT DRIVER I: GOVERNMENT COMMITMENT

8. Institutions and legislation. Various legislative measures were adopted to reduce and phase-out ODS, including a requirement for enterprises to obtain licences to import/export ODS, ODS-containing products, and licenses to assemble or repair ODS-containing equipment; a ban on imports of most types of ODS³³ and products that contain them. The disposal of refrigerators in landfill sites was banned, and ODS in the cooling circuits (but not in the foam) had to be collected. Enterprises that used ODS were required to pay an 'ecological insurance' which aimed to deter the import and use of ODS refrigerants.
9. Enterprises were also required to submit annual reports on the type and quantity of ODS that they used or imported. However, environmental inspectors did not enforce this. From 2004, the NOU maintained a database of ODS reports, but these data were not available. In general, the legislative framework has not provided sufficient support to maintain ODS phase-out. Kazakhstan has not yet ratified three Amendments to the Montreal Protocol³⁴, although the NOU prepared documentation in 2005 for the ratification of two Amendments. Recently, the requirement for enterprises to have a permit for working with ODS was suspended, because the government felt it discouraged entrepreneurial work during the current economic crisis.
10. *Customs and border security:* There are 168 border points and about 5000 Customs officers. The GEF project provided 100 refrigerant identification machines. They were simple to use, but had some impractical features. Only one laboratory was able to verify the type of ODS, but it lacked key equipment. In 2003, 61 Customs officers (about 1% of the total) were trained in ODS issues. Some legislation relating to customs was adopted, guidelines were produced, and several cases of illegal imports were intercepted. However, the Customs officers reported that there was no legislation in place to prevent the entry of illegal ODS, even though imports were banned.
11. *Awareness of ozone depletion.* The NOU carried out some activities that aimed to build public and industry support for policies on ozone protection. Workshops were reported by newspapers, radio and TV. Contests were held for posters and essays on ozone issues. A brochure, T-shirts, caps and pens were distributed. However, the impact of these awareness activities could not be evaluated quantitatively because, as in many countries, a baseline to measure the impact was not developed.

5.1.4 IMPACT DRIVER II: ACTIVITIES IN REFRIGERATION AND FIRE PROTECTION SECTORS

12. *Training of refrigerant technicians.* To encourage the re-use of existing CFCs, the project provided training and equipment to technicians who service and repair refrigeration equipment. About 60% of technicians (3,365 of a total of about 5,600) were given comprehensive training in 2002-2007, and small numbers subsequently. Trainees that passed the course received a certificate and manual. Good practice guidelines were also published. However, about 30% (1,800) of the technicians have not been trained. The

³³ A decree adopted in 2005 banned the import of CFCs, halons, carbon tetrachloride, methyl chloroform and methyl bromide.

³⁴ The Copenhagen Amendment (1992), Montreal Amendment (1997) and Beijing Amendment (1999).

servicing of air-conditioning units in vehicles used 9%³⁵ of total CFC imports in 1998, so the project trained 800 vehicle technicians. However, only one garage collected ODS from air-conditioning units in Astana because restrictions on ODS emissions were not enforced.

13. *Equipment for capturing refrigerants.* The GEF project supplied 754 machines for capturing CFC refrigerants, 50 manual pumps/bags, and other items. The equipment was distributed to enterprises that attended the training courses. Enterprises valued this equipment because it avoided the cost of purchasing new CFCs. Some reported difficulties in obtaining spare parts. The equipment was used during the project, but for diverse reasons it was not used much afterwards.
14. *ODS capture and destruction.* About 700 enterprises that received equipment were due to report on the amounts of ODS captured, but only about 30% of the enterprises submitted reports. Several factors undermined the ODS collection/disposal efforts. There is no mandatory reporting of data on ODS collection. Legislation did not prohibit ODS emissions, so technicians could simply release unwanted ODS to the air. Nevertheless some enterprises voluntarily collected and stored unwanted ODS, and were frustrated by the lack of a safe disposal method. Kazakhstan has no facilities for destroying ODS and, for cost reasons, ODS are generally not taken to other countries for destruction.
15. *Fire protection sector.* The GEF project provided equipment³⁶ to the State Fire Department (SFD) for collecting and storing halon for re-use until halon-free systems could be installed. Two experts were trained to use the equipment, but they left and were not replaced. The equipment probably was not used after 2003. SFD published a book on halon reduction methods and kept a database on halon users in 2002-2006; about 85 tonnes of halon were collected. However, SFD is not financed by the central budget and did not have funds to continue this work.

5.1.5 IMPACT DRIVER III: SUSTAINABILITY OF ENTERPRISES THAT ADOPTED ALTERNATIVES

16. The GEF project assisted with the purchase and installation of ODS-free equipment in a number of enterprises.
17. *Foam production.* In the past, 145 ODP-tonnes of CFCs were used for blowing rigid and flexible foam materials used for insulation, in furniture and in other applications. GEF provided \$1.2 million for alternative equipment, trials and training for about 33 foam-making enterprises. Workers reported fewer breathing problems with the alternative systems, and foam quality improved in some areas. However, after the project, several enterprises switched from the chosen alternative (water) to HCFCs, aiming to improve the insulation quality. Adoption of HCFCs contradicted the enterprise/project letters of commitment which stated that 'only zero-ODP technology will be used'. In the flexible foam sector, most enterprises closed down because they could not compete with cheaper foam products made in Russia.
18. *CFC solvent.* The GEF project provided \$99,000 to eliminate 6 ODP-tonnes of CFC in an enterprise that used CFC as a solvent when making liquid oxygen and nitrogen utilized in manufacturing of chlorinated products. Equipment was installed, but it was not operational because it was not certified. Certification would cost about \$150,000-180,000.
19. *Refrigeration and air-conditioning.* GEF provided \$2.5 million for training and equipment, as described above. The GEF evaluation team interviewed 5 enterprises that service refrigeration equipment. Most enterprises valued the training and found the equipment reduced their expenditure on CFCs. Spare parts could usually be obtained. In several areas

³⁵ Servicing of air-conditioning units in vehicles consumed 110 ODP-tonnes CFCs in 1998.

³⁶ The budget for halon recovery equipment was \$163,231.

the equipment was barely used because it was provided after the majority of CFCs had gone.

5.1.6 THREATS THAT COULD UNDERMINE ODS PHASE-OUT

20. *Illegal trade.* Some enterprises reported that CFC imported from Russia and China was available locally, at a low price. Few customs officers were trained in ODS legislation and detection, and they lacked suitable detection equipment. The NOU had no plans to address this situation.
21. *Government commitment.* Legislation, enforcement and plans were lacking in a number of areas. For example, the legislation does not require the collection and storage of halon, and there was no Halon Management Plan. Several Amendments to the Montreal Protocol have not yet been ratified. Imports of methyl bromide have re-started recently, despite a government commitment to phase out this ODS by 2004. The NOU depended entirely on funding from international donors and contracts, which indicated a lack of government commitment to ozone layer protection.
22. *Refrigeration sector.* About 30% of refrigerant technicians were not trained and certified. About half of the refrigeration and air-conditioning equipment is currently estimated to use HCFCs. The suspension of registration requirements for enterprises using ODS, because of the economic crisis, is likely to weaken the government's ability to track and control ODS use.

5.1.7 IMPLEMENTING AGENCIES

23. UNDP-UNEP was the implementing agency for the GEF project. GEF required feasibility studies when projects were developed, including checks on the financial viability of enterprises. But the needs and circumstances of enterprises were not properly examined by UNDP-UNEP-UNOPS, with the result that some equipment provided by the project has not been used or was used only for a short time. Some project activities were subject to long delays. For example, the continuation of an institutional strengthening project was approved by the GEF in April 2007 but UNEP did not release funds until 2.5 years later.

5.1.8 IMPACT ON PHASE-OUT OF OZONE-DEPLETING SUBSTANCES

24. The project aimed to phase-out 679 ODP-tonnes in 4 years, and succeeded in phasing out 564 ODP-tonnes, so 83% of the target was achieved. Kazakhstan met its phase-out commitments on time for halon, methyl chloroform and carbon tetrachloride, and was one year late for CFCs. Kazakhstan initially achieved its commitment to phase-out methyl bromide imports by 1 January 2004, but imports have re-started recently. Three Amendments of the Montreal Protocol have not been ratified.
25. Further details are available in Volume 2: Country Reports.

5.2 RUSSIAN FEDERATION SUMMARY

5.2.1 BACKGROUND

1. The Russian economy underwent substantial changes during the 1990s as it moved from a centrally-planned economy towards a free market system. In 1992 the Russian Federation Consumed³⁷ about 49,000 ODP-tonnes of ODS in aerosols (46% of total), refrigeration (27%), fire suppression (14%), foam (11%) and solvents (2%). The Russian Federation also produced 74,000 ODP-tonnes of ODS, about 10% of global ODS production.
2. In order to comply with the Montreal Protocol, the Russian Federation was supposed to phase-out the production and Consumption of halon by January 1994, and CFC, methyl chloroform and carbon tetrachloride by January 1996. The phase-out was achieved on time for methyl chloroform but not for the other ODS. Consumption in 1996 was 926 ODP-tonnes of halon, 12,359 ODP-tonnes of CFC, and 542 ODP-tonnes of carbon tetrachloride.
3. In the period 1995 to 2002, the Montreal Protocol adopted 6 Decisions expressing concern about the Russian Fed's failure to meet the Protocol's requirements, and urging action³⁸. In 1998 the Russian Federation made commitments to phase-out the production and Consumption of halon and CFC by 1 June 2000, and to phase-out Consumption of carbon tetrachloride and methyl chloroform by the same date.

5.2.2 INPUTS

4. GEF contributed \$8.5 million towards a Special Initiative project financed by international donors, to phase-out ODS production. GEF also provided \$48.1 million to phase out ODS Consumption, while co-finance of about \$24 million was provided by enterprises. The ODS project period ran from 1994 to 2005. The projects were managed by a Project Implementation Unit (PIU) which operated from 1995 to 2004. The PIU had 4 staff and 3 consultants, and worked closely with the World Bank personnel, the MNR and other relevant bodies.
5. The GEF project initially focused on aerosols and refrigeration, and was later expanded to refrigeration servicing, medical devices, foam, solvents and fire protection. The project (1) Assisted enterprises to phase-out ODS; (2) Strengthened institutional capacity for regulatory measures and other activities to support the phase out; and (3) Set up a PIU to manage/implement the phase-out.

5.2.3 IMPACT DRIVER I: GOVERNMENT COMMITMENT

6. *Institutions and legislation.* In 1992 the government formed an Inter-Agency Commission for Ozone Layer Protection (IAC), attached to MNR, which helped to prepare regulations and national ODS phase-out plans. In 1995-2001, various legislative measures were adopted, including a national programme to promote the production of ODS-free alternatives; a system for licensing the imports/exports of ODS and ODS-containing products; quantitative limits on ODS production, followed by a ban (except for authorised exemptions); a ban on new ODS production facilities; and restrictions on ODS production and consumption. Responsibility for environmental policy was spread among various bodies, and MNR was frequently reorganised.
7. *Customs and border security.* There are 126 regional Customs officers and 690 border checking points. Some training programmes were put in place to familiarise Customs

³⁷ 'Consumption' as defined by the Montreal Protocol = ODS production + imports – exports – exempted uses. ODS Consumption is the annual national supply of new ODS.

³⁸ Decisions VII/18, VIII/25, IX/31, X/26, XIII/17 and XIV/35 of the Montreal Protocol (Ozone Secretariat 2006).

officers with ODS issues. However, this was not effective due to personnel changes and the lack of ODS detection equipment.

8. *Awareness of ozone depletion.* The PIU organised publications and media coverage. Enterprises were informed of the need to phase out ODS by various different sources. There was no special programme in MNR to raise public awareness of ozone related issues.

5.2.4 IMPACT DRIVER II: ACTIVITIES IN REFRIGERATION AND FIRE SECTORS

9. *Training of refrigerant technicians.* In 2002, trainers from 24 regional refrigeration servicing centres were trained. The enterprises then organised the training of technicians in their region, using the project's training materials. More than 600 technicians were trained, but this was a small fraction of the total number. Legislation did not require the certification of technicians, with the result that ODS were poorly handled by many untrained technicians. Special training was provided in enterprises that installed flammable ODS substitutes, and the training was supervised by the local safety authorities.
10. *Equipment for capturing refrigerants.* The GEF project supplied refrigeration servicing centres (in about 24 regions) with equipment for recovery and reclaiming refrigerants so that CFCs could be re-used. While portable recovery machines were widely used, the refrigerant recycling machines were difficult to transport and were little used. Data on the quantity of refrigerant recovered were collected by PIU from 1998 to 2004 but no statistics were available. Overall the project in the refrigeration servicing industry was not implemented in a systematic manner and not based on a Refrigerant Management Plan.
11. *Fire protection sector.* The existing systems that were designed to use halon could not easily use substitutes, resulting in a demand for the capture and re-use of halon. Several enterprises acquired their own halon capture equipment, and recovered a total of more than 400 tonnes of halon in the period 2000-2008.

5.2.5 IMPACT DRIVER III: SUSTAINABILITY OF ENTERPRISES THAT ADOPTED ALTERNATIVES

12. The GEF project funds assisted with the purchase and installation of ODS-free equipment in 12 enterprises. The GEF evaluation team visited a selection of enterprises: two aerosol producers, one foam producer, two former ODS production facilities, a halon recycling company, a chemical research centre and one refrigerator producer, as well as two refrigeration servicing centres described in the Section above. In some cases the alternative technologies were selected without full discussion with the enterprises, and with limited examination of any business implications. The enterprises involved in the project became almost or exclusively ODS-free. The adoption of alternatives typically caused disruption and changes in production equipment and working practices, but training helped with the adaptation. Some have expanded their operations and increased the number of employees as a result of the project, while others have become more financially stable.
13. *Aerosol production.* GEF funded \$10.9 million to eliminate 2,317 ODP-tonnes of CFCs with alternative substances (hydrocarbons or CO₂) in two enterprises that manufacture products in aerosol spray cans. One enterprise had no complaints with the equipment supplied, except that the hydrocarbon storage had to be upgraded. Another enterprise received substantial upgrading of its facilities. Alternative CFC-free equipment was also provided to a pharmaceutical company making medical skin treatment aerosol products. However this enterprise is still making CFC-based MDI products. A CFC-free MDI is undergoing certification in the Ministry of Health.
14. *Foam production.* GEF provided funds of \$1 million to an enterprise for the adoption of alternatives for 39 ODP-tonnes of CFC in the manufacture of foams for building insulation. The transition to the new technology was not easy, and there were no training materials.

There was a significant initial cost for safety-related equipment and plant modifications, but the operating costs of the alternative were significantly lower than CFCs. The enterprise later bought more of the same equipment, to increase their production and product range.

15. *Refrigerator production.* In 1993 about 12 manufacturers in Russia produced about 3.5 million refrigerators per year. Economic transformations led to production of less than 1.2 million in 1996. The project provided funds of \$0.6 million to one domestic refrigerator producer to phase-out 115 ODP-tonnes of CFCs. The enterprise established strong business relations with another enterprise in Belarus that received GEF assistance, increasing the product range and financial security.
16. *Refrigeration servicing and repair.* The service centres that received equipment for capturing CFCs reported that the lighter and portable machines were valued because they avoided the need to buy refrigerant. Equipment that fitted existing CFC refrigerators with a different refrigerant was not used by the enterprise because the cost was too high for clients. Enterprises reported that CFC-dependent refrigerator components were still being imported, which increased the demand for CFCs. Repairing a domestic refrigerator by installing a CFC compressor (available from Belarus) was about half the cost of buying a new refrigerator.
17. *ODS production.* Funds from the Special Initiative were used to pay compensation to an ODS producer for shutting down the production of 6,124 tonnes of CFCs and eliminating ODS production capacity. The enterprise considered that the payment was appropriate for shutting down production, but noted that operating costs increased in the facility due to an imbalance in the production of various chemicals.

5.2.6 THREATS THAT COULD UNDERMINE ODS PHASE-OUT

18. *Government commitment.* At present the major focus of the Ministry of Natural Resources and Ecology (MNRE) is the development of financial returns related to mineral resources, leaving other environmental issues such as ozone protection at risk because they receive less staff time. The PIU was abolished in 2004 when the project finished. Data on ODS is not collected in a systematic way. Legislation is lacking in key areas, such as a ban on releasing ODS from equipment. Up-to-date manuals and guidelines on alternatives and good practices have not been disseminated in a systematic way. ODS phase-out plans have not been updated to support the adoption of ODS-free alternatives in medical aerosols, solvents, fire protection, and sectors that use HCFCs. World Bank personnel advised that \$3 million remained in the Special Initiative project account, which could be disbursed if well planned proposals were put forward by MNRE.
19. *Illegal trade.* Enterprises reported that CFCs were easily available on the local market; the labels indicated that China might be the source. There is a risk that illegal trade will increase due to a lack of comprehensive and effective border controls and policies. The Customs officers generally were not trained in ODS issues and lacked detection equipment.
20. *Continued CFC consumption.* Russia did not complete the phase-out of CFC consumption in two sectors (medical aerosols and solvents in aerospace) and annually requests special exemptions from the Montreal Protocol. These sectors need to take action to adopt suitable alternatives. Recent meetings between the aerospace sector and experts from the Montreal Protocol's technical panel may lead to some investigation of alternatives, but comprehensive plans need to be developed and implemented.
21. *Halons.* National experts estimated that 5,000 to 11,000 tonnes of halon were still installed in fire-fighting equipment, creating a strong demand for imports of used halon. Emissions of halon will continue without legislation and a national plan to ensure that alternatives are adopted.

5.2.7 IMPLEMENTING AGENCIES

22. The World Bank was the implementing agency for the GEF projects. Institutional strengthening was not fully achieved, with the result that legislation is absent in some areas, and sector-wide plans were often absent. The World Bank's economic viability test of enterprises may have been too stringent in some sectors. Some enterprises were not adequately consulted about the choice of alternative technology. The calculation of funding needs was based on unrealistic figures in several cases. For example, the funds for two aerosol enterprises were based on a maximum capacity of 20 million aerosols per year, although their production level was 4.3 and 6 million in 1996. GEF funds were also used for substantial upgrades at a factory site (such as new buildings to avoid production downtime, road paving, and water and power connections) although general upgrading is not eligible for funding under the Montreal Protocol and MLF guidelines.

5.2.8 IMPACT ON PHASE-OUT OF OZONE DEPLETING SUBSTANCES

23. The Russian Federation phased out the production and Consumption of methyl chloroform before the committed date, but was 6 months late in meeting the target for halon. Production and Consumption of carbon tetrachloride (for non-exempt uses) occurred after the phase-out target, but appears to have been zero since 2003. The production and Consumption of CFCs was mainly phased out in 2000, but some continued at low level. The closure of most ODS production by the Russian Federation was considered to have reduced the global illegal ODS trade at that time. Currently, CFCs are still produced/consumed for two uses (medical aerosols and aerospace), and the Russian Federation continues to rely on the annual approval of special exemptions by the Montreal Protocol for these CFCs.
24. Further details are available in Volume 2: Country Reports.

5.3 UKRAINE SUMMARY

5.3.1 BACKGROUND

1. Ukraine became independent of the Soviet Union in 1991, resulting in many political and economic changes. Economic expansion occurred in 2000 to 2007 until the recent global economic crisis. In the early 1990s Ukraine used ODS in refrigeration (about 51% of total ODS), aerosols (22%), solvents (14%) and foam (13%).
2. In order to comply with the Montreal Protocol, Ukraine was supposed to phase-out the Consumption of halons by January 1994, and to phase-out Consumption of CFCs and two other types of ODS by January 1996. However, the phase-out date was not achieved. Consumption in 1996 increased to 1,402 ODP-tonnes of CFCs, 64 ODP-tonnes of halons, and 8 ODP-tonnes of methyl chloroform and carbon tetrachloride. In 1998 the production of carbon tetrachloride increased to 2,820 ODP-tonnes. The Montreal Protocol discussed the problems and adopted Decisions³⁹ in 1995 and 1998 which requested Ukraine to take relevant action. Ukraine made commitments to phase out the Consumption of CFCs, halons, methyl chloroform and carbon tetrachloride by 2002. The Protocol meeting specifically rejected Ukraine's request to continue imports of CFCs until 2010 for servicing refrigeration equipment.

5.3.2 INPUTS

3. GEF provided financial resources of \$23.2 million to assist Ukraine to phase out 1,464 ODP-tonnes of ODS and to comply with the Montreal Protocol's requirements. This was supplemented by co-financing of about \$4 million from enterprises. The project ran from 1998 to 2004.
4. The project infrastructure was slow to be established. A Project Implementation Unit (PIU) was set up and operated under the Inspectorate of the Ministry of Environmental Protection (MEP). It took some time to develop suitable local expertise for handling procurement, finance and management. World Bank staff provided overall supervision. The project faced a number of administrative barriers, such as frequent changes in Ministry personnel and the slow clearance of documents by government departments such as the Treasury. There were lengthy delays in Customs clearance for equipment purchased by the project.
5. The project carried out the following activities: (1) installed non-ODS technologies in about 8 enterprises that used ODS; (2) provided training and set up several service centres for re-using CFCs; (3) set up a centre for storing and re-using halon; (5) developed a national legislative framework that aimed to support ODS phase-out.

5.3.3 IMPACT DRIVER I: GOVERNMENT COMMITMENT

6. *Institutions and legislation.* From 1998 to 2004 the government adopted a number of legislative measures relating to ODS, which included a system for licensing the import/export of ODS and products containing ODS; banning ODS imports/exports except for exempted uses; a programme for the production of fire extinguishing equipment based on ODS-free substances; and a programme for ending the production and use of ODS in Ukraine. Import permits and licenses were checked by the regional ecological inspectors and Customs. However the roles and responsibilities of the environmental Ministry and inspectorate were poorly defined with respect to ODS, which resulted in duplicated effort and uncompleted tasks in some areas. In second quarter of 2009, the Ozone Unit was established and four posts existed within the Department of Air Protection and Climate were filled. The

³⁹ Decision VII/19 and X/27 on Compliance with the Montreal Protocol by Ukraine (Ozone Secretariat 2006).

responsibilities related to ODS issues were transferred to the newly organized branch on ozone and greenhouse gases.

7. *Customs and border security.* The involvement of Customs officers in ODS activities is an important cornerstone of any national policy on ODS. There are about 180 customs entry points. However, the GEF project did not provide ODS detection equipment and training. The MEP Inspectorate took the initiative to hold joint annual training courses on ODS issues with Customs officers and ecological inspectors. They used UNEP's publicly-available documents on illegal trade, and used a questionnaire to determine if officers followed the legislative and licensing requirements. However, no cases of illegal trade were reported, and the GEF evaluation team was unable to obtain statistics on the percentage of Customs officers that were trained.
8. *Awareness of ozone depletion.* There was no widespread awareness campaign, but the PIU mounted a modest public information programme. The PIU informed the enterprises that were involved in the project about ODS problems and alternatives. The PIU expected enterprises to pass on this information to other ODS-using enterprises that did not participate in the project. The impact cannot be evaluated quantitatively because, as in many other countries, a baseline to measure the impact was not developed.

5.3.4 IMPACT DRIVER II: ACTIVITIES IN REFRIGERATION AND FIRE PROTECTION SECTORS

9. *Training of technicians who handle refrigerants.* The GEF project aimed to eliminate about 500 tonnes of CFC imports, by enabling technicians to capture and re-use existing CFCs when they serviced or repaired refrigeration equipment. Two training centres were established with qualified instructors, equipment and manuals. More than 300 technicians (a modest percentage of the total) were trained in 6 regional servicing centres. The training is now paid for by the technicians. National legislation does not require qualifications, so there is no incentive to undertake training.
10. *Equipment for capturing refrigerants.* The project distributed a large number of machines for capturing ODS to regional refrigeration servicing centres that were connected to many smaller outlets.
11. *Fire protection sector.* GEF funds of \$493,900 assisted in the establishment of a halon collection and cleaning facility at an institute. Halon was collected using a specially equipped truck. Purified halon was returned to the users. GEF also provided \$275,000 to establish a halon information centre at the national fire safety research centre. It aimed to compile data, draw up a Halon Management Plan, review international codes and standards, and promote the introduction of ODS alternatives. About 17 harmonised standards were finalised, while about 6 remain to be developed. However, an estimated 1,511 ODP-tonnes of halon remains installed in equipment. Much of this is in the fire-suppression systems of about 16 gas pumping stations located on gas pipelines.
12. *Results of ODS capture and destruction.* In the period 2005-2008 almost 8 tonnes of halon was captured. Data on captured and recycled CFCs were collected regularly and reported to the PIU during the period when it existed. However, the GEF evaluation team was unable to obtain reports on the quantities of CFCs. ODS destruction facilities are not available in Ukraine.

5.3.5 IMPACT DRIVER III: SUSTAINABILITY OF ENTERPRISES THAT ADOPTED ALTERNATIVES

13. The GEF evaluation team visited three enterprises: A refrigerator manufacturer, an aerosol manufacturer, and a refrigeration servicing centre. In total, the GEF project assisted 8 or 9 enterprises to adopt alternative technologies. Other companies that applied for funds failed to provide necessary information or did not pass the financial viability test required by the

World Bank. The transition at two enterprises was particularly complex so the PIU designated a procurement expert to assist the whole implementation process, and this measure proved effective.

14. *Refrigerator manufacture.* GEF funds of \$9.8 million were provided to a domestic refrigerator manufacturer (NORD) to eliminate about 500 ODP-tonnes of CFCs. The enterprise was actively involved in the choice of technology and selection of suppliers. The adoption of non-ODS technology required additional work on new materials, compatibility, and other aspects, and suppliers of new parts often charged more. However, the enterprise was satisfied with the transition, and had experienced strong growth in production until the global economic crisis in 2008.
15. *Aerosol manufacture.* GEF provided about 3.1 million for eliminating about 500 ODP-tonnes of CFCs in an enterprise (Ukrainian Aerosols) that produced aerosol products for households and vehicles. Propane alternatives were adopted and, in contravention of GEF guidelines, HCFC ODS were also adopted. The installation of equipment took more than a year, and during this time the manufacturer was not able to operate. However, the business recovered later. Despite various deficiencies, the enterprise concluded that the project had a positive impact on its operations.
16. *Refrigeration servicing.* The machines for capturing ODS were valued by enterprises because they were portable and generated additional income which improved profitability. When enterprises noticed these benefits they often purchased additional machines.

5.3.6 THREATS THAT COULD UNDERMINE ODS PHASE-OUT

17. *Government commitment.* The most recent legislation on ODS was adopted in 2004, although there remain many areas where additional controls and updates are needed to strengthen existing regulations. At the time of this GEF evaluation, there were no staff in the ozone office in the environmental Ministry (all 4 staff posts were vacant). The roles of the environmental Ministry and Inspectorate were not clearly defined. There were no plans to adopt alternatives for most of the remaining installations that use halons, and the Halon Management Plan was not fully implemented. HCFCs have been adopted as interim CFC substitutes to a significant extent in some sectors, and this problem remained to be addressed.
18. *Illegal trade.* The risk of illegal trade appeared high. Customs officers did not have ODS detection equipment, and the extent of training was not clear. CFCs were still available on the market in Ukraine and a demand for CFC remained, particularly for industrial refrigeration equipment.
19. *Methyl bromide and carbon tetrachloride.* The Ministry believed that about 100 tonnes of methyl bromide is in stock and that about 8-10 tonnes are used per year for stored grain. The quantity of methyl bromide used for quarantine (which is exempt from the Montreal Protocol's phase-out requirements) and for normal purposes needs to be clarified. GEF allocated \$4.7 million in 2005 to assist Ukraine to phase-out methyl bromide and carbon tetrachloride. However, the project was in abeyance due to the complex political process in Ukraine.

5.3.7 IMPLEMENTING AGENCIES

20. The World Bank was the implementing agency for the GEF project. Initially there were frequent changes in the Bank's staff in Ukraine which complicated communications and slowed activities. The presence of Russian speaking staff in the Bank was an asset. Initially, the disbursement of funds for institutional strengthening was delayed, and the start up of the PIU was not easy. Equipment supplied to the refrigeration servicing sector was selected

by international consultants as a result of the bidding process, and enterprises in the sector reported that they were not consulted at that stage.

5.3.8 IMPACT ON PHASE-OUT OF OZONE-DEPLETING SUBSTANCES

21. Ukraine achieved its commitments of phasing out Consumption of halons, methyl chloroform and carbon tetrachloride before 2002. However, the imports of CFCs continued until 2005 for medical aerosols, as a special exemption authorised by the Montreal Protocol. The GEF project assisted in the phase-out of 800 - 1,400 ODP-tonnes, based on the historical consumption reported from 1997 to 2001.
22. Further details are available in Volume 2: Country Reports.

5.4 UZBEKISTAN SUMMARY

5.4.1 BACKGROUND

1. Uzbekistan became independent of the Soviet Union in 1991. Uzbekistan used CFCs and, to a lesser extent, other common types of ODS. In the mid-1990s there was a significant domestic demand for CFCs for refrigeration and air-conditioning equipment as a result of company privatisation and expanded economic activity. Uzbekistan did not produce ODS, but imported them mainly from the Russian Federation.
2. In order to comply with the Montreal Protocol, Uzbekistan was supposed to phase-out the imports (consumption) of halons by January 1994, and to phase-out by January 1996 its imports of CFCs and two other types of ODS. The phase-out was achieved on time for halons, but imports of CFCs and others continued after the phase-out date (imports in 1996 amounted to 260 ODP-weighted tonnes of CFCs, and 12 ODP-tonnes of two other types of ODS). The Montreal Protocol discussed this problem and in 1998 adopted a Decision⁴⁰ in which Uzbekistan made commitments to adopt national legislation to control the imports of ODS chemicals and equipment using ODS, and to complete the required phase-out of ODS imports by 2002.

5.4.2 INPUTS

3. GEF provided financial resources of \$3,203,364 to assist Uzbekistan to phase out 142 ODP-tonnes of ODS in the refrigeration sector and to comply with the Montreal Protocol's requirements. This was supplemented by \$31,000 from the government and \$121,830 (in-kind) from a refrigerator manufacturing factory. The GEF project period ran from 1998 to 2007. UNDP-UNEP were the implementing agencies.
4. The State Committee for Nature Protection (SCNP) was responsible for preparing and implementing the sub-projects, in co-operation with international consultants designated by the implementing agencies, as well as monitoring and reporting on their progress. A National Ozone Unit (NOU) was set up in 2001, almost 2 years after the sub-projects had started. It was funded by the State budget, revenue from ODS licence fees, and international sources such as GEF. The SCNP also had inspection staff in 15 regional offices around the country, which issued compliance certificates to enterprises for ODS-related activities and received ODS tax payments.
5. The GEF project focused on CFCs in the refrigeration sector. The project (1) provided training and equipment for refrigeration servicing technicians so they could re-use existing CFCs; (2) eliminated the use of CFCs in the manufacture of domestic refrigerators by providing alternative equipment, and (3) strengthened the government's capacity to manage the phase-out of ODS, including the training of Customs officers to combat illegal trade in ODS.

5.4.3 IMPACT DRIVER I: GOVERNMENT COMMITMENT

6. *Institutions and legislation.* A number of legislative measures were adopted to reduce and phase-out ODS, including a system that controlled the type and quantity of ODS imported/exported; customs controls; a ban on imports of most CFCs and imports of refrigeration and air-conditioning equipment containing CFCs; a tax on ODS imports and products containing ODS; obligatory certification of goods such as refrigerators, air conditioners and heat pumps; requirements for qualifications; and requirements for enterprises to report annually on the type and quantity of ODS imported, used and stored.

⁴⁰ Decision X/28 on Compliance with the Montreal Protocol by Uzbekistan (Ozone Secretariat 2006).

The NOU maintained a database of information reported by enterprises. Environmental inspectors inspected enterprises, verified reports, and followed-up on suspected infringements.

7. *Customs and border security.* The NOU established a range of activities with the SCNP and the State Customs Committee (SCC) to combat illegal trade in ODS. The GEF project supplied SCC with 19 refrigerant identifier machines to detect illegal refrigerants. In 2002-2007, the GEF project trained 30 officials as trainers, and trained more than 320 customs officers and inspectors. The officers learned about ODS issues, the legislation, how to identify different types of ODS and inspect documentation. They sat an examination at the end of the course. Training was supported by manuals about controlling the import and exports of ODS products and equipment. Customs officers continue to check the documentation for ODS, and test the refrigerant as necessary. Fines for smuggling ODS are small, but drivers who commit offences face extremely long administrative delays on future journeys.
8. *Awareness of ozone depletion.* In 2001-2003 the NOU carried out various activities aiming to build public support for legislation and policies on ozone layer protection. This included 25 articles in the mass media, participation in 33 radio and TV shows, 41 lectures, distribution of 4,400 books for children and 14,000 calendars, a postage stamp, a play, and annual ecological festival. The impact of these awareness activities cannot be evaluated quantitatively because, as in many other countries, a baseline to measure the impact was not developed.

5.4.4 IMPACT DRIVER II: ACTIVITIES IN REFRIGERATION SECTOR

9. *Training of technicians who handle refrigerants.* The GEF project aimed to capture and re-use existing CFCs, following the ban on imports of new CFCs, by providing training and some equipment to the technicians who service and repair refrigeration equipment. About 75% of technicians (1,648 personnel) were given comprehensive theoretical and practical training in 2001-2007. The training was assessed as satisfactory by employers and the GEF evaluation team. Quality control practices included expert supervision of trainers during the early stages (an issue that was not addressed in other countries) and a requirement for technicians to pass an examination. Technicians were encouraged to update their knowledge every 3-4 years.
10. The NOU identified several problems and drafted relevant legislation. However, the adoption of new legislation is expected to take several years. The draft legislation aims to tackle the problem of an estimated 450-500 unregistered technicians, and to adopt regulatory standards and codes of practice for handling refrigerants.
11. *Equipment for capturing refrigerants.* The GEF project supplied 300 manual pumps, 430 machines for capturing refrigerants like CFCs, and a range of other equipment. The equipment was distributed to 100 enterprises, both small and large, focusing on the most populated areas. The NOU maintained a database on equipment (location, functionality, and the amount of ODS captured), and re-distributed the equipment in cases where it was not being used effectively. The enterprises and NOU reported that the equipment was generally reliable, but new filters were needed frequently (every 75 hours of operation) and filters were in short supply.
12. *Results of ODS capture and destruction.* Enterprises that received equipment were obliged in the contract to report on the amounts of ODS captured and decontaminated. About 117 tonnes of CFCs were collected from equipment, mainly in the first 3 years of the project. The NOU noted that some enterprises collected more ODS than others, so they re-allocated the equipment to more efficient enterprises with the aim of increasing the collection of ODS.

Legislation adopted in 2000 banned the disposal of refrigerators in landfill, and required ODS in the cooling circuits (but not in the foam) to be collected by metal recycling facilities. Uzbekistan does not have facilities for the destruction of unwanted ODS, except for small-scale equipment which is costly and slow. As a result servicing technicians often store unwanted ODS, where it can slowly leak, emitting ODS to the atmosphere.

5.4.5 IMPACT DRIVER III: SUSTAINABILITY OF ENTERPRISES

13. *Refrigerator manufacture.* Uzbekistan has one manufacturer of domestic refrigerators (SINO), a state enterprise that is regarded as strategically important. In the early 1990s SINO made about 210,000 fridges per year, however the Soviet market collapsed in the mid-1990s and production fell to less than 28,000 fridges per year. GEF provided financing of \$1.5 million for equipment that used ODS-alternatives for fridge manufacture, with the aim of eliminating 35 ODP-tonnes of CFCs. SINO provided co-finance of about \$3-3.5 million. The enterprise was satisfied with the equipment. However, the project took 15 months longer than planned. Further comments on the SINO project are made in the Section 5.4.7 on Implementing Agencies below.
14. *Servicing refrigerators:* The GEF evaluation team interviewed 5 enterprises, including large and small refrigeration service and repair operations, and a refrigerated railway wagon refurbishment workshop. Enterprises valued the training of technicians because it improved their skill and volume of work. One enterprise reported that some equipment was unsuitable and two mentioned difficulties in obtaining filters or spare parts. Other enterprises found the equipment useful, and two reported that it helped their profitability.

5.4.6 THREATS THAT COULD UNDERMINE ODS PHASE-OUT

15. *Illegal trade.* Government officers have detected numerous cases of illegal ODS imports since 2002. An enterprise informed the GEF evaluation team of the high risk of illegal trade, noting that the black market price of CFC-12 is cheaper than alternative refrigerants. In 2008 the NOU formally requested an increase in customs staff. The penalties for illegal imports are relatively small at present.
16. *Halons.* In 2000 Uzbekistan banned all imports of halons, except for authorised exemptions. Halon is used in fire extinguisher systems in about 22 aircraft, and some used halons are imported for re-filling⁴¹. However the national plan for ODS did not contain plans to address the use of halon. There was no evidence of a Halon Management Plan.
17. *Methyl bromide.* This pesticide is imported and used for quarantine treatments, a sector that is exempted from the Montreal Protocol's phase-out requirements. There was no evidence of strict tracking and accountability procedures to ensure that any methyl bromide imported for quarantine is not diverted to other uses.
18. *Government commitment.* The government is fully committed to eliminating the use of all ODS, and much has been accomplished. However, additional legislation and action is needed in some areas, such as measures to address HCFC imports, and to promote the adoption of environmentally-friendly alternatives. The adoption of new legislation tends to be a slow process.

5.4.7 IMPLEMENTING AGENCIES

19. UNDP-UNEP was the implementing agency for the GEF project. UNDP did not follow MLF guidelines when drafting the SINO factory project budget because the funding was calculated on a production run of 250,000 fridges per year, rather than actual production

⁴¹ Imports of used ODS are not counted when the Montreal Protocol calculates annual ODS 'consumption'.

(which has averaged 4,760 fridges per year since 2003). As a result, the funding level was about 10 times higher than permitted under MLF guidelines. The SINO project was also slow to make progress, so the NOU made 18 visits to the factory to provide assistance and supervision that UNOPS failed to provide. There was a lack of clarity in operational procedures and other long delays by agencies, such as a 17-month delay from the signing of the project until release of the first payment. UNEP was late in delivering training manuals and paying for training. More recently, GEF approved a continuation of an institutional strengthening project in April 2007, but as at May 2009 the NOU had not received the funds.

5.4.8 IMPACT ON PHASE-OUT OF OZONE-DEPLETING SUBSTANCES

20. Uzbekistan's project achieved the objective of phasing out 142 ODP-tonnes of ODS. The government has reported zero imports (consumption) of all relevant ODS since 2002. Uzbekistan also met the targets and additional commitments set by the Montreal Protocol Decision in 1998⁴².
21. Further details are available in Volume 2: Country Reports.

⁴² Decision X/28 on Compliance with the Montreal Protocol by Uzbekistan.

6

COMPARISON OF AGENCY AND DONOR PERFORMANCE

6.1 SCOPE AND OBJECTIVE

1. The GEF Project to phase out ODS in 18 CEITs was implemented by the World Bank and UNDP-UNEP. Although the approaches of the Implementing Agencies were similar, of interest to this evaluation was whether there would be differences in the achievements in ODS reduction and phase out in the CEITs where each Agency was responsible, by examining such parameters as the total expenditure, the quantity phased out, how fast the ODS was phased out, and the cost-effectiveness. The quantitative methodology used in this Chapter was described in Chapter 3: Evaluation Framework.
2. This evaluation also compared the GEF funding of the phase out of ODS in CEITs with the same activity funded by the Multilateral Fund (MLF)⁴³ in developing countries. The GEF selected from the 18 CEITs four of them for in-depth evaluation: Kazakhstan, the Russian Federation, Ukraine and Uzbekistan. These CEITs were compared with selected developing countries that had similar Gross Domestic Product (GDP), ODS Consumption and per capita income: Egypt, Brazil, Cameroon and Romania.
3. The relationship between GDP and reported ODS Consumption was also examined to determine to what extent the GEF and MLF financial assistance had affected ODS Consumption and, moreover, whether this financial assistance could effectively decouple⁴⁴ ODS Consumption from GDP. If this were to be the case, it would have useful implications for funding interventions in other portfolios such as POPs and Climate Change.
4. Firstly, this Chapter reports on the work that compared:
 - 1) The performance of the Implementing Agencies (World Bank / UNDP-UNEP) in their activities that led to the phase out ODS in 18 CEITs;
 - 2) The performance of the donor organisations (GEF / MLF) in their work to phase out ODS in the four selected CEITs (for the GEF) and the four selected developing countries (for the MLF).
5. In each of 1) and 2) above, the criteria that were used for these comparisons were:
 - 3) Total expenditure;
 - 4) Amount of ODS phased out;
 - 5) Time required to phased out ODS;
 - 6) Cost-effectiveness;

⁴³ The phase out of ODS in developing countries is funded by the Multilateral Fund (MLF). The GEF and the MLF have similar operational modalities: They both engaged the World Bank and UNDP-UNEP to implement the ODS phase out in their respective country portfolios.

⁴⁴ Decoupling in this context refers to the ability of an economy to grow when environmentally-damaging chemicals and technology that are important to the economy are reduced and replaced with environmentally-friendly technology.

7) Efficiency of expenditure.

6. Secondly, this Chapter determines the correlation between GDP and ODS Consumption in four selected CEITs (GEF-funded countries) and four selected developing countries (MLF-funded countries) to examine the value of the GEF and MLF finance in promoting CEIT and developing country compliance with the Montreal Protocol, and the value of the GEF and MLF finance in decoupling ODS Consumption from GDP.
7. Thirdly, this Chapter reports on work that examined the impact of the funding on improving compliance of CEITs with the requirements of the Montreal Protocol, as measured by the reduction in annual appearances by CEITs before the Protocol's Implementation Committee. Almost 84% of the CEITs in the GEF portfolio had experienced difficulty with compliance, and one of the aims of the finance was to assist the CEITs to bring their ODS Consumption in line with the requirements of the Montreal Protocol. Compliance with the Montreal Protocol by CEITs was therefore an important measure of success for the GEF.

6.2 PHASE OUT OF PRODUCTION

8. Although '*production*' is part of the '*Consumption*' equation⁴⁵ used in the Montreal Protocol, this evaluation examined '*production*' separately as it was an important and specific component of the reduction and phase out of ODS in the Montreal Protocol. Halting production was the equivalent of '*turning off the taps*' and hence a fundamental and important step in eliminating ODS.
9. Ozone-depleting substances (ODS) were produced in three CEITs: the Czech Republic, the Russian Federation and Ukraine. It was not possible to compare the performance of the Implementing Agencies in the phase out of ODS production in the CEITs for reasons unique to each CEIT:
 - The Czech Republic used the GEF finance to phase out CFCs⁴⁶ and to fund a study to determine the commercial potential for the production of non-CFC substances, after CFC production had been closed down. The World Bank was the Implementing Agency;
 - The Russian Federation halted production of CFCs and halon with financial assistance from the 'Special Initiative' that involved only the World Bank as the Implementing Agency. CTC production was halted prior to the start of the GEF Project in 1998;
 - Ukraine requested funds to halt the production of methyl bromide but these were not approved by the World Bank as the Implementing Agency for Ukraine. The production site, which has not been used since 2002, has fallen into disrepair and is unlikely to be used in the future.
10. It was therefore not possible to compare Implementing Agencies as only the World Bank was only involved in these countries. Further information is available on the phase out of ODS production in the Czech Republic, the Russian Federation and Ukraine in Volume 2: Country Reports.

6.3 PHASE OUT OF CONSUMPTION

11. Annex 8 (on page 165) shows the total GEF finance provided to the Implementing Agencies (UNDP-UNEP and the World Bank) in each of the eighteen CEITs, the time required to phase

⁴⁵ Article 2 Definitions: Consumption = Production plus imports minus exports

⁴⁶ The GEF paid \$212,000 (actual expenditure) to phase out about 2000 ODP-tonnes of CFCs.

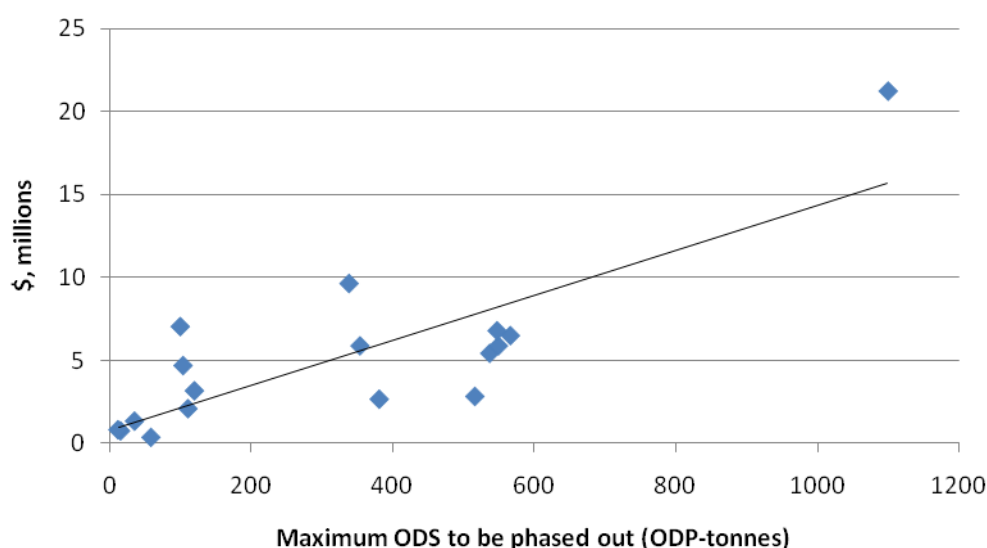
out the ODS, as well as other key statistics. The data in specific columns in this Annex were analysed to compare the performance of UNDP-UNEP with the World Bank. The results of this analysis are reported in the following Sections.

6.3.1 Expenditure

GEF: UNDP-UNEP and World Bank expenditure compared

12. For each country (Column 1 in Annex 8 and Implementing Agency (Column 2), the quantity of ODS to be phased out at start of the Project (Column 6) was the same as the maximum amount to be phased out (Column 7), except in the case of Latvia and the Russian Federation. After the start of the Project in both countries, Latvia imported ODS and the Russian Federation produced and stockpiled ODS, which resulted in more ODS Consumption than at the start of the Project. For these analyses, we used the maximum reported ODS consumption as the target to be phased out, even if it occurred after the start of the Project.
13. The total GEF funding in each country that was required to implement alternatives to reduce and phase out the maximum quantity of ODS is shown in Column 8 of Annex 8. In general, GEF expenditure in each country was correlated⁴⁷ with the quantity of ODS to be phased out in that country (Figure 7).

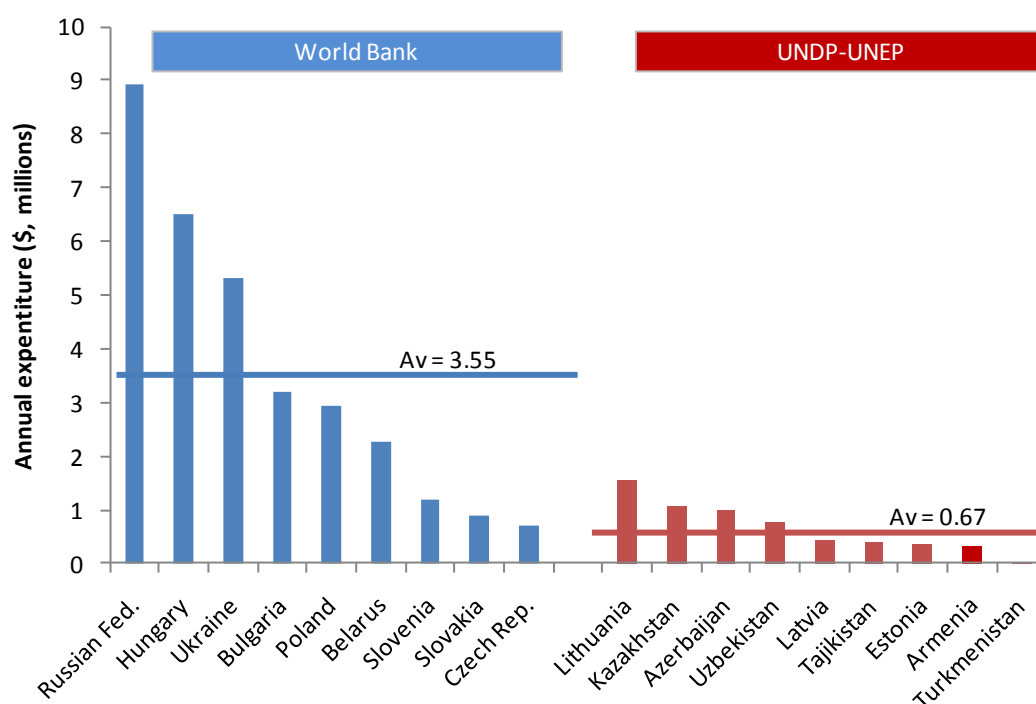
Figure 7: Allocation of finance by the GEF to 17 CEITs (excluding the Russian Federation), according to the amount of ODS to be phased out in each CEIT



14. The World Bank and UNDP-UNEP received \$106 million and \$25.69 million respectively for projects in nine CEITs each, making average expenditure between each Agency \$11.78 million and \$2.85 million per CEIT respectively. The World Bank as the Implementing Agency in Russia and Ukraine was allocated about 55% of total GEF funding to eliminate significantly larger ODS Consumption than in the other CEITs. At that time, the Russian Federation was one of the largest consumers and producers of CFCs in the world. Therefore the difference in expenditure between the Implementing Agencies was due to the greater size of the phase out Projects that were being implemented by the World Bank compared to UNDP-UNEP.
15. For these reasons, the annual expenditure (Column 9) was \$0.67 million in CEITs where UNDP-UNEP was the Implementing Agency compared to \$3.55 million in CEITs where the World Bank was the Implementing Agency (Figure 8).

⁴⁷ The Pearson product-moment correlation coefficient for ODS versus funding was 0.81 (excluding Russia)

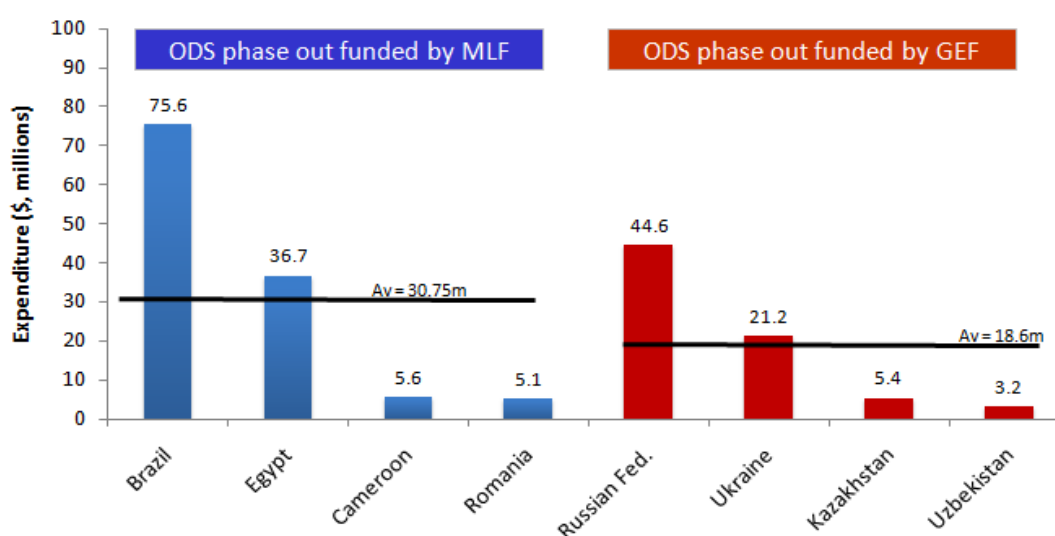
Figure 8: Annual expenditure by the World Bank and UNDP/UNEP (\$, million)



6.3.2 GEF and MLF expenditure compared

16. The expenditure of the MLF to phase out ODS in Brazil, Egypt, Cameroon and Romania averaged \$30.75 million in these countries, compared to \$18.6 million expended by the GEF in the Russian Federation, Ukraine, Kazakhstan and Uzbekistan (Annex 8 on page 165; Figure 9). Although the quantity of ODS that was phased out was similar between the GEF and MLF countries, the GEF expenditure averaged 40% less than MLF expenditure.

Figure 9: ODS phase out funded by the MLF in four developing countries (blue), compared with the ODS phase out funded by the GEF in four CEITs (red)

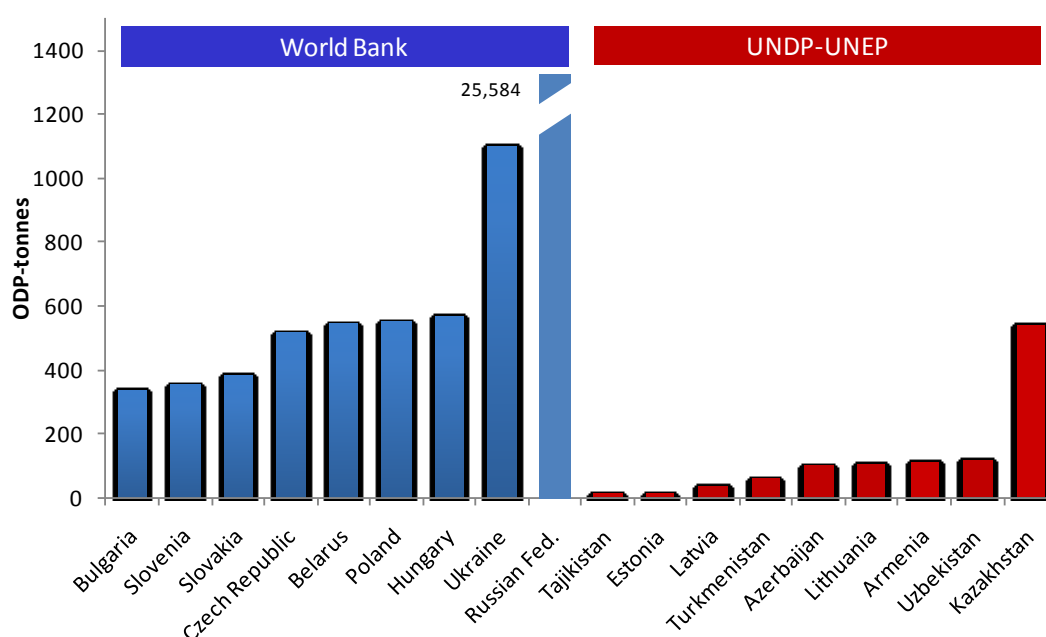


6.4 AMOUNT PHASED OUT

6.4.1 GEF: World Bank and UNDP-UNEP compared

17. The quantities of ODS phased out in CEITs by UNDP-UNEP and the World Bank are shown in Annex 8 (Column 7) and in Figure 10. The average amount phased out by the World Bank in nine CEITs was 3,326 ODP-tonnes. The average amount phased out by UNDP-UNEP in nine CEITs was 121 ODP-tonnes.
18. In general, the World Bank implemented projects that phased out large quantities of ODS, which was especially the case in the Russian Federation (25,584 ODP-tonnes) and Ukraine (11,000 ODP-tonnes). The World Bank project portfolio in the Russian Federation included investment projects to convert five aerosol enterprises that consumed about 9,800 ODP-tonnes, which was about 40% of the World Bank's ODS portfolio. Similarly, three large projects in Ukraine (two in aerosol and one in refrigeration manufacturing) led to phase out of about 1,000 ODP-tonnes of ODS.
19. In contrast, UNDP-UNEP targeted low-volume-ODS-consuming CEITs with ODS used mainly in the refrigeration servicing sector. In Kazakhstan, for example, about 60% of the ODS to be phased out was in the refrigeration sector, 23% in the solvent sector, and the remainder in foam and halon. There was a similar dominance of the refrigeration servicing sector in the other CEITs in the UNDP-UNEP portfolio.

Figure 10: ODS Consumption phased out by the World Bank and by UNDP-UNEP in CEITs



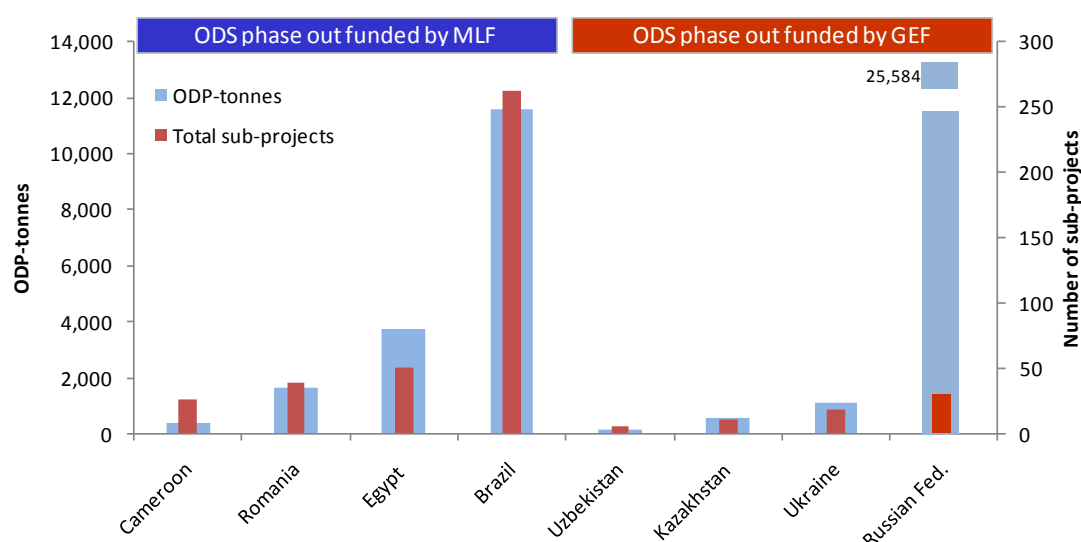
6.4.2 GEF and MLF compared

20. The quantities of ODS phased out in each of the selected MLF countries was generally larger than the amounts phased out in the selected GEF-funded countries, with the exception of the Russian Federation (see Figure 11) which alone phased out about 50% more ODS Consumption than the total of the four selected MLF-funded countries.
21. There were more sub-projects in each of the selected MLF-funded countries than in the selected GEF-funded countries (Figure 11). This was particularly evident in the Russian Federation where Implementing Agencies developed 39 sub-projects to phase out more than 25,500 ODP-tonnes of ODS, whereas the Implementing Agencies in Brazil developed about seven times as many sub-projects (263) to phase out about half of the quantity of ODS

that was phased out in the Russian Federation.

22. The large number of MLF sub-projects in Brazil was in response to the large number of small- and medium-sized enterprises in the foam and commercial refrigeration sectors. These enterprises proliferated in response to business opportunities in a free-market economy. In contrast, Russia had a centralized economy at the time of the project in which the government directed (*'command-and-control'*) the economic activities of relatively few large industrial enterprises.

Figure 11: Quantity of ODS phased out and number of sub-projects by the MLF and GEF

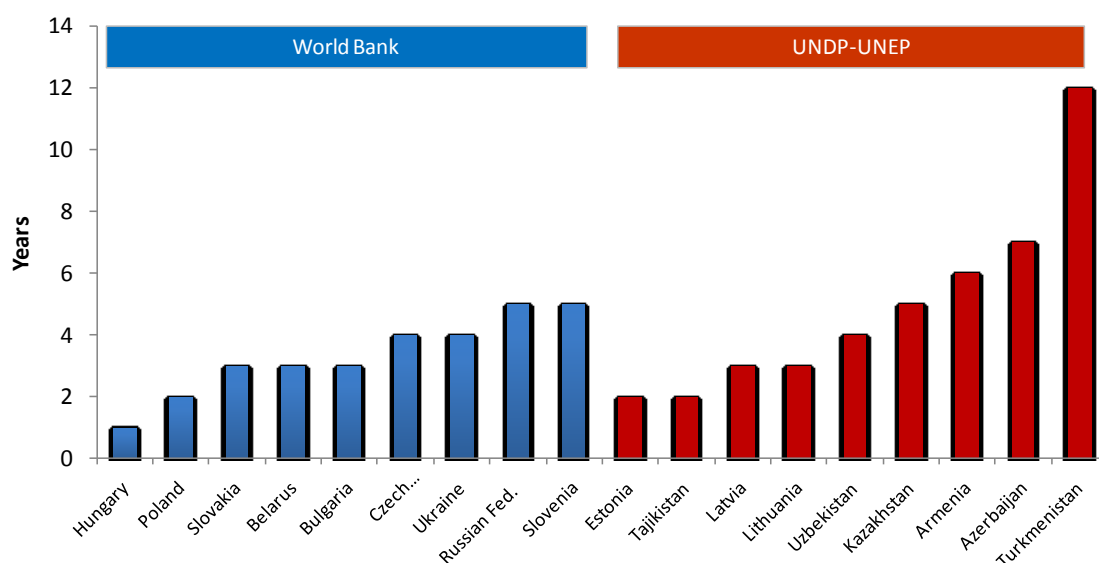


6.5 TIME TO PHASE OUT ODS

6.5.1 GEF: World Bank and UNDP-UNEP compared

23. For each CEIT (Column 1 in Annex 8) and Implementing Agency (Column 2), the time from the start of the GEF finance (Column 3) until the year when the country officially reported zero consumption of ODS (Column 4) were used to calculate the number of years that was required to phase out ODS in each country (Column 5).
24. The average time for ODS to be phased out in CEITs where the World Bank was the Implementing Agency was 3.3 years, compared to 4.9 years for UNDP-UNEP (Figure 12). However, without Armenia and Turkmenistan included in the UNDP-UNEP calculation, the average time for UNDP-UNEP reduced to 3.7 years, which was similar to the average time for the World Bank.
25. It would be reasonable to exclude Armenia and Turkmenistan from the calculation of the average as the Parties to the Montreal Protocol accepted a change in categorisation from developed to developing country for both countries, at their requests. This change of categorisation effectively extended their time to phase out ODS to 1 January 2010. The other CEITs were required to phase out ODS much earlier than 2010 to remain compliant with the Montreal Protocol.
26. The World Bank commenced operations in 1994 and UNDP-UNEP in 1998 (Annex 8 Column 4). The phase out of ODS occurred four years earlier in World Bank projects than in UNDP-UNEP projects, as the World Bank started about 4 years earlier. The Bank's early experience gained on the phase out of ODS in these countries was shared in regional workshops that were initiated by the Bank in the Czech Republic, Hungary, Slovenia, Poland and Russia from 1997 to 1999.

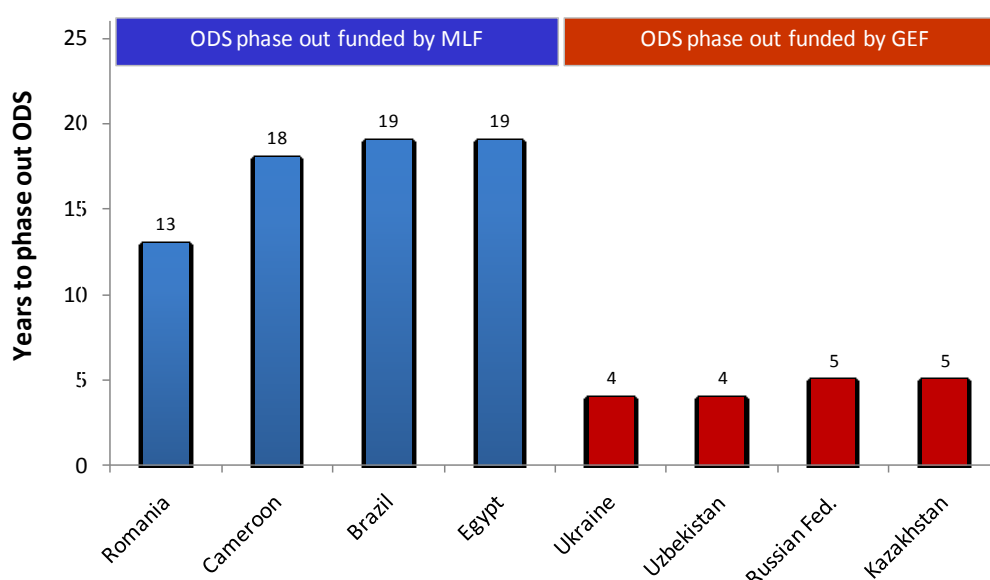
Figure 12: Years to phase out ODS in countries where the World Bank or UNP-UNEP was the Investment Agency



6.5.2 GEF and MLF compared

27. Implementing Agencies in selected countries where the MLF was the donor organisation required an average of 17.3 years to phase out ODS in those countries, which was significantly longer than the average time of 4.5 years in selected countries where the GEF was the donor organisation (Figure 13).

Figure 13: Years to phase out ODS in selected countries where the MLF or GEF was the donor organisation



28. The longer phased out time in the MLF-funded projects was because developing countries were permitted 10-years longer to phase out ODS than developed countries. This 10-year 'grace period' (or longer) acknowledges that the socio-economic infrastructure in developing countries is not as well-developed as in developed countries, and therefore the additional response time for technology transfer that is required to replace ODS with alternatives is warranted.

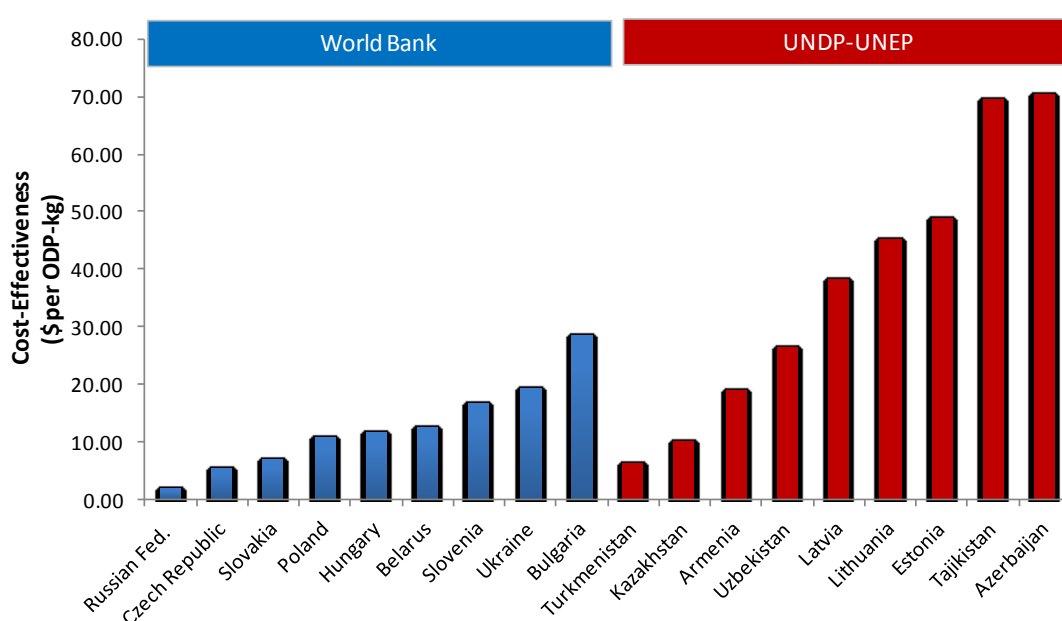
29. On the other hand, the data also demonstrate that in the four selected developing countries that, with levels of ODS Consumption and GDPs similar to the four selected CEITs, they could have eliminated ODS in a similar time as the four CEITs. Faster replacement of ODS technology with non-ODS would benefit both the ozone layer and climate (See Chapter 7: Theory of Change – Assessment of Impact Drivers and Sustainability).

6.6 COST EFFECTIVENESS

6.6.1 GEF: World Bank and UNDP-UNEP compared

30. The cost-effectiveness of the phase out of ODS in CEITs by the World Bank and UNDP-UNEP was calculated for each Agency by dividing their expenditure on sub-projects in each CEIT (Column 8 of Annex 8) by the quantity of ODS phased out (Column 6).
31. The average cost-effectiveness of the World Bank was \$12.58 for each ODP-kg phased out, whereas the average cost-effectiveness of the UNDP-UNEP was \$37.06 for each ODP-kg phased out (Figure 14). The World Bank was therefore about three times more cost-effective than UNDP-UNEP in phasing out ODS in CEITs.
32. The difference in the average cost-effectiveness between the Agencies was mainly due to the different ODS sectors that became the target of each Agency's responsibility to address, and the difference in cost per ODP-kg of each sector.
33. For example in the Russian Federation, the World Bank phased out 88.4% of its total ODS target by implementing five sub-projects in the aerosol sector at an average cost-effectiveness of \$3.38/ODP-kg. The share of funding for these five aerosol projects constituted 56.7% of the Bank's total investment in sub-projects in Russia. This sector was characterised by large and concentrated quantities of ODS e.g., 9,500 ODP-tonnes in 5 enterprises. In contrast, UNDP-UNEP phased out 37% of its total ODS target by addressing the refrigeration servicing sector that had an average cost-effectiveness \$34.6/ODP-kg. The refrigeration servicing sector was characterised by small and diffuse quantities of ODS e.g., 50 ODP-tonnes in 500 enterprises. Large and concentrated quantities of ODS were less costly to replace with alternative technology than small and diffuse quantities of ODS.

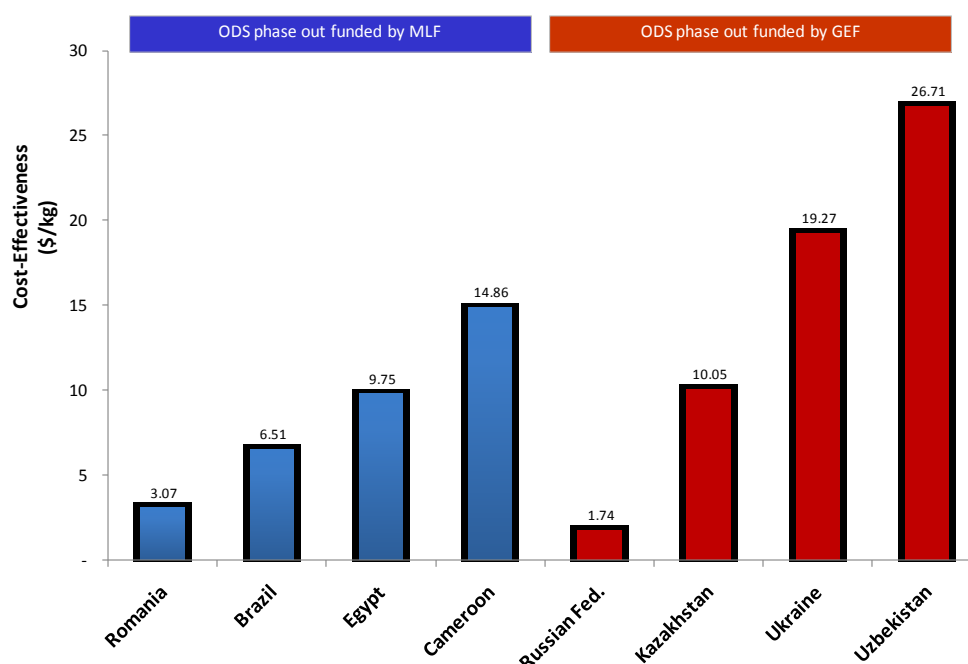
Figure 14: Cost-effectiveness of the phase out of ODS in CEITs where the World Bank or UNDP-UNEP was the Implementing Agency



6.6.2 GEF and MLF compared

34. The cost-effectiveness of the phase out of ODS in selected countries by the GEF and the MLF was calculated for each donor organisation by dividing their expenditure in each country (Column 8 of Annex 8 for the GEF; Column 5 of Annex 9 for the MLF) by the quantity of ODS phased out in each country (Column 7 of Annex 8 for the GEF; Column 4 of Annex 9 for MLF).
35. The average cost-effectiveness of the GEF was \$14.45 for each ODP-kg phased out, whereas the average cost-effectiveness of the MLF was \$8.55 for each ODP-kg phased out (Figure 15). The MLF was therefore about twice as cost-effective as the GEF in phasing out ODS.
36. The difference in the average cost-effectiveness between the donor agencies was due to a difference between them in the application of incremental costs, and a difference in overall approach by the donor agencies to phasing out ODS in CEITs and developing countries.
37. The Implementing Agencies under the direction of the MLF used cost-effectiveness thresholds for specific activities within each ODS sector (as \$/ODP-kg), as one of the criteria that determined the size of the project investment. In contrast, the Implementing Agencies under the direction of the GEF were not always constrained by cost-effectiveness thresholds and sometimes exceeded them and, moreover, included costs that the MLF would not have considered incremental. Examples are provided in Volume 2: Country Reports, and two of them are cited here as illustrative of the differences between the Donor organisations.
38. The SINO refrigerator manufacturing facility in Uzbekistan, UNDP-UNEP did not follow MLF guidelines at SINO because the size of the GEF investment was calculated on the historical production of 250,000 fridges per year, rather than actual production at the time. As a result, the funding level was about 10 times higher than permitted under MLF guidelines. As a second example, the investment cost at the Harmonia aerosol production facility in Moscow was based on a maximum production capacity of 20 million cans per year, which was 4-5 times the annual production at the time of project formulation. In addition, the GEF financed infrastructural changes that included new buildings, constructed and asphalted a new road and courtyard, connected water and power to the site and purchased four railway wagons. These infrastructural changes are not considered incremental costs by the MLF.
39. In overall approach, the GEF funded individual sub-projects whereas the MLF replaced the funding of individual projects by funding at the country level through Multi-Year Performance Agreements (MYA). The MYAs combine the funding commitment by MLF with the commitment of the country to achieve an annual phase-out target that equals or exceeds the country's obligations under the Montreal Protocol. The MYAs proved to be particularly efficient and cost-effective in addressing the phase out of ODS in the refrigeration servicing sector.

Figure 15: Cost-effectiveness of the phase out of ODS in selected countries where the donor agency was the MLF or the GEF



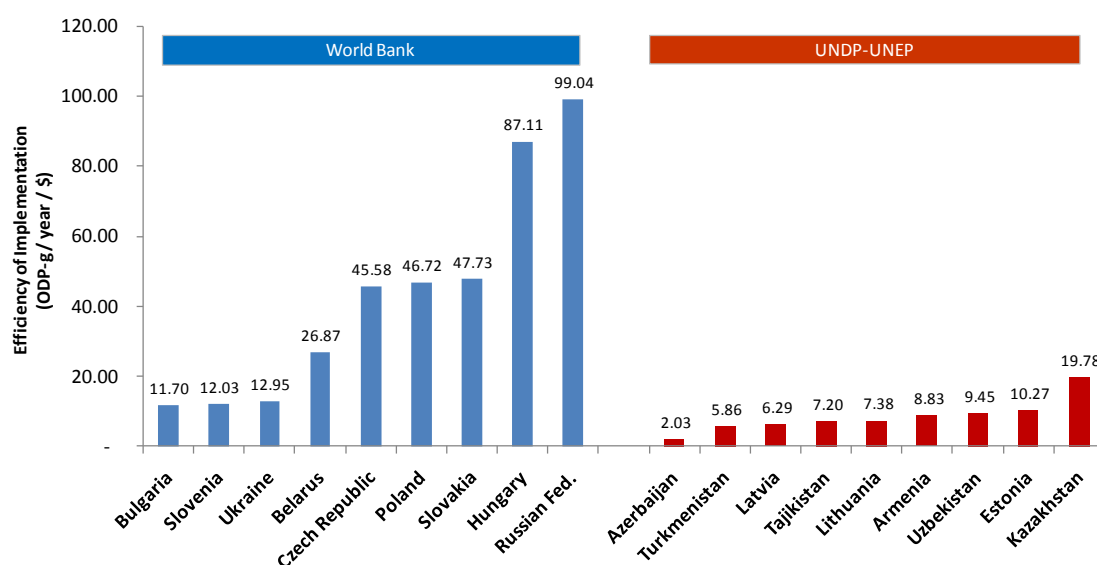
6.7 EFFICIENCY OF EXPENDITURE TO PHASE OUT ODS

6.7.1 GEF: World Bank and UNDP-UNEP compared

40. The Efficiency of Expenditure to phase out of ODS in selected countries by the World Bank and UNDP-UNEP was calculated for each Implementing Agency by dividing the quantity of ODS phased out (Column 6 Annex 8) by the number of years that was required for Consumption to be reported as zero after the start of the Project (Column 5 Annex 8) and by the expenditure of each Implementing Agency (Column 8 Annex 8).
41. The results showed that the World Bank “Efficiency of Expenditure” averaged 43.30 ODP-g per year per dollar of expenditure across the nine CEITs, whereas UNDP-UNEP averaged 8.56 ODP-g per year per dollar of expenditure across the nine CEITs (Figure 16). UNDP-UNEP was therefore 5-6 times less efficient at implementing the projects in the CEITs than the World Bank.
42. The difference in the average “Efficiency of Expenditure” between the Agencies was mainly due to the different ODS sectors that became the target of each Agency’s responsibility to address, the difference in cost per ODP-kg of each sector, and the time required to phase out the ODS in the CEITs.
43. For example in the Russian Federation project, the World Bank phased out 88.4% of its total ODS target by implementing five sub-projects in the aerosol sector at an average cost-effectiveness of \$3.38/ODP-kg. The share of funding for these five aerosol projects constituted 56.7% of the Bank’s total investment in sub-projects in Russia. This sector was characterised by large and concentrated quantities of ODS e.g., 9,500 ODP-tonnes in 5 enterprises. In contrast, UNDP-UNEP phased out 37% of its total ODS target by addressing the refrigeration servicing sector that had an average cost-effectiveness \$34.6/ODP-kg. The refrigeration servicing sector was characterised by small and diffuse quantities of ODS e.g., 50 ODP-tonnes in 500 enterprises. Large and concentrated quantities of ODS were less costly to replace with alternative technology than small and diffuse quantities of ODS.
44. The average “Efficiency of Expenditure” for UNDP-UNEP was also lower than the World Bank

because UNDP-UNEP were responsible for the implementation of projects in Armenia and Turkmenistan, which took longer to phase out ODS than in the other seven CEITs in their portfolio. The Parties to the Montreal Protocol accepted a change in categorisation from developed to developing country, as a result of a formal request to the Parties by both countries. This change of categorisation effectively extended their time to phase out ODS to 1 January 2010. Moreover, prior to the re-categorisation, both CEITs faced administrative difficulties which detracted from their work to phase out ODS (see further detail in Volume 2: Country Reports). The other sixteen CEITs were required to phase out ODS much earlier than 2010 to remain compliant with the Montreal Protocol.

Figure 16: Efficiency of expenditure in phasing out ODS by the World Bank and UNDP-UNEP (ODP-g/year/\$)

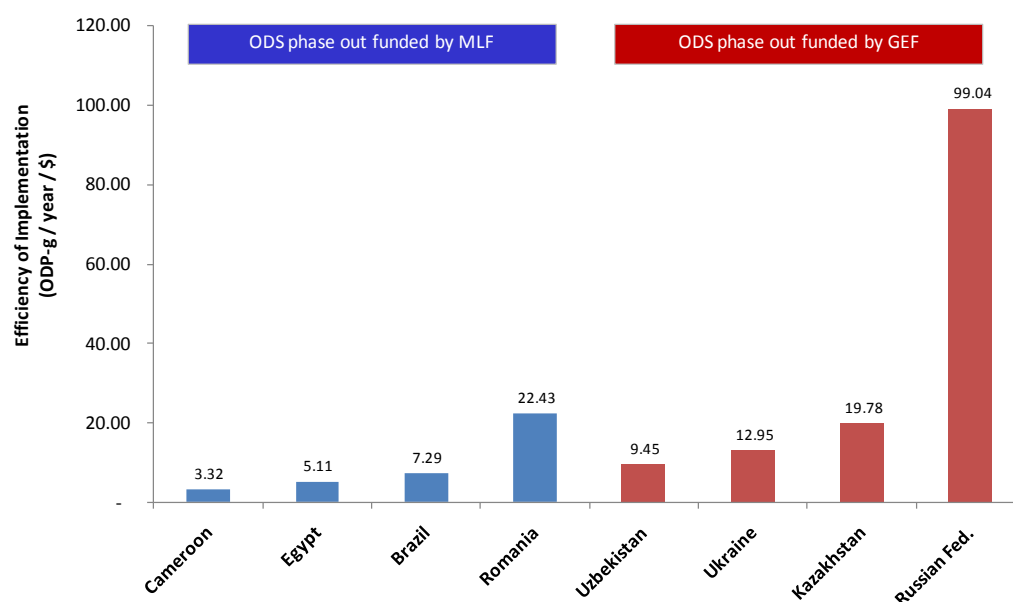


6.7.2 GEF and MLF compared

45. The Efficiency of Expenditure in the phase out of ODS in selected countries by the MLF and the GEF was calculated for each donor organisation by dividing the quantity phased out in each selected country (Column 7 of Annex 8 for the GEF; Column 4 of Annex 9 for the MLF) by the number of years for the ODS Consumption to be reported as zero after the start of the Project (Column 5 of Annex 8 for the GEF) and the total expenditure in each country that was required to phase out ODS (Column 8 of Annex 8 for the GEF; Column 5 of Annex 9 for MLF). For the MLF countries, the number of years for ODS Consumption to be reported as zero was calculated from the beginning of the finance by the MLF in that country until phase out which was assumed to be 1 January 2010.
46. The results showed that the MLF “Efficiency of Expenditure” averaged 9.54 ODP-g per year per dollar of expenditure across the four selected developing countries, whereas GEF averaged 35.31 ODP-g per year per dollar of expenditure across the four selected CEITs (Figure 17). MLF was therefore 3-4 times less efficient at implementing the projects per year in the four selected developing countries than the GEF in the four selected CEITs.
47. MLF averaged a lower “Efficiency of Expenditure” than the GEF because of the longer phase-out time in MLF-funded countries. The longer phased out time in the MLF-funded projects was because developing countries were permitted 10-years longer to phase out ODS than developed countries. This 10-year ‘grace period’ acknowledges that the socio-economic infrastructure in developing countries is not as well-developed as in developed countries, and therefore the additional response time for technology transfer that was required to replace ODS with alternatives was warranted.

48. In the Russian Federation and Ukraine, there were ODS consuming enterprises that did not pass the World Bank's financial viability test and therefore did not receive GEF assistance. Some other companies refused to undertake the test or did not apply for assistance at all. Subsequently, many of these companies financed the phased out ODS themselves. ODS phased out by all companies, whether financed directly by the GEF or indirectly by the companies themselves, was used by the Agencies in the GEF-financed projects to calculate the total ODS phased out in the country. In some cases, only 30% of the ODS to be phased out in the country was financed by the GEF, but in the final calculation the GEF included 100% of the ODS phased out. In contrast, the MLF only used the ODS phased out as a result of the MLF finance and specifically excluded in any calculation ODS phased out by other finance. The MLF did not apply a stringent financial viability test. The result was that the GEF costs were lower because the GEF finance was divided by a larger amount of ODS that was not directly attributable to the direct GEF finance. Conversely, the MLF costs were higher because they the MLF costs were divided by a smaller amount of ODS phased out according to the ODS phased out that was directly financed by the MLF.

Figure 17: Efficiency of project implementation by the MLF and the GEF (ODP-g/year/\$)



49. This "Efficiency of Expenditure" is based on a comparison of only 4 selected CEITs and four MLF countries. Validation using all 18 CEITs with all MLF-funded countries was beyond the Terms of Reference of this Impact Evaluation.

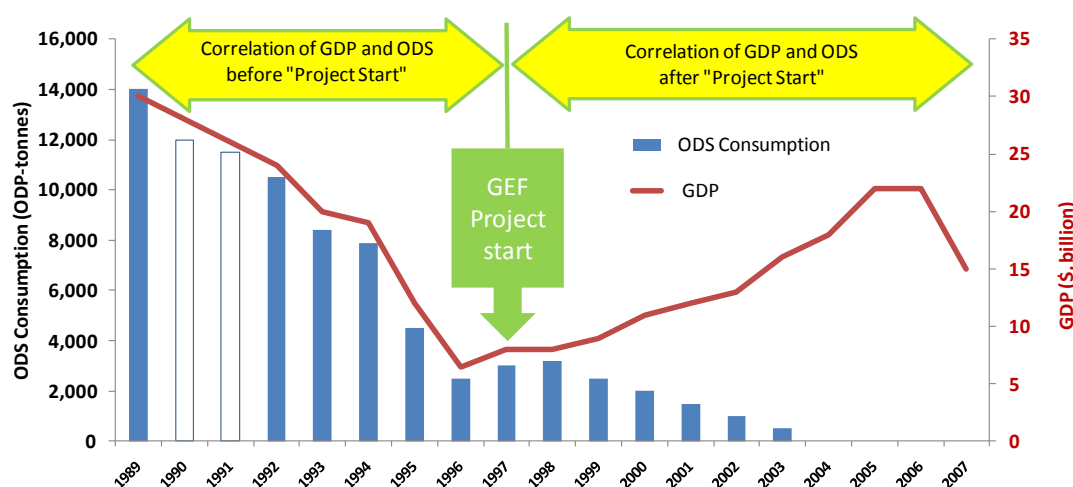
6.8 RELATIONSHIP BETWEEN GDP AND ODS CONSUMPTION

50. The relationship between ODS Consumption and GDP for the period *before* and after the Project commenced was determined by recording the GDP and ODS Consumption each year from 1986 until 2007 in the four CEIT countries and Romania. Romania was a developing country until it acceded to the EU on the 1 January 2007, and was removed from the list of developing countries by the Parties in the same year under Decision XIX/19. Many of the legislative activities in Romania prior to accession were focused on harmonising Romanian legislation on ODS with EU legislation on ODS. For these reasons, Romania's ODS reduction activities were more consistent with a developed rather than developing country from 2000 to 2007, and it was therefore analysed as a CEIT for the purpose of these correlation analyses.
51. The correlation between GDP and reported ODS Consumption in the CEITs was analysed in each of the two separate phases, as shown schematically in Figure 18. Figure 18 shows at

the start of the Project (green box labelled “GEF Project Start”). GDP (red line) and reported ODS Consumption (blue bars) are shown trending downward *before* the start of the Project. The second phase of Figure 18 *after* the “Project Start” shows GDP increasing and reported ODS Consumption decreasing.

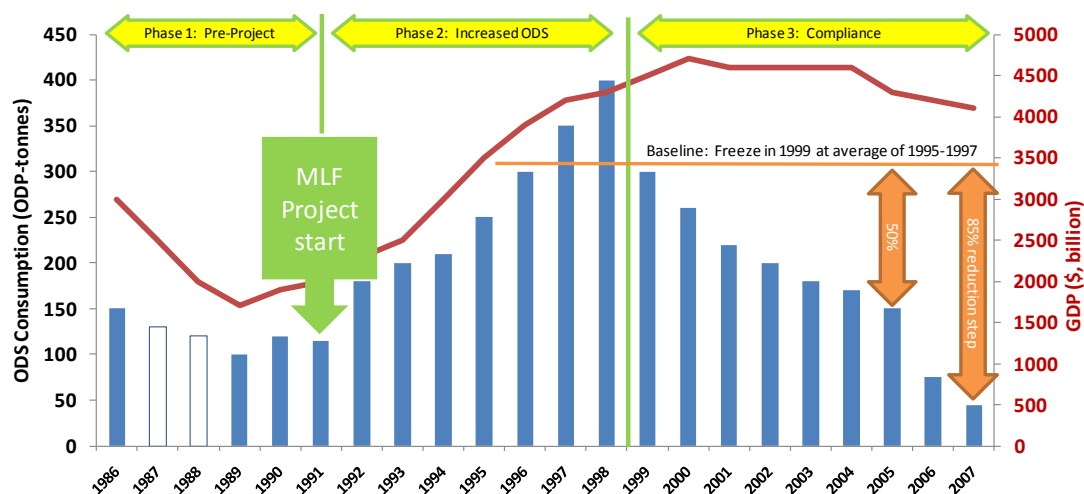
52. For the two phases (before and after the start of the Project), the Pearson product-moment correlation coefficient was used to examine the *nature* of the correlation (positive or negative) and its *strength* (weak, moderate or strong) between GDP and reported ODS consumption, in each of the four GEF-funded CEITs and Romania. A positive correlation would indicate that both GDP and reported ODS consumption are trending together in the same direction, whereas a negative correlation would indicate that they were diverging.

Figure 18: Schematic showing a CEITs ODS Consumption and GDP before and after the start of the Project



53. The correlation between GDP and reported ODS Consumption in the developing countries was analysed in each of the three separate phases, as shown schematically in Figure 19. Unlike in CEITs where there were only two phases analysed, in developing countries there were typically three phases: Phase 1: Pre-Project; Phase 2: Increase stocks; Phase 3: Compliance (Figure 19).
54. Developing countries in Phase 1 reduced ODS Consumption as GDP reduced. In Phase 2, many developing countries increased their imports of ODS in the 1990's after the start of the MLF finance, while still remaining compliant with the Montreal Protocol. This increase in ODS in Phase 2 was typically to ensure that sufficient ODS was available for servicing refrigerators and air conditioning for a later time (after 1999) when ODS Consumption had to be frozen or reduced in order to remain compliant with the Montreal Protocol (Phase 3), or due to more widespread implementation of ODS technology, or a combination of servicing and technology. Phase 2 typically lasted for 3-7 years, which delayed the time for ODS Consumption to reduce.
55. In Phase 3, ODS consumption was typically reduced after the freeze in ODS Consumption 1999 (based on the average Consumption from 1995 to 1997) in order to meet the Protocol's freeze and 50% reduction in ODS Consumption requirement by 1 January 2005 and 85% reduction by 1 January 2007.
56. The *nature* and *strength* of the correlation coefficients in the developing country analyses were determined and interpreted for each of the three phases, following the same procedures as those used for CEITs described above.

Figure 19: Schematic showing an MLF-funded developing country's ODS Consumption and GDP in Phase 1 before the MLF funding, in Phase 2 when ODS increased, and in Phase 3 during compliance with the requirements of the Montreal Protocol



57. The ODS consumption data for each CEIT and developing country was obtained from the Ozone Secretariat's [Data Access Centre](#)⁴⁸, which is based on annual reports submitted by Parties according to Article 7 of the Montreal Protocol. A linear interpolation was used when reported ODS Consumption was absent for one or more years, and the relevant ODS Consumption bar(s) were not filled with solid blue but shown in blue outline only (see 1990 and 1991 years in Figure 18).
58. For the four CEIT countries, GDP data were available from the [International Monetary Fund](#) for 1992 to 2007, and for the MLF countries from 1986 until 2007 from the same source.

6.8.1 GEF-funded CEITs

59. The relationship between GDP and reported ODS Consumption is shown for the GEF-funded CEITs: Kazakhstan (Figure 20), the Russian Federation (Figure 21), Ukraine (Figure 22), and Uzbekistan (Figure 23).
60. ODS Consumption reported by Kazakhstan followed the trend in GDP until 1999 when there was a significant reduction in ODS Consumption (Figure 20), but unlike the other CEITs the ODS Consumption exceeded the GDP trend line. The GEF Project started in 2000. The decline before the start of the Project may be the result of work carried out in Kazakhstan to reduce ODS Consumption in anticipation of the GEF-funded Project. GDP increased significantly from 1999, while at the same time reported ODS Consumption continued to decrease after the Project commenced. This result indicated that the GEF finance was successful in reducing ODS Consumption and, moreover, ODS Consumption was reduced when GDP increased.
61. ODS Consumption reported by the Russian Federation followed the trend in GDP from 1992 until 2000 when ODS Consumption was reduced to zero in 2001 (Figure 21). A small ODS Consumption was reported each year from 2002 until 2007 for uses that were exempted by the Parties to the Montreal Protocol, including 2007. The Russian Federation reported increased ODS Consumption after the start of the Project in 1996. This was due to the production and stock of CFCs and halon for national use and for export. GDP increased significantly from 1999, while at the same time reported ODS Consumption continued to decrease to low levels from 2001 onwards. This result indicated that the GEF and other

⁴⁸ Data Access Centre. Ozone Secretariat website: http://ozone.unep.org/Data_Reporting/Data_Access/

sources of finance were successful in reducing ODS Consumption and, moreover, ODS Consumption was reduced when GDP increased.

62. ODS Consumption reported by Ukraine followed the trend in GDP until 1999 when there was a reduction in ODS Consumption (Figure 22). The GEF Project started in 1998. GDP increased significantly from 1999, while at the same time reported ODS Consumption continued to decrease after the Project commenced, except in 2001 when it increased above the previous year. This result indicated that the GEF finance was successful in reducing ODS Consumption and, moreover, ODS Consumption was reduced when GDP increased.
63. Uzbekistan showed a significant decline in ODS Consumption between the Consumption reported in 1989 and the Consumption reported in 1993 (Figure 23). From 1993 onwards, reported ODS Consumption declined while at the same time GDP increased. Uzbekistan achieved a decline in ODS Consumption before the start of the Project in 1998 because of work undertaken by the government to implement legislation that reduced the ability of enterprises to import ODS. GDP continued to increase from 1999 onwards, while at the same time ODS Consumption continued to decrease after the Project commenced. This result indicated that the GEF finance was successful in reducing ODS Consumption and, moreover, ODS Consumption was reduced when GDP increased.
64. The correlation coefficients for GEF-funded CEITs for the GDP and ODS consumption *before* (Phase 1) and *after* (Phase 2) the GEF Project commenced are shown in Table 5.

Table 5: Correlation coefficients for the GEF-funded CEITs and MLF-funded Romania before (Phase 1) and after (Phase 2) the GEF Project commenced

Country	Range	Correlation Coefficient between GDP and ODS	
		Phase 1: Before finance	Phase 2: After finance
Kazakhstan	1990-2000	0.49	
	2001-2004		-0.92
Russian Federation	1990-1996	0.98	
	1997-2000		-0.68
Ukraine	1992-1997	0.77	
	1998-2004		-0.85
Uzbekistan	1990-1997	0.79	
	1998-2001		-0.94
Romania	1986-1991	-0.95	
	1994-2006		-0.55

Pearson product-moment correlation coefficient

65. The results showed a moderate to strong correlation between GDP and ODS Consumption before the Project for all the CEITs except Kazakhstan and Romania, which supported the 'visual' description above. The correlation between GDP and ODS Consumption was weak for Kazakhstan because the ODS Consumption exceeded the GDP trend line for most of the time prior to the Project commencing. Romania showed a strong negative correlation during Phase 1 because ODS Consumption was assumed to increase between 1987 to 1992, when at the same time GDP decreased. The years 1987 to 1992 (6 years) were interpolated in a linear and increasing way, as there was no reporting on ODS Consumption by Romania for this period, which increased the uncertainty of this result.
66. After the Project, there was a moderate to strong negative correlation for all the CEITs and Romania between GDP and ODS Consumption. This again supported the 'visual' description above since there was divergence between GDP and ODS Consumption, particularly as the Russian Federation had a weaker negative correlation possibly because of the increase in ODS stockpiling after the project which tracked the increase in GDP. These results indicated that the GEF finance was successful in reducing ODS Consumption and, moreover, ODS

Consumption was reduced when GDP increased.

6.8.2 MLF-funded developing countries

67. The relationship between GDP and ODS Consumption is shown for the MLF-funded countries: Egypt (Figure 24), Cameroon (Figure 25), Brazil (Figure 26) and Romania (Figure 27).
68. The MLF finance commenced in Egypt in 1991 (Figure 24). In each of the following 2 years, Egypt imported about 150% more ODS than in 1991. Egypt may have stockpiled ODS *prior* to the ODS reduction steps that were required to remain compliant with the ODS reduction requirements in Montreal Protocol, to ensure that sufficient ODS was in the country to meet the refrigeration servicing requirements *after* the reduction steps. It is also possible that the ODS reports for 1992 and 1993 were incorrect and have not been corrected⁴⁹, since the ODS Consumption reported prior to 1992 and after 1993 tend to follow a rather predictable and consistent downward trend. For example, the large quantities of halon reported by Egypt for 1986 ODS Consumption were not substantiated in subsequent years and could be erroneous. From 1994 onwards, Egypt continued to reduce ODS Consumption almost every year with only minor increases compared to the previous year on some occasions, while at the same time GDP continued to increase. This result indicated that the MLF finance was successful in reducing ODS Consumption and, moreover, ODS Consumption was reduced when GDP increased.
69. The MLF finance commenced in Cameroon in 1992 (Figure 25). In each of the following 9 years until 2001, Cameroon imported 2-3 times more ODS than it consumed in 1991. By 2000, ODS consumption was 3-4 times more than the 1991 Consumption. Cameroon may have stockpiled ODS *prior* to the ODS reduction steps that were required to remain compliant with the ODS reduction requirements in Montreal Protocol, to ensure that sufficient ODS was in the country to meet the refrigeration servicing requirements *after* the reduction steps. In general, ODS that is used after the year of import or production does not contribute toward reported Consumption in the following years. From 2002 onwards, Cameroon continued to reduce ODS Consumption every year, while at the same time GDP continued to increase. This result indicated that the MLF finance was successful in reducing ODS Consumption and, moreover, ODS Consumption was reduced when GDP increased.
70. The MLF finance commenced in Brazil in 1991 (Figure 26). In each of the following 4 years, Brazil imported about 20% more ODS than it consumed the previous year 1991. Brazil may have stockpiled ODS *prior* to the ODS reduction steps that were required to remain compliant with the ODS reduction requirements in Montreal Protocol, to ensure that sufficient ODS was in the country to meet the refrigeration servicing requirements *after* the reduction steps. ODS Consumption during this period and in 1997 and 1998 followed the same trend line as GDP. There was a sharp increase in ODS Consumption in 1999, which exceeded the GDP trend line. From 2000 onwards, Brazil continued to reduce ODS Consumption almost every year with only minor increases compared to the previous year on some occasions, while at the same time GDP continued to increase. This result indicated that the MLF finance was successful in reducing ODS Consumption and, moreover, ODS Consumption was reduced when GDP increased.
71. The MLF finance commenced in Romania in 1993 (Figure 27) and from this year onwards, Romania continued to reduce ODS Consumption almost every year with only relatively minor increases compared to the previous year on some occasions, while at the same time GDP

⁴⁹ Mistakes in reporting can be corrected retrospectively by the official reporting entity of the country submitting a corrected report to the Ozone Secretariat, together with reasons for the correction. The Secretariat forwards the information for the consideration of the Implementation Committee, who advises the Parties on the outcome of its considerations.

continued to increase. The rises in ODS consumption tended to mirror the GDP trend line from 1995 to 1998. Compared to the other three developing countries, Romania's ODS Consumption profile was more closely matched to the other GEF-funded CEIT countries possibly because Romania in the early 2000's was preparing for accession to the EU. Accession required acceding countries to harmonise their ODS (and other regulations) with those of the EU. Romania phased out ODS consumption in 2006. This result indicated that the MLF finance was successful in reducing ODS Consumption and, moreover, ODS Consumption was reduced when GDP increased.

72. A review of the reported ODS Consumption by Romania showed that, unlike most developing countries, Romania did not stockpile ODS. As Romania's ODS Consumption profile was typical of a CEIT rather than a developing country, a correlation between ODS and GDP was analysed for two-phases (without phase 2 stockpiling) using the same methodology as the other CEITs, and the results of the correlation analysis was reported in Table 5. The correlation coefficients for GDP and reported ODS Consumption for three remaining MLF-funded developing countries are shown in Table 6 for the three phases.
73. The correlation coefficients for GDP and reported ODS Consumption for Brazil showed a moderate negative correlation in Phase 1, a weak positive correlation in Phase 2 and a strong negative correlation in Phase 3 (Table 6). In Phase 2, stockpiling followed the similar upward trend line at a time when GDP was also increasing. The strong negative correlation indicates a divergence of the GDP (upward) from ODS Consumption (downward) at the same time. This divergence in 2000 occurred 9 years *after* the funding but at the same time as the freeze in Consumption, and 6 years *before* the 50% reduction step, so it is likely that the freeze and reduction step were the primary causes of the reduction in reported ODS Consumption. However, the MLF financial assistance would have provided financial assistance to implement ODS-free technology and to reduce ODS Consumption, which is likely to have occurred in parallel with the increase in ODS.

Table 6: Correlation coefficients for GDP and reported ODS Consumption in three developing countries before the MLF finance commenced (Phase 1), during ODS increase (Phase 2), and during compliance (Phase 3)

Country	Range	Correlation Coefficient		
		Phase 1	Phase 2	Phase 3
Brazil	1986-1991	-0.56		
	1992-1998		0.35	
	1999 - 2007			-0.88
Cameroon	1986-1992	0.91		
	1993-1998		0.64	
	1999-2007			-0.97
Egypt	1986-1991	-0.98		
	1992-1998		-0.72	
	1999-2007			-0.98

Pearson product-moment correlation coefficient

74. The correlation coefficients for GDP and reported ODS Consumption for Cameroon showed a strong positive correlation in Phase 1, a strong positive correlation in Phase 2 and a strong negative correlation in Phase 3 (Table 6). The Phase 1, 2 and 3 results conform to the Figure 19: Schematic for developing country response. In Phase 1 and before the MLF financial assistance, ODS consumption increased at the same time as GDP. After the financial assistance and in Phase 2, stockpiling and GDP increased in the same upward direction. In Phase 3, the strong negative correlation indicated the end of stockpiling and a divergence of the GDP (upward) from ODS Consumption (downward) at the same time. This divergence occurred 9 years *after* the funding but 4 years *before* the 50% reduction step, so it is likely

that the reduction step was the primary cause of the reduction in reported ODS Consumption.

75. The correlation coefficients for GDP and reported ODS Consumption for Egypt showed a strong negative correlation in Phase 1, a moderate negative correlation in Phase 2 and a strong negative correlation in Phase 3 (Table 6). Phase 1 and 2 negative correlations reflected accurately rising GDP with falling ODS Consumption. In Phase 3, the strong negative correlation indicated a divergence of the GDP (upward) from ODS Consumption (downward) at the same time. This divergence occurred 2 years *after* the funding but 8 years *before* the 50% reduction step, making it likely that the MLF finance was the primary cause of the annual and reasonably consistent incremental reductions in reported ODS Consumption from 1994 until 2007.

Figure 20: Kazakhstan – Reported ODS Consumption (solid), extrapolated Consumption (outline), and Gross Domestic Product (GDP)

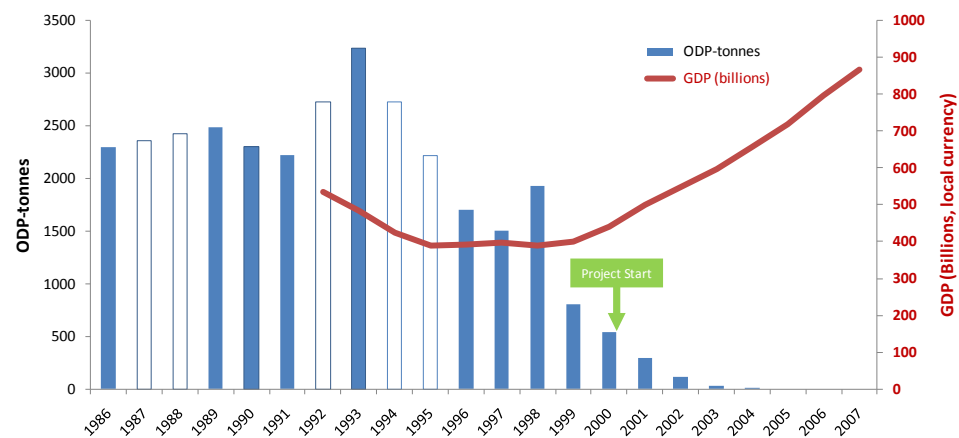


Figure 21: The Russian Federation – Reported ODS Consumption (solid), extrapolated Consumption (outline), and Gross Domestic Product (GDP)

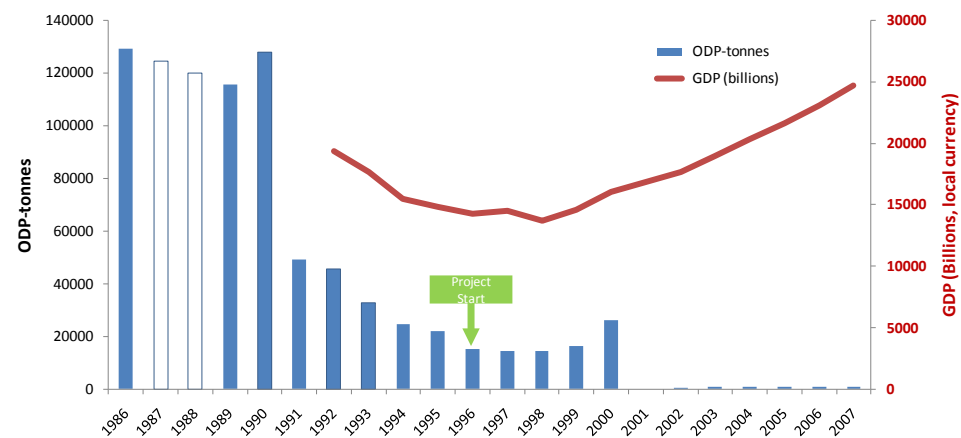


Figure 22: Ukraine – Reported ODS Consumption (solid), extrapolated Consumption (outline), and Gross Domestic Product (GDP)

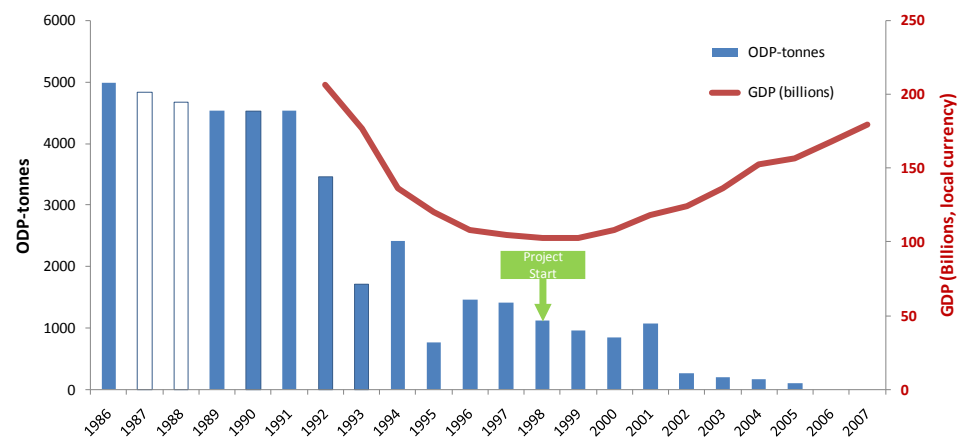


Figure 23: Uzbekistan – Reported ODS Consumption (solid), extrapolated Consumption (outline), and Gross Domestic Product (GDP)

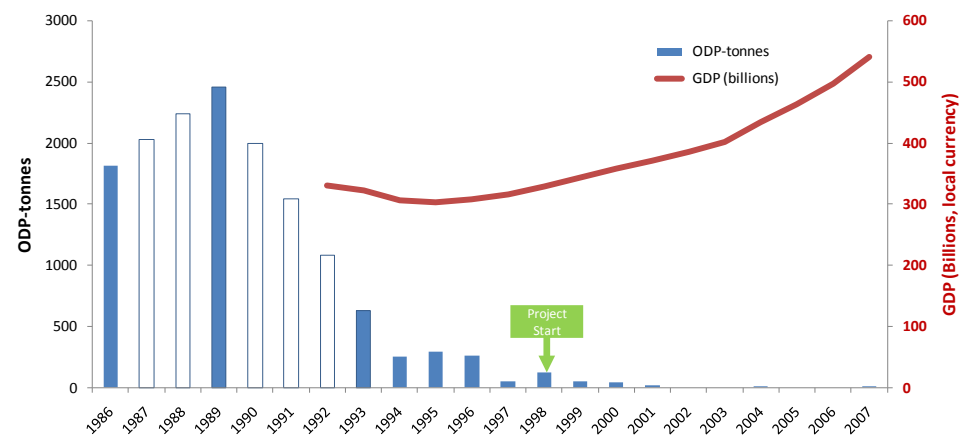


Figure 24: Egypt – Reported ODS Consumption (solid), extrapolated Consumption (outline), and Gross Domestic Product (GDP)

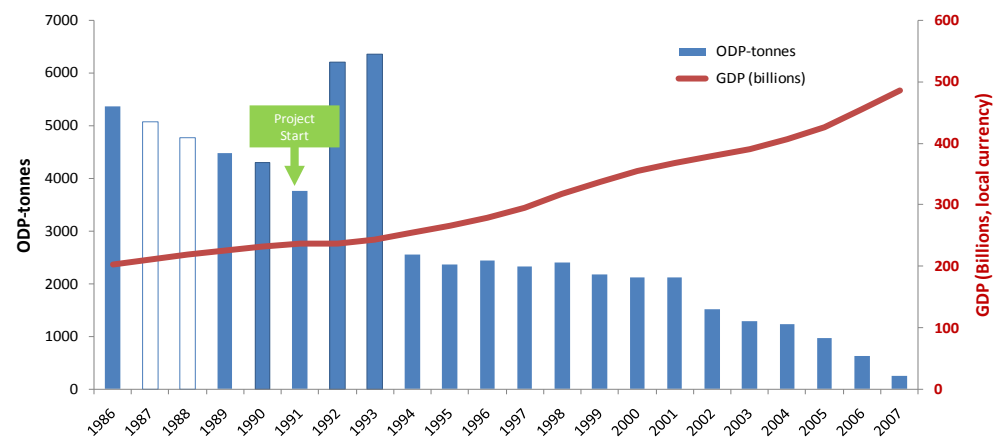


Figure 25: Cameroon – Reported ODS Consumption (solid), extrapolated Consumption (outline), and Gross Domestic Product (GDP)

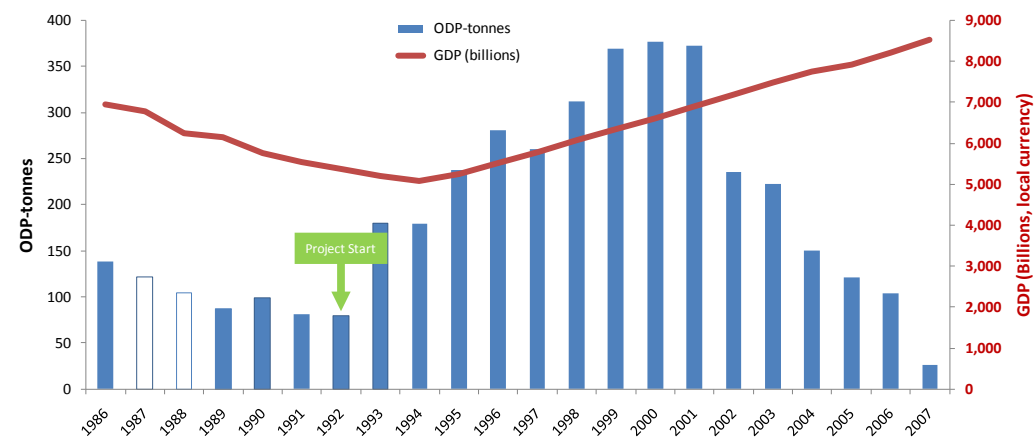


Figure 26: Brazil – Reported ODS Consumption (solid), extrapolated Consumption (outline), and Gross Domestic Product (GDP)

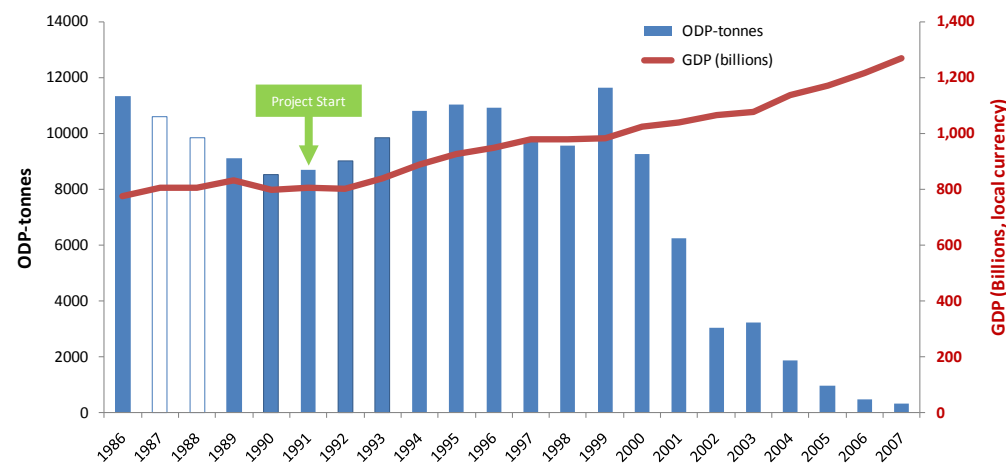
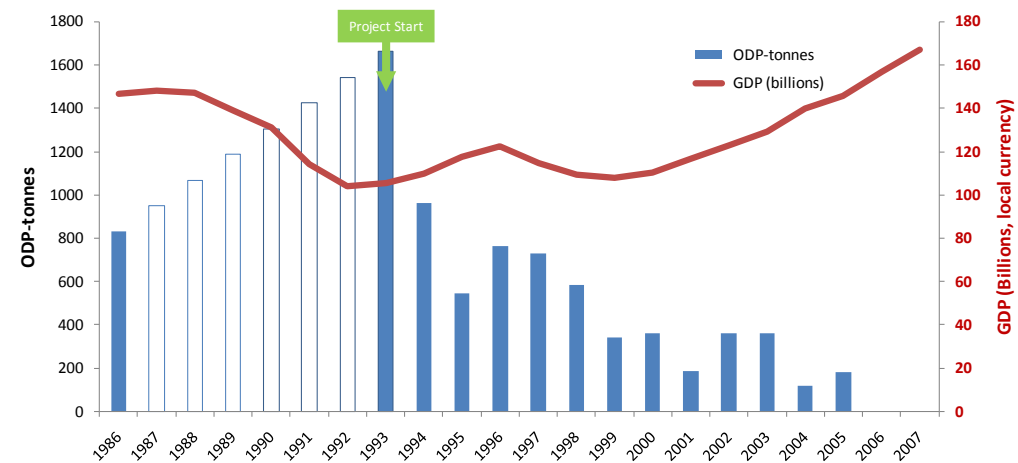


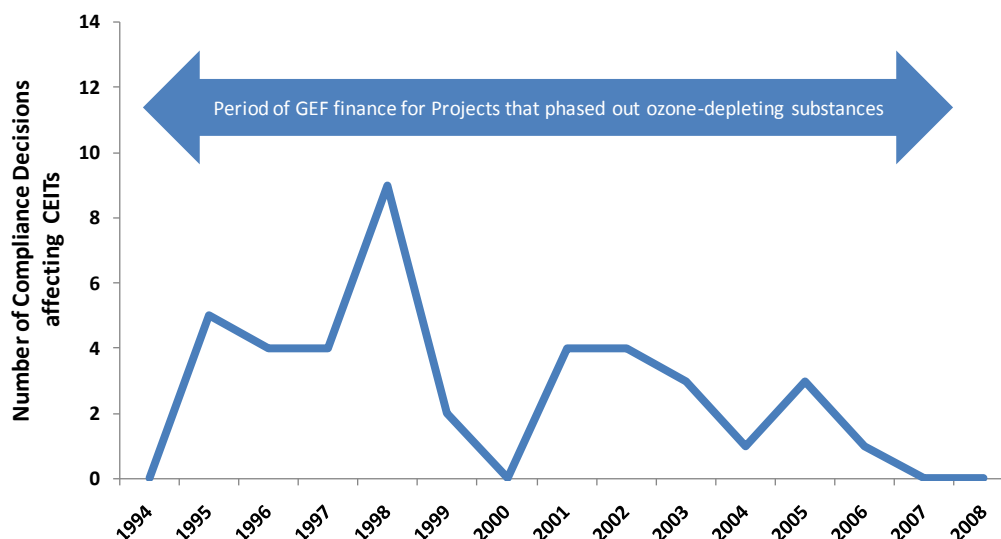
Figure 27: Romania – Reported ODS Consumption (solid), extrapolated Consumption (outline), and Gross Domestic Product (GDP)



6.9 FULFILMENT OF THE REQUIREMENTS OF THE MONTREAL PROTOCOL

76. The number of Decisions agreed by the Parties to the Montreal Protocol related to compliance of CEITs with the Protocol's requirements for the reduction and phase out of ODS was recorded for each year from 1994 until 2008 (Figure 28). The Decisions were compiled from Reports of the Meetings of the Parties to the Montreal Protocol which are retained on the Ozone Secretariat website.

Figure 28: Number of compliance Decisions by the Parties from 1994 to 2008 affecting CEITs.



77. Fifteen of the 18 CEITs did not fulfil the Protocol's requirements in one or more years during the period 1995 to 2006. In the period 1995 to 1999, CEITs were responsible for all of the cases of non-compliance that were brought before the Protocol's Implementation Committee. The number of problem cases in CEITs diminished over the period of the GEF finance from 1994 until 2007. From 1 January 2007, there were no Protocol Decisions relating to compliance with the Protocol by CEITs. This indicated that the GEF finance had assisted the CEITs to fulfil the Protocol's requirements for ODS phase-out, which was the prime objective of the GEF ozone portfolio.

6.10 SUMMARY AND DISCUSSION

Implementing Agencies

78. As a result of the comparison of the Implementing Agencies, we showed that:
- Expenditure was proportional to the amount of ODS to be phased out in the CEITs;
 - The World Bank expenditure was on average about 5 times more than UNDP-UNEP because the Bank implemented projects that phased out about 27 times more ODS than UNDP-UNEP;
 - The time that each Implementing Agency took to phase out ODS was similar - on average 3.3 years for the World Bank compared with 3.7 years for UNDP-UNEP;
 - The World Bank was about three times more cost effective than UNDP-UNEP as the World Bank paid \$12.58 for each ODP-kg phased out, compared to UNDP-UNEP that paid \$37.06;
 - UNDP-UNEP Efficiency of Expenditure that averaged 8.56 ODP-g per year per dollar was not as good as the World Bank which phased out ODS at the rate of 43.30 ODP-g per year per dollar;

GEF – MLF Donor Agencies

79. As a result of the comparison of the Donor Agencies, we showed that:

- The average GEF expenditure of \$18.6 million in the four selected CEITs (Kazakhstan, the Russian Federation, Ukraine and Uzbekistan) was much less than the average MLF expenditure of \$30.57 million in four selected developing countries (Brazil, Egypt, Cameroon and Romania), even though amounts to be phased out and the GDP levels were overall similar between the GEF- and MLF-funded countries (except in the Russian Federation and Brazil). Therefore, based on an evaluation of the cost in the four countries in each portfolio, GEF was more economical than MLF in average expenditure in these selected countries;
- The GEF-funded countries phased out ODS about 4 times faster than the MLF-funded countries, because there was a time limit imposed on the CEITs by the Parties to the Montreal Protocol that was more restrictive than the time limit established by the Parties for developing countries. Therefore, the developing countries could be expected to take longer. However, a longer period of time results in more emissions to the environment and more ozone layer damage, and therefore there is an environmental cost paid for the additional time.
- In terms of cost-effectiveness, the MLF was more cost effective at \$8.55 for each ODP-kg phased out, compared to the GEF at \$14.45 for each ODP-kg phased out;
- In 'efficiency of expenditure', the MLF was not as good as the GEF as the MLF phased out ODS at an average of 9.54 ODP-g per year per dollar across the four selected MLF-funded countries, compared to the GEF phased out ODS at an average of 35.31 ODP-g per year per dollar across the four selected GEF-funded countries.

80. These results for the donor organisation may not be the same if a larger number of developing countries were compared, but this was beyond the terms of reference for this Impact Evaluation.

Compliance with the Montreal Protocol

81. The evaluation shows that non-compliance with the requirements of the Montreal Protocol was widespread among CEITs prior to receiving GEF funding. Indeed, one of the main reasons for the GEF becoming involved with the phase out of ODS in CEITs was to assist them to eliminate ODS technology and in so doing return most of them to compliance with the requirements of the Montreal Protocol. The review of the non-compliance Decisions that are produced annually by the Parties shows that CEITs no longer dominate the meetings of the Implementation Committee, which was the case in the past when CEITs found compliance with the Montreal Protocol challenging. As a measure of the success of the GEF finance in the ozone portfolio of countries, there were no Decisions affecting the compliance of CEITs in 2007.

GDP and ODS consumption

82. In the examination of the relationship between GDP and ODS Consumption phased out, the evaluation showed that in all of the GEF-funded CEITs and in two of the MLF-funded developing countries (Brazil and Cameroon), there was a moderate to strong correlation between GDP and ODS Consumption *before* there was a divergence of GDP and reported ODS Consumption. ODS Consumption tracked GDP in a somewhat predictable manner. In these four CEITs shortly *after* the start of the financial assistance, ODS Consumption no longer tracked GDP. In the two developing countries, there was a delay in ODS reduction due to stockpiling, but then a reduction in ODS Consumption when GDP was increasing.

83. It is reasonable to assume, mainly because of the proximity in time of the cause and effect, that the cause of the decoupling of ODS consumption from GDP is the GEF Project that financed the reduction and phase out of ODS. This is a useful insight as there are many countries in the Montreal Protocol that argue that further elimination of ODS is not possible without detriment to the growth of the economy. The result gained by the GEF and the MLF shows the contrary – that elimination of an environmentally damaging technology has been achieved without a significant impact on the GDP.

7

ASSESSMENT OF IMPACT DRIVERS AND SUSTAINABILITY

7.1 INTRODUCTION

1. Chapter 7 presents the assessment of the Ozone portfolio Theory of Change (TOC) as presented in Chapter 4. In this Chapter, Sections 7.2 to 7.6 present the assessment of impact drivers relating to issues of government commitment and private enterprise sustainability; Section 7.7 assesses the key threats or risks to impacts; Section 7.8 and discussed catalytic impact; and 7.9 describes the benefit to the global environment and human health as a result of the phase out of ODS in CEITs.
2. The TOC for the phase out of ODS in 18 CEITs was assessed through semi-structured interviews in each country with stakeholders from the government and private enterprises; questionnaire survey with government stakeholders; and a review of secondary documentary data. Further details of the methodology are given in Chapter 3.
3. The information from the eighteen Country Reports (see Volume 2: Country Reports) was extracted into ten Tables to assess government (Table 7 to Table 12) and enterprise (Table 13 to Table 17) impact drivers and sustainability across the CEIT portfolio, as follows:

Table 7:	Legislation that supports activities to reduce and eliminate ODS
Table 8:	Customs and border security
Table 9:	Training of servicing personnel
Table 10:	Equipment used for the recovery, recycling and reclamation of ODS
Table 12:	Other activities that indicated a government commitment to reduce and eliminate ODS
Table 13 to Table 17:	Information provided by enterprises that were provided with GEF financial assistance to phase out ODS in the refrigeration (Table 13), aerosol (Table 14), foam (Table 15), solvent (Table 16) and servicing (Table 17) sectors.
4. The first five columns in each Table of these Tables above show the country, legislative affiliation, developed/developing country status under the Montreal Protocol, and the year that the Project started and ended.
5. The legislative affiliation (Column 2) was assigned in this Report as either 'EU' (for the EU-CEITs) or 'Non-EU-CEITs' for the Central Asian CEITs, Belarus, Ukraine, and the Russian

Federation. We found that the EU legislation on ozone depleting substances⁵⁰ that is in force in all Member States in the EU-CEITs required them to adopt national legislation on ODS in their countries to implement the requirements of the EU legislation. On the other hand, the Non-EU-CEITs had no regional driver of legislation and they were required to establish their own national legislation on ODS. In this way, we could see that there were two major blocs within the CEITs – the EU-CEITs and the Non-EU-CEITs – which set the framework for the subsequent assessments of the activities to reduce and phase out ODS, and the sustainability of these activities, that are described in the Tables.

6. Column 3 in each Table divided the CEITs into those that fall under Article 2 in the Montreal Protocol (A2, Developed countries) and those that fall under Article 5 (A5, Developing countries). All the countries in the evaluation were A2, except for Armenia and Turkmenistan. The Parties to the Montreal Protocol accepted Armenia's change from A2 to A5 in 2002, which was before the GEF Project commenced in 2004. The Parties accepted Turkmenistan's change from A2 to A5 in 2004, which was near the end of the 7-year Project from 1998 to 2005. The implications of these changes are discussed under the relevant Sections below.
7. Columns 4 and 5 in each Table show the start and end of the Project respectively in each country, as this was important for evaluating the sustainability of actions to reduce and phase out ODS *after* the end of the Project.
8. As a result of these interviews and based on qualitative data collected through the semi-structured interviews and focus groups, a survey questionnaire was also developed to verify and validate responses on key issues that included:
 - Legislative and institutional capacity
 - ODS destruction and phase out management
 - Trade issues
 - Training
 - Project design and implementation
 - Monitoring and reporting
9. The responses of the 18 CEITs to the survey questionnaire were analysed as percentage of countries responding to each question according to the same blocs described above, in order to maintain consistency with the analysis of the Country Reports. The responses from the nine EU-CEITs were compared with the responses to the same questions from the nine Non-EU-CEITs. The responses to the survey are provided within the relevant Sections of this chapter.

7.2 GOVERNMENT COMMITMENT

10. Government commitment was identified in the TOC as an important driver to ensure progression from outputs to impacts. Several key components and / or indicators were identified by the evaluation for assessment: Legislation (including Montreal Protocol compliance); customs and border security; and recycling, reclamation and re-use programs

7.2.1 Legislation

11. The CEITs ratified, acceded, accepted or approved up to 6 legislative instruments: The Vienna Convention and the Montreal Protocol; followed by the London, Copenhagen,

⁵⁰ Regulation (EC) No 2037/2000 which came into force in all Member States on 1 October 2000.

Montreal and Beijing Amendments (Table 7, Column 6). The GEF required, as a condition of the provision of financial assistance, that each of the CEITs become a Party to the Vienna Convention and the Montreal Protocol, and the London Amendment. All the CEITs were Party to all 6 instruments, except for Kazakhstan which had yet to accede to the Copenhagen, Montreal and Beijing Amendments; and Azerbaijan which has yet to accede to the Montreal Amendment. Acceptance of all 6 instruments by a country indicated that the government was fully committed to being bound by all the control measure obligations and requirements contained in the Montreal Protocol.

12. As Kazakhstan had not accepted the obligations of the Copenhagen and Beijing Amendments, HCFCs that were imported after 1 April 2004 by Kazakhstan were not in compliance with the Montreal Protocol, based on the requirements of Decision XV/3 that was agreed by the Parties on trade in HCFCs in 2003. That Decision clarified that trade in HCFCs should be between Parties that had agreed to be bound by the obligations of both the Beijing and Copenhagen Amendments. The Decision permitted developed countries that had yet to ratify, accede or accept the Beijing Amendment to submit data to the Ozone Secretariat by 31 March 2004 of their intention to do so, as well as to supply information to show that they were in full compliance with Articles 2, 2A to 2G and 4 of the Montreal Protocol. Kazakhstan was not mentioned in the report by the Ozone Secretariat to the Parties in 2004, suggesting that information had not been submitted. In addition, Kazakhstan imported HCFCs in excess of its consumption limit from 1 January 2004 for each year from 2004 to 2007 inclusive, and exceeded the consumption limit for non-QPS methyl bromide in 2006 and 2007.
13. These actions would make it difficult for Kazakhstan to show that it was in full compliance with Articles 2, 2A to 2G and 4 of the Montreal Protocol. Therefore, the government of Kazakhstan appeared less committed and focused on the Montreal Protocol than the other CEITs that were evaluated.
14. The legislation that mandated ozone-depleting substance (ODS) recovery, recycling and reclamation ("3R") operations (Column 7) and reporting the results of the 3R (Column 8) was mainly implemented in the EU-CEITs and in two (Tajikistan and Uzbekistan) of the Non-EU-CEITs (Column 7). Slovakia did not implement legislation as a national 3R programme was not put in place, and instead imported recovered ODS in sufficient quantities to meet its servicing needs.
15. Qualification requirements for personnel that serviced refrigeration and air conditioning equipment were mandatory in many countries. All of the EU-CEITs put in place qualification requirements as well as 2 Non-EU-CEITs (Belarus and Kazakhstan) (Column 9). These countries also put in place procedures that specified the syllabus that was required to achieve a level of technical competency acceptable to the government. These activities minimised ODS emissions and conserved stocks of ODS for servicing. Many companies in Non-EU-CEITs without legislated qualification requirements complained that there was no incentive to ensure personnel were trained and moreover, there were unqualified servicing workers that were *"...not doing a good job"*. The evaluation concludes that CEITs that had legislated for qualification requirements had put in place an ongoing and effective programme that promoted the goal of minimising ongoing damage to the ozone layer as a result of ODS emissions.
16. The ban on the import of CFCs is an important legislative indicator of the focus by government(s) in reducing ongoing demand for ODS and also to encourage use of alternatives. CEITs that banned CFC imports more than a year before the end of the Project in each country were considered to have implemented legislation that targeted the ODS reduction and phase out, as they used the legislation to drive the reductions (Column 11).

The EU-CEITs and the Russian Federation banned the import of CFCs much earlier (from 1994 to 2001) than the Non-EU-CEITs (2000 to 2008) (Column 10). Five of the Non-EU-CEITs did not implement bans on CFCs in a timely manner, and this delayed the adoption of alternatives due to the availability of CFCs in the market.

17. The survey questionnaire that showed that 67% of the NOUs in EU-CEITs 'strongly agreed' that sufficient legal and policy instruments were currently in place to address the reduction and phase out of ODS, compared to 67% of the Non-EU-CEITs that 'slightly disagreed' that this was not the case.

Table 7: Legislative drivers in each country that supported key activities to reduce and phase out ozone-depleting substances in CEITs

COUNTRY	Legislative driver	Developed (A2) or Developing (A5) country	Project Start	Project end	Number of Montreal Protocol legislative instruments agreed	Legislation that mandates 3R	Legislation for reporting on 3R	Legislation for qualification requirements	Year that import of CFCs banned	Targeted legislation before or during Project
1	2	3	4	5	6	7	8	9	10	11
Bulgaria	EU	A2	1995	2000	6	Yes	Yes	Yes	1996	Yes
Czech Republic	EU	A2	1994	1998	6	Yes	Yes	Yes	1995	Yes
Estonia	EU	A2	2000	2007	6	Yes	Yes	Yes	1999	Yes
Hungary	EU	A2	1995	1998	6	Yes	Yes	Yes	1994	Yes
Latvia	EU	A2	1997	2007	6	Yes	Yes	Yes	2001	Yes
Lithuania	EU	A2	1998	2005	6	Yes	Yes	Yes	1996	Yes
Poland	EU	A2	1997	2001	6	Yes	Yes	Yes	1996	Yes
Slovakia	EU	A2	1995	2002	6	No	Yes	Yes	1995	Yes
Slovenia	EU	A2	1995	2002	6	Yes	Yes	Yes	1997	Yes
Armenia	Non-EU	A5	2004	2009	6	No	No	No	2007	Yes
Azerbaijan	Non-EU	A2	1999	2002	5	No	No	No	2002	No
Belarus	Non-EU	A2	1997	2000	6	Unknown	Yes	Yes	2008	No
Kazakhstan	Non-EU	A2	2000	2005	3	Yes	No	Yes	2005	No
Russian Fed.	Non-EU	A2	1996	2004	6	No	No	No	1995	Yes
Tajikistan	Non-EU	A2	2002	2006	6	Yes	No	No	2004	Yes
Turkmenistan	Non-EU	A5	1998	2005	6	No	No	No	2005	No
Ukraine	Non-EU	A2	1998	2004	6	No	No	No	Unknown	No
Uzbekistan	Non-EU	A2	1998	2007	6	Yes	Yes	No	2000	Yes

Source: Volume 2 Country Reports, "GEF Impact Report of the phase out of ozone-depleting substances in Countries with Economies in Transition, July 2009"

EU = European Union; A2 = Article 2 = Developed country in the Montreal Protocol; A5 = Article 5 = Developing country in the Montreal Protocol

7.3 CUSTOMS AND BORDER SECURITY

18. The ability of a country to combat illegal trade in ODS depends on a number of factors:
- 1) Legislation to combat illegal trade and support customs and border security
 - 2) The number of Customs and other staff that have been *trained* to detect illegal trade in ODS;
 - 3) The *equipment* available to Customs and other officers that enable them to distinguish between illegal and legal ODS and ODS-containing equipment;
 - 4) *Cooperation* between Customs and other agencies to share intelligence on illegal trade;
 - 5) *Penalties* applied to those that are caught undertaking illegal trade
19. All of the CEITs trained Customs officers during the Project, except for Belarus, the Russian Federation and Ukraine (Table 8, Column 6). Analysis of the survey questionnaire showed that all of the Non-EU-CEITs reported that training had been undertaken during the Project, but only 78% of the EU-CEITs reported training during Project. Although the Czech Republic trained Customs officers during the Project, they commented that it was not done sufficiently early to combat imports of illegal CFCs that undermined their earlier ODS reduction phase out activities.
20. Forty four percent of CEITs delivered training on reducing illegal trade in ODS to Customs officers in the past 3 years, after the Project was completed. For example, Azerbaijan, Bulgaria, Hungary, Slovenia and Ukraine followed up with training after the Project (Column 7), which indicated that their Customs training was more sustainable than in 66% of the CEITs that did not follow up.
21. CEITs sought support for customs training from external sources, where this was possible. For example, Bulgaria obtained finance from an EU fund, and Hungary hosted the UNEP Green Customs meetings on two occasions. Ukraine used government finance to fund the Customs training after the Project was completed. Belarus and the Russian Federation were therefore the only two CEITs that did not train Customs officers at all, either during or after the Project. The implications of this are discussed below.
22. Almost three times more Customs officers were reported to have been trained in the Non-EU-CEITs (988) as in the EU-CEITs (339). Azerbaijan alone was reported to have trained about half of the total Customs officers from the 18 CEITs. This may reflect the increasing importance that the Parties have placed recently on combating illegal trade in ODS, which has been publicized more widely in the past 9 years in the Montreal Protocol than in the previous 10 years⁵¹.
23. It was not possible to determine the percentage of officers trained to detect illegal trade in any country, as in many countries the total number of customs officers is kept confidential. In some countries, remarkably few were trained. For example, Lithuania only has 5 trained, but the government reported that they went back to their check points and passed on the information to their colleagues.
24. The Customs officers in about half the countries (10 CEITs) were equipped with refrigerant identifiers (Table 8 Column 9). This finding was supported by the analysis of the survey questionnaire that showed that 4 of the EU-CEITs and 4 of the Non-EU-CEITs did not have

⁵¹ The first Decision on illegal trade was in 1995. There were only 3 decisions up to 2000. From 2001 onwards, there has been a Decision agreed on illegal trade in almost every Meeting of the Parties.

identifiers. Kazakhstan reported that 100 identifiers were provided to its Customs officers, which was about 40% of the total number of identifiers (238) provided to the 18 CEITs. However, Customs officers reported that the identifiers were not particularly reliable as they gave false positives, they sometimes did not have the support from a scientific laboratory to confirm the refrigerant identified at the border, and they were not able to identify blends of ODS and HFCs. This undermines the effectiveness of the identifiers as one of the tools to combat illegal trade.

25. One of the other techniques used to intercept illegal trade was through sharing of intelligence information between agencies with the Customs service. Six of the EU-CEITs (Bulgaria, the Czech Republic, Estonia, Hungary, Lithuania and Slovenia) and two non-EU-CEITs (Armenia, Uzbekistan) reported that information was shared every 3-12 months, according in most cases to a legislative requirement (Column 10). A further 9 CEITs reported that the Customs service worked with other agencies, typically the Inspectorate (Column 11). Based on information from all the CEITs except Poland and Kazakhstan, we conclude the 16 shared information to combat illegal trade in ODS. Some countries such as Kazakhstan and Uzbekistan reported that they focused more on some countries than others, based on their experiences with illegal trade in the past, which assisted them to intercept illegal trade in ODS more effectively.
26. Analysis of the survey questionnaire showed that 44% of the EU-CEITs and 56% of the Non-EU-CEITs agreed that illegal trade in ODS existed in their countries. About 30% of the countries reported that illegal trade had been intercepted during the Project (Column 12), and 50% had detected illegal trade in the past 3 years after the Project had finished (Column 13). This indicated that the training of Customs officers was having a sustainable effect. There were more Non-EU-CEITs than EU-CEITs that reported interceptions of illegal trade past 3 years, which could be indicative of the low demand-less pressure for CFCs in the EU-CEITs compared to the Non-EU-CEITs where there was reported to be a market for CFCs. Illegal trade is discussed further on page 107 in Section 7.7: Assessment of Threats and Risks.
27. All EU-CEITs reported that they had penalties that could be applied to traffickers of ODS that were found guilty of illegal trade, but only four of Non-EU-CEITs (Belarus, Kazakhstan, the Russian Federation and Uzbekistan) reported that they had the ability to impose fines (Column 14). Penalties under EC legislation that have been transposed into national legislation in the EU-CEITs are required to be “...*effective, proportionate and dissuasive*”. As a result, some EU-CEITs impose jail sentences as well as fines for those found culpable of illegal trade in ODS. The penalty for illegal ODS trade in one of the Non-EU-CEITs (Uzbekistan) was judged to be not sufficiently dissuasive, and therefore unlikely to discourage illegal ODS trade. Uzbekistan reported that it was revising its penalty system for illegal ODS trade. In the meantime, the Customs reported that the fine was not as important as the disruption to the business of the violators because of the increased number of checks conducted by Customs. Analysis of the survey questionnaire showed that all of the EU-CEITs reported that they had legislation in place to combat illegal trade, compared to 77% of the Non-EU-CEITs. This legislation allowed: 89% of the EU-CEITs to return confiscated ODS to the country of origin, compared with 22% of the Non-EU-CEITs; and 89% of the EU-CEITs to return impose fines for illegally traded ODS, compared with 67% of the Non-EU-CEITs. More of the Non-EU-CEITs (57%) reported legislation that could impose a jail sentence for those caught smuggling ODS compared to EU-CEITs (44%).
28. On the basis of interviews with the NOUs in all countries, the Customs services and inspectorates in some countries, as well as servicing operations in many countries, the evaluation was able to form an opinion on the likelihood of illegal trade in ODS (mainly CFCs) (Column 15). Many of them reported on incidences of illegal trade, and even the price of

CFCs on the local black market. Illegal trade was unlikely in the EU-CEITs, mainly because CFC-based equipment is rare and there is little demand, rather than the vigilance per se of the Customs and other agencies at the border.

29. In contrast, illegal trade was likely in all of the Non-EU-CEITs, except for Armenia and Turkmenistan and Azerbaijan (Column 15). The first two countries are Article 5 and trade in CFCs is still legal within the consumption limits of the Montreal Protocol. In Azerbaijan, the team considered that the large number of Customs officers that have been trained to detect illegal ODS, combined with the high frequency of reporting by Customs to the NOU, had countered illegal trade effectively.
30. Other issues related to illegal trade are discussed further in Section 7.7: 'Threats and Risks'.

Table 8: Customs and border security

COUNTRY	Legislative affiliation	Developed (A2) or Developing (A5) country	Project Start	Project end	Training of customs officers during project	Training of customs officers after Project	Total number of customs officers trained	Refrigerant identifiers	Freq of reports from Customs to ENV	Customs, Inspectorate and other agencies work together	Illegal imports intercepted during Project	Illegal imports intercepted in last 3y	Penalties for illegal trade	Illegal trade in ODS suspected by Evaluation Team
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Bulgaria	EU	A2	1995	2000	Yes	Yes	135	32	12m	Yes	No	No	Yes	No
Czech Republic	EU	A2	1994	1998	Yes	Unkn	115	No	6m	Yes	Yes	No	Yes	No
Estonia	EU	A2	2000	2007	Yes	No	24	Yes	3m	Yes	Yes	Yes	Yes	No
Hungary	EU	A2	1995	1998	Yes	Yes	20	Yes	12m	Yes	Yes	No	Yes	No
Latvia	EU	A2	1997	2007	Yes	No	40	No	Unkn	Yes	Unkn	Unkn	Yes	No
Lithuania	EU	A2	1998	2005	Yes	No	5	No	6m	Yes	No	No	Yes	No
Poland	EU	A2	1997	2001	Yes	Unkn	Unkn	40	Unkn	Unkn	Unkn	Unkn	Yes	No
Slovakia	EU	A2	1995	2002	Unkn	Unkn	Unkn	No	Yes	Yes	Unkn	Yes	Yes	No
Slovenia	EU	A2	1995	1998	Yes	Yes	Unkn	No	12m	Yes	Unkn	Yes	Yes	No
Armenia	Non-EU	A5	2004	2009	Yes	NR	88	12	12	Unkn	No	No	Unkn	Not Rel.
Azerbaijan	Non-EU	A2	1999	2002	250	180	430	13	Often	Unkn	Unkn	Yes	Unkn	No
Belarus	Non-EU	A2	1997	2000	No	No	0	No	Unkn	Yes	Unkn	Yes	Yes	Yes
Kazakhstan	Non-EU	A2	2000	2005	Yes	Unkn	61	100	Unkn	Unkn	Yes	Yes	Yes	Yes
Russian Fed.	Non-EU	A2	1996	2004	No	No	0	No	0	Yes	0	Unkn	Yes	Yes
Tajikistan	Non-EU	A2	2002	2006	105	Unkn	105	22	Yes	Yes	Likely	Likely	Unkn	Yes
Turkmenistan	Non-EU	A5	1998	2005	Yes	No	Unkn	Yes	Unkn	Yes	Unkn	Yes	Unkn	Not Rel.
Ukraine	Non-EU	A2	1998	2004	No	Yes	Unkn	No	Unkn	Yes	Unkn	No	Unkn	Yes
Uzbekistan	Non-EU	A2	1998	2007	Yes	No	304	19	6m	Yes	Yes	Yes	Yes	Yes

Source: Volume 2 Country Reports, "GEF Impact Report of the phase out of ozone-depleting substances in Countries with Economies in Transition, July 2009"

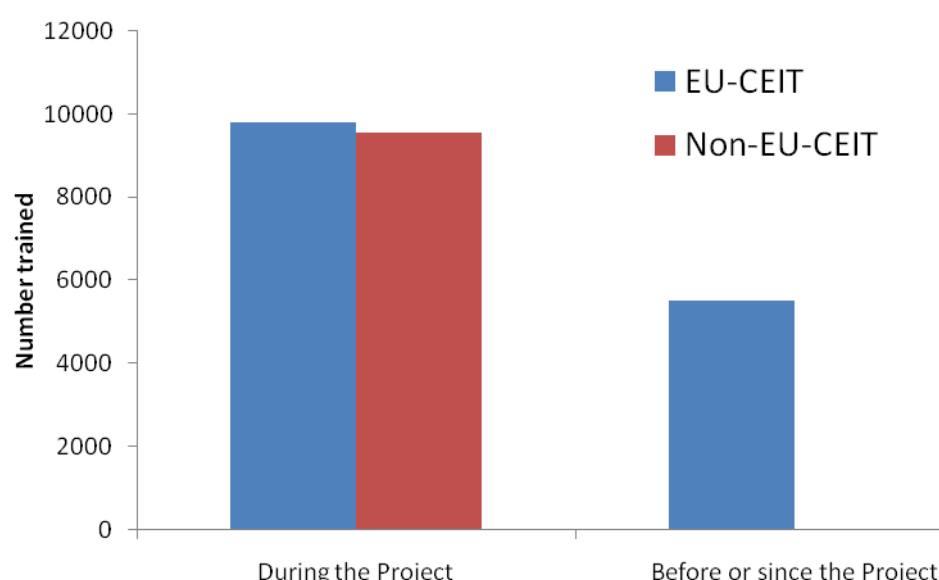
EU = European Union; A2 = Article 2 = Developed country in the Montreal Protocol; A5 = Article 5 = Developing country in the Montreal Protocol; Not Rel = Not relevant as Armenia and Turkmenistan were re-categorised as Developing Countries, so any trade in CFCs within the Consumption limit was legal

7.4 TRAINING OF PERSONNEL IN THE USE OF RECOVERY, RECYCLING AND RECLAMATION EQUIPMENT

31. The aim of the recovery, recycling and reclamation ("3R") scheme was threefold:
- To permanently reduce the demand for imported or produced refrigerants, by using recovered and recycled CFCs;
 - To reduce the demand for CFCs which was being partly met by illegal imports, by using recovered and recycled CFCs;
 - To reduce the cost of early CFC-equipment retirement by extending the period of which this takes place, by using recovered and recycled CFCs.
32. ODS was important for providing a source of ODS within the country to support the refrigerant demand when servicing refrigeration and air conditioning equipment, at a time when imports or production of CFCs were reduced or banned altogether. The ability of countries to implement effective 3R programmes depended on the legislation they had in place, the training of personnel in refrigerant management, the availability of equipment and its distribution. Each of these factors is discussed, together with the extent to which this training enabled countries to recover ODS including halon and to destroy unwanted ODS. The evaluation also reports on the sustainability of these operations by examining to what extent these 3R activities continued after the conclusion of projects.
33. As evidence of the effort by CEITs to capture the benefits of the 3R scheme, more than 10,500 technicians were trained *during* in the course of the 3R sub-projects and a further 5,500 were trained *after* the project was completed. The task of training personnel in best practice servicing of refrigeration and air conditioning equipment became the responsibility of the NOU in each country. In many of them, a refrigeration Association was formed in response to this challenge, if such an Association did not already exist prior to the start of the GEF projects. These Associations not only helped to organise the training by providing a venue and liaising with teaching staff, but also they assisted with the distribution of the recovery and recycling equipment to the service centres. Some of them kept track of this equipment over time, and redistributed it when necessary to service centres that were more active than others in the recovery and recycling of ODS. In most cases, the Associations evolved into organisations with a large membership of influential businesses that liaised effectively with the NOU and assisted them in the development of legislation that affected their servicing operations. Many of them today have full time staff that provide advice to their members, on the basis of income derived from membership fees and training.
34. The evaluation found that Associations were active mainly in the EU-CEITs, with good examples in Bulgaria and Poland, as well as in the non-EU-CEITs of Armenia, Belarus and the Russian Federation and Tajikistan (Table 9, Column 6). The Institute for Refrigeration and Air Conditioning in Bulgaria not only carried out many of the activities described above, but also organised small teams to assemble the recovery and recycling equipment. In Poland, the Prozon Foundation was at the heart of the recovery and recycling operations, and took responsibility for reclamation of ODS and for organising destruction when reclamation was not possible. Prozon also maintained a database of the recovery and recycling machines and their locations. The Chamber of Commerce in Slovenia provided technical training courses for best practice servicing of refrigeration and air conditioning equipment. The State Institute of Applied Chemistry in St Petersburg in the Russian Federation was the principal institution responsible for policy and technology advice on ODS in that country, although it was not known to what extent they advised on the choice of equipment for the recovery and recycling of ODS.

35. There was, however, no Association, Institute or Foundation in Azerbaijan, Kazakhstan, Turkmenistan, Ukraine and Uzbekistan. Some of these countries were in the process of forming an Association, but the requirement for legal approval had delayed their establishment. Some of the companies in these countries did not see the benefits of an Association and even regarded an Association as unlikely to be useful because of its links to the NOU or the government. The government, with its legislative capability, was seen as '*the enemy*' that was likely to hinder rather than help business operations and ultimately reduce their profitability.
36. The benefit of the Association or similar organisation was shown in the number of technicians trained before and after the Project was completed (Columns 7 and 8; Figure 29). Most of the EU-CEITs had Associations or similar organisations that took responsibility for follow up training. Follow-up training is an important activity that ensures that technicians skills and knowledge is up to date and in-line with legislation, and so promotes sustainability of ODS phase-out. However, there were almost no technicians trained before or since the Project in the Non-EU-CEITs, and many of them did not have Associations. The only follow up training has been in Kazakhstan, but the number trained (26) was much fewer than the number trained during the Project (3,365).

Figure 29: Number of technicians trained in EU-CEITs compared with Central Asian CEITs during and after the completion of the Project.



37. Analysis of the survey questionnaire showed that 78% of the EU-CEITs reported training in refrigeration servicing during the Project, compared with 89% of the Non-EU-CEITs. More were trained in the Non-EU-CEITs possibly because of the experiences that had been gained in Projects that were completed earlier in the EU-CEITs that showed the value of this training.
38. In most of the EU-CEITs, the training *after* the Project was completed was paid for by the trainee, unlike during the Project when the costs were met by the funds from the Project (Column 9). Self-payment after the completion of the Project was evidence of the sustainability of the training programme, and strongly linked to the presence of an Association in the country.
39. Many of the EU-CEITs provided trainees with a Greencard or certificate as a result of having passed the training course (Column 10). The Greencard (or blue in Latvia) is a small identification card that was shown to clients as evidence of the qualifications achieved. The

Greencard was typically valid for 3-5 years, and could be re-validated with further training. In Poland, the Greencard was temporarily withdrawn pending the implementation of new legislation on qualification requirements. In the EU-CEITs, not all applicants for the courses passed the examination, as trainees had to demonstrate they had achieved a standard of knowledge and practical proficiency.

40. In the Non-EU-CEITs, only Belarus, Kazakhstan and Turkmenistan had a certificate, whereas the others had no certificate or identification card (Column 10). There were no reports of applicants failing the training courses. The absence of a certificate or identification card, together with no legislative requirement for qualifications (Column 11), increased the prospects of unqualified personnel servicing refrigeration and air conditioning equipment. The servicing sector in Ukraine, as an example, cited the involvement of unqualified personnel. Ukraine has no legislation for training, no certificate or Greencard system and has undertaken no training since the Project was completed in 2004.
41. To deter unqualified personnel, most of the EU-CEITs reported that legislation was in force to penalise workers that were without qualifications for servicing refrigeration and air conditioning equipment (Column 12). However, in the Non-EU-CEITs, most had no legislation for qualification requirements and no legislation to penalise workers proven to not be qualified.
42. In conclusion, the presence of an Association or similar body, together with legislation that mandated qualification requirements, promoted ongoing training activities after the completion of the Project. Training undertaken after the Project was common in EU-CEITs and almost non-existent in Non-EU-CEITs. Relatively few Non-EU-CEITs had legislation in place that mandated training of technicians, and as a consequence there were more reports of unqualified personnel working in these countries than in the EU-CEITs.
43. Investment in training also encouraged the ongoing and proficient use of the ODS recovery and recycling equipment. Extended use of the equipment beyond the closure of the Project ensured that the GEF continued to get value from the use of the equipment, and that such activities continued to protect the ozone layer. The equipment for recovery and recycling is discussed in the next Section.

Table 9: Training of personnel in the servicing of refrigeration and air conditioning equipment

COUNTRY	Legislative driver	Developed (A2) or Developing (A5) country	Project Start	Project end	Association or Institute	Trained during Project	Training before or since Project	Technicians paid for training after the Project	Certificate or "Greencard" (Validity, years)	Legislation for Qualification requirements	Unqualified penalised
1	2	3	4	5	6	7	8	9	10	11	12
Bulgaria	EU	A2	1995	2000	Institute	1500	500	Yes	Certificate	Yes	Yes
Czech Republic	EU	A2	1994	1998	Association	850	1700	Yes	Greencard (3)	Yes	Yes
Estonia	EU	A2	2000	2007	Association	200	Yes	Yes	Certificate	Yes	No
Hungary	EU	A2	1995	1998	Association	3600	3000	Yes	Greencard (5)	Yes	Yes
Latvia	EU	A2	1997	2007	Association	180	54	Yes	Greencard (3)	Yes	Yes
Lithuania	EU	A2	1998	2005	Association	0	272	Yes	Greencard (5)	Yes	Yes
Poland	EU	A2	1997	2001	Foundation	1725	No	No	Greencard (0)	Yes	Yes
Slovakia	EU	A2	1995	2002	Association	1760	Yes	Yes	Certificate	Yes	Unkn
Slovenia	EU	A2	1995	1998	Cham. of Com	211	Unkn	Unkn	Certificate	Yes	Unkn
Armenia	Non-EU	A5	2004	2009	Association	685	No	Not Rel.		No	No
Azerbaijan	Non-EU	A2	1999	2002	None	1101	No	No		No	No
Belarus	Non-EU	A2	1997	2000	Association	1000	No	No	Certificate	Yes	No
Kazakhstan	Non-EU	A2	2000	2005	None	3365	26	Yes	Certificate	Yes	No
Russian Fed.	Non-EU	A2	1996	2004	Institute	600	No	No		No	No
Tajikistan	Non-EU	A2	2002	2006	Association	334	No	No		No	No
Turkmenistan	Non-EU	A5	1998	2005	None	366	No	No	Certificate	No	No
Ukraine	Non-EU	A2	1998	2004	None	456	No	No		No	No
Uzbekistan	Non-EU	A2	1998	2007	None	1648	No	No		No	No

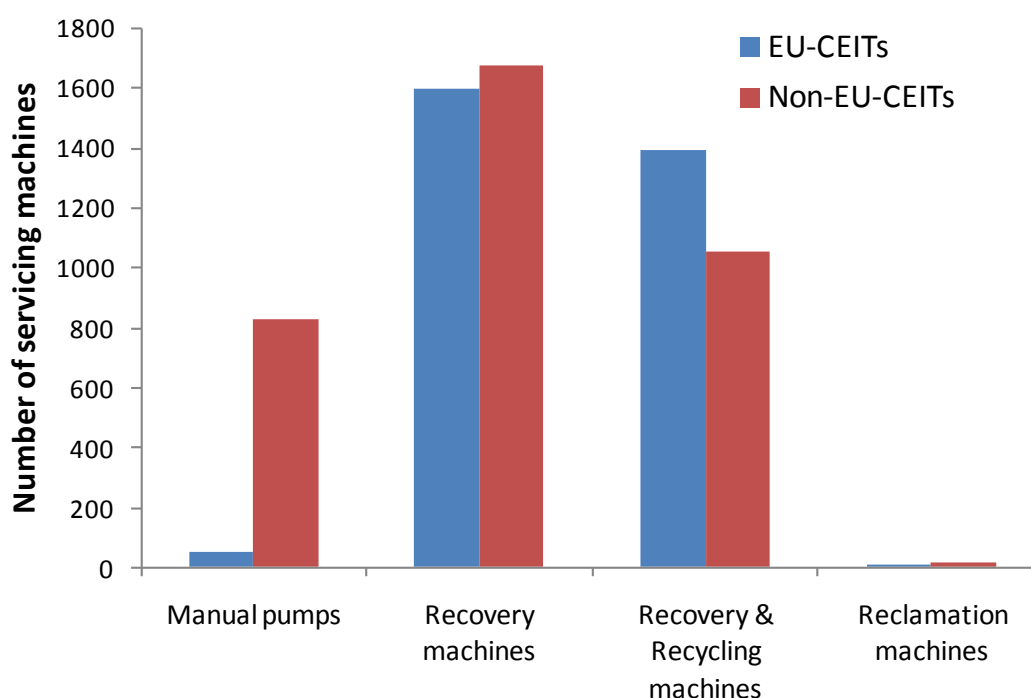
Source: Volume 2 Country Reports, "GEF Impact Report of the phase out of ozone-depleting substances in Countries with Economies in Transition, July 2009"

EU = European Union; A2 = Article 2 = Developed country in the Montreal Protocol; A5 = Article 5 = Developing country in the Montreal Protocol

7.4.1 Equipment used to recover, recycle and reclaim ODS

44. There was a range of equipment financed by the GEF that was distributed to servicing centres for the recovery, recycling and reclamation of ODS. Manual pumps came with a plastic bag to temporarily store the ODS. Recovery pumps were electrical and transferred the refrigerant to a small cylinder. Recovery and Recycling (R&R) machines recovered the refrigerant, filtered the coarse material (*'light cleaning'*) and then returned the slightly cleaner refrigerant to the equipment. Reclamation machines recovered the refrigerant and *'deep cleaned'* it using more sophisticated filters than those in the R&R machines.
45. Manual pumps were distributed to only one of the EU-CEITs (Estonia), but 67% of the Non-EU-CEITs (Table 10, Column 6). They had the advantage of being relatively light compared to the other units, making them easier to transport without a vehicle. However, hand pumping required more effort than the electrical Recovery machines (Column 7), and they were reported to not be as widely used for this reason.
46. The Recovery machines (about 4,200) outnumbered Manual Pumps (880) by four-fold (compare Columns 6 and 7). They were distributed about equally between the EU- and the Non-EU-CEITs (Figure 30). In the 18 CEITs, Bulgaria had about 25% of the recovery equipment because that country did not use the GEF finance to purchase assembled machines. Instead Bulgaria purchased the components and assembled the equipment themselves, which allowed them to make more machines for the same allocated funds.

Figure 30: Number of manual pumps, recovery machines, recovery & recycling machines and reclamation machines distributed to servicing centres in EU-CEITs and Non-EU-CEITs



47. There were more Recovery and Recycling machines distributed in EU-CEITs than in Non-EU-CEITs (Column 8; Figure 30). These were usually larger, heavier units that required a vehicle for transport to the ODS-containing equipment. More technicians in the EU-CEITs than in the Non-EU-CEITs had a vehicle to transport these machines. The Reclamation machines were relatively rare with generally one, two or sometimes three allocated per country (Column 9, Figure 30). Uzbekistan was unusual having 12 of them. Some countries had none (Armenia, Azerbaijan, Kazakhstan, Slovakia, Tajikistan and Turkmenistan). Slovakia had none

because it imported recycled refrigerant that was presumably 'clean'. The number of reclamation machines allocated to the Russian Federation was unknown.

48. A database of the location of these machines has been maintained by about 30% of the CEITs – Armenia, Lithuania, Poland, Slovenia, Tajikistan, Ukraine and Uzbekistan (Column 10). Uzbekistan maintained the database mainly for the purposes of re-allocating under-utilised machines to companies that could make more use of them. Poland had recently initiated the database in order to ensure that the machines were stored and used appropriately.
49. Sometimes the refrigerant that was recovered was so contaminated that it was not possible to be reclaimed. An analysis of the survey questionnaire showed that 89% of the EU-CEITs stored the contaminated ODS for later destruction, whereas only 11% of the Non-EU-CEITs reported storage for later destruction. In most of the EU-CEITs, the contaminated refrigerant was destroyed (the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia) or used as feedstock by the chemical industry (the Czech Republic). Contaminated ODS was not destroyed in the non-EU-CEITs, except the Ukraine where commercial destruction facilities exist.
50. Enterprises in many countries that were involved in servicing reported that, in the absence of destruction facilities, they had stored the contaminated refrigerant in cylinders on their properties on the understanding that eventually it would be destroyed. Only two of the EU-CEITs (Poland and Slovakia) and two Non-EU-CEITs (Ukraine and Uzbekistan) reported that they had refrigerant destruction facilities in their countries during the Project (Column 11). In Uzbekistan, the facilities were not commercial but small scale, rather impractical and expensive to use.
51. However, all of the EU-CEITs except Hungary reported that they shipped the contaminated ODS to be destroyed to a facility in another country, but none of the Non-EU-CEITs reported this as an option (Column 12). Non-EU-CEITs might ship contaminated refrigerant to another country in the future if destruction facilities remained unavailable in their own countries. This was supported by an analysis of the survey questionnaire that showed that, in the past 2 years, 55% of the EU-CEITs reported that they destroyed ODS in their own country, whereas all of the Non-EU-CEITs ODS was not destroyed in local facilities. However, there are logistical and cost issues that would need to be addressed to make this practical, which are discussed further in Section 7.7: Theory of Change – Assessment of Threats and Risks.

Table 10: Equipment used for the recovery, recycling and reclamation of ozone-depleting substances in CEITs

COUNTRY	Legislative driver	Developed (A2) or Developing (A5) country	Project Start	Project end	Manual pumps	Recovery machines	Recovery and recycling machines	Reclamation machines	Machines database	Destruction capability inside country during or after Project	Destruction outside during or after the Project
1	2	3	4	5	6	7	8	9	10	11	12
Bulgaria	EU	A2	1995	2000	0	1000	30	2	No	No	Yes
Czech Republic	EU	A2	1994	1998	0	0	500	2	No	No	Yes
Estonia	EU	A2	2000	2007	50	50	5	1	No	No	Yes
Hungary	EU	A2	1995	1998	0	0	625	1	No	No	No
Latvia	EU	A2	1997	2007	0	0	40	2	No	No	Yes
Lithuania	EU	A2	1998	2005	0	0	50	3	Yes	No	Yes
Poland	EU	A2	1997	2001	0	550	140	1	Yes	Yes	Yes
Slovakia	EU	A2	1995	2002	0	0	0	0	No	Yes	No
Slovenia	EU	A2	1995	1998	Unknown	Unknown	Unknown	Unknown	Yes	No	Yes
Armenia	Non-EU	A5	2004	2009	100	70	5	0	Yes	No	No
Azerbaijan	Non-EU	A2	1999	2002	300	300	50	0	No	No	No
Belarus	Non-EU	A2	1997	2000	0	50	5	1	No	No	No
Kazakhstan	Non-EU	A2	2000	2005	50	595	59	0	No	No	No
Russian Fed.	Non-EU	A2	1996	2004	0	0	925	0	No	No	No
Tajikistan	Non-EU	A2	2002	2006	50	117	5	0	Yes	No	No
Turkmenistan	Non-EU	A5	1998	2005	30	31	3	0	No	No	No
Ukraine	Non-EU	A2	1998	2004	0	86	0	1	Maybe	Yes	No
Uzbekistan	Non-EU	A2	1998	2007	300	430	0	12	Yes	Yes	No

Source: Volume 2 Country Reports, "GEF Impact Report of the phase out of ozone-depleting substances in Countries with Economies in Transition, July 2009"

EU = European Union; A2 = Article 2 = Developed country in the Montreal Protocol; A5 = Article 5 = Developing country in the Montreal Protocol

7.5 OTHER ACTIVITIES THAT INDICATED GOVERNMENT COMMITMENT

52. The government's commitment to the protection of the ozone layer was measured through its performance in producing legislation that reduced and phased out ODS, such as the programme to recover and recycle ODS, reporting of the results of that programme, and the requirement of workers to be qualified to recover and recycle ODS. These were activities that were mainly undertaken during the Project, although some CEITs already had this legislation in force before the Project commenced (See Section 7.2.1: Legislation).
53. There were also activities carried out during and after the Project which demonstrated the government's ongoing commitment to *monitor* the results of its activities aimed at reducing ODS emissions. These post-Project activities included the recovery and recycling of unwanted domestic refrigerators, halon recovery and storage, the reporting of the 3R results, and implementation of other legislation on ODS.
54. In the Non-EU-CEITs, only Kazakhstan and Uzbekistan developed a programme for the recovery ODS from unwanted refrigerators, whereas all of the EU-CEITs had such a programme in place (Table 12, Column 6). Most of the EU-CEITs recovered ODS from both the cooling circuit and the insulation foam. Kazakhstan and Uzbekistan recovered ODS from the circuit, but the remaining two-thirds of the ODS contained in the insulation foam was not recovered. The other seven Non-EU-CEITs took the refrigerators to the landfill where over time the ODS would be emitted from the discarded refrigerators, which was an environmentally unacceptable result.
55. Halon was recovered and banked by few of the CEITs (Column 7). Only Estonia, Hungary, Kazakhstan, Latvia and Poland collected halon during the Project and banked it. A regional halon bank was established in Estonia to service the needs of the Baltic countries, but so far halon has been received only from Latvia and none from Lithuania. The programme in Kazakhstan halted when trained technicians were no longer available to collect and store the halon. In most of these countries, halon collection and storage was not formulated into the Project. The Russian Federation did not recover halon during the Project because the enterprises involved failed to comply fully with the procurement procedures to obtain the halon reclamation equipment⁵². The relatively expensive equipment that is needed for the reclamation of halon was a deterrent to government involvement in such programmes in countries where this equipment was not financed in the projects. This aspect is discussed further in Section 7.7: Theory of Change – Assessment of Threats and Risks.
56. Eleven of the CEITs reported the amount of ODS recovered, recycled and reclaimed during their projects, in compliance with Regulation (EC) No 2037/2000⁵³. More of the EU-CEITs reported such results after the Project than non-EU CEITs, because as Member States they were required to report this information to the European Commission in order to remain compliant with that Regulation. Reports from Latvia and Slovakia were not made available for the evaluation. Many of the Non-EU-CEITs ceased collecting the information once the Project was completed, with the exception of Belarus, Tajikistan and Uzbekistan. Some of the servicing companies that were visited in the Non-EU-CEITs continued to collect and

⁵² Some large Russian companies such as Gazprom maintain their own private banks, see: http://ozone.unep.org/teap/Reports/HTOC/2006_HTOC_Assessment_Report_2006.pdf

⁵³ Article 16 of Regulation (EC) No 2037/2000 requires Member States to recovery, recycle, reclaim ODS contained in refrigeration, air-conditioning and heat pump equipment, domestic refrigerators and freezers, equipment containing solvents, fire protection systems and fire extinguishers, and to use technologies approved by the Parties or by any other environmentally acceptable destruction technology when ODS is destroyed. Member States are required to report annually to the Commission on the quantities of ODS recovered, recycled, reclaimed or destroyed.

maintain a database on ODS amounts recovered, recycled and reclaimed, but did not submit the information to the NOU since they reported that there was no interest from the government in collecting it. The evaluation concluded that legislation was necessary to encourage reporting after the project completion.

57. An analysis of the survey questionnaire showed that all of the EU-CEITs and 78% of the Non-EU-CEITs had 3R programmes in place in 2007. All of the EU-CEITs reported that the quantities of ODS recovered, recycled, reclaimed and destroyed were reported to the National Ozone Units. However, only 44% of the NOUs in the Non-EU-CEITs collected such information mainly because there was no legislation in place that required such information to be collected. The quantity of ODS reported to be recovered in 2007 in EU-CEITs was almost 400% more than in the Non-EU-CEITs (Table 11).

Table 11: Quantity of ODS recovered in EU-CEITs and Non-EU-CEITs in 2007

Ozone-depleting substance recovered	EU-CEITs (Kg)	Non-EU-CEITs (Kg)
CFCs	22,969	15,798
HCFCs	90,588	19,304
Halon	20,532	800
Other	109	-
TOTAL	134,198	35,902

Source: Analysis of the survey questionnaire undertaken in this Impact Evaluation

58. Almost 23 tonnes of CFCs were reported to be recovered, which indicated that there were still significant quantities recoverable from equipment some 13 years after the ban on the import and production of CFCs in the EU-CEITs.
59. As a further indicator of government commitment to ozone layer protection, nine CEITs continued to draft and implement legislation after the Project had been completed (Column 10). These were mainly the EU-CEITs, and largely in response to the requirements of the EC regulation on fluorinated gases (F-gases). F-gases such as HFCs have been used to replace ODS for refrigeration and air conditioning. The EC legislation required amongst a range of activities for Member States to implement activities that addressed the qualification requirements of technicians that serviced refrigeration and air conditioning equipment that contained F-gases, and to put in place procedures that would minimise emissions of F-gases. The conditions that have been put in place are equally applicable to ODS as they are to F-gases, and therefore this related legislation has been of benefit to ozone layer protection.
60. Latvia has this legislation in place, but it was implemented during the term of the Project which concluded later than all the other EU-CEITs. In the Non-EU-CEITs, only Belarus, Tajikistan and Uzbekistan have put in place legislation after the Project finished.

Table 12: Other activities that indicated government commitment to reduce and eliminate ozone-depleting substances

COUNTRY	Legislative driver	Developed (A2) or Developing (A5) country	Project Start	Project end	Refrigerator recovery during or after the Project	Halon recovered during the Project	RRR results during the Project	RRR results after the Project	ODS or related legislation implemented after the Project
1	2	3	4	5	6	7	8	9	10
Bulgaria	EU	A2	1995	2000	Yes	No	No	Yes	Yes
Czech Republic	EU	A2	1994	1998	Yes	No	Yes	Yes	Yes
Estonia	EU	A2	2000	2007	Yes	Yes	Most	Yes	Yes
Hungary	EU	A2	1995	1998	Yes	Yes	Yes	Yes	Yes
Latvia	EU	A2	1997	2007	Yes	Yes	No	No	No
Lithuania	EU	A2	1998	2005	Yes	No	Some	Yes	Yes
Poland	EU	A2	1997	2001	Yes	Yes	Yes	Yes	Yes
Slovakia	EU	A2	1995	2002	Yes	Unkn	No	No	Yes
Slovenia	EU	A2	1995	1998	Yes	No	Unkn	Yes	Unknown
Armenia	Non-EU	A5	2004	2009	No	No	Yes	NR	NR
Azerbaijan	Non-EU	A2	1999	2002	No	No	No	Unkn	No
Belarus	Non-EU	A2	1997	2000	No	No	No	Yes	Yes
Kazakhstan	Non-EU	A2	2000	2005	Yes	Yes	Yes	No	No
Russian Fed.	Non-EU	A2	1996	2004	Yes	No	Yes	No	No
Tajikistan	Non-EU	A2	2002	2006	No	No	Yes	Yes	Yes
Turkmenistan	Non-EU	A5	1998	2005	No	No	Yes	No	No
Ukraine	Non-EU	A2	1998	2004	No	No	No	No	No
Uzbekistan	Non-EU	A2	1998	2007	Yes	No	Yes	Yes	Yes

Source: Volume 2 Country Reports, "GEF Impact Report of the phase out of ozone-depleting substances in Countries with Economies in Transition, July 2009"

EU = European Union; A2 = Article 2 = Developed country in the Montreal Protocol; A5 = Article 5 = Developing country in the Montreal Protocol

7.6 ENTERPRISE COMMITMENT TO THE REDUCTION AND PHASE OUT OF OZONE-DEPLETING SUBSTANCES

61. In this Section, we examine the commitment of enterprises in 18 CEITs in the refrigeration, aerosol, foam, solvent and servicing sectors to the reduction and phase out of ozone-depleting substances.

7.6.1 Refrigeration sector

62. The refrigeration sector comprised enterprises that manufactured domestic refrigerators, compressors, refrigerated display cabinets or mobile air conditioning units. There were 22 refrigerator production companies that were examined in this report (Table 13). Eight companies were in the Non-EU-CEITs and 14 of them were in the EU-CEITs.
63. The World Bank was the implementing agency for 15 of the sub-projects, and UNDP the implementing agency for seven of them (Column 6). The World Bank always carried out a financial viability test on each enterprise as part of the process of determining whether or not an enterprise would be funded, whereas UNDP never tested the financial viability of each company (Column 9).
64. All of the companies except one (EDA, Poland) achieved the goal of phasing out ODS (Column 10). EDA was a compressor manufacturing company that went bankrupt before the target was achieved. EDA had a target of 320 ODP-tonnes because this quantity was attributed to future ODS avoided as a result of the conversion to CFC-free compressors. Sumgait sub-project was implemented by UNDP which had a target of zero ODS, because UNDP did not attribute future ODS phase out to compressors.
65. There was no correlation between the implementing agency and its financial viability test or not, with the ODS phase out achieved and whether or not the company was currently operational (Column 12). In Table 13, the World Bank undertook 16 of the investment sub-projects and UNDP 7. The World Bank was the implementing agency for six enterprises that are no longer operational, and UNDP 3.
66. Thirteen of the 22 enterprises were still operational in 2009, some having been concluded more than 11 years ago, which meant that 58% of the GEF investment in this sector was *'still a going concern'*. Nine companies were not operational in 2009.
67. Nine companies reported that the GEF financial assistance had increased their production (Column 13) and improved their profitability (Column 14), which indicated that the conversion to non-ODS technology had been good for business. It is likely that companies supplying the nine with materials also increased their sales (Column 15), so the GEF finance had a catalytic effect beyond the nine companies that benefited directly from the funding.
68. Some of these companies e.g. NORD (Ukraine), Snaige (Lithuania) and Atlant (Belarus), used their improved profitability to purchase other companies, and to establish daughter companies in other countries. Because of the increase in production and expansion of manufacturing facilities, it was likely that employment increased after the transition and prior to the 2007-2009 economic crisis (Column 16). The GEF funding contributed to a positive socio-economic impact by increasing local employment. Details of the changes to the companies as a result of the GEF financial assistance are described within the individual Country Reports in Volume 2.
69. Accurate and comprehensive project formulation contributed toward the success of the ODS phase out. Analysis of the survey questionnaire showed that 56% of the NOUs in the EU-CEITs *'strongly agreed'* that the sub-projects were well *formulated* by the Implementing Agencies compared with only 11% of the NOUs in the Non-EU-CEITs that *'strongly agreed'*

where 67% 'agreed'. Similarly, 44% of the NOUs in the EU-CEITs 'strongly agreed' that the sub-projects were well *implemented*, compared with none of NOUs in the Non-EU-CEITs where 67% 'agreed'. This suggested that EU-CEITs obtained a more satisfactory result on sub-project formulation and implementation, compared to Non-EU-CEITs. About 56% of the EU-CEITs 'strongly agreed' that they were *consulted* during project formulation and implementation phase, whereas none of the Non-EU-CEITs 'strongly agreed' that they were consulted during project formulation.

70. We conclude that in the refrigeration sector about 60% of the enterprises that received financial support are still operational, many more than 10 years after the closure of the Project. About 40% of them were more profitable after the transition to non-ODS technology than before. The technology that had been installed 10 years ago in many cases was still operational, albeit in some companies with lower output in the past 2 years than in the period prior to the economic crisis.

Table 13: Enterprises that were provided financial assistance to phase out ozone-depleting substances in the refrigeration sector

Country	Status	A2 or A5	Project start	Project end	Implementing Agency	Enterprise name	GEF (\$, million)	Financial viability test	Achieved ODS target	ODP phased out in ODP-tonnes	Operational currently	Increased production after the Project	Improved profitability	Supply companies increased	Increase in employment
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Bulgaria	EU	A2	1995	2000	WB	Cool Star	0.536	Yes	Yes	27	Yes	Yes	Yes	Likely	Unkn
Bulgaria	EU	A2	1995	2000	WB	MRAZ	3.338	Yes	Yes	128	No	No	No	No	Unlikely
Bulgaria	EU	A2	1995	2000	WB	Frigo	1.076	Yes	Yes	17	No	Unkn	Unkn	Unkn	Unkn
Bulgaria	EU	A2	1995	2000	WB	Brist	2.046	Yes	Yes	10	Yes	Yes	Yes	Likely	Yes
Bulgaria	EU	A2	1995	2000	WB	Klima Inkom	1.012	Yes	Yes	19	Yes	Unkn	Unkn	Unkn	Unkn
Czech Rep.	EU	A2	1994	1998	WB	Thermo-King	0.249	Yes	Yes	110	Yes	Not rel.	Not rel.	Unkn	Unkn
Hungary	EU	A2	1995	1998	WB	Frigolux	0.440	Yes	Yes	16	Yes	Yes	Yes	Likely	Unkn
Lithuania	EU	A2	1998	2005	UNDP	Snaige	2.009	No	Yes	112	Yes	Yes	Yes	Likely	No
Lithuania	EU	A2	1998	2005	UNDP	Oruva	1.729	No	Likely	20	No	Unlikely	Unlikely	Unlikely	Unlikely
Poland	EU	A2	1997	2001	WB	Polar	0.529	Yes	Yes	200	Yes	Yes	Yes	Likely	Likely
Poland	EU	A2	1997	2001	WB	Zamex	1.098	Yes	Yes	75	No	Unkn	Unkn	Unkn	Unlikely
Poland	EU	A2	1997	2001	WB	EDA	1.581	Yes	Unlikely	320	No	No	Unkn	Unlikely	Unkn
Slovenia	EU	A2	1995	1998	WB	LTH	1.754	Yes	Yes	26	No	Unlikely	Unlikely	Unlikely	Unlikely
Slovakia	EU	A2	1995	2002	WB	Samsung	2.590	Yes	Yes	Unkn	No	No	No	No	No
Armenia	NON-EU	A5	2004	2009	UNDP	Saga	0.170	No	Yes	6	Yes	Yes	Yes	Yes	Unkn
Azerbaijan	NON-EU	A2	1999	2002	UNDP	Sumgait	2.400	No	Yes	0	No	No	No	No	No
Azerbaijan	NON-EU	A2	1999	2002	UNDP	Chinar	2.900	No	Yes	122	Yes	No	No	No	No
Belarus	NON-EU	A2	1997	2000	WB	Atlant	4.320	Yes	Yes	282	Yes	Yes	Yes	Yes	Yes
Russian Fed.	NON-EU	A2	1996	2004	WB	Iceberg	0.629	Yes	Yes	115	Yes	Yes	Yes	Yes	Yes
Tajikistan	NON-EU	A2	2002	2006	UNDP	Pamir	0.123	No	Yes	0.2	No	No	No	No	No
Uzbekistan	NON-EU	A2	1998	2007	UNDP	SINO	1.516	No	Yes	35	Yes	No	No	No	No
Ukraine	NON-EU	A2	1998	2004	WB	Nord	9.775	Yes	Yes	500	Yes	Yes	Yes	Yes	Yes

Source: Volume 2 Country Reports, "GEF Impact Report of the phase out of ozone-depleting substances in Countries with Economies in Transition, July 2009"

EU = European Union; A2 = Article 2 = Developed country in the Montreal Protocol; A5 = Article 5 = Developing country in the Montreal Protocol

7.6.2 Aerosol sector

71. There were eleven aerosol companies that were examined in this evaluation (Table 14). Four of the companies were in the Non-EU-CEITs and the 7 in the EU-CEITs. All of them manufactured household aerosols that contained a wide range of ingredients used for such activities as house and car cleaning or body grooming, except four companies (Mediroll in Hungary, Polfa Tarch. in Poland, Lek and Krka in Slovenia) that produced aerosols for medicinal purposes.
72. The World Bank was the implementing agency for 8 of the sub-projects, and UNDP the implementing agency for 3 of them (Column 6). All of them achieved their ODS phase out target (Column 10).
73. Three of the eleven plants were either not operational or partially operational (Column 12). Mediroll in Hungary had used the GEF finance to develop and market a surgical instrument sterilisation product that used ethylene oxide as the sterilant. Ethylene oxide has since been banned in Hungary and therefore production was discontinued, but the company still manufactured a wide range of other medical products. The GEF finance to Mediroll was modest compared to the amount of ODS phased out. Therefore although the product was not sustainable, the ODS phase out and the company were both sustainable.
74. Two of the other facilities involved aerosol companies that were partially operational. The Chimprom aerosol facility in the Russian Federation operated once every three to four years, according to market demand. This so-called campaign production was undertaken because of the limited sales achievable by the company. Similarly, the Yerevan Household Chemistry Plant in Armenia produced aerosol engine cleaning degreasers in a single round of a campaign production annually, but only when there was a demand for the product. The main part of its operations was not functioning and it was considered bankrupt. This facility also reported difficulty in obtaining spare parts for its operations (Column 13), but six of the other 11 facilities reported that spare parts were readily available at reasonable cost.
75. It was not possible to correlate the failure (no production in one company) and partial failure (campaign production in two companies) with the presence or absence of a financial viability test performed on these companies by the implementing agencies. All of these companies achieved the ODS phase out, and then either their product or the company failed to survive completely or partially after the ODS was phased out.
76. Five of the aerosol plants increased their production (Column 14), and improved their profitability (Column 15) as a result of the GEF financial assistance, which indicated that the conversion to non-ODS technology had been good for business. It is likely that companies supplying these four with materials also increased their sales (Column 16), so the GEF finance had a catalytic effect beyond the four aerosol companies that benefited directly from the funding. Companies that were not directly funded benefited from the aerosol expert advice provided to the companies that were funded⁵⁴. This again showed that the catalytic effect of the GEF funding went beyond the companies being funded in this sector.
77. Harmonia, now the largest aerosol producer in the Russian Federation, was one of the companies that reported increased profitability. However, it was not optimistic of similar profit margins in the future as a more profitable market had developed that required more sophisticated aerosol filling equipment than that supplied by the Project ten years ago. Harmonia reported that they felt locked into the older GEF technology as it was unable to

⁵⁴ Information provided to the GEF Impact Evaluation workshop held in Tashkent 7-8 September 2009 by the Russian Federation, which had the greatest share of the aerosol projects

sell the equipment to raise funds for new equipment. The Russian Federation taxed any potential sale of equipment that was derived from an international project at a rate that made any such sale prohibitively expensive for a company.

78. Only one of the companies (Ukrainian Aerosols) reported an increase in the number of workers, in response to increased business. The same company was making arrangements with another local company to jointly develop and market products in a way that was expected to benefit both companies, but which both companies could not achieve individually.
79. The evaluation concludes that the conversion to non-ODS technology in the aerosol sector was successful. Most of the companies that had converted were still in operation in 2009, and some of them were more profitable than prior to the conversion. Given that the aerosol market is highly competitive due to the possibility in many countries of cheaper imports, the survival rate of the companies in the CEITs was satisfactory.

Table 14: Enterprises that were provided financial assistance to phase out ozone-depleting substances in the aerosol sector

Country	Status	A2 or A5	Project Start	Project end	IA	Enterprise name	GEF \$ million	Financial viability test	Achieved ODS target	ODP phased out in ODP-tonnes	Operational	Spare parts available	Increased production after the Project	Improved profitability	Supply companies increased	Increase in employment
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Hungary	EU	A2	1995	1998	WB	Mediroll	0.048	Yes	Yes	107	No	Not rel	Unkn	Unlikely	Unlikely	Unlikely
Hungary	EU	A2	1995	1998	WB	Auto-Mobil	0.081	Yes	Yes	97	Yes	Unkn	Unkn	Unkn	Unkn	Unkn
Latvia	EU	A2	1997	2007	UNDP	Kvadro	Unkn	No	Yes	5	Yes	Yes	Yes	Yes	Yes	Unkn
Lithuania	EU	A2	1998	2005	UNDP	Vilnius	0.468	No	Yes	246	Yes	Yes	Yes	Yes	Likely	Unkn
Poland	EU	A2	1997	2001	WB	Polfa Tarch.	0.446	Yes	Yes	320	Yes	Yes	Unkn	Yes	Unkn	Unkn
Slovenia	EU	A2	1995	1998	WB	Krka	0.414	Yes	Yes	79	Yes	Unkn	Unkn	Unkn	Unkn	Unkn
Slovenia	EU	A2	1995	1998	WB	Lek	1.777	Yes	Yes	157	Yes	Unkn	Yes	Yes	Yes	Yes
Armenia	NON-EU	A5	2004	2009	UNDP	Yerevan	0.035	No	Yes	14	CP	No	No	No	Unkn	Unkn
Russian Fed.	NON-EU	A2	1996	2004	WB	Chimprom	4.733	Yes	Yes	1212	CP	Yes	No	No	No	No
Russian Fed.	NON-EU	A2	1996	2004	WB	Harmonia	6.185	Yes	Yes	1105	Yes	Yes	Yes	Yes	Yes	Unkn
Ukraine	NON-EU	A2	1998	2004	WB	Ukranian	3.100	Yes	Yes	500	Yes	Yes	Yes	Yes	Yes	Yes

Source: Volume 2 Country Reports, "GEF Impact Report of the phase out of ozone-depleting substances in Countries with Economies in Transition, July 2009"

EU = European Union; A2 = Article 2 = Developed country in the Montreal Protocol; A5 = Article 5 = Developing country in the Montreal Protocol IA = Implementing Agency; CP = Campaign production and partially operational

7.6.3 Foam sector

80. There were eleven foam companies that were examined in this evaluation (Table 15). Three companies were in the Non-EU-CEITs and eight of them were in the EU-CEITs. The World Bank was the implementing agency for 8 of the sub-projects, and UNDP the implementing agency for 3 of them (Column 6). Six of the companies manufactured sandwich panels, four of them flexible foam that was used for tank or pipe insulation, and one that was a spray foam company (Column 8).
81. All of them achieved their ODS phase out target (Column 10), except for Trademarket (Kazakhstan) that achieved about 90% ODS reduction as it reverted to HCFCs after transitioning in the Project to ODS-free technology. Trade Market is a system house that in 1998 supplied 16 companies with chemicals for the manufacture of small-scale rigid and flexible foam. Four of the companies in the rigid foam operations went bankrupt as they were not able to sustain the relocation costs, and almost all the companies in the flexible foam operations went bankrupt due to cheaper imports from Russia. The sandwich panel operations under Trade Market are therefore shown as operational (Column 13), but the flexible foam as not operational. There was no correlation between the Implementing Agency's use of a financial viability test or not and the subsequent survival of the foam-manufacturing company.
82. Metalplast was deleted from the company records in Poland in 2006 when it was purchased by another company (Ruuki), which was operational in 2009. The evaluation assumed that the equipment that was supplied in the Project was being used by Ruuki, and therefore it was scored as operational.
83. Three companies reported that spare parts were available for the machinery financed by the GEF that covered sandwich, spray and flexible foam operations in Hungary, Latvia and the Russian Federation (Column 14). There was no information from the other companies on the availability of spare parts.
84. Five of the foam facilities reported that their production increased (Column 15), and their profitability improved (Column 16) as a result of the GEF financial assistance, which indicated that the conversion to non-ODS technology had been good for business. For some of them, employment either increased or was likely to have increased (Column 18). It is likely that companies that supplied these five with materials also increased their sales (Column 17), which indicated that the GEF finance had a catalytic effect beyond the five companies producing foam products that benefited directly from the funding. The reasons for their increased production and profitability are provided in the Country Reports in Volume 2.
85. Two other companies that were operational did not increase production or improve profitability (Columns 15 and 16). One was Metalucon in Hungary that reported that the sandwich panel manufacturing equipment was used a great deal in the past, but in 2009 its use was about 1-day per month. The factory was operating 4-6h on a 4-day week. Metalucon reported difficulty competing with cheaper panels produced locally in Hungary. The other company was Ritols from Latvia which reported a similar level of operations before and after the conversion. Ritols applied spray foam for insulation in established as well as new buildings, and during the economic crisis its work involved mainly old buildings as there was little new construction.
86. The evaluation concludes that the conversion to non-ODS technology in the CEIT portfolio was successful in the foam sector. Most of the companies that had converted were still in operation in 2009, and some of them were more profitable than prior to the conversion. Given that the foam market is highly competitive due to the possibility in many countries of cheaper imports, the survival rate of the companies in all CEITs was satisfactory except for

those in Kazakhstan for the reason provided above.

Table 15: Enterprises that were provided financial assistance to phase out ozone-depleting substances in the foam sector

Country	Status	A2 or A5	Project Start	Project end	IA	Enterprise name	Foam type	GEF \$, million	Financial viability test	Achieved ODS target	ODP phased out in ODP-tonnes	Operational	Spare parts available	Increased production after the Project	Improved profitability	Supply companies increased	Increase in employment
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Czech Rep	EU	A2	1994	1998	WB	BHL	Sandwich	0.554	Yes	Yes	80	Yes	Unkn	Yes	Yes	Likely	Likely
Hungary	EU	A2	1995	1998	WB	Hajdu.	Flexible	1.010	Yes	Yes	63	Yes	Unkn	Yes	Yes	Likely	Unkn
Hungary	EU	A2	1995	1998	WB	Metalucon	Sandwich	0.683	Yes	Yes	46	Yes	Unkn	Unlikely	Unlikely	Unlikely	Unlikely
Hungary	EU	A2	1995	1998	WB	Metisol	Sandwich	0.336	Yes	Yes	80	Yes	Yes	Yes	Yes	Likely	No
Latvia	EU	A2	1997	2007	UNDP	Ritols	Spray	0.106	No	Yes	13	Yes	Yes	No	No	No	No
Poland	EU	A2	1997	2001	WB	Inzynieria	Flexible	0.149	Yes	Yes	19	Yes	Unkn	Unkn	Unkn	Unkn	Unkn
Poland	EU	A2	1997	2001	WB	Metalplast	Sandwich	0.481	Yes	Yes	300	Yes	Unkn	Unkn	Yes	Unkn	Unkn
Slovenia	EU	A2	1995	1998	WB	Trimo	Sandwich	1.153	Yes	Yes	28	Yes	Yes	Yes	Yes	Yes	Likely
Kazakhstan	NON-EU	A2	2000	2005	UNDP	Trade Market	Sandwich	1.154	No	No	90	Yes	Unkn	Yes	Yes	Yes	Yes
Kazakhstan	NON-EU	A2	2000	2005	UNDP	Trade Market	Flexible	0.285	No	Yes	45	No	Unkn	No	No	No	No
Russian Fed.	NON-EU	A2	1996	2004	WB	Stroydetal	Flexible	1.082	Yes	Yes	39	Yes	Yes	Yes	Yes	Yes	Yes

Source: Volume 2 Country Reports, "GEF Impact Report of the phase out of ozone-depleting substances in Countries with Economies in Transition, July 2009"

EU = European Union; A2 = Article 2 = Developed country in the Montreal Protocol; A5 = Article 5 = Developing country in the Montreal Protocol IA = Implementing Agency;

7.6.4 Solvent sector

87. There were eleven companies that were examined by the evaluation team that converted to ODS-free solvents (Table 16). Four companies were located in the Non-EU-CEITs and seven of them in the EU-CEITs. The World Bank was the implementing agency for ten of the sub-projects, and UNDP the implementing agency for one (Column 6), which was the Pavlodar Chemical Company (PCC) in Kazakhstan.
88. All of them achieved their ODS phase out target (Column 10), except for the PCC. The PCC is a company that produces industrial chemicals. The GEF financed the replacement of CFCs with methylene chloride (MTC) as a solvent to remove oil contaminants from various oxygen processing systems that could cause an explosion if not removed. The grant also paid for a machine to recover and reclaim the MTC, as a way of conserving the total used. The equipment was installed but it was not operational as it had not been certified. The costs of certification were not included in the GEF finance, and were about twice the cost of the equipment. The lack of certification of the equipment was not affecting the plant's current operations which were shut down until 2010 pending the installation of new oxygen-generating equipment. PCC was unsure of whether they would be able to pay for the certification costs. PCC was therefore evaluated as not operational (Column 12).
89. All of the 10 solvent sub-projects that were examined in this report that were undertaken by the World Bank were successful. The only sub-project undertaken by UNDP was not successful, after the equipment was installed. The financial viability of PCC was not determined prior to investment by UNDP, but financial viability tests were undertaken by the World Bank for all the other solvent subprojects. The evaluation team concluded that the lack of certification for the PCC equipment was related more to project formulation rather than company financial viability, and therefore there was no correlation between the financial viability test and the inoperability of the equipment that was installed.
90. MMG and Tisza, both companies from Hungary, were also scored as not operational. MMG was the largest manufacturer of control and automation devices in Hungary. In 2009, it was reported to be in receivership and the evaluation team was unable to determine whether the ODS had been phased out. Tisza manufactured shoes and the GEF financed a range of equipment to replace the ODS solvents. Soon after the plant was operational, Tisza established a daughter company and the GEF-paid equipment was transferred to this company. The daughter company went into liquidation shortly afterwards, and the fate of the equipment was unknown.
91. Three companies (Hitelap and Rutitex in Hungary, Labod in Slovenia) reported that their production increased (Column 14), and their profitability improved (Column 15) as a result of the GEF financial assistance, which indicated that the conversion to non-ODS technology had been good for business.
92. Employment increased in Hitelap (Column 18), a company in Hungary that manufactured printed circuit boards for electronic firms using sophisticated and expensive electronic and X-ray technology. Machines that were purchased with the GEF funds were reported by the company to be crucial for its operations, even 13 years after they were installed. The Project assisted the company to increase production 10-fold, and it also enabled the company to comply with environmental and safety legislation. It is likely that companies that supplied these five with materials also increased their sales (Column 17), which indicated that the GEF finance had a catalytic effect beyond the five companies producing foam products that benefited directly from the funding.
93. Rutitex Ltd is a chain of dry-cleaning laundries in Hungary. The Project enabled early amortization of the CFC-operated machines and enabled compliance with environmental

legislation. Competitors of Rutitex that were not funded by the GEF replaced their dry-cleaning equipment with open-top cleaners that were subsequently banned under the EC directive on Volatile Organic Compounds⁵⁵, and they went bankrupt.

94. The conversion to non-ODS technology in the CEIT portfolio was successful in the solvent sector. Approximately 90% of the financial investment by the GEF in these sub-projects was in equipment that was still be used. Most of the companies that had converted were still in operation in 2009, and some of them were more profitable than prior to the conversion.

⁵⁵ The [Solvents Emissions Directive](#), also known as the [VOC \(Volatile Organic Compounds\) Directive \(1999/13/EC\)](#), entered into force on 1 April 2001 in the European Union for new installations, and applies to all installations since 31 October 2007.

Table 16: Enterprises that were provided financial assistance to phase out ozone-depleting substances in the solvent sector

Country	Status	A2 or A5	Project Start	Project end	IA	Enterprise name	GEF \$, million	Financial viability test	Achieved ODS target	ODP phased out in ODP-tonnes	Operational	Spare parts available	Increased production after the Project	Improved profitability	Supply companies increased	Increase in employment
3	2	1	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Bulgaria	EU	A2	1995	2000	WB	VMZ	0.649	Yes	Yes	50	Yes	Unkn	Unkn	Unkn	Unkn	Unkn
Hungary	EU	A2	1995	1998	WB	MMG	1.147	Yes	Unkn	91	No	Unkn	Unkn	Unkn	Unkn	Unkn
Hungary	EU	A2	1995	1998	WB	Hitelap	0.187	Yes	Yes	32	Yes	Yes	Yes	Yes	Likely	Yes
Hungary	EU	A2	1995	1998	WB	Tisza	0.124	Yes	Yes	24	No	Unkn	Unkn	Unkn	Unkn	Unkn
Hungary	EU	A2	1995	1998	WB	BRG	0.012	Yes	Yes	1.5	Yes	Unkn	Unkn	Unkn	Unkn	Unkn
Hungary	EU	A2	1995	1998	WB	Rutitex	0.346	Yes	Yes	8	Yes	Yes	Yes	Yes	Yes	No
Slovenia	EU	A2	1995	1998	WB	Labod	0.181	Yes	Yes	2.8	Yes	Unkn	Yes	Yes	Likely	Likely
Belarus	NON-EU	A2	1997	2000	WB	Minsk Comp	Unkn	Yes	Yes	49	Yes	Unkn	No	Yes	No	Unlikely
Belarus	NON-EU	A2	1997	2000	WB	Tsvetotron	Unkn	Yes	Yes	32	Yes	Unkn	Unlikely	Yes	Unlikely	Unlikely
Belarus	NON-EU	A2	1997	2000	WB	Minsk Inst	Unkn	Yes	Yes	6.2	Yes	Unkn	No	Yes	Yes	Unlikely
Kazakhstan	NON-EU	A2	2000	2005	UNDP	Pavlodar	0.099	No	No	0	No	NR	No	No	No	No

Source: Volume 2 Country Reports, "GEF Impact Report of the phase out of ozone-depleting substances in Countries with Economies in Transition, July 2009"

EU = European Union; A2 = Article 2 = Developed country in the Montreal Protocol; A5 = Article 5 = Developing country in the Montreal Protocol IA = Implementing Agency;

7.6.5 Servicing sector

95. There were sixteen companies that were visited in this evaluation that participated in the refrigerant recovery, recycling and reclamation programme (Table 17). All of these companies were located in the six CEITs from Central Asia and from the Russian Federation and Ukraine, except one which was located in Slovenia. UNDP was the implementing agency for twelve of the sub-projects, and the World Bank was the implementing agency for four of them (Column 6).
96. The total number of servicing companies operating in these six countries was almost 800 (Column 9). Therefore, the evaluation team was aware that its conclusions were based on visits to less than 2% of the companies operating in these countries.
97. The ODP-tonnes targeted in each country that were to be eliminated as a result of the servicing programme were defined in all of these countries except in the Russian Federation (Column 11). The ODP-tonnes phased out as a result of the servicing programme was reported for two of the countries (Armenia and Uzbekistan) but not for Azerbaijan, Kazakhstan, the Russian Federation, Slovenia and Ukraine (Column 12).
98. Armenia achieved 86% of its relatively low phase out target per year of 5 ODP-tonnes. This phase out was achieved by means of an Incentive Programme which aimed to eliminate the use of CFCs by replacing or retrofitting refrigeration equipment in 35 enterprises.
99. Uzbekistan achieved a much lower phase out of 16% (15 ODP-tonnes) of its targeted 92 ODP-tonnes per year. Uzbekistan commented that the relatively low quantity of CFCs recovered reflected the scarcity of CFCs compared to 1995 and 1996. Several of the servicing companies, who handled more CFCs in the mid-1990's than when the Project was operational, provided a similar comment. In an effort to increase refrigerant recovery, however, Uzbekistan re-assigned machines from poorly to highly efficient companies, based on a review of their CFC quantities recovered and recycled. In general, the amount reported as recovered and recycled by countries as lower than targeted could be due to under-reporting by the servicing companies, or an over-ambitious target initially developed in the course of sub-project formulation, or a combination of the two.
100. All of the servicing companies that were assessed were operational, except one in Kazakhstan (Column 13). Torgtekhnik had not used the recovery machine because there were insufficient CFCs to recover and recycle following Kazakhstan's import ban. The recovery machine had arrived too late as most of the CFCs had already gone. The other companies generally reported that the machines had been well used in the past, but their operational cost for the limited amount of refrigerant no longer made them cost-effective to use.
101. Two companies reported that spare parts for the equipment were available (Electroservice in Ukraine, and Oasis in Kazakhstan), but 4 other companies reported difficulties in obtaining spare parts (Column 14). As a result, some machines had been cannibalised to keep others operational, or machines were left in a state of disrepair. Even when the parts were available, their cost was reported to be an impediment to purchase. For example, one hose for the machines was equivalent to one week's salary for a technician in Uzbekistan.
102. The majority of the servicing companies visited that were operational reported that the recovery and recycling machines improved their profitability (Column 15). They no longer had to buy CFCs which in many cases were becoming more expensive, or were not obtainable. Some companies reported that they were selected for refrigerator repair by clients because they had machines that allowed them to re-use the refrigerant. Most of the companies reported that they did not pass on the cost savings to their clients.

103. The evaluation concludes that, on the basis of the 2% of the servicing companies visited, the use of the recovery and recycling equipment in the CEIT portfolio was satisfactory in the servicing sector. Most of the equipment was still in use. However, there was a lack of information in most countries on the quantities recovered and recycled. Where information was available, the quantities were often much less than targeted in the sub-project formulation. Spare parts were becoming an issue for some companies, and the implications of this are discussed further in Section 7.7: Assessment of Risks and Threats.

Table 17: Enterprises that were provided financial assistance to phase out ozone-depleting substances in the servicing sector

Country	Status	A2 or A5	Project Start	Project end	IA	Enterprise name	Financial viability test	Total number of companies in the 3R programme	GEF budget investment (\$, millions)	Tonnes targeted per year	ODP-tonnes phased out per year	Operational	Spare parts available	Improved profitability
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Armenia	NON-EU	A5	2004	2009	UNDP	Incent. Pgm	Yes	35	0.482	5.6	4.3	Yes	Unkn	Yes
Azerbaijan	NON-EU	A2	1999	2002	UNDP	Titan	No	32	1.106	85	Unkn	Yes	Unkn	Unkn
Kazakhstan	NON-EU	A2	2000	2005	UNDP	Oasis	No	600	2.545	70	Unkn	Yes	Yes	Yes
Kazakhstan	NON-EU	A2	2000	2005	UNDP	Combitech	No					Yes	No	Yes
Kazakhstan	NON-EU	A2	2000	2005	UNDP	Polair	No					Yes	Unkn	Yes
Kazakhstan	NON-EU	A2	2000	2005	UNDP	Torg Teknik.	No					No	Unkn	No
Kazakhstan	NON-EU	A2	2000	2005	UNDP	Auto Klimat	No					Yes	Unkn	Yes
Russian Fed.	NON-EU	A2	1996	2004	WB	Podolsktorg.	Yes	24	9.265	Unkn	Unkn	Yes	Unkn	Yes
Russian Fed.	NON-EU	A2	1996	2004	WB	Volgograd	Yes					Yes	Unkn	Unkn
Ukraine	NON-EU	A2	1998	2004	WB	Electroservice	Yes	9	2.144	538	Unkn	Yes	Yes	Yes
Slovenia	EU	A2	1995	1998	WB	Gorenje Servis	Yes	1	0.190	11.4	Unkn	Yes	Unkn	Yes
Uzbekistan	NON-EU	A2	1998	2007	UNDP	Savdotek.	No	100	1.328	92	15	Yes	No	Yes
Uzbekistan	NON-EU	A2	1998	2007	UNDP	Shark Shab.	No					Yes	No	Yes
Uzbekistan	NON-EU	A2	1998	2007	UNDP	Yo'L Ref.	No					Yes	Unkn	Unkn
Uzbekistan	NON-EU	A2	1998	2007	UNDP	Kerio Ser.	No					Yes	Unkn	Yes
Uzbekistan	NON-EU	A2	1998	2007	UNDP	Savodo Tek.	No					Yes	No	Yes

Source: Volume 2 Country Reports, "GEF Impact Report of the phase out of ozone-depleting substances in Countries with Economies in Transition, July 2009"

EU = European Union; A2 = Article 2 = Developed country in the Montreal Protocol; A5 = Article 5 = Developing country in the Montreal Protocol IA = Implementing Agency;

7.7 THEORY OF CHANGE: ASSESSMENT OF THREATS AND RISK

7.7.1 *Illegal trade in ozone-depleting substances*

104. Under the Montreal Protocol, most countries have adopted licensing systems intended to regulate the type and quantity of ODS imports and exports. Analysis of the survey questionnaire showed that 100% of the EU-CEITs reported that a licensing system for ODS was in place, compared with 89% of the Non-EU-CEITs. The Montreal Protocol requires all countries to have a licensing system. However, to have an *effective* licensing system in place, it is necessary to put in place quotas that act to restrict the quantity of ODS that can be imported, and to have procedures in place for allocating the quota system equitably. In this respect, an analysis of the survey questionnaire showed that 100% of the EU-CEITs reported that quotas for ODS were in place, compared with only 56% of the Non-EU-CEITs.
105. The large volume of legitimate ODS trade that takes place for exempted and legal uses provides cover for illegal trade. One study⁵⁶ calculated that more than 24,000 legitimate trans-boundary shipments of ODS occurred in 2004, so Customs officers face a complex task of differentiating legal from illegal shipments.
106. Illegal trade in ODS can arise in many forms⁵⁷. For example, ODS containers can be disguised to give the appearance of transporting non-ODS substances. Traders can attempt to import or export ODS without licenses, using false descriptions in Customs documents. In other examples, traders have pretended that ODS were going to be exported legitimately from industrialised to developing countries (where the phase-out date is later) but in fact they exported empty cylinders, and sold the ODS illegally in industrialised countries⁵⁸.
107. The World Customs Organisation (WCO) Regional Intelligence Liaison Office (RILO) serves as the focal point of intelligence analysis and liaison enforcement cooperation with Member administrations in Asia and the Pacific region. RILO collects, collates, evaluates and disseminates information on customs offences to the offices in the region, and periodically produces bulletins containing seizures of global and regional relevance, trend analyses and analytical reports.
108. During the mid-1990s most of the ODS illegally entering Europe and the USA was believed to have originated in Russia⁵⁸, and cases of illegal trade in CFCs manufactured in Russia were detected in Estonia, UK, USA and other countries⁵⁹. Illegal ODS trade in CEITs became a cause of serious concern during the 1990s⁵⁸. The Parties to the Montreal Protocol have agreed three times as many decisions on illegal trade in the past 8 years as they have in the previous 12 years, which indicates that level of concern for the Parties.
109. Most of the CEITs have intercepted illegal trade in ODS since 2002. Those reported in this evaluation are shown in Annex 10, together with information obtained from other sources. Annex 10 shows that interceptions of Asian origin have become increasingly more frequent in non-EU-CEITs. The reported cases by the Customs agencies are relatively small-scale, in

56 EIA & Chatham House. (2006). ODS Tracking: Feasibility study on developing a system for monitoring the transboundary movement of controlled ozone-depleting substances between the Parties. Report produced under Decision XVII/16 of the Montreal Protocol. Retrieved from Ozone Secretariat: http://ozone.unep.org/Meeting_Documents/mop/18mop/ODS-Tracking-September-2006-1.pdf

57 UNEP. (2009). Dialog Concept Note. China ECA Dialog on Cooperation in Border Enforcement and Joint Training/Consultation of Customs Officers. 23-25 June 2009. Urumqi, China: UNEP DTIE

58 UNEP. (2001). Illegal Trade in Ozone Depleting Substances. OzonAction Newsletter Special Supplement. No 6. Paris: UNEP DTIE OzonAction

59 EIA. (2008). Environmental Crime: A Threat To Our Future. ISBN 0-9540768-5-0. London: Environmental Investigation Agency. Page 15.

contrast to the large amounts of CFCs available on the market in Central Asian countries. This indicated large-scale smuggling of ODS that must have by-passed border security (Dialog Concept Note, 2009 p. 3).

110. Table 18 summarises examples of illegal trade reported in Annex 10. Note that a large number of reported cases (notably in Uzbekistan) often indicated that a country was more vigilant in monitoring for illegal trade than countries that reported few cases of illegal trade.

Table 18: Examples of illegal ozone-depleting substance trade reported in CEITs since 2002

Country	No. of reported events	Implied sources of ODS	Substances	ODP-tonnes	Tonnes	Year(s) of events
Armenia	2	Saudi Arabia, United Arab Emirates	CFC	Unknown	Unknown	2007?
Belarus	1	Not stated	CFC	Unknown	Unknown	2003
Czech Rep.	3	Czech Rep., other not stated	HCFC	> 0.021	> 0.380	2002-2003
Estonia	13	Estonia, other not stated	Halon, HCFC	> 2.404	> 0.470	2005, 2007?
Kazakhstan	1 + reported risk	Russia, China	CFC, HCFC	> 0.006	> 0.110	2007, 2009
Poland	> 2	Ukraine	HCFC, CFC	> 0.150	> 0.150	2005?
Russia	4 + reported risk	China, Germany, Russia, other not stated	CFC, TCE, other	46.377	> 109.960	2007, 2008, 2009
Slovakia	20	Not stated	Unknown	Unknown	Unknown	2004-2009
Tajikistan	several	Not stated	CFC mainly	Unknown	Unknown	Unknown
Turkmenistan	1 + reported risk	Not stated	CFC, other?	Unknown	> 1.224	2006, 2009
Ukraine	Reported risk	Not stated	CFC	Unknown	Unknown	2009
Uzbekistan	> 21	China, Kyrgyzstan, Uzbekistan	CFC, HCFC, MB, other	Unknown	> 1.764	2002-2008

See **Annex 10** for further details and information sources. MB = methyl bromide; TCE = trichloroethylene

111. The evaluation assessed the risk of Illegal trade for each of the CEITs based on the information contained in Table 7 (legislation) and Table 9 (Equipment) and Table 10 (Training) that affected the ability of the Customs Agency and sometimes the Inspectorate to combat illegal trade. This resulted in two countries with moderate risk of illegal trade in ODS entering the market (Ukraine and Uzbekistan), four countries as high risk (Kazakhstan, the Russian Federation, Tajikistan and Turkmenistan) and the remaining CEITs as low risk. The countries and reasons for these assessments are provided in Table 19.

Table 19: Risk of illegal trade in ozone-depleting substance after 2010

Country	Assessment	Reason for assessment
Armenia	Low	- Article 5 country with imports declining, and effective recovery and recycling programme; officers recently trained
Belarus, Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia, Slovenia	Low	- Legislation in place with dissuasive penalties - Trained customs officers with detection equipment and inter-agency communication - New legislation on ODS in EU countries requires country profiling
Azerbaijan	Low	- Frequent communication between NOU and Customs; - Trained officers
Kazakhstan	High	- Relatively few customs officers trained to detect ODS;

Country	Assessment	Reason for assessment
		rarely used detection equipment, lack of knowledge by Customs of ODS legislation, few interceptions ODS and bribery of customs officers
The Russian Federation	High	- Weak coordination between Ministry of Environment and the Customs Service leading to limited information exchange - No trained customs officers - Data on ODS imports and exports inconsistent - Few interceptions of ODS - Customs officers jailed in 2009 for taking bribes - Cheap virgin CFCs on the market and widespread reports of interceptions
Tajikistan	High	- Some trained customs officers but fast rotation so knowledge of ODS detection lost; - Large demand for CFCs because of old equipment and insufficient funds for CFC-free replacements - Insufficient recovery and recycling programme which contributes to 10% of the CFCs required
Turkmenistan	High	- Poor interagency coordination with Customs; - Few trained officers; - identifiers not with Customs; - Cannot afford to replace CFC-based equipment; - Reports of cheap CFCs on the market - Recovery and recycling programme left weakened by staff that have left the country; - Licence system and quotas not in place
Ukraine	Moderate	- Reports of cheap CFCs on the market - Poor interagency coordination - Inspectorate monitoring ODS via licence system and quotas
Uzbekistan	Moderate	- Legislation in place to penalise those engaging in illegal trade - Penalties being strengthened - Trained customs officers with detection equipment and inter-agency communication - Good record of interceptions of illegal trade in ODS

112. One of the main problems facing Customs officers is the large number of categories of ODS that have not been phased out but are still permitted, either because the ODS is not controlled in the Montreal Protocol, or there is an exemption for some Parties and uses and not others. For example, there are restrictions on some refrigerants as fluids, but not if the fluids are contained within equipment as the Parties elected to control ODS at the source, rather than in the equipment. There are exemptions for ODS used as feedstock and process agents, because feedstock is consumed and not emitted, and process agents are used under controlled conditions with emission restrictions. Some uses are permitted without quota restrictions e.g., methyl bromide for quarantine and pre-shipment (QPS), but banned in developed countries for non-QPS uses and not banned in developing countries for the same uses until 2015. It is almost impossible for the Customs officers to be fully conversant with all the nuances of ODS cross-border and to ensure that all transactions are compliant with the Montreal Protocol. Instead, Customs officers must rely on their knowledge of the legislation in each country and must take a decision to deny or allow import-export based on this knowledge. Training of Customs officers was therefore seen as a high priority by the

many of the governments in the CEITs.

7.7.2 Recovery, recycling, reclamation and destruction of ozone-depleting substances

113. The important elements of a successful programme to conserve ODS for servicing refrigeration and air conditioning equipment include *training* and *equipment*, underpinned by legislation to require *qualifications* of servicing personnel and *reporting* of the results of the work on an annual basis to the NOU.
114. The previous Section showed that all countries had gained access to two or more different types of recovery and recycling equipment as a result of the GEF finance (Table 20, column 4), and all had undertaken training of personnel during the Project.

Table 20: Assessment of the prospects for a continuing ODS recovery and recycling programme in CEITs

Country	Legislative driver	Status in MP	3R machines	Refrigeration	Association or similar	Training after the Project	Legislation for Qualifications	Legislation for reporting on 3R	Access to destruction	Risks of annual 3R programme failure
1	2	3	4	5	6	7	8	9	10	
Bulgaria	EU	A2	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Low
Czech Republic	EU	A2	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Low
Estonia	EU	A2	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Low
Hungary	EU	A2	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Low
Latvia	EU	A2	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Low
Lithuania	EU	A2	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Low
Poland	EU	A2	Yes	Yes	No	Yes	Yes	Yes	Yes	Low
Slovakia	EU	A2	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Low
Slovenia	EU	A2	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Low
Armenia	Non-EU	A5	Yes	Yes	No	No	No	No	No	Med
Azerbaijan	Non-EU	A2	Yes	No	No	No	No	No	No	High
Belarus	Non-EU	A2	Yes	Yes	No	Yes	Yes	No	No	Med
Kazakhstan	Non-EU	A2	Yes	No	Yes	Yes	No	No	No	Med
Russian Fed.	Non-EU	A2	Yes	No	No	No	No	No	No	High
Tajikistan	Non-EU	A2	Yes	Yes	Yes	No	No	No	No	Med
Turkmenistan	Non-EU	A5	Yes	No	No	No	No	No	No	High
Ukraine	Non-EU	A2	Yes	No	No	No	No	Yes	Yes	High
Uzbekistan	Non-EU	A2	Yes	No	No	No	No	No	No	Med

Source: Volume 2 Country Reports, "GEF Impact Report of the phase out of ozone-depleting substances in Countries with Economies in Transition, July 2009"

115. Those countries that continued 3R programmes after the end of the Project were the EU-CEITs who were associated with the presence of an Association or similar (Column 5), training after the project (Column 6), legislation for qualification requirements (Column 7) and reporting the results of the programme on an annual basis (Column 8). Associations were present in only three (Armenia, Belarus and Tajikistan) Non-EU-CEITs. The evaluation assessed the risks of failure of the recovery and recycling programme in the EU-CEITs as 'low'.
116. Armenia, Belarus, Kazakhstan, Tajikistan and Uzbekistan were assessed as 'medium' risk of failure for the 3R programme. In the case of Armenia and Belarus, both had an Association or similar that was performing independently of the NOU, and Belarus also had legislation for qualifications and 3R reporting in place. Although Kazakhstan did not have an Association, it was unusual in the non-EU-CEITs because it had put in place procedures for

training technicians and legislation for qualification requirements, both of which would enhance the prospects for continuation of the 3R programme. Tajikistan had an Association that collected data on the quantities of ODS recovered and recycled, assisted with training of personnel in the 3R programme, and helped the government to disseminate information on the importance of ODS recovery and recycling.

117. Countries with a high risk of failure in the 3R programme were assessed as Azerbaijan, the Russian Federation, Turkmenistan and Ukraine. These countries had none of the key elements in place (Columns 5-8) that encouraged these programmes to continue after the Project ceased.
118. An inactive or poorly operating 3R programme exposes the country to a greater risk of non-compliance with the Montreal Protocol control schedules. Both Turkmenistan and Armenia, who are categorised as developing countries, have been in the last phase of consumption of Group I CFCs since 1 January 2007 (which is limited to 15% of base level), prior to consumption phase out of CFCs on 1 January 2010.
119. For the remaining developed country non-EU-CEITs, the ability to recover and recycle ODS in general will reduce the prospects of illegal trade in new ODS refrigerants. Virgin CFCs cannot be imported to service existing equipment, as developed country consumption must remain at zero for all except HCFC refrigerants and blends that do not contain CFCs. It will also help to avoid premature retirement of this equipment.
120. All of the EU-CEITs have access to destruction facilities (Column 9), but only one of the non-EU-CEITs (Ukraine). The Czech Republic reported that it did not destroy all the ODS but shipped it to Germany for use in the chemical industry. This is a useful alternative to destruction, where this feedstock use becomes possible. Uzbekistan destroyed illegal ODS that had been intercepted by its Customs agency in the past, but the facility is not commercial, expensive to use and impractical. Therefore, Uzbekistan was scored in Table 20 as 'No' since it does not have access to commercial facilities that can safely and economically destroy ODS.
121. Many of the servicing companies in the non-EU-CEITs reported that contaminated ODS was taking up valuable storage space in their facilities and moreover, there was no means to destroy it. The amount of ODS stored varied, from small amounts of 12-13 kg in small cylinders to several larger cylinders that would each have stored several hundred kilogram. However, the risk of this contaminated ODS being emitted increased the longer it was stored. It was also difficult to ascertain whether old-contaminated ODS was released in order to make space for new-contaminated ODS, and therefore the amount stored and released could be underestimated. It was clear, however, that the servicing companies wanted a permanent solution to the problem such as destruction, as they were participating in the servicing programme for its commercial and environmental benefit. To release the ODS would be damaging for the environment and counter to the original intentions in the servicing programme.

7.7.3 Continued use of ODS: Halon

122. Halon as a fire fighting and explosion-suppression agent was reported to be an issue in several of the CEITs. In the EU-CEITs, many of them banned the import of halon and equipment that relied on halon in the early 1990s. Later, (EC) Regulation No 2037/2000 required from 1 January 2004 EU-CEITs to decommission all non-critical uses of halon and to recover them for destruction using technologies approved by the Parties or using any other environmentally-acceptable destruction technology. A critical use was defined at those that did not have a technically and economically feasible alternative, which mainly referred to equipment used by the military, as well as the aviation and petroleum industries.

123. As a result, halon has been replaced by alternatives in many installations in the EU-CEITs, and the halon either destroyed or banked for uses that still remain critical. This is important as halon production ceased in all developed countries on 1 January 1994, and has almost ceased in developing countries except for relatively small quantities that are produced in North Korea. Therefore, the only halon that is available to replace any lost from its existing applications is 'used' halon that has been reclaimed and banked for this purpose. The use of recycled halon, whether imported or obtained from national banks, is not counted in the Consumption of the country, and therefore such use is compliant with the Montreal Protocol.
124. Estonia and Lithuania in particular documented the halon that had been decommissioned from ships and the TV tower (see Volume 2). The halon from Estonia was stored in the regional halon bank in Tallinn which serves as a bank for the Baltic countries. In Poland and the Czech Republic, companies recovered and banked halon using equipment that they paid for themselves, as the GEF paid only for training activities related to halon recovery and banking.
125. In contrast to the EU-CEITs, the non-EU-CEITs were not as active in replacing decommissioned halon with alternatives and therefore halon was much more of an environmental problem in these countries:
- **Armenia** has no management plan to replace halon and the only activity has been a meeting in 2007 to raise awareness with key stakeholders on its importance;
 - **Azerbaijan** banned the import of halon in 1997 and the GEF funded a recovery and reclamation system for a halon bank in 2001, but the evaluation team could find no evidence of the bank or any records of halon recovered since the establishment of the bank;
 - **Belarus** intended to phase out halon by 2000 and received GEF finance for training, but a programme has yet to be developed to recover and reclaim halon;
 - **Kazakhstan** received funding for equipment and training, but the recovery programme has been in abeyance for several years since the technicians trained to operate the equipment were no longer available;
 - **The Russian Federation** received funding for equipment and training, but the programme did not eventuate as equipment procurement did not comply with the World Bank's rules on procurement;
 - There was no report by the NOUs in **Tajikistan** and **Turkmenistan** on halon and therefore it was not possible to determine its importance in those countries;
 - In **Ukraine**, the GEF paid for the establishment of a halon information centre that would estimate the supplies and consumption of halon, review international codes and standards in this field, and develop a halon bank management Programme. Halon was recovered and reclaimed and returned to users, but there was no legislation in place that required decommissioned halon to be replaced with alternatives. A database of installed halon was established, but this is now out of date, and 17 out of 20 standards have been finalized. About 63% of the total halon in Ukraine was installed in fire fighting systems at gas pumping stations located on the gas pipelines that supplied gas to Europe from Russia, which create a demand for halon. There are 19 gas pumping stations which were installed from 1970 to 1980. So far, one halon-based system has been replaced with a CO₂ fire-suppression system. Two other pumping stations are scheduled for halon replacement;

- In **Uzbekistan**, imports of halon were banned for all except essential uses in 2000, but there has been no management plan developed for halon. This resulted in TEAP recommending in 2002 that Uzbekistan import recycled halon, in response to Uzbekistan's request to the Parties for an exemption for halon for its aircraft industry. The aircraft industry in Uzbekistan therefore continues to create a demand for halon.
126. TEAP in 2005 estimated that 1,173,000 ODP-tonnes of halon were banked globally in 2002. As CEITs countries were responsible for about 17% of the ODS Consumption globally, it is reasonable to assume that in 2002 CEITs had in banks 17% of the global halon, equivalent to 199,410 ODP-tonnes of halon. Because of the leakage rate from banks, this was expected to reduce to 77,690 ODP-tonnes by 2015. In 2009 and about half way in the period between 2002 and 2015, the evaluation team could account for about 567 ODP-tonnes of halon on ships flagged to Azerbaijan, 30,000-60,000 ODP-tonnes of halon in the Russian Federation, and about 1,500 ODP-tonnes of halon in Ukraine. The total for these three CEITs was therefore in the range of 32,000 to 62,000 ODP-tonnes. The environmental impact of halon in CEITs is discussed further in Section 7.9: Benefit to the Environment.
127. In 2007, the Ozone Secretariat reported that halon was being stockpiled by governments or enterprises, either because they intend to use them in the future or because they find the cost of destruction too high⁶⁰. Such stockpiles are being held under various conditions which allow varying degrees of annual leakage; there are no Protocol requirements on maintenance of these stockpiles, and there is little information on their size. In the absence of legislation or other incentives requiring or encouraging destruction, holders of such stockpiles have an economic incentive to vent stocks when the cost of maintaining the stock exceeds the value of the substance. Preventing the release of stockpiled ODS would result in ozone benefits as well as climate co benefits.

7.7.4 Continued use of ODS: Methyl bromide

Non-Quarantine and pre-shipment uses

128. Methyl bromide is a broad-spectrum pesticide which has been used to control pests in certain agricultural crops and stored products since the 1930s. The Montreal Protocol required the phase out of methyl bromide on 1 January 2005 in industrialised countries and by 2015 in developing countries. The majority of industrialised countries have successfully phased it out, although a handful of countries have been granted so-called 'critical use' exemptions (CUEs) after the phase-out date.
129. Some of the EU-CEITs were not able to end their use of methyl bromide by the due date and required a further four years of critical uses to implement alternatives. The last EU-CEIT to end the critical uses of methyl bromide was Poland in 2008. None of the non-EU-CEITs have requested the critical uses of methyl bromide, until recently with an application in 2009 to the Parties by the Russian Federation.
130. In the non-EU-CEITs, the Russian Federation, Kazakhstan and Ukraine each face different issues relating to methyl bromide Consumption:
- **Russia** reported methyl bromide Consumption only in 1994-1996⁶¹, but zero in each year from 1997 to 2007 (Ozone Secretariat, 2009 p. May 2009). But recently in 2009, for the first time, Russia requested an exemption of 135 tonnes of methyl bromide for the post-harvest sector in 2010. TEAP has asked for further information, and as of May 2009 has not yet made any

⁶⁰ UNEP. 2007. Summary of issues for discussion at the dialogue. Note by the Secretariat. [UNEP/OzL.Pro/DKFC/1/2](#).

⁶¹ 1,043 ODP-tonnes in 1994, 1,430 ODP-tonnes in 1995, and 96 ODP-tonnes in 1996

recommendations about this request (TEAP, 2009 pp. 285-286). Details on the specific use(s) were not yet available. However, alternatives have been widely adopted for virtually all post-harvest sectors world-wide.

- **Kazakhstan** has not yet ratified the Copenhagen Amendment and is therefore not legally bound by the methyl bromide phase-out schedule. Kazakhstan used methyl bromide until 2000, and reported zero Consumption in 2001-2005. However, the government reported Consumption of 19.8 ODP-tonnes in 2006 and 60 ODP-tonnes in 2007 (Ozone Secretariat, 2009 p. May 2009), which was not compliant with the phase out schedule for methyl bromide. The NOU indicated that methyl bromide was being used to treat soil in glasshouses for tomato production, and in grain elevators. As a Party to the Montreal Protocol, Kazakhstan is expected to ratify the Copenhagen Amendment and then comply with the methyl bromide phase-out.
- **Ukraine** reported methyl bromide Consumption of 390 ODP-tonnes in the mid-1990s, and zero Consumption in 1996 to 2007. During this period about 150 to 840 ODP-tonnes per year were reported to be used for QPS. The methyl bromide was reported to be mainly used for fumigating stored grain, which is unlikely to be for QPS but rather for a use that is no longer permitted under the Montreal Protocol. Currently, an estimated 60 ODP-tonnes of methyl bromide is held in stock, and about 5-6 ODP-tonnes per year was believed to be used for grain.

131. The continued use of methyl bromide described above is the result of poor management by the respective governments to differentiate QPS from non-QPS uses, to monitor its use in both categories, and to implement alternatives for non-QPS uses in a timely and well-coordinated manner. This should have been possible bearing in mind that the Parties listed methyl bromide as a controlled substance in 1992. For the last 15 years, the Parties have been aware of its impending phase out and the vast majority have put in place procedures to replace its use.

Quarantine and pre-shipment uses

132. Methyl bromide is also used for controlling pests in specific types of commodities such as fruit and grain, mainly as a requirement of quarantine authorities in the importing country. When the Montreal Protocol first placed controls on methyl bromide, a general exemption was created for all QPS uses of methyl bromide. This means that the Montreal Protocol does not require QPS uses to be phased out at present.
133. In 2007, four of the EU-CEITs reported that methyl bromide was not used at all for QPS (the Czech Republic, Estonia, Lithuania and Slovakia); Bulgaria reported 0.2 ODP-tonnes, Hungary 1.9 and Poland 3.6 ODP-tonnes. In 2007, five of the EU-CEITs reported that methyl bromide was not used at all for QPS (Armenia, Azerbaijan, Belarus, Turkmenistan and Ukraine); the Russian Federation reported 19.9 ODP-tonnes in 2007, Tajikistan 3.8 ODP-tonnes. No reports were submitted in 2007 by Latvia, Kazakhstan and Uzbekistan. The total amount reported for QPS in 2007 from the 16 CEITs was 29.6 ODP-tonnes.
134. Several CEITs appeared to be misclassifying non-QPS use as QPS. This would mean that some methyl bromide uses were being continued after the phase out date, and that QPS uses are overestimated. However, because the relative volume of methyl bromide being used for QPS was relatively small, it has been assessed as less of a risk to the ozone layer than other ODS that was being used in greater quantities.

7.7.5 Lack of government commitment

135. The government commitment was assessed in 7.2.1 "Legislation" by examining the number

of legislative instruments in the Montreal Protocol that had been agreed by the CEITs, and the extent of national legislation that reduced and phased out ODS (summarised in Table 7). The level of government commitment was also assessed by evaluating activities undertaken by governments *after* the Project was completed, such as the monitoring and reporting of ODS recovered and recycled including halon, and the implementation of further legislation to protect the ozone layer (summarised in Table 12). In this Section, criteria from Table 7 and Table 12 have been extracted to provide an assessment of the threats and risks that arise when there is a lack of government commitment (summarised in Table 21).

136. The evaluation assessed the level of government commitment as high in the EU-CEITs, Tajikistan and Uzbekistan; medium in Armenia, Belarus and Kazakhstan; and low Azerbaijan, the Russian Federation, Turkmenistan and Ukraine.
137. Governments in CEITs were assessed as having a high level of commitment when the National Ozone Units (NOUs) were funded from the central budget (Column 4). Analysis of the survey questionnaire showed that 89% of the EU-CEITs reported that the NOUs were funded from a central government budget, compared with 44% of the Non-EU-CEITs. Fifty six percent of the Non-EU-CEITs reported that the NOUs depended on donor agency funding or contracts. We assessed NOUs as unsustainable when they were not funded from the government budget, since external sources of funding were typically short term, unpredictable and unsustainable.
138. Governments in CEITs were assessed as having a high level of commitment when the governments had implemented legislation on ODS (or that affected operations on ODS) after the Project was completed (Column 6); the Customs had intercepted illegal ODS imports in the last 3 years as their Customs officers were trained and most had ODS detection equipment (Column 7); the governments had implemented legislation to impose penalties for illegal trade in ODS (Column 8); the governments had legislation in place that mandated the recovery and recycling of ODS (Column 5).
139. The EU-Regional legislation on ODS in the EU was most likely the key factor that promoted the continuation of a high level of government commitment in the EU-CEITs, as many of them were already committed to ozone layer protection before and during their projects. Typically legislation that mandated the recovery and recycling of ODS was accompanied by legislation that required training of technicians and reporting of the results.
140. Armenia, Belarus and Kazakhstan that were categorised as medium had fewer of these elements in place, except that they were centrally funded except for Kazakhstan. Azerbaijan, the Russian Federation, Turkmenistan and Ukraine that were rated with a low level of government commitment had the fewest elements in place, compared to the other CEITs. Azerbaijan had government funding, but the NOU was not performing optimally. These governments had little continuity of activities on ozone layer protection after the GEF-funded projects were completed, mainly because there was no funding of the NOU from a central budget. Legislation in particular was not in place, or had been drafted but not adopted, as the staff to draft and promote the adoption of the legislation were not present or not familiar with the work that needed to be undertaken. ODS recovery and recycling was either not occurring at all or occurring in a rather *ad hoc* and unplanned way. There was no monitoring of the ODS results, and using of these results to fine tune policies to improve the servicing operations. Training of technicians was in most cases non-existent, which led to unqualified workers servicing air conditioning and refrigeration equipment. CFCs were readily available on the market for a reasonable price, as there was little enforcement of prohibited ODS by the Customs Agency to prevent CFCs being imported and placed on the market.

Table 21: Assessment of lack of government commitment to ozone layer protection in CEITs

Country	Legislative driver	Status in Montreal Protocol	NOU financed from central budget	Legislation that mandates ODS recovery and recycling	ODS or related legislation implemented after Project last 3y	Penalties for illegal trade	Level of government commitment	
1	2	3	4	5	6	7	8	9
Bulgaria	EU	A2	Yes	Yes	Yes	No	Yes	High
Czech Republic	EU	A2	Yes	Yes	Yes	Yes	Yes	High
Estonia	EU	A2	Yes	Yes	Yes	Yes	Yes	High
Hungary	EU	A2	Yes	Yes	Yes	No	Yes	High
Latvia	EU	A2	Yes	Yes	Yes	No	Yes	High
Lithuania	EU	A2	Yes	Yes	Yes	Yes	Yes	High
Poland	EU	A2	Yes	Yes	Yes	No	Yes	High
Slovakia	EU	A2	Yes	No	Yes	Yes	Yes	High
Slovenia	EU	A2	Yes	Yes	Yes	Yes	Yes	High
Armenia	Non-EU	A5	Yes	No	Too soon	Unkn	Unkn	Med
Azerbaijan	Non-EU	A2	Yes	No	No	Unkn	Unkn	Low
Belarus	Non-EU	A2	Yes	Unkn	Yes	Unkn	Yes	Med
Kazakhstan	Non-EU	A2	No	Yes	No	Yes	Yes	Med
Russian Fed.	Non-EU	A2	No	No	No	Unkn	Yes	Low
Tajikistan	Non-EU	A2	Yes	Yes	Yes	Yes	Unkn	High
Turkmenistan	Non-EU	A5	No	No	No	Yes	Unkn	Low
Ukraine	Non-EU	A2	No	No	No	No	Unkn	Low
Uzbekistan	Non-EU	A2	Yes	Yes	Yes	Yes	Yes	High

Source: Volume 2 Country Reports, "GEF Impact Report of the phase out of ozone-depleting substances in Countries with Economies in Transition, July 2009"

141. Analysis of the survey questionnaire showed that more EU-CEITs 'agreed' (56%) or 'strongly agreed' (11%) that the NOUs had sufficient staff to address new projects on ODS and sufficient support from other ministries within the government, compared to NOUs from Non-EU-CEITs that 'agreed' (33%) or 'strongly agreed' (11%).
142. In summary, without the government commitment there is a risk that the poor control of ODS that prevailed in these countries at the start of the projects will reoccur , because the government had not funded staff to build on the achievements of the project when it was completed. In turn this could impact adversely on the ability of governments to act to phase out remaining ODS.

7.8 CATALYTIC ACTION

7.8.1 Scale up and spill over effects

143. Analogous to a chemical acting as a catalyst to speed up the rate of a chemical reaction, the finance provided by the GEF not only eliminated the use of ODS in the country being financed, but it also reduced the time to phase out ODS in companies that were not directly financed by the GEF, thereby speeding up the rate of ODS elimination in the country. The catalytic action was the result of a multi-faceted approach by the GEF that financed not only companies but also a diversity of programmes that included institutional strengthening, training of customs and personnel, ODS recovery and recycling programmes, training of servicing technicians, awareness raising campaign, as well as halon recovery and reclamation.

144. Forty percent⁶² of the companies reviewed in this Impact Report reported increased production and improved profits as a result of the GEF finance:
- Nine refrigerator production companies (Table 13);
 - Five aerosol production facilities (Table 14);
 - Seven foam producers (Table 15);
 - Six companies that converted to non-ODS solvents (Table 16)
145. It is likely that companies supplying these companies with materials for their production also increased their sales. Therefore, the GEF finance had a catalytic effect beyond the companies that benefited directly from the funding.
146. Some of the refrigerator companies e.g. NORD (Ukraine), Snaige (Lithuania), used their improved profitability to purchase other companies, and to establish daughter companies in other countries. This is an example of catalytic action and scale up that extended beyond the national boundaries of the company that was financed by the GEF. Because of the increase in production and expansion of manufacturing facilities. Employment increased after the transition and prior to the 2007-2009 economic crisis. The GEF funding therefore had a positive social impact by increasing local employment.
147. The training in general commenced with the Train-the-Trainer programme in which relatively few were trained initially. However, the trainers subsequently trained 10 to 20 times more personnel using this method that has been used widely by UNEP. The method leverages or catalyses the number of staff that can be trained in a way that significantly and rapidly increases the total number qualified for the tasks. The catalytic effect has become sustainable in many countries as in ten⁶³ of the CEITs the trainees were prepared to pay for the costs of the training themselves.
148. In the training of Customs officers, Lithuania reported that only five officers were trained (See Table 8), but these officers subsequently trained other officers in check-points around Lithuania. The catalytic effect of the training in the Customs sector is a factor that would be difficult to determine, but it may have a positive influence in combating illegal ODS trade.
149. Awareness raising campaigns were put in place by almost all of the CEITs to promote positive action toward activities that protected the ozone layer. For example, Poland and other CEITs reported that an awareness raising campaign was essential for promoting the recovery and recycling of ODS, to the extent that the programme was not working effectively until this was undertaken. Latvia carried out the most extensive awareness raising campaign of all the CEITs which was targeted mainly at schools. As a result of the widespread activities and general enthusiasm that was generated by the Project, ozone layer protection is now recognised as one of the criteria for “green schools” which will have a catalytic impact on generations of school children beyond the initial work. Some countries reported that the campaigns were useful for engendering support at the political level for policies and legislation on ozone layer protection
150. It was difficult to quantify the overall catalytic impact in relation to the phase out of ODS. We estimated, however, this to be about 40% of the total ODS phased out in the CEITs (Table 22), based on the reported ODS Consumption prior (Row 1) and after (Row 4) the GEF Project, and the quantity of ODS phased out (Row 3) compared to the amount targeted (Row 2). The impact on companies includes co-financing since this itself was a type of catalytic impact.

⁶² 23 companies out of 58, excluding servicing companies = 40%

⁶³ Estonia, Hungary, Latvia, Lithuania, the Czech Republic, Kazakhstan, Uzbekistan, Turkmenistan, Belarus, Slovakia

Table 22: Estimated ODP-tonnes phased out as a result of catalytic action (ODP-tonnes)

No	Criteria	1996	1996	2007	%	Source
1	ODS consumption in CEITs prior to GEF finance	21,000				Ozone Secretariat
2	Budget: ODP-tonnes targeted for phase out with GEF finance		12,000			Chapter 4
3	Actual: ODP-tonnes phased out with GEF finance			11,000	52%	Estimate from success rate in Volume 2
4	ODS consumption in CEITs after GEF finance			1,665	8%	Ozone Secretariat
5	Catalytic Impact: ODP phased out by companies without GEF financial assistance			8,335	40%	Calculated as difference
	Total	21,000	NR	21,000	100%	

7.8.2 Importance of enterprise champions

151. Enterprise champions are generally important for any endeavour⁶⁴. In this Evaluation Report, their importance in implementing ODS-free technology can be illustrated by the enterprise champions in the NORD domestic refrigerator company in Ukraine, and Nikochem in the Russian Federation.
152. The Nord company attributed the success of the Project to the technical and political skills of the chairman of the Board of Directors, who was also a former vice premier of Ukraine and later Parliament deputy. Together the Deputy Chairman of NORD Board and first deputy director, NORD encouraged the government to take the decisions that resulted in funding of the phase out projects in NORD and other enterprises. As a result, NORD demonstrated a steady production growth of about 10% annually. The overall production of NORD group reached 1.2 million refrigerators in 2007. The growth in production of domestic appliances leveraged the capacity of the enterprise to expand its operations in manufacturing commercial refrigeration equipment at its affiliated company Donbass Plus. The projects in Ukraine were unlikely to have eventuated without these enterprise champions.
153. Nikochem in the Volgograd region is one of the largest chemical production companies in the Russian Federation, exporting to 22 countries worldwide. The company was recognised as one of the 1000 best companies in Russia and the best company of the Volgograd region. The company closed down the CFC production and has since diversified into a range of alternative, profitable chemicals that can be produced at relatively low volume. The chemical company mitigated the adverse impacts of its production system by using best-practice natural ecosystems such as settling ponds and glasshouses. Unlike other chemical companies in Russia that closed down CFC production without significant diversification into alternative products, the Board of Directors of this company steered the company to profitability, while taking into consideration the environment in their production processes. The Board of Directors of Nikochem are enterprise champions.

7.8.3 Key factors influencing catalytic action

154. The key factors influencing catalytic action are innovation, demonstration, replication and cooperation. Often a single project was a combination of each of these factors. Government policies, measures and action have a significant impact on the speed and extent of catalytic action. The private sector's involvement in projects and co-financing are crucial,

⁶⁴ Andersen, SO & D. Zaelke. 2003. Industry Genius: Inventions and people protecting the climate and fragile ozone layer. Greenleaf publishing, United States.

as they have a demonstration and replication role as well as an impact on supplier companies supply funded enterprises with raw materials.

155. The importance of the implementing agencies and their consultants to formulate and implement projects based on the most cost-effective and environmentally-beneficial technology is important, particularly if the agencies and their consultants build on past experiences when formulating and implementing new projects. The implementing agencies must also encourage companies to take action as soon as possible with the least administrative burden.
156. We provide examples of the key factors that influenced catalytic action in this Report. Further details on these and other government and enterprise responses to the phase out of ODS are contained within Volume 2: Country Reports.

Innovation

157. [Lek](#) is one of the largest manufacturers of drug and cosmetic aerosols in Slovenia. The GEF provided \$1,992,600 of financial assistance toward the replacement of 157 ODP-t of CFC-11 and CFC-12 with hydrocarbons (as propane-butane) used in the production of Byvacin, an antibiotic spray applied to the skin. An innovative method was developed as a result of the conversion, resulting in less production cost and improved product sales. Lek reported that without the GEF funding Byvacin funding would have stopped, and the employment of 20 employees terminated. Indeed, the spectacular sales of Byvacin on the export markets were so successful that they restored the Lek business to its pre-1989 levels and employed an additional 20 staff in one of the highest unemployment areas in Slovenia.
158. [Trimo](#) is one of Europe's largest manufacturers of fire resistant sandwich panels that are used for building insulation. PU foam is used as an adhesive to bond mineral wool fibres to the metal walls of the panels. At that time, about 40-60% of the production was exported, mainly to Europe and the Russian Federation. The GEF project yielded technical benefits which assisted Trimo to significantly increase production of fire resistance panels, and to expand their production capacity. Access to the German market was in part due to compliance with the latest German fire standards, for which the sub-project paid for the costs of certification. Daughter companies were established in other countries such as Dubai, Serbia, the Russian Federation. The sub-project was a catalyst for innovative technical developments that drew visits from other experts from Japan, Russia and Saudi Arabia, with a view to replicating the technology in other countries.
159. [Ekotez](#) manufactures ODS recovery and reclamation equipment. The GEF contributed toward the cost of the production of the recycling and recovery machines that were used in many of the CEITs. Ekotez became an agent for [reclamation equipment](#), designed and sold one of the first [recovery machines](#), and became a partner in 53 [international programmes](#)⁶⁵ over a 10 year period. The GEF-funded programme in the CEITs with its emphasis on the recovery and reclamation of ODS was the commercial inspiration for the innovative equipment developed by Ekotez.
160. [Snaigė](#) is the only domestic refrigerator and freezer manufacturer in the Baltic. The elimination of ODS and its replacement with innovative (at the time) non-ODS technology resulted in an increase in the production of refrigerators. The GEF funding enabled the company to put in place modern production and refrigeration technologies that improved competitiveness, increased production capacity, improved environmental compliance, improved manufacturing quality and working conditions, reduced production costs & labour, and reduced the energy demand of refrigerators. The 30% savings in energy consumption

⁶⁵ Including with NORD and REFMA in Ukraine, under a UNIDO project

promoted sales of refrigerators on EU markets as purchasers could claim government-funded rebates e.g. Netherlands. The number of models increased from 7 (before 1997) to 25 after the Project.

161. Innovative technologies that were implemented in these and other companies were the result of a relatively small number of technical experts that were present in the Implementing Agencies that were abreast of ODS-free technology globally. As an example among the Agencies, the World Bank formed the Ozone Operations Resource Group ([OORG](#)) to provide specialised sector-based technical advice and assistance to the Bank. OORG consisted of engineers and scientists who were recognized internationally as leaders in the particular ODS sector. The OORG helped keep the Bank up-to-date on sector-specific innovative and environmentally-suitable technological advances, commercially available ODS substitutes, cost-effectiveness of various technical options and related developments.

Demonstration

162. [Bratri Horakove Ltd](#) (BHL) is the largest manufacturer of sandwich panels in the Czech Republic. The GEF project paid for the replacement funded high-pressure non-CFC foam-blowing technology as a replacement for CFCs, and financed the construction a small laboratory to determine the foam's thermal value, firmness and other properties. After a series of trials, BHL selected HCFC-141b as a transitional replacement for CFC-blown foam, and later transitioned to an HFC-134a/CO₂ blend which required 8% thicker panels to compensate for the lower insulative value. BHL hosted demonstration workshops with other Czech manufacturers of foams to share the results of the trials with different foam-blowing formulations. The laboratory was made available to other Czech manufacturers for testing the properties of products produced with various foam blowing agents and procedures. The same blend was used by BHL for foam blowing. As a result of the sub-project, BHL increased its market share from 10% to 30% to become the largest foam panel manufacturer in the Czech Republic.
163. Labod is the largest drying cleaning company in Slovenia which in the early 1990s used CFCs to clean leather, silk and similar materials each year. The GEF funded the replacement of 1,1,1-trichloroacetic acid (TCA) with C₁₁H₂₄ (an aliphatic hydrocarbon). Labod's income has increased in proportion to the quantity of clothes dry cleaned, which the company attributes to the environmentally-friendly method for dry cleaning. Labod ran demonstration workshops to show several hundred other dry cleaning operations in Slovenia that hydrocarbons were easy to implement and resulted in cost-effective cleaning operations.
164. In 1992 [Thermo King Czech Republic](#) (TKCR) was the largest refrigerated transport company in the Czech Republic. Amongst a range of subprojects with TKCR, the GEF funded the development of prototype non-CFC transport refrigeration units, and retrofit procedures for industrial refrigeration equipment that could be used by producers of refrigeration systems and service (maintenance/repair) providers. The Research Institute of Refrigerating Engineering within TKCR was essential for the development of the retrofit procedures since it contained testing facilities and laboratories for commercial performance and service-life trials. The transport refrigeration units were retrofitted with R-401b⁶⁶, as energy efficiency was reported to be improved by 8% although ODS was being used (89% HCFCs in the blend). Retrofit Manuals were produced in English, Russian and Czech to promote the implementation of a range of CFC-free retrofit options in CEITs and Europe.

Replication

165. Many aspects of the establishment of the ODS recovery, recycling and reclamation (3R)

⁶⁶ R-401b is HCFC-22/HFC-152a/HCFC-124 as 61/11/28 percent.

operations in the CEITs were examples of replication, particularly the machines required for this operation, and the training on how to use them effectively.

166. More than 3,300 machines were used in 18 CEITs for 3R operations (see Table 10 on page 88). Of these, about 1000 were used in Bulgaria alone. The number of recovery machines was more than in any of the CEIT countries surveyed because in the late 1990's, the Institute for Refrigeration & Air Conditioning in Bulgaria provided a team of technicians to assemble 20-30 units per week from component parts, which was less expensive than purchasing the completed units from a supplier. The Institute estimated that about 70-75% of these recovery machines which were replicated throughout the country were still operational. This underscored the continued value of this equipment to the service personnel, and that the machines were still having a sustainable impact in reducing ODS almost 10y after the Project was completed.
167. In other CEITs, the machines were distributed to a network of refrigeration servicing organisations. In some CEITs such as Poland, for example, there was a payment system established which financed the collection and transport of ODS from all servicing stations on the network to a centralised reclamation facility. Some of the larger enterprises such as Combitech in Kazakhstan had their own network established, while in other countries such as Ukraine one enterprise (Electroservice in Kiev) took responsibility for obtaining and distributing the machines to other servicing organisations.
168. The Slovenian government took an approach on 3R that was different from the other CEITs. The Ministry of Environment decided the 3R programme would be carried out by one enterprise called Gorenje Servis (GS). GS was at the time the largest servicing organization in Slovenia, with about 30% of the Slovenian market for servicing refrigerators and heat pumps using a network of 10 servicing stations and 29 technicians. GS received equipment for 3R from the Project, and financed its own publicity awareness raising campaign (PARC) on the damage caused by CFCs to the ozone layer. The PARC encouraged the general public to employ qualified technicians to recover ODS. This resulted in a 20% increase in servicing work for GS, compared with a same period in the previous year. This is the only report from the 18 CEITs where the impact of the PARC was evaluated, relative to a base line. As a result of GS actions and success, another company in Slovenia (LTH) purchased their own 3R equipment, thereby replicating the equipment and action taken by another Slovenian company. Further action taken by LTH related to 'Cooperation' is discussed in paragraph 174 below.
169. Training of technicians was a key element of the 3R programmes that was replicated in each CEIT. Some of the CEITs translated the UNEP Manual on the 3R programme into their national language, which facilitated the uniform delivery of the requirements of the programme across the different CEITs. In this way, more than 10,500 personnel were trained in 3R during the project, and a further 5500 after the Project was completed. The efficient and effective replication of this programme had a threefold effect:
 - It reduced the countries imports of CFCs as instead recovered and recycled CFCs could be used to service equipment. This reduced the official Consumption⁶⁷ of ODS reported to the Parties annually;
 - Because new ODS was not being produced, the future ozone depletion reduced assuming all ODS is eventually released;
 - It extended the operational life of the equipment that still depended on CFCs as a cost-effective method was used to avoid premature retirement of such equipment.

⁶⁷ Consumption = (ODS Production + ODS imports) – ODS exports

Cooperation

170. There was extensive government and enterprise cooperation in taking actions to reduce and phase out ODS.
171. Implementation of policies and measures by the government in the CEITS was important for promoting the replication of important activities undertaken by stakeholders to reduce and phase out ODS, and to ensure their cooperation in these activities. For example, the ban on the import of CFCs affected all ODS importers equally and encouraged them to import alternative refrigerants that were not ozone-depleting.
172. Governments have encouraged cooperation through Public Awareness Raising Activities, which was a key component of the reduction and phase out of ODS in almost all of the CEITS. The most extensive PARC was carried out in Latvia. The NOU undertook an extensive campaign of Awareness Raising over a 12 month period to educate Latvian school children on the value of protecting the ozone layer called *"Protect and be Protected"*. The NOU worked with 5 experts/teachers across different disciplines. These initiatives included: 37 press releases; Information on ODS regulations provided to NGOs, state authorities and private companies; Publishing and regularly updating a webpage; Development of portable experiments; Video on ozone layer protection; Launch of campaign *"Ozone Layer Friendly School"* with competitions; Production of 1,500 "3mm"⁶⁸ posters and 600 maps; Development of teaching aids for multi-level education; Two publications; Five regional training workshops for teachers of primary school as well as teachers of chemistry, biology, geography and physics; Manufacture of special souvenirs, prizes and certificates (sponsored as much as possible); Production of a Latvian version of the Ozzy Ozone video; and a Closing Ceremony with 142 Ozone Layer Friendly Schools.
173. Awareness raising campaigns not only encouraged the public to take their refrigerators for ODS recovery and recycling, but they also reduced public resistance toward legislation on ODS and encouraged political action.
174. As a commercial example of cooperation, [LTH](#) was the largest commercial refrigerator manufacturer in Slovenia, producing chest freezers, cabinets for ice cream and frozen food, and refrigerators for catering industry and shops. The company financed the purchase of its own 3R equipment and developed refrigerator servicing capacity. This equipment was used to collect and store recovered refrigerants, to identify recovered refrigerants, and for refrigerant reclamation. LTH funded experts to give lectures on 3R, and ran refrigeration training courses for service companies in other parts of the former Yugoslavia. LTH cooperated with other servicing companies in Croatia, Bosnia, Bulgaria and Macedonia to provide information and advice on ODS 3R programmes.
175. Sometimes the GEF programme expanded the horizon of companies to seek entirely new materials that are not based on traditional petrochemical raw materials. For example, [Ritols](#) is a privately owned company in Latvia that now uses an ODS-free water-blown system for the production of rigid polyurethane (PU) spray foam for building insulation. As a result of the GEF project, Ritols is now part of a scientific programme with EU counterparts in the EU 7th Framework Programme [FORBIOPLAST](#) to find innovative plant rather than petrochemical sources for PU foam.
176. As an example of cooperation encouraged by the Implementing Agencies, the World Bank ran a series of workshops that were designed to capture and build on the experiences and good practices of the countries involved in the phase out of ODS. Regional workshops were held in: Budapest (May 1997) with the Czech Republic, Slovenia and Hungary; in Bledno and

⁶⁸ The thickness of the ozone layer

Ljubljana (October 1997) with the Czech Republic, Poland, Slovenia and Hungary; and in Prague (March 1998) with the Czech Republic, Poland, Slovenia, Hungary, Belarus, Slovakia and the Russian Federation. Further workshops with CEITs were also convened by the Bank and held in Warsaw in October 1998 and in Moscow in March 1999.

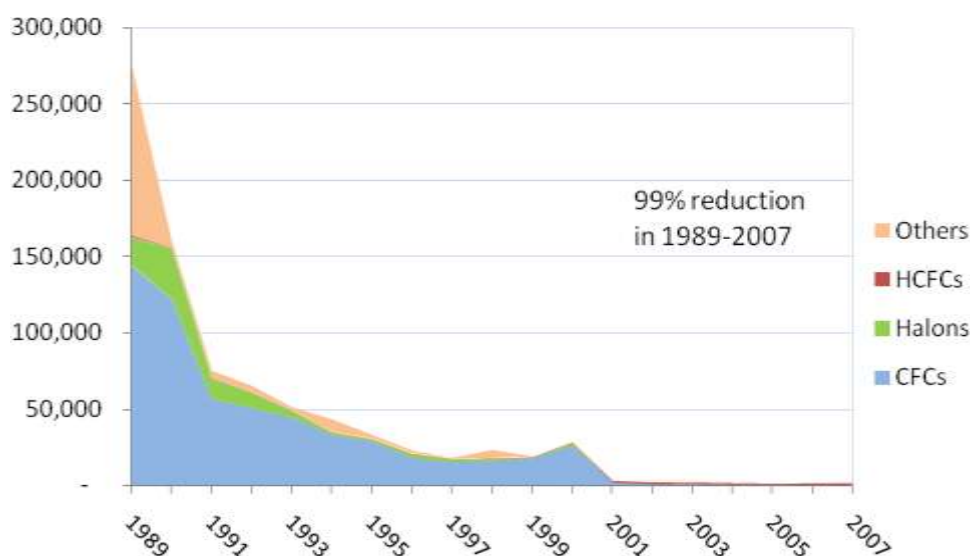
7.9 BENEFIT TO THE GLOBAL ENVIRONMENT AND HUMAN HEALTH

177. This section aims to quantify the environmental benefits of the GEF projects: the reduction in ozone depleting chemicals, the reduction in global warming gases, and the avoided impacts of UV-radiation on agriculture, fisheries, materials and human health. The contribution of the GEF programme was also compared with the results of global action on ODS.

7.9.1 Ozone Layer

178. Action taken under the Montreal Protocol has reduced the annual consumption of ODS from more than 1,791,600 ODP-tonnes/year (the historical global baseline⁶⁹) to 68,700 ODP-tonnes/year in 2007⁷⁰. This indicates a global reduction of 96%. Without the Protocol, by the year 2050, ozone depletion would have risen worldwide, reaching at least 50% in the northern mid latitudes and 70% in the southern mid latitudes⁷⁰.
179. Figure 31 shows the reported annual consumption of ODS in 18 CEITs from 1989 to 2007. The CEITs started with a historical baseline consumption of about 304,000 ODP-tonnes, amounting to 17% of the global historical baseline.

Figure 31: Consumption of ODS in CEITs, 1989-2007 (ODP-tonnes)



Data source: (Ozone Secretariat, 2009)

180. The ODS consumption in CEITs fell significantly during the early and mid 1990s due to the weak economic conditions that prevailed at the time (see Chapter 5: Summaries of Country

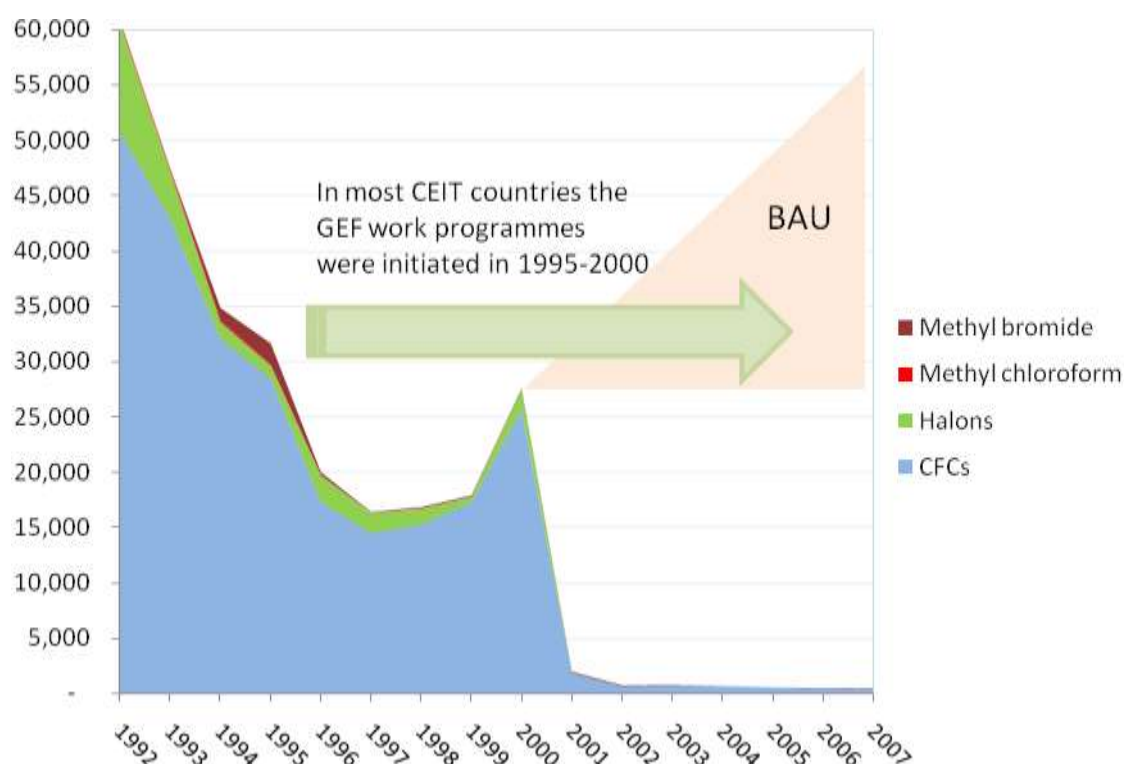
⁶⁹ The baseline is a specific year of ODS consumption that was chosen by the Montreal Protocol as the starting point or basis for calculating the percentage of ODS reductions in subsequent years. The baseline year for major CFCs, for example, was 1986 in industrialised countries, and the average of 1995-97 in developing countries (Ozone Secretariat 2006). The baseline and consumption data do not cover all ODS, but only the types of ODS for which the Montreal Protocol has set phase-out dates.

⁷⁰ Ozone Secretariat. (2008). *Basic facts and data on the science and politics of ozone protection. Background for the media*. Nairobi: UNEP.

Reports of the Case Study CEITs; also Section 6.8 on GDP and ODS in Chapter 6: Comparison of Agency and Donor Performance). This means that a large drop in ODS consumption occurred in CEITs before the first GEF intervention in the mid-1990s.

181. In Figure 32, the arrow indicates the main period of GEF intervention, which started from 1995 onwards⁷¹. After the GEF programme was initiated in many CEITs, the annual consumption of ODS was reduced from about 21,000 ODP-tonnes in 1996 to 1,665 ODP-tonnes in 2007, as shown in Figure 32. This means that the GEF projects contributed to the elimination of about 19,260 ODP-tonnes of annual ODS consumption, and therefore contributed about 1.1% of the global benefit to the ozone layer.
182. Figure 32 also shows the trend from 1992 to 2007 in the consumption of the four major groups of ODS that were targeted by the GEF finance (CFCs, halon, methyl chloroform and methyl bromide). It demonstrates that a substantial reduction in all four types of ODS occurred during the GEF intervention period, after the year 2000. The triangle labelled 'BAU' in Figure 32 shows a theoretical Business-As-Usual scenario, illustrating the range of ODS consumption that could be expected from normal business practice after the year 2000, in the absence of intervention and assistance from the GEF. It indicates that the GEF intervention prevented annual consumption of more than 25,000 ODP-tonnes, and probably prevented substantial growth in ODS.

Figure 32: Consumption of CFCs, halon, MCF and MB in 18 CEITs, 1992-2007 (ODP-tonnes). Business-As-Usual (BAU) shows the range of theoretical ODS consumption without the GEF finance.



Compiled from: (Ozone Secretariat, 2009)

7.9.2 Global warming

183. ODS consumption contributes to global warming, because most ODS are greenhouse gases.

⁷¹ The GEF programme started in 1993 in one CEIT country, but in most CEITs the GEF programme started after 1995. So 1996 has been used as a representative starting point for ODS consumption in this analysis.

The elimination of ODS therefore brings significant benefits for the climate. In the following three paragraphs, the global warming impact of the ODS phase-out was calculated by converting the annual ODS consumption data into CO₂eq per year, and comparing the change that occurred over time, globally and in CEITs:

184. *Change in global ODS level in 1989 vs. 2007:* Global annual consumption of ODS was reduced from the level of about 9,244 million tonnes CO₂eq/year in 1989 to 1,870 million tonnes CO₂eq/year in 2007. This indicates a global reduction of 7,374 million tonnes CO₂eq in the annual consumption level, with direct benefits for the climate.
185. *Change in CEIT ODS level in 1989 vs. 2007:* For comparison, ODS consumption in CEITs was reduced from the level of about 1,315 million tonnes CO₂eq/year in 1989 to 42 million tonnes CO₂eq/year in 2007. This indicates a beneficial reduction of 1,273 million tonnes CO₂eq in CEITs. This includes all of the ODS reductions made in CEITs before the GEF programme was initiated, and amounts to about 17% of the global reduction.
186. *Change in CEIT ODS level after the GEF programme was initiated, 1996 vs. 2007:* After the work programme was initiated in many CEITs, ODS consumption was reduced from the level of about 147 million tonnes CO₂eq/year in 1996 to 42 million tonnes CO₂eq/year in 2007, giving a beneficial reduction of about 105 million tonnes CO₂eq. The GEF programme therefore contributed about 8% of the total reductions made in CEITs, and contributed about 1.4% of the global reduction (of 7,374 million tonnes CO₂eq) achieved in the period from 1989 to 2007.

7.9.3 Other environmental impacts

187. Without the Montreal Protocol, 50% ozone depletion in the northern mid-latitudes would have doubled the UV-B radiation reaching the earth in the highly populated northern mid-latitude regions. In the southern mid-latitudes, ozone depletion of 70% would have quadrupled UV-B levels⁷². By comparison, the ozone hole has about 40% ozone-depletion. The high UV-B would have been damaging to living organisms and ecosystems, such as plants, forests, aquatic organisms, wildlife, farm animals⁷² and building materials⁷³.
188. Most of the negative impacts have not been quantified. However, a Canadian study estimated global benefits from the Montreal Protocol amounting to \$459 billion in the period 1987-2060 in three areas alone: fisheries, agriculture and building materials:
 - \$238 billion due to avoided damage to fisheries
 - \$191 billion due to avoided damage to agriculture
 - \$30 billion due to avoided damage to materials⁷³.
189. Since the CEITs consumed 17% of the global quantity of ODS base levels in the past, we can assume that CEITs contributed 17% of the global benefits above. This indicates benefits of \$77 billion arising from the phase-out of ODS in CEITs, for fisheries, agriculture and materials. The impact of the GEF projects in CEITs was estimated to be 1.1% of the global total, indicating benefits of \$5 billion in these three sectors (Table 23).

⁷² Ozone Secretariat. (2008). Basic facts and data on the science and politics of ozone protection. Backgrounder for the media. Nairobi: UNEP.

⁷³ Environment Canada. (1997). Global Benefits and Costs of the Montreal Protocol on Substances that Deplete the Ozone Layer. The Right Choice at the Right Time. Ottawa: Environment Canada

Table 23: Estimated benefits of Montreal Protocol for fisheries, agriculture and materials (\$ billion)

Sector	Estimated value of damage prevented by the Montreal Protocol (\$ billion)		
	Global	CEIT-18 total	CEIT-18 GEF impact
Fisheries	238	40	2.6
Agriculture	191	32	2.1
Materials	30	5	0.3
Total	459	77	5.0

7.9.4 Estimated human health Benefits

190. Although an Impact Report normally contains quantitative rather than estimated information, in the case of ‘health benefits’ this has not been possible. Human health benefits can only be realistically identified in terms of estimated ‘*reduced numbers*’ of deaths and other impacts.
191. There have been few studies that have estimated the human health benefits of the Montreal Protocol. In 1997, the government of Canada⁷⁴ estimated that the Montreal Protocol in the period from 1987 to 2060 prevented:
- 19,100,000 cases of non-melanoma skin cancer;
 - 1,500,000 cases of melanoma skin cancer;
 - 333,500 skin cancer fatalities; and
 - 129,100,000 cases of cataracts.
192. The impact of the GEF projects in CEITs is therefore estimated to be 1.1% of the above values:
- 210,100 cases of non-melanoma skin cancer;
 - 16,500 cases of melanoma skin cancer;
 - 3,669 skin cancer fatalities; and
 - 1,420,100 cases of cataracts.
193. The Protocol’s Technology and Economic Assessment Panel Co-chair concluded that:
- “...the benefits of stratospheric ozone protection far exceed the costs. Consider the additional evidence that industrial customers that were once dependent on ODS have [examples that show] costs are lower with alternatives, and that alternatives and substitutes are so economical that most consumers have not noticed the price effects of the strong Montreal Protocol controls”.*
194. Chapter 6 discussed how the GEF and MLF finance has decoupled the transition ODS to ODS-free technology from GDP. This allowed the economy to continue to grow while at the same time ODS Consumption declined rapidly. Examples in this Chapter and in Volume 2 have described that on many occasions the implementation of ODS-free technology has not only stabilised the financial situation of the enterprise but also improved enterprise profit through new business opportunities.

⁷⁴ Environment Canada. (1997). Global Benefits and Costs of the Montreal Protocol on Substances that Deplete the Ozone Layer. The Right Choice at the Right Time. Ottawa: Environment Canada.

Annex 1: Evaluation Matrix to evaluate programmes that reduced and phased out ozone-depleting substances in Countries with Economies in Transition

EVALUATION MATRIX

OVERARCHING OBJECTIVE:

To evaluate the impact of the GEF Ozone Portfolio of projects on the phase out of ozone-depleting substances in Countries with Economies in Transition

SUB-OBJECTIVES:

1. To evaluate the impact of the GEF Ozone portfolio investments in CEITs in reducing **ODS production**;
2. To evaluate the impact of GEF Ozone portfolio investments in CEITs in reducing **ODS consumption**;
3. To assess the **sustainability** of GEF investments in maintaining ODS phase-out in CEITs;
4. To assess the extent to which the GEF investments **catalyzed** further changes in behaviour and decisions of stakeholders;
5. To **compare and contrast** the investment and other measures of the **GEF** to phase out ODS production / consumption, with those of the **MLF**;
6. To distil key **lessons** from the GEF Ozone portfolio that have the potential to improve future ODS interventions and in the Persistent Organic Pollutants and Climate Change focal areas.

•

Key Questions	Sub-questions	Indicators / Basic Data	Sources of information	Methodology components
Sub-objective 1: To evaluate the impact of the GEF Ozone portfolio investments in CEITs in reducing ODS production				
What was the intended series of causal linkages which reduced ODS production ?	What was the status of compliance of CEITs vis-a-vis the Montreal Protocol preceding the GEF intervention? What were or are the quantities of each type of ODS produced each year? What caused fluctuations in production? What was the relationship between the production and consumption sectors in ODS producing and consuming CEITs? What were the production	• ODS production and consumption data • MP ODS reduction schedule • Reduction in producer sale of ODS over time • Reduction in ODS exports over time to each market • ODS quantities reported by producers as exports to other specific CEITs • The scope of GEF ODS phase-out activities in the consumption sector in many CEITs • The pressure from international community •	• Data officially reported to the Ozone Secretariat under Article 7 • Reports of the MP Implementation Committee • Records of ODS sold by producer over time, by market destination	• Literature review of: – Country programmes – Sub-Project documents – CIR (WB) – PIR (UNDP) – Country and project evaluations • Semi-structured interview, with Survey questions sent in advance, including: – Ozone and GEF Secretariats; – WB, UNDP, UNEP; – NOUs and Program Managers – Stakeholders during field visits – MLF Secretariat and Evaluation Unit

Key Questions	Sub-questions	Indicators / Basic Data	Sources of information	Methodology components
	sector issues in CEITs that triggered the GEF intervention?	•	• Evaluation reports • Ozone Secretariat database • Database of the GEF ODS phase out program • Reports of UNEP DTIE and Environment Investigation Agency • MP Implementation Committee decisions • •	– Selected experts • Comparison of World Bank impact (Russia / Ukraine) with UNDP-UNEP (Kazakhstan and Uzbekistan) impact, ○ Statistical comparison ○ Field-based ‘qualitative’ comparison • UNDP – UNEP Terminal Evaluation(s)
	What were the GEF policies in place to address ODS phase-out in ODS producing CEITs? What were/are Government counterpart strategies, including economic instruments that disincentivised ODS production?	• GEF Operating Procedures • GEF financing policies regarding ODS production sector • Role and actions of bi-lateral donors • Production taxes, duties, fees • ODS waste disposal charges for producer • Financial support to producer to invest in technology that produces ODS-free substances	• GEF EO desk reviews of completed ODS projects • GEF Egnyte Database • WB, UNDP - UNEP and GEF Secretariat staff • Bilateral	

Key Questions	Sub-questions	Indicators / Basic Data	Sources of information	Methodology components
			agency documents • National legislative instruments in force over time • Producer investment in alternative technology • Evaluation reports	
	What were or are the Policies and Measures that reduced the <i>demand</i> for ODS production?	• Country Programmes adopted by national Governments as environmental national priorities • Import ban on national ODS equipment for ODS production • Export ban on ODS exports • National restrictions on the use of ODS • Voluntary commitment by producer to phase out • Incentives for the production of ODS-free substances	• Commitments of producers pledged in signed grant agreements • UNEP Voluntary Commitment pledge by producers • Evaluation reports	
	What were inputs, elements and components of the Special Initiative Project on the ODS phase-out in the production sector in the Russian Federation?	• Documentation of scope, policies and strategy • Institutional arrangements • Funding level and disbursement schedule • Co-financing commitments • Government and producer	• Special Initiative Project criteria and objectives • Swedish EPA, especially Mr	

Key Questions	Sub-questions	Indicators / Basic Data	Sources of information	Methodology components
		commitments • Technical expertise • Technical assistance component • Implementation arrangements • Monitoring and verification procedures	Husamuddin Ahmadzai • Survey results • Interview results	
	What were major outputs of the project?	• The closure of each production facility covered by the project • The creation of institutional capacity to supervise, monitor and enforce closure of ODS production	• Government and WB, UNDP – UNEP verification and supervision reports	
	What were environmental, technological and social impacts of the ‘Special Initiative Project’?	• The elimination of ODS production capability through permanent closure of operative and latent ODS production capacity • Creation of ODS stockpiling banks under the control of the Government • Accelerated ODS phase-out in Russia and FSU countries and transition to non-ODS technologies • Compliance with bans on ODS import and export • Reduction in ODS emissions • Reduction in emission of highly potent greenhouse gases • Presence of ODS free alternatives • Ratification of Montreal Protocol amendments	• Verification reports • Monitoring and verification material • Article 7 ODS consumption data reported by Russia and FSU countries • IPCC data on emissions of GWP materials • Results of interview with staff in the Research	

Key Questions	Sub-questions	Indicators / Basic Data	Sources of information	Methodology components
		• Compensation for unemployment, retraining, relocation	• Centre “Applied Chemistry” in St Petersburg • Status of MP ratification • Conditionality on social implications in grant agreements with enterprises	
	What were the major risks and how risks were they mitigated?	• Penalty clauses in grant agreements and verification arrangements • Implementation Committee sanctions • Timely adoption of Government policies	• Grant agreements • Verification reports	
	In what ways did the political and financial climate help or hinder progress in achieving the objectives? What action had been taken to overcome difficulties?	• Time for legislation to be adopted • Personnel availability and continuity in national project implementation unit • Financial resources from bi-lateral donors in addition to GEF • Actions to overcome difficulties	• Evaluation reports • Survey results • Interview results •	
	Was the Special Initiative Project sustained as planned?	• Continuity of strong Government support to enforce the sustainability of the project • Effectiveness of the verification and monitoring system	• Verification and evaluation reports • Survey results • Interview	

Key Questions	Sub-questions	Indicators / Basic Data	Sources of information	Methodology components
			results	
	How different was the project design and the <i>modus operandi</i> of the IAs to achieving the objective(s) in ODS phase-out in the production sector by the GEF and MLF ?	• Criteria and policies of the GEF and the MLF in the production sector • Implementation and verification arrangements • Funding arrangements, including loans • Training • Capacity Building • Technology Transfer • Monitoring and evaluation • Responsiveness to problems • Other	• GEF ODS Operational Program and Focal Area Strategies • MLF Policies and Procedures • Evaluation reports • Survey results • Interview results	
Sub-objective 2: To evaluate the impact of GEF Ozone portfolio investments in CEITs in reducing ODS consumption				
What was the intended series of causal linkages which reduced ODS consumption ⁷⁵ ?	What was or is the ODS consumption each year? What was or is the quantity imported according to import country? What caused fluctuations in consumption?	• Reduction in ODS consumption over time • Reduction in retailer sale of ODS over time • Reduction in ODS imports over time from each country	• Data officially reported to the Ozone Secretariat under Article 7 • Records of ODS imported over time, by import country	• Literature review of: – Country programmes – Sub-Project documents – CIR (WB) – PIR (UNDP) – Country and project evaluations • Semi-structured interview, with Survey questions sent in advance, including: – Ozone and GEF Secretariats; – WB, UNDP, UNEP; – NOUs and Program Managers
	What criteria were used to define national priorities for	• Extent of enterprise financial or other contribution	• Country programs	

⁷⁵ We use the definition of 'consumption' which is *production plus imports minus exports*. That is, $C = (P + I) - E$. Source: Paragraph 6 of Article 1, Montreal Protocol on Substances that Deplete the Ozone Layer.

Key Questions	Sub-questions	Indicators / Basic Data	Sources of information	Methodology components
	ODS consumption phase out? What criteria were used to select an enterprise as a target for GEF assistance?	- Quantity of ODS consumed/enterprise - Importance of the enterprise to the national economy	- Evaluation reports - Survey results - Interview results	- Stakeholders during field visits - MLF Secretariat and Evaluation Unit - Selected experts - Comparison of World Bank impact on ODS consumption (Russia / Ukraine) with UNDP-UNEP (Kazakhstan and Uzbekistan) impact - UNDP – UNEP Terminal Evaluation(s)
	What were or are the economic instruments that disincentivised ODS use ?	- Import taxes, duties, fees - User taxes, duties, fees - ODS waste disposal charges for user - Financial support to user to invest in technology that uses ODS-free substances	- National legislative instruments in force over time that restricted ODS - User investment in technology that no longer relied on ODS	
	What were the inputs, elements and components of GEF ODS phase-out projects in specific industrial sectors in CEITs?	- Scope, strategies and policies - Institutional and implementation arrangements - Funding level and disbursement schedule - Co-financing commitments - Government and ODS consuming enterprise commitments - Technical expertise - Technical assistance component - Implementation arrangements - Monitoring and verification procedures	- Project documents - Verification and evaluation reports - Survey results - Interview results - Site visits	
	What were or are the Policies and Measures that reduced the <i>demand</i> for ODS	- Signatory to MP and its amendments - Import ban on national ODS equipment	Date MP Amendments	

Key Questions	Sub-questions	Indicators / Basic Data	Sources of information	Methodology components
	consumption?	for ODS consumption • Export ban on ODS exports • National restrictions on the use of ODS • Voluntary commitment by user sector to phase out • Incentives for the user to use ODS-free substances	ratified • Resulting legislative framework for ODS phase out • National strategy to implement the legislation, including coordination (NOU), training programmes, monitoring, reporting and verification • Public awareness campaigns • UNEP Voluntary Commitment pledge by User sector • Other evidence of government or user commitment to ODS phase	

Key Questions	Sub-questions	Indicators / Basic Data	Sources of information	Methodology components
			out	
	What were major outputs of the project?	• Type of manufacturing processes converted to non-ODS technologies • Number of manufacturing facilities converted • Creation of additional institutional capacity • Technology transfer • Training of personnel • Adoption of legislation measures • Public awareness • • • • • •	• Project documents • Verification and evaluation reports • Survey results • Interview results • Site visits	
Sub-objective 3: To assess the sustainability of GEF investments in maintaining ODS phase-out in CEITs ⁷⁶				
To what extent has the ODS phase out been sustained?	What is the annual ODS production by type over the past 10y?	Table and figures of ODS production by year and type	Ozone Secretariat Data Centre	• Literature review of: – Country programmes – Sub-Project documents – CIR (WB) – PIR (UNDP) – Country and project evaluations • Semi-structured interview, with Survey
	What is the consumption (as defined in Art 1) of ODS in the past 10 years?	Table and figures of ODS consumption by year and type Evaluation reports		
	What policies and measures have been introduced to minimize the supply of, and	• Ratification of amendments to the Montreal Protocol	• Evaluation reports	

⁷⁶ In doing so, pay particular attention to issues of trade in ODS (under Article IV of the MP) and illegal trade.

Key Questions	Sub-questions	Indicators / Basic Data	Sources of information	Methodology components
	demand for, ODS?	• Import/export licensing systems; • Import quotas • Import ban on ODS-containing equipment • Export ban on materials made with ODS for which that use has been phased out • Strengthening institutional and inter-agency linkage and co-operation through establishing inter-agency ozone committees, ozone offices • Promoting formation of professional associations • Other	• Survey results • Interview results • Field visits •	questions sent in advance, including: – Ozone and GEF Secretariats; – WB, UNDP, UNEP; – NOUs and Program Managers – Stakeholders during field visits – MLF Secretariat and Evaluation Unit – Selected experts • Comparison of World Bank impact (Russia / Ukraine) with UNDP-UNEP (Kazakhstan and Uzbekistan) impact • UNDP – UNEP Terminal Evaluation(s)
	What economic and financial instruments have been used/considered in your country to control ODS supply and demand?	• Import taxes, duties, fees • ODS waste disposal charges • Subsidies for RR&R • User payment for collection old ODS-based appliances • Other	• Legislative documents • Awareness campaign • Evaluation reports • Survey results • Interview results • Field visits •	
	Why is ODS still <i>produced</i>, if this is the case? Why is ODS still <i>imported</i>, if this is the case? Why is ODS still <i>exported</i>, if	See first row, Sub-objective 3	• Evaluation reports • Survey results • Interview results	

Key Questions	Sub-questions	Indicators / Basic Data	Sources of information	Methodology components
	this is the case?		- Field visits	
	Which enterprises that received GEF funding are or are not operational today? Why did enterprises that obtained GEF finance remain in business or go out of business? Why did some enterprises go back to ODS technology after briefly adopting ODS-free methods ('back-sliding')	- List of enterprises that received GEF funding and their addresses, with 😊, 😐 or ☹ indicating their operational state - Reasons provided by IA, stakeholders, interviewees and managers of related enterprises for staying in business, going of business, or backsliding to ODS	- Evaluation reports - Survey results - Interview results	
	What actions were undertaken by IAs to promote enterprises to recover, reclaim and recycle (RR&R) ODS, in order to avoid consumption and production of ODS? What actions were undertaken by the government to promote enterprises to recover, reclaim and recycle (RR&R) ODS, in order to avoid consumption and production of ODS?	- List of actions taken by IAs on RR&R - List of actions taken by the government to promote RR&R, such as: - Establishment grant - Training - Equipment provision - Awareness campaign - Policies and measures - Stockpiling of ODS for the servicing tail	- Evaluation reports - Survey results - Interview results - Legislative review - Policies and measures reported by NOU	
	How many enterprises undertake RR&R? How much ODS is RR&R each year?	- Number of R&R facilities - Quantity of Annex A (Group 1) and B (Group 1) substances RR&R for each of the past 5 years [CFCs] - Quantity of Annex A (Group 2)	- Evaluation reports - Survey results - Interview results	

Key Questions	Sub-questions	Indicators / Basic Data	Sources of information	Methodology components
		substances RR&R for each of the past 5 years [halon] - Quantity of unrecyclable & contaminated ODS destroyed each year - Number of technicians trained annually in how to undertake RR&R competently	Ozone Secretariat, according to reports by the Party	
	What actions have you taken to reduce the risk of illegal imports of ODS in order to sustain the phase out?	- Initial training of, and training updates for, customs officers - Spot checks at border including results and frequency of inspection - Reports of seizure of illegal ODS, Identification of illegal ODS using laboratory methods - Correspondence with importing countries to promote coordinated action - Registration and licensing of ODS importers - Provision of ODS identifiers to customs officers - Establishment of a computer-based custom information system connected to agencies responsible for the import/export licensing system - Substantive penalties for illegal trade	- UNEP Customs training - Reports submitted to the Ozone Secretariat on illegal trade - Evaluation reports - Interview results - Laboratory results - Evidence of international coordination - Discussions with Prof Janusz Kozakiewicz (PL)	
	What actions were taken to improve and maintain the	Number of personnel supported by GEF/IA funds prior to, during and after	Evaluation reports	

Key Questions	Sub-questions	Indicators / Basic Data	Sources of information	Methodology components
	institutional strength during the course of the ODS phase out? What evidence do you have that your government did not or did see the need to continue the institutional arrangements after the ODS phase out projects were finished? What lessons can be drawn from these experiences?	the project completion • Number of personnel supported by government funds prior to, during and after the project completion • List of actions by government on IS • Number of personnel (non-government funded and government funded) before and after the actions • Report of lessons learnt	• Interview results • Survey results •	
	What actions were taken to reduce the risk of the <i>unavailability</i> of ODS-free technology? What actions were taken to reduce the risk of the <i>continuity of supply</i> ODS-free technology?	• Reduced import tariffs • Expedited customs clearance • Expedited procurement • Use of local manufacture and expertise to produce ODS-free technology • Reaching out to SMEs • Other actions • •	• Evaluation reports • Interview results • Survey results	
Sub-objective 4: To assess the extent to which the GEF investments catalyzed further changes in behaviour and decisions of stakeholders ⁷⁷				
To what extent did GEF investment in eligible enterprises initiate follow-on investment in other enterprises?	What was the percentage share of the manufacturing business that was financed for conversion by the GEF investment? Conversely, what was the	• Number of businesses that were financed directly, and the percentage contribution to the output of the sector • Percentage share of manufacturing	• Evaluation reports • Interview results • Survey results	• Literature review of: – Country programmes – Sub-Project documents – CIR (WB)

⁷⁷ The focus is on private sector follow-on investments and outcomes of capacity development & technical assistance, to assist Government policy, regulation and enforcement.

Key Questions	Sub-questions	Indicators / Basic Data	Sources of information	Methodology components
	percentage share of the manufacturing business that was <i>not</i> financed for conversion by the GEF investment? [See link to criteria for funding eligibility above]	sector financed, for each key sector Percentage share of manufacturing business that was not financed directly		- PIR (UNDP) - Country and project evaluations - Semi-structured interview, with Survey questions sent in advance, including: - Ozone and GEF Secretariats; - WB, UNDP, UNEP; - NOUs and Program Managers - Stakeholders during field visits - MLF Secretariat and Evaluation Unit - Selected experts - Comparison of World Bank impact (Russia / Ukraine) with UNDP-UNEP (Kazakhstan and Uzbekistan) impact - UNDP – UNEP Terminal Evaluation(s)
	Do these non-GEF-financed businesses remain in operation today? How might the GEF-financed businesses have helped the non-GEF-financed businesses to transition to non-ODS technology?	- Number of non-GEF-financed businesses in key sectors - Directly-financed business helped unfunded business by: - Sharing expertise - Improving the availability of non-ODS refrigerants - Demonstrating the operational viability of ODS-free technology	- Evaluation reports - Interview results - Survey results	
	What criteria can be used to separate catalytic results from the direct results of investment? How important was the effort of businesses that were not directly funded in the overall transition away from ODS?	- Involvement of ‘unfunded’ businesses in workshops and other awareness raising activities - Bank loans that were taken out by ‘unfunded’ businesses to finance their own transition to ODS-free technology - Estimate of the percent of ‘unfunded’ businesses that transitioned to ODS-free technology in key sectors	- MLF Secretariat staff - MLF database - UNEP - UNDP - WB - GEF Secretariat staff - Local banking community	
Sub-objective 5: To compare and contrast the investment and other measures of the GEF to phase out ODS production / consumption, with those of the MLF;				
What was the GEF’s	What was the historical chain	List of reasons for including CEIT	GEF	Literature review of:

Key Questions	Sub-questions	Indicators / Basic Data	Sources of information	Methodology components
overall intention in funding the ODS programme in CEITs?	of events that led the GEF to include ODS phase out in the GEF program for CEITs? What percentage reduction in consumption and production did the GEF expect, compared to the base level? How long did the GEF expect the reduction and phase out in production and consumption to take? Did the GEF expect some sectors and countries to take longer than others to phase out ODS? Why did the GEF expect the results to be sustainable? What procedures and methods did the GEF use to determine the level of funding that should be provided in each country for ODS phase out? What procedures and methods did the GEF use to approve the level of funding? What were the criteria used to allocate effort to phase out ODS between the WB, UNEP and UNDP? What procedures were used to ensure effective coordination between the different agencies?	countries in the ODS phase out programme • Percent reduction expected • Period of time from inception that was expected for the ODS PO; • Expected time by sector and by country, with reasons • List of action by the GEF that led them to the belief that the results would be sustainable • Criteria used to determine the level of funding, for each country and sector • Criteria used to allocate effort between WB, UNEP and UNDP • Procedures put in place to ensure effective coordination between the implementing agencies	Secretariat website • GEF Secretariat (for statistical analysis advice) • Evaluation reports in the 4 focus CEITs • Interview results • Survey results	– Country programmes – Sub-Project documents – CIR (WB) – PIR (UNDP) – Country and project evaluations • Semi-structured interview, with Survey questions sent in advance, including: – Ozone and GEF Secretariats; – WB, UNDP, UNEP; – NOUs and Program Managers – Stakeholders during field visits – MLF Secretariat and Evaluation Unit – Selected experts • Comparison of World Bank impact (Russia / Ukraine) with UNDP-UNEP (Kazakhstan and Uzbekistan) impact • Statistical comparison of speed of production and consumption change: – Within 4 focus countries being Russian Federation, Ukraine, Kazakhstan and Uzbekistan – In comparison to 4 MLF projects of comparable socio-economic status – Production and consumption status (if appropriate and possible)

Key Questions	Sub-questions	Indicators / Basic Data	Sources of information	Methodology components
What was the MLF's overall intention in funding the ODS programme in these 4 MLF-funded countries?	What was the historical chain of events that led the MLF to include ODS phase out in these MLF-funded countries? What percentage reduction in consumption and production did the MLF expect, compared to the base level? How long did the MLF expect the reduction and phase out in production and consumption to take? Did the MLF expect some sectors and countries to take longer than others to phase out ODS? Why did the MLF expect the results to be sustainable? What procedures and methods did the MLF use to determine the level of funding that should be provided in each country for ODS phase out? What procedures and methods did the MLF use to approve the level of funding? What were the criteria used by the MLF to allocate effort to phase out ODS between the various IAs? What procedures were used to ensure effective coordination between the	• List of reasons for including MLF countries in the ODS phase out programme • Percent reduction expected • Period of time from inception that was expected for the ODS PO • Expected time by sector and by country, with reasons • List of action by the MLF that led them to the belief that the results would be sustainable • Criteria used to determine the level of funding, for each country and sector • Criteria used to allocate effort between implementing agencies • Procedures put in place to ensure effective coordination between the implementing agencies	• MLF Secretariat website • Evaluation reports in the 4 MLF countries • Interview results • Survey results	

Key Questions	Sub-questions	Indicators / Basic Data	Sources of information	Methodology components
	different agencies?			
Sub-objective 6: To distil key lessons from the GEF Ozone Portfolio that have the potential to improve future ODS interventions and in the Persistent Organic Pollutants and Climate Change focal areas				
What are the key lessons from the GEF Ozone Portfolio investments?	What were the opportunities and challenges that the IAs faced in Ukraine (WB), the Russian Federation (WB), Kazakhstan (UNDP/UNEP) and Uzbekistan (UNDP/UNEP)? What actions were taken by the IAs to overcome these challenges? How successful were these actions in overcoming each challenge?	- List of opportunities - List of challenges or difficulties - List of actions taken to overcome challenges - Description of whether or not the action taken was fully, partially or not successful	- WB - UNEP - UNDP - Evaluation reports in the 4 MLF countries - Interview results - Survey results	- Literature review of: - Country programmes - Sub-Project documents - CIR (WB) - PIR (UNDP) - Country and project evaluations - Semi-structured interview, with Survey questions sent in advance, including: - Ozone and GEF Secretariats; - WB, UNDP, UNEP; - NOUs and Program Managers - Stakeholders during field visits - MLF Secretariat and Evaluation Unit - Selected experts - Comparison of World Bank impact (Russia / Ukraine) with UNDP-UNEP (Kazakhstan and Uzbekistan) impact - UNDP – UNEP Terminal Evaluation(s)
	What are the opportunities and challenges being faced by countries seeking to mitigate the impact of Climate Change? Of these challenges, which are common to the CEIT programme, and which are unique to Climate Change? In what ways does the GEF experience in CEITs help with addressing issues effectively in Climate Change?	- List of opportunities - List of challenges or difficulties - List of actions taken to overcome challenges - Description of whether or not the action taken was fully, partially or not successful - Description of sectors, and the size/importance of the problem, that could be assisted by the GEF in addressing Climate Change	- WB - UNEP - UNDP - GEF Least Developed Country Fund - Experts within the GEF involved in climate change - Interview results - Survey results	

Key Questions	Sub-questions	Indicators / Basic Data	Sources of information	Methodology components
	What are the opportunities and challenges being faced by countries seeking to mitigate the impact of POPs? Of these challenges, which are common to the CEIT programme, and which are unique to POPs? In what ways does the GEF experience in CEITs help with addressing issues effectively in POPs?	- List of opportunities - List of challenges or difficulties - List of actions taken to overcome challenges - Description of whether or not the action taken was fully, partially or not successful - Description of sectors, and the size/importance of the problem, that could be assisted by the GEF in addressing POPs	- WB - UNEP - UNDP - GEF POPs Fund - Experts within the GEF involved in POPs - Interview results - Survey results	
	What are the opportunities and challenges in CEITs that are or are not present in MLF-funded countries that have comparable socio-economic conditions to CEITs? What actions were taken by the MLF-IAs to overcome these challenges? How successful were these actions in overcoming each challenge?	- List of opportunities - List of challenges or difficulties - List of actions taken to overcome challenges - Description of whether or not the action taken was fully, partially or not successful	- MLF Secretariat - GEF Secretariat	
	What actions did the GEF take that worked well in your country to help with the phase out of ODS? What actions did the GEF take that <i>did not</i> work well in	- List of priorities - Coordination with staff - Payment delivery - Procurement operations - Coordination of programme	- NOUs in CEITs / field visits - Interview results - Survey results	

Key Questions	Sub-questions	Indicators / Basic Data	Sources of information	Methodology components
	your country? If the ODS phase out programme were to start again tomorrow, list actions that the GEF could take to perform better? Describe actions that the GEF could take in the future to assist your country in addressing ODS, climate change and POPs issues?	• Communication • Institutional strengthening	• Evaluation reports	
What are the overall contributions of the GEF Ozone Portfolio at the global level?	Quantify the impact of the ODS phase out in CEITs on the recovery of the ozone layer What is the likely impact on global human health as a result of the phase out in CEITs, due to the lower UV values? What is the likely impact on the environment (fauna, flora) as a result of the phase out in CEITs, due to the lower UV values?	• Our calculations of impact at the global level due to reduced UV • Estimate of the impact on global human health expressed as number of cancers avoided • Estimate of the impact on cropping systems, fauna and flora according to pro-rata estimates from existing reports	• Canadian report (1997) on UV impact on global cancer incidence • Australian report on UV impact on cancer • Report of the Montreal Protocol's Environmental Effects Panel • Experts, including: – Dr van der Leum (Co-chair Environm	• Our calculations of impact at the global level due to reduced UV, based on two reports • Expert comment on our calculations and estimates of impact of GEF / CEIT programme ===== • Our calculations of GWP reductions, based on known ODP reductions from Ozone Secretariat Data Centre • TEAP expert comment on our calculations and estimates of impact of GEF / CEIT programme ===== • Our estimates of ODS remaining in equipment, based on original base size, transitions away from ODS, stocked ODS and annual leakage rates in each sector; • Our calculations of the impact on global warming of leakage of ODS from existing equipment

Key Questions	Sub-questions	Indicators / Basic Data	Sources of information	Methodology components
			- ental Effects Panel) – Prof Janet Bornman (Director, International Global Change Institute)	TEAP expert comment on our calculations and estimates of impact of GEF / CEIT programme
	Describe the improvement to climate change as a result of the CEIT ODS phase out programme? Quantify the reduction in global warming in CEITs, measured in CO₂-equivalents, due to the reduction in the global warming potential attributable to phased out ODS By how many years would you estimate that the phase out of ODS in CEITs advance the time required to globally decrease global warming due to greenhouse gases?	- Our calculations of GWP reductions, based on known ODP reductions from Ozone Secretariat Data Centre - Our calculations of how many years we estimate that the phase out of ODS in CEITs has advanced the time required to globally decrease global warming due to greenhouse gases - TEAP expert comment on our calculations and estimates of impact of GEF / CEIT programme	- Paper by Velders <i>et al.</i> (2007) and estimates by us on impact at global level	
	Quantify the impact on recovery of the ozone layer due to leakage of ODS from existing equipment contained in CEITs Quantify the impact on global warming of leakage of ODS	- Our estimates of ODS remaining in equipment, based on original base size, transitions away from ODS, stocked ODS and annual leakage rates in each sector; - Our calculations of the impact on global warming of leakage of ODS from	TEAP report in response to Decision XVIII/12 which examined the potential impact of ODS	

Key Questions	Sub-questions	Indicators / Basic Data	Sources of information	Methodology components
	from existing equipment contained in CEITs	existing equipment • TEAP expert comment on our calculations and estimates of impact of GEF / CEIT programme • • • •	leakage from existing equipment on the recovery of the ozone layer and the potential impact on climate	
DEFINITIONS AND ACRONYMS USED IN THE MATRIX				
Catalyzed	Induced changes that were not directly funded by the project	PIR	Project Implementation Report, UNDP	
CEITs	Countries with Economies in Transition	POPs	Persistent Organic Pollutants	
CIR	?Closing Implementation Report, World Bank	RR&R	Recovery, reclamation and recycling [of ODS], as in the servicing sector	
Climate Change	Programmes under the United National Framework Convention on Climate Change	Sector	Refrigeration, fire-fighting and servicing are examples of three sectors	
Consumption FSU	Montreal Protocol term defined as production plus imports minus exports Former Soviet Union countries	Servicing tail	Allowable consumption of ODS, usually in the last 10y of the phase out, and usually less than 5% of the base level consumption	
GWP	Global Warming Potential, with CO2 indexed as one. The ability of chemicals to warm the planet, according to their radiative qualities. Many ODS have high GWPs.	TEAP	The Montreal Protocol's Technology and Economic Assessment Panel	
IA	Implementing agency which in this report means UNDP, UNEP or WB	UNDP	United Nations Development Programme	
MLF	Multilateral Fund (of the Montreal Protocol)	UNEP	United Nations Environment Programme	
NOU	National Ozone Unit	UV	Ultra-Violet radiation, some forms of which can cause cancers. UV is a consequence of a weakened ozone layer	
ODS	Ozone-depleting substance e.g. CFC-112	WB	World Bank	
Ozone Secretariat	Based in Nairobi, Kenya. Secretariat for the Montreal Protocol			

Annex 2: Example of Semi-Structured Interview Guide (Government)

Russian Federation / Ministry / Existing institutions, legislation and control measures

Please Note: The comments in italics at the beginning of most sections are taken from a previous report of the World Bank. They have been reproduced by the GEF Evaluation team as a basis for the questions that follow.

The Project has supported the counterparts to effectively develop the necessary regulatory and institutional tools to allow Russia to move forward with future ODS management, consistent with international expectations and standards. However, the Ministry of Natural Resources (MNR, renamed as the Ministry of Natural Resources and Ecology) has not assigned or resourced any permanent responsibility for ODS issues within its structure once the Project is over, despite having this capacity readily available. Similarly the overall institutional mechanism that supervised the Project, namely the Interagency Commission for Ozone Layer Protection (IAC), is currently inoperative, despite having been an effective vehicle for consensus building and decision making for most of the Project.

Based on this, the overall conclusion is that the Project long term impact on institutional development is dependent on the results of the current restructuring of environmental management responsibility within the GOR. More specifically, it will require the new Federal Service for Environmental, Technological and Nuclear Oversight (FSETNO) or MNR to assume direct responsibility for this issue and provide capacity to address it, building on that provided by the Project. MNR has amalgamated FSETNO through the most recent Government restructuring process. More generally, this would also have been seen as a pre-condition for any future international initiatives of this type, either related to ODS or other global chemical pollutant issues.

	Question	Question in Russian	Oral at Meeting	Written
	What is the institutional set up to deal with the Montreal Protocol issues within the Government? Please provide a flow chart describing responsibilities and reporting lines.		MNRE	✓
	What actions were taken to improve and maintain the institutional strength during the course of the ODS phase out?			✓
	What was the number of dedicated ozone personnel supported by GEF funds prior to, during and after the project completion?			✓
	What was the number of dedicated ozone personnel supported by government funds prior to, during and after the project completion?			✓
	The Russian Federation has ratified all the amendments to the Montreal Protocol and adopted a series of legislation measures so far to comply with the Montreal Protocol. What were or are the Policies and Measures that reduced the demand for ODS consumption (e.g. control and ban of ODS imports/exports; control and ban of imports of ODS-containing equipment; national restrictions on the use of ODS; promotion of voluntary commitment by user sector)?		MNRE	✓

	What are the most important and effective legislative acts being used to control and enforce imports and export of ODSs and equipment containing ODSs?			✓
	Question	Question in Russian	Oral at Meeting	Written
	Please provide details of any new legislation related to ODSs, in particular HCFCs and HCFC containing equipment		MNRE	✓
	How useful is your experience in phasing-out CFCs to coping with the implementation of HCFC phase-out program?			✓
	Please describe in detail how the quota and licensing system is working in the country?			✓
	To what extent have the institutional strengthening component and assistance provided from the GEF facilitated the creation of a policy, administrative, economic, technical and political context essential for the success of investment projects and verifiable phase-out of ODS? In particular, could the GEF project be credited for establishment and updating of the Country Program, a system of data collection for purposes of international reporting as required under the Montreal Protocol, establishment of regulatory controls on ODS consumption, import and export, and licensing of residual ODS consumption?			✓
	In your opinion, how could the scope and efficiency of the institutional strengthening arrangements provided under the GEF been improved if we were to start again today?		MNRE	✓
Enforcement (Customs)				
12	What are the major challenges in enforcing the national legislation in order to fully meet the requirements of the Montreal Protocol?			
13	What is the role of the National Customs Office in enforcing the systematic collection of ODS import/export data?		MNRE	✓

14	Was a computerized data base of imported/exported data established in the country? If, yes how does this data base operate?			✓
15	Does the custom office have a training program for customs officers to prevent illegal trade of ODSs? If yes, please describe how it works. How many customs officers have been trained in handling ODS import/export procedures?		MNRE	✓
16	What ODS identifiers and/or other technical means are used at customs entry points? If yes, how many entry points are equipped with such equipment?			✓
17	What penalties may apply in case of contraventions of established ODS import/export regime (fines, cessation or confiscation of commodities and goods, others)? Please give examples of identified contraventions and measures taken by customs.			✓
	Question	Question in Russian	Oral at Meeting	Written
18	To what extent has the institutional strengthening component under the GEF ODS project contributed to the improvement of the ODS enforcement regime in the Russian Federation?			✓
19	What actions have you taken to reduce the risk of illegal imports of ODS in order to sustain the phase out? In particular: • Initial training of, and training updates for, customs officers • Spot checks at border including results and frequency of inspection • Reports of seizure of illegal ODS, identification of illegal ODS using laboratory methods • Correspondence with importing countries to promote coordinated action • Registration and licensing of ODS importers • Provision of ODS identifiers to customs officers • Establishment of a computer-based custom information system connected to agencies responsible for the import/export licensing system • Substantive penalties for illegal trade			✓

ODS Phase out in the consumption sector				
	What were the national priorities in ODS phase out in consumption sectors in the Russian Federation?			✓
	What national strategies were in used in the ODS phase out in the aerosol, refrigeration, foam, solvent, fire protection and refrigeration servicing industrial sectors?		MNRE	✓
	To what extent did the GEF sub-projects in industrial sectors contribute to the implementation of national sectoral ODS phase out strategies?			✓
	What economic instruments were used by the Government that promoted the ODS consumption phase out (import and ODS user taxes, duties, fees, financial support to user to invest in ODS-free technology)?		MNRE	✓
	What were the major challenges faced by the Government in phasing out ODS consumption to meet requirements of the Montreal Protocol?		MNRE	✓
	To what extent did the scope, policies and implementation modalities of the assistance provided by the GEF in consumption sectors met the expectations of the Government of the Russian Federation?		MNRE	✓
Expenditure / infrastructure				
<i>Despite the opportunity afforded by the Bank through several extensions of the grant closing dates, MNR's performance in 2001-2003 was the primary reason for not being able to use approximately US\$7.7 million of GEF funding which could have funded additional residual ODS phase out sub-projects, sixteen of which were prepared and approved.</i>				
	Question	Question in Russian	Oral at Meeting	Written

	What the underlying reasons for curtailing spending under the third GEF funding tranche and diverting about US \$ 7.8 million from resources allocated to the consumption sector to the Special Initiative Project in the production sector?		MNRE	✓
ODS Phase out in the production sector				
<i>Articles 2A to 2E of the Montreal Protocol contain provisions allowing developed countries to exceed established limits in production of ODSs in order to meet the basic domestic needs (BDN) of Article 5 countries.</i>				
	Why was the Russian Federation not successful in producing ODS for BDN?			✓
	What methodology and criteria were used in negotiating the level of funding for the Special Initiative Project to phase the ODS production capacity in the Russian Federation?			✓
	What were the environmental, technological and social impacts of the “Special Initiative Project”?			✓
	In what ways did the political and financial climate help or hinder progress in achieving the objectives of the Special Initiative Project?		MNRE	✓
<i>Funds were allocated under the Special Initiative Project to develop technologies for production of non-ODS alternatives.</i>				
	What were the major achievements in development of production technologies of non-ODS alternatives?		MNRE	✓
<i>Remaining inventories of banked ODS anticipated to be eliminated at the end of 2005.</i>				
	What is the current size of ODS inventories in the Russian Federation?			✓

Sustainability of the institutional strengthening component

The technical assistance component of the GEF project covered the establishment of a formal licensing system for ODS consumption and production, assignment of quotas, import/export controls and a system of data collection for the purposes of international reporting under the MP. This in itself is a major positive outcome, particularly when it was accomplished during a period of major institutional change and instability in the environmental management sector. In its Implementation Completion Report (ICR) the World Bank expressed its concern regarding its sustainability of given the absence of any material commitment within the responsible government agencies to assume responsibility for or to fully implement these tools. "This is unlikely to have any direct impact on the overall achievements of the Project in sustained phasing out of primary ODS production and consumption since the results of the investment component are effectively irreversible. However, it raises concerns about Russia's ability and willingness to implement the evolving international phase out requirements of the MP in areas such as methyl bromide and transitional substances or even more broadly in being part of global chemical management agenda where Russia should be a major participant. Having said this, upon closing there is an indication that the Government may be responding to this issue within the current round of restructuring of environmental management responsibility. However, provision of policy direction through such vehicles as maintaining a current Country Program as well as and updating or direct enforcement of regulatory requirements by environmental authorities have uncertain prospects pending stabilization of the overall institutional structure in the sector."

The responses to Questions 1 to 8 will provide information addressing the World Bank concern about the sustainability of the institutional strengthening component expressed in the above excerpt.

Sustainability of the investment component

The World Bank appraised 58 projects under three funding tranches. Only 31 projects were actually implemented. Others were cancelled for various reasons by the enterprises or as a result of the absence of timely government decision making.

	Question	Question in Russian	Oral at Meeting	Written
	Of the 31 enterprises that received GEF funding, which of them are not operational today?			✓
	Why did enterprises that obtained GEF finance remain in business or go out of business?			✓
	Why did some enterprises go back to ODS technology after briefly adopting ODS-free methods ('back-sliding')?			✓
	Did the mandatory co-financing from the enterprise contribute to the sustainability of enterprises receiving assistance from the GEF?		MNRE	✓

	What actions were taken to reduce the risk of the <i>unavailability</i> of ODS-free technology?		MNRE	✓
	Question	Question in Russian	Oral at Meeting	Written
	What actions were taken to reduce the risk of the <i>continuity of supply</i> ODS-free technology? In relation to the questions 53 and 54 please substantiate by addressing the following: • Reduced import tariffs • Expedited customs clearance • Expedited procurement • Use of local manufacture and expertise to produce ODS-free technology • Other actions		MNRE	✓
Sustainability of the Special Initiative Project				
	Was the Special Initiative Project sustained as planned?			✓
Sustainability of the Project Implementation Unit				
<i>The World Bank assessed positively the role of Project Implementation Unit (PIU) funded by the GEF. It is noted in its ICP that the PIU capacity and associated performance had declined over the last two years of the Project, which is directly attributable to the absence of a stable environmental management responsibility in the Government at the policy level compounded by increasing counterproductive interference in routine administrative functions of the PIU.</i>				
	What were the reasons for declining in PIU capacity and associated performance in the last two years of its existence?		MNRE	✓
Mitigated economic and social impacts associated with the elimination of ODS				

	To what extent did the GEF project mitigate economic and social impacts associated with the elimination of ODS in the Russian Federation?		MNRE	✓
GEF funding / catalytic impact				
	What was the percentage share of the ODS-based manufacturing business in the country that was financed for non-ODS conversion by the GEF investment, for each key sector?			✓
	Conversely, what was the percentage share of the ODS-based manufacturing business that was <i>not</i> financed for conversion by the GEF investment for each key sector?			✓
	Question	Question in Russian	Oral at Meeting	Written
	Did the directly-financed business helped unfinanced business by: sharing expertise, improving the availability of non-ODS refrigerants, demonstrating the operational viability of ODS-free technology?		MNRE	✓
	How important was the effort of businesses that were not directly funded in the overall transition away from ODS?			✓
Prospects of future environmental initiatives in other areas, including HCFC phase out				
	Is there an interest in seeking further international support to address global environmental objectives e.g. HCFCs; climate change, POPs, others?		MNRE	✓

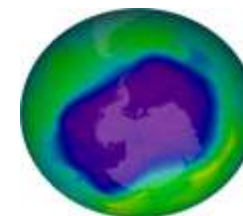
	What were specific challenges/opportunities in the implementation of the GEF project in the Russian Federation? Please list the key lessons from the implementation of the GEF Ozone project that have the potential to improve future funding interventions in HCFCs, the Persistent Organic Pollutants and Climate Change focal areas.			✓
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Annex 3: Example of Semi-Structured Interview Guide that was used as a basis for discussion with enterprises

ODS Consumption Phase Out In Foams Sector		
Thursday 12 February: Moscow / JSC Stroidetal		
No	Questions (not excluding the possibility of follow up questions)	Questions in Russian
1	What is the quantity of 'Vilatherm' XPS that has been produced over the past 10y?	
2	Where do you sell most of your products?	
3	How does Stroidetal maintain market share relative to your major competitor Nelidovo and to foreign imports?	
4	How did you overcome the challenges that you faced when installing the butane technology for foam blowing e.g., energy consumption, safety, de-odorising, testing of foam, operational costs	
5	Did the change to butane technology reduce or enhance your market competitiveness?	
6	Please describe the safety procedures that you have in place and any government inspection of the safety of the foam-producing equipment and procedures	
7	What advice would you give to improve the funding and operations of the conversion programme?	



Global Facility
Environment
Evaluation Office



Impact Evaluation in Countries with Economies in Transition

SURVEY TO NATIONAL OZONE UNITS

Thank you in advance for completing this survey. Your answers will contribute toward our report “Ozone Depleting Substances: Impact Evaluation in Countries with Economies in Transition”.

The sender of the survey form (name / country) will not be disclosed in the report or publically. The Form has been numbered to allow the consultants to confirm the return of the survey from the NOU.

When completing the survey, please highlight the box that you choose in some way e.g. X ☐ or ☐ or ☐. Please choose the box that is closest to your answer. Please answer all the questions.

Please complete the survey and save you changes as ‘Survey No [number]’. Please submit the completed survey as an attachment to an email to tom.batchelor@skynet.be or by fax to +32-2-792-4658. Please submit the completed survey no later than 31 March 2009.

Number of Form: 131

INSTITUTIONAL CAPACITY	Strongly disagree ☐ Disagree ☐ Slightly disagree ☐ Agree ☐ Strongly Agree ☐
1. You have sufficient support from other Ministries and Departments to effectively manage the reduction and phase out of ODS	☐ ☐ ☐ ☐ ☐
2. You have sufficient staff available to work on new projects on ODS	☐ ☐ ☐ ☐ ☐
3. Your main source of funding for the National Ozone Unit comes from (circle or underline one choice):	
a. Central government budget	
b. Donor Agency e.g. UN agencies	
c. Contracts	
4. You have sufficient legal and policy instruments currently in place to address the reduction and phase out of ODS	☐ ☐ ☐ ☐ ☐
5. You have legislative instruments that apply to:	
a) Licences for any ODS imports	Yes ☐ No ☐
b) Quotas for ODS imports and/or exports	Yes ☐ No ☐
c) Taxes to discourage ODS imports	Yes ☐ No ☐
d) Subsidies to encourage ODS-free technology	Yes ☐ No ☐
e) Environmental taxes to discourage ODS use	Yes ☐ No ☐
f) Permits for any ODS use	Yes ☐ No ☐
ODS REDUCTION AND PHASE OUT MANAGEMENT	
6. Do you have a Country Strategy for phase out of ODS?	Yes ☐ No ☐
7. Do you have Management Plan(s) for the reduction and phase out of ODS	Yes ☐ No ☐

8. The ODS Management Plan(s) has/have been implemented for one or more of the key ODS sectors	Yes ☐ No ☐
9. If you answered 'Yes' to Q8, what are the key sectors that have been implemented in the plan (circle or underline 1 or more choices):	
a. Refrigerants	
b. Halons	
c. Methyl bromide	
d. Other ODS	
TRADE ISSUES	
10. Illegal trade in ODS exists in your country	Yes ☐ No ☐
11. Customs officers have equipment in use to effectively detect illegal ODS at the border	Yes ☐ No ☐
12. You have legislation in place that allows Customs to combat illegal trade in ODS	Yes ☐ No ☐
13. If you answered 'Yes' to Q12, you have:	
e. Sent back the ODS to the country of origin	Yes ☐ No ☐
f. Confiscated intercepted ODS	Yes ☐ No ☐
g. Fines or penalties for smugglers	Yes ☐ No ☐
h. Jail sentences for smugglers	Yes ☐ No ☐
14. Confiscated ODS is later destroyed?	Yes ☐ No ☐
15. The customs officers have been trained to enforce laws on illegal trade in ODS?	Yes ☐ No ☐
RECOVERY AND RECYCLING OF ODS	
16. You have operations in 2007 in your country that recovered ODS	Yes ☐ No ☐
17. ODS recovered in 2007 was officially reported to the National Ozone Unit	Yes ☐ No ☐
18. If you answered Yes to Q17, estimate the quantity in kilogrammes of ODS recovered in each of the following categories in 2007:	
i. CFCs – I estimateKg	

ii. HCFCs – I estimateKg	
iii. Halons – I estimate Kg	
iv. Other ODS – I estimateKg	
19. Most of the recovered ODS is recycled or re-used	Yes ☐ No ☐
STORAGE AND DESTRUCTION OF ODS	
20. Recovered ODS is stored for destruction	Yes ☐ No ☐
21. In the past 2 years, recovered ODS that is no longer needed has been sent for destruction in my country	Yes ☐ No ☐
22. You have ODS destruction capability* available in your country?	Yes ☐ No ☐
TRAINING	
23. Training was undertaken during the project	Yes ☐ No ☐
24. If you answered Yes to Q23, which of the following sectors were addressed in the training?	
a) Refrigeration servicing	Yes ☐ No ☐
b) Customs	Yes ☐ No ☐
c) Fire fighting (halon)	Yes ☐ No ☐
d) Other sector	Yes ☐ No ☐
25. Training has been provided <u>in the last three years</u> in the following sectors:	
a) Customs	Yes ☐ No ☐
b) Fire fighting (halon)	Yes ☐ No ☐
c) Other sector	Yes ☐ No ☐

PROJECT DESIGN AND IMPLEMENTATION	Strongly disagree Disagree Slightly disagree Agree Strongly Agree ☐ ☐ ☐ ☐ ☐
26. The ODS Project as a whole was well <i>formulated</i>	☐ ☐ ☐ ☐ ☐
27. The ODS Project as a whole was well <i>implemented</i>	☐ ☐ ☐ ☐ ☐
28. All sub-projects were well <i>formulated</i>	☐ ☐ ☐ ☐ ☐
29. All sub-projects were well <i>implemented</i>	☐ ☐ ☐ ☐ ☐
30. National stakeholders (e.g. government, private sector recipients) were consulted when the Project as a whole was being <i>formulated</i>	☐ ☐ ☐ ☐ ☐
31. National stakeholders (e.g. government, private sector recipients) were consulted when the sub-projects were being <i>implemented</i>	☐ ☐ ☐ ☐ ☐
IMPLEMENTING AGENCY	Highly unsatisfactory Unsatisfactory Slightly unsatisfactory Satisfactory Highly satisfactory ☐ ☐ ☐ ☐ ☐
32. I would rate the performance of the Implementing Agency for the investment sub-projects as:	☐ ☐ ☐ ☐ ☐
•	Strongly disagree Disagree Slightly disagree Agree Strongly Agree ☐ ☐ ☐ ☐ ☐
33. In general, the international consultants were essential for the implementation of the sub-projects	☐ ☐ ☐ ☐ ☐
34. If you disagreed (strongly, disagree or slightly), which sector/area was the consultant not essential (circle or underline one or more answers):	
a) Refrigeration	

b) Foam	
c) Halon	
d) Customs training	
e) Other	
•	Highly unsatisfactory Unsatisfactory Slightly unsatisfactory Satisfactory Highly satisfactory ☐ ☐ ☐ ☐ ☐
35. I would rate the quality of the monitoring/supervision of the Project as a whole by the Implementing Agency as:	☐ ☐ ☐ ☐ ☐
MONITORING AND REPORTING	Strongly disagree Disagree Slightly disagree Agree Strongly Agree ☐ ☐ ☐ ☐ ☐
36. Reporting to the Ozone Secretariat is important	☐ ☐ ☐ ☐ ☐
37. My country has submitted reports to the Ozone Secretariat on ODS consumption each year for the past 5 years?	Yes ☐ No ☐

*Approved Destruction Processes

[Source: Annex II of the report of the Fifteenth Meeting of the Parties]

	Applicability		
	Concentrated sources		Dilute sources
Technology	Annex A, Gp. I Annex B Annex C, Gp. I	Halon (Annex A, Gp. II)	Foam
Destruction and removal efficiency (DRE)	99.99%	99.99%	95%
Cement kilns	Approved	<i>Not Approved</i>	
Liquid injection incineration	Approved	Approved	
Gaseous/fume oxidation	Approved	Approved	
Municipal solid waste incineration			Approved
Reactor cracking	Approved	<i>Not Approved</i>	
Rotary kiln incineration	Approved	Approved	Approved
Argon plasma arc	Approved	Approved	
Inductively coupled radio frequency plasma	Approved	Approved	
Microwave plasma	Approved		
Nitrogen plasma arc	Approved		
Gas phase catalytic dehalogenation	Approved		
Superheated steam reactor	Approved		

Annex 5: Action points as a result of comments received in the Consultation Workshop



**GEF OZONE DEPLETING SUBSTANCES IMPACT EVALUATION
OF COUNTRIES WITH ECONOMIES IN TRANSITION**

Consultation Workshop: Presentation of Draft Evaluation Report

7-8 September 2009, Tashkent, Uzbekistan

Action Points as a result of comments in the Consultation Workshop

No.	Country	Comment made at the Consultation Workshop	Action
1	Uzbekistan	GEF should be more flexible in considering funding support for countries – that is, it should include consideration of products that contain ODS (especially HCFCs), not just the ODS itself. There is a need to strengthen awareness among stakeholders, and to establish a network to facilitate discussions between key stakeholders. Uzbekistan is interested in cooperating with GEF on POPs, pesticides and chemicals, waste management and biodiversity	Uzbekistan may wish to follow-up these points with the GEF Secretariat, through its GEF Focal Point. • Included in Conclusion 4, paragraph 29 • Included in Recommendation 2, paragraph 45
2	Ukraine	Why was Ukraine compared with Egypt in the analysis of GEF vs. MLF projects?	The report stated that the comparison countries were matched with the CEITs on the basis of ODS consumption, population and per capita gross national income. This information was also provided in response to the question in workshop
3	Ukraine	A draft law on regulating greenhouse gases (GHG) is currently being considered by Parliament in Ukraine. It aims to integrate GHG and ODS which have a Global Warming Potential, and to encourage closer cooperation between Montreal Protocol and Kyoto Protocol in the management of environmental response	A footnote to this effect was inserted into paragraph 26 of the Ukraine country report
4	Kazakhstan	Legislation for ODS requires enterprises to have equipment for recovery and recycling of ODS. Enterprises must have a licence for activities relating to ODS. Ratification of the Montreal Protocol Amendments is being considered in Parliament at present. Kazakhstan has submitted reports and tries to comply with all Montreal Protocol requirements even though ratification is lacking.	• Table 7 Section 7.2.1 updated • Slide 4 of Conclusion 2 updated • Slide 57 Conclusion 6 updated • Volume 1, Section 7.7.5, paragraph 140 and Table 21 updated
5	NORD company, Ukraine	Following the GEF funding, NORD eliminated ODS and now uses only non-ODS and environmentally friendly refrigerants and foam blowing agents (primarily isobutane)	No changes necessary. A Nord representative informed the meeting of information contained in Volume 2.
6	Russian Federation	In the GEF project the experts were of high quality. Even companies who did not receive funds benefitted from meetings with these experts.	Volume 1, Section 7.6.2 Para 76 updated and footnote added

No.	Country	Comment made at the Consultation Workshop	Action
7	Uzbekistan	Wishes to ask the representatives of Russian Federation and Ukraine to provide more details (names) on ODS and ODS-free substances and equipment	- Included in the Conclusion 4, paragraph 29 - Recommendation 2, Paragraph 45.
8	Russian Federation	Fines for illegal trade are included in the Administrative Code of the Russian Federation	Updated the following: - Conclusion 6, Slide 57 - Volume 1 Section 7.3 paragraph 27 - Table 8 in Section 7.3 - Table 21 in Section 7.7.5
9	Ukraine	Ukraine differs from other countries in having an Environmental Control Service (>1500 officers) since the 1990s, as well as a Customs service. This helps to control illegal trade. Inspectors are located at Customs posts in Ukraine. Ukraine had discussions with manufacturers and monitored imports from China in particular. There were ODS smuggling cases in the past, but now almost zero. Environmental inspectorate of Ukraine received training from the national budget, not from the GEF project. Ukraine seeks opportunities to cooperate with GEF in the training of Customs and the Inspectorate in future.	Paragraphs 29 and 30 of the Ukraine country report were updated Recommendation 2, paragraph 45
10	Kazakhstan	There are some administrative fines and penalties for illegal trade in Kazakhstan, as stated in the survey, but not in the presentation. Also, customs officers do have detector equipment. Kazakhstan is currently introducing an 'enquiry and reply' computerised system in all Ministries so that only authorised people will be able to grant licenses in future	- Table 7 Section 7.2.1 updated - Slide 4 of Conclusion 2 updated - Slide 57 Conclusion 6 updated - Volume 1, Section 7.7.5, paragraph 140 updated - Volume 1 Table 21 updated
11	Ukraine	An update: Currently there are plans to modernise the gas pipeline, including new equipment without halon/ODS, with EBRD support. This year the national legislation on ODS will be updated and is due to include halon, but it is not clear what date it will be adopted. The halon database developed in 2002 needs to be computerised and updated. Looks forward to finding resources for this.	Footnote added to paragraph 60 of Volume 2 Ukraine country report Relevant bodies in Ukraine may wish to follow-up with the national GEF Focal Point
12	Kazakhstan	Current law prohibits halon imports. The project collected halon and did not need it because alternatives were adopted. Kazakhstan requested guidelines and instructions from UNOPS for reclamation facilities, but did not get any answers to its questions. Kazakhstan restated that there is a problem of how to destroy unwanted stocks of halon	See Volume 2 Section 8.3.1 Para 91 point#3 banning Annex B substances (Halon) Kazakhstan may wish to sell halon for critical uses (those without alternatives) rather than destroy it, in the light of its value on the international market
13	Russian Federation	Some companies in the Russian Federation have the capability to destroy unwanted ODS. If other countries are interested, they could contact Mr Tselikov to establish contacts between the relevant Parties	Interested countries may wish to contact See contact details for Mr Tselikov circulated in the Workshop
14	Ukraine	Ukraine has systems for regulating, controlling and inspecting ODS. A department has been established at the Ministry to regulate both ODS and GHG, and will play the role of a national ozone unit. Two government Resolutions were recently drafted on ODS. Other institutional changes are underway, such as establishing a new ozone centre. Government bodies are directly involved in the import and export of ODS, and the system is operating well	To reflect this comment, two more sentences were added to Volume 1, Section 5.3.3 paragraph 6
15	Kazakhstan	What was the basis for selecting the criteria for evaluating countries? Were the same criteria applied to all countries? Were some criteria given greater weighting than others?	All the criteria were equally rated. We provided this information in the workshop, and in the methodology section in Volume 1
16	Uzbekistan	The efficiency of ODS phase-out is not the final objective – it is ozone layer recovery. It would be useful to see more data on this.	Information on the recovery of the ozone layer and the complexities of its recovery due to interactions with the effects of climate change were described

No.	Country	Comment made at the Consultation Workshop	Action
			in the workshop. The <i>Scientific Assessment of Ozone Depletion</i> in 2006 reported that the total level of ODS in the atmosphere has started to decrease. However the recovery of the ozone layer is slower than expected. The Antarctic ozone hole, for example, is expected to continue until 2060-2075, roughly 10-25 years later than scientists estimated previously
17	World Bank	Section 2.4.4 of the short version of the report mentions unwanted stocks of ODS and the lack of destruction facilities, but makes no recommendation on this point	Provided in Recommendation 1 paragraph 37: "Investment in destruction facilities to provide government and the private sector with appropriate options for the safe and cost-effective disposal of ODS".
18	Several countries	The report shows that further work is needed on ODS. What is the procedure for informing GEF about our needs?	Countries were urged to discuss their needs with their national GEF Focal point and regional representatives. Participants were informed of the GEFSEC meeting in Paris 14-16 October 2009, and the need to prepare appropriate statements for this meeting from the perspective of 'negotiations'.

Annex 6: Participants in the Consultation Workshop, Tashkent 7-8 September 2009

Country	Name	Affiliation
Kazakhstan	Ms. Valentina Kryukova	Director, Climate Change Coordination Centre
Kazakhstan	Mr Syrym Nurgaliev	Project Assistant, Climate Change Coordination Centre
Russian Federation	Ms Maria Volosatova	Head, Air Protection and Expertise of State Policy and Regulation Department, Ministry of Natural Resources and Environment
Russian Federation	Mr Tarasov Alexey	Iceberg Refrigeration Company, Smolensk
Russian Federation	Dr Olga Blinova	Russian Scientific Centre, Applied Chemistry
Russian Federation	Mr Vassily Tselikov	Advisor to Directorate, FSUE "Federal Centre of Geo-Ecological Systems" (FCGS 'Ecology')
Ukraine	Mr Volodymyr Balashov	Chief, Dept of Ecological Control on Customs Territory, radiation security and export/import of ODS, Ministry of Environment
Ukraine	Mr Aleksandr Burmistrov	Deputy Chief, Dept of Ecological Control on Customs Territory, radiation security and export/import of ODS, Ministry of Environment
Ukraine	Mrs Nadiia Ovchynnikova	Director of the Dept for Air Protection and Environmental Monitoring, Ministry of Environment
Ukraine	Dr Anatolii Gamera	Halon Expert
Ukraine	Dr Gennady Geyyer	Deputy Director Nord Refrigeration, Donetsk
Uzbekistan	Mr Khayrullo Ibragivov	Senator of the Committee of Oliy Majlik (Parliament)
Uzbekistan	Mr A'sam Ravshanov	Chief of Division of Agriculture Department, Cabinet of Ministers of Uzbekistan
Uzbekistan	Mr Narimam Umarov	Chairman, State Committee for Nature Protection
Uzbekistan	Mr Rakhmatulla Khabirov	First deputy chairman, SCNP
Uzbekistan	Mrs Nadejda Dotsenko	Head of the Main Department of Air Protection, National Coordinator of Ozone Office, SCNP
Uzbekistan	Mr Farkhat Saydiev	Assistant Coordinator of Ozone Office, SCNP
Uzbekistan	Ms Naila Rustamova	Main specialist of the Main Department of Air Protection, SCNP
Uzbekistan	Dr Lyudmila Aksyonova	Head of the International Cooperation and Programmes Department, SCNP
Uzbekistan	Mr Kamaliddin Sadikov	Head of the State Analytics Inspection, National Focal Point of POPs and Rotterdam Convention, SCNP
Uzbekistan	Mr Inoyatulla Nigmatov	Head of Information Service, International Cooperation and Programmes Department, SCNP
Uzbekistan	Mr Majit Khodjaev	Director of Centre "ENV-Power" , SCNP
Uzbekistan	Mr Bahtiyor Abduganiev	Chief of Central Customs Laboratory, State Customs Committee
Uzbekistan	Mr Abdusabir Saidov	Head of Dept., Central Customs Laboratory, State Customs Committee
Uzbekistan	Mr Alisher Usmanov	Head of Division UNO and international organisations department, Ministry of Foreign Affairs
Uzbekistan	Mr Daniyori Kamilov	Lead economist of the Coordination Department, Ministry of Finance

Country	Name	Affiliation
Uzbekistan	Mr Bahretdin Muratov	Main specialist of agriculture and water development division, Ministry of Economy
Uzbekistan	Mr Uktam Ablakulov	Deputy Director, JSC Sino
Uzbekistan	Mr Kudratulla Karimov	Tashkent State Technical University
Uzbekistan	Mr Abdusamat Muminov	Engineer, Tashkent State Technical University
Uzbekistan	Mr Andrey Makarov	Director, JSC Savdotehnikamontaj
Uzbekistan	Mr Khabibulla Nazirov	Chief of Service, JSC Shark Shaboda
Uzbekistan	Mr Turgunbay Ergashev	Chief Engineer, JSC Yulreftrans
Uzbekistan	Mr Sergey Myagkov	Operation of GEF Focal Point, Cabinet of Ministers of the Hydro Meteorological Service, SANIGMI
GEF Evaluation Office	Dr David Todd	Senior Evaluation Officer
GEF Evaluation Office	Dr Lee Risby	Evaluation Officer
GEF Secretariat	Mr Ibrahima Sow	Program Manager POPS
International Consultant	Mr Valery Smirnov	Canada
World Bank Uzbekistan	Mr Iskander Buranov	Operations officer energy and infrastructure
UNDP Uzbekistan	Mr Farhod Maksudov	Programme specialist for Environment and Energy
Touchdown Consulting Brussels	Dr Tom Batchelor	Director
Touchdown Consulting Brussels	Dr Melanie Miller	Director

Annex 7: Key activities in the Impact Evaluation and timetable

Evaluation Process	Timeframe	Responsibility
1) Approach Paper circulated for discussion and formulation of TOR and cooperation with UNIDO and UNEP Evaluation Offices discussed	May – December 2008	GEF EO
2) Selection and hiring of consultants	September 2008	GEF EO
3) Literature review on GEF ODS Projects (Evaluations and Project Implementation Reports)	August - October 2008	GEF EO
4) Consultant work-plan	Early October 2008	Consultants
5) Desk Review of MLF / Montreal Protocol literature and comparable projects	October 2008	Consultants
6) Statistical analyses of collated data	January – March 2009	Consultants / GEF EO
7) Country fieldwork (4 GEF countries): Russia / Ukraine and Kazakhstan / Uzbekistan	February – April 2009	Consultants / GEF EO
8) Country fieldwork in 11 other CEITs, and complete 3 desk study CEITs	April – June 2009	Consultants
9) Submission of progress information ⁷⁸ as part of the Annual Report on Impact 2008 for GEF Council	November 2008	GEF EO
10) Analysis and report drafting	May – July 2009	Consultants
11) Submission of the draft report to GEF EO for internal comments	June 2009	Consultants
12) Circulation of draft report to countries, GEF Secretariat, and Implementing Agencies	August 2009	GEF EO
13) Regional workshop in Uzbekistan with stakeholders mainly from Russia / Ukraine & Kazakhstan / Uzbekistan	September 2009	GEF EO / Consultants
14) Final report drafting	September 2009	Consultants
15) Editing inclusion in the Annual Report on Impact 2009	September 2009	GEF EO
16) Follow up work for publication by GEF EO and/or externally	Nov. 2009 – February 2010	GEF EO (No budgeted input from Consultants)

⁷⁸ This will report on evaluation implementation issues only.

Annex 8: Implementing Agency cost-effectiveness, intensity of implementation, implementation efficiency and relative implementation efficiency in 18 CEITs

Countries with Economies in Transition	Implementing Agency	Start of GEF finance	Actual year of phase-out	Years to phase-out	Quantity of ODS to be phased out at the start of the GEF Project	Maximum ODS Consumption after the GEF funding	Expenditure	Annual expenditure	Cost-effectiveness	Intensity of Implementation	Efficiency of Implementation
				(a)	(b)	(c)	(\$, million)	(\$ / year)	(\$/ODP-kg)	(ODP-tonnes /yr)	(ODP-g/yr/\$)
1	2	3	4	5	6	7	8	9	10	11	12
Armenia ²	UNDP- UNEP	2004	2010	6	110.7	110.7	2.09	0.35	18.88	18.45	8.83
Azerbaijan	UNDP- UNEP	1999	2006	7	99.9	99.9	7.04	1.01	70.47	14.27	2.03
Belarus	World Bank	1997	2000	3	547.4	547.4	6.79	2.26	12.40	182.47	26.87
Bulgaria	World Bank	1995	1998	3	338.4	338.4	9.64	3.21	28.49	112.80	11.70
Czech Rep.	World Bank	1994	1998	4	516.0	516.0	2.83	0.71	5.48	129.00	45.58
Estonia	UNDP- UNEP	2000	2002	2	15.4	15.4	0.75	0.38	48.70	7.70	10.27
Hungary	World Bank	1995	1996	1	566.2	566.2	6.50	6.50	11.48	566.20	87.11
Kazakhstan	UNDP- UNEP	2000	2005	5	537.1	537.1	5.43	1.09	10.11	107.42	19.78
Latvia	UNDP- UNEP	1998	2001	3	25.3	35.2	1.34	0.45	38.07	8.43	6.29
Lithuania	UNDP- UNEP	1998	2001	3	103.8	103.8	4.69	1.56	45.18	34.60	7.38
Poland	World Bank	1996	1998	2	549.4	549.4	5.88	2.94	10.70	274.70	46.72
Russian Fed.	World Bank	1996	2001	5	22,075.6	25,584.2	44.58 ¹	8.92	1.74	4415.12	99.04
Slovakia	World Bank	1995	1998	3	380.9	380.9	2.66	0.89	6.98	126.97	47.73
Slovenia	World Bank	1995	2000	5	353.8	353.8	5.88	1.18	16.62	70.76	12.03
Tajikistan	UNDP- UNEP	2002	2004	2	11.8	11.8	0.82	0.41	69.49	5.90	7.20
Turkmenistan ²	UNDP- UNEP	1998	2010	12	25.3	58.4	0.36	0.03	6.16	2.11	5.86
Ukraine	World Bank	1998	2002	4	1,100.0	1,100.0	21.24	5.31	19.31	275.00	12.95
Uzbekistan	UNDP- UNEP	1998	2002	4	119.8	119.8	3.17	0.79	26.46	29.95	9.45

¹Excluding funds allocated for closure of production facilities. ²Armenia and Turkmenistan were reclassified as developing countries which requires zero consumption of ODS on 1 January 2010

Annex 9: MLF-funded projects in Brazil, Cameroon, Egypt and Romania

Country	Agency	Project Impact (ODP-tonnes)	Actually phased out (ODP-tonnes)	Approved (\$)	Support (\$)	Total approved (\$)	Support/ Total (%)	Disbursed (\$)	Support disbursed (\$)	Total disbursed (\$)	Disbursed / Approved (%)
1	2	3	4	5	6	7	8	9	10	11	12
Projects in aerosol, foam, refrigeration and halon sectors											
Brazil	Canada	21	-	651,829	-	651,829		651,829	-	651,829	
Brazil	Germany	-	-	247,400	32,162	279,562		247,400	32,162	279,562	
Brazil	WB	1,086	1,086	6,900,249	573,844	7,474,093		6,900,249	573,844	7,474,093	
Brazil	UNDP	5,769	5,769	36,717,447	4,660,215	41,377,662		34,999,156	4,531,017	39,530,173	
Brazil	UNIDO	444	388	4,345,526	561,949	4,907,475		4,345,526	561,951	4,907,477	
Brazil Solv Proj CFC-113	UNDP	4	4	68,394	8,891	77,285		68,394	8,891	77,285	
Total Brazil Projects		7,321		48,862,451	5,828,170	54,690,621	11.93	47,144,160	5,698,973	52,843,133	96.62
CFC phase-out NPP											
Brazil	Germany	-	-	3,883,600	372,610	4,256,210		2,810,914	219,396	3,030,310	
Brazil	UNDP	5,727	4,801	22,916,400	1,966,776	24,883,176		10,578,053	933,810	11,511,863	
Total Brazil NPP				26,800,000	2,339,386	29,139,386	8.73	13,388,967	1,153,206	14,542,173	49.91
Brazil Grand Total		13,048		75,662,451	8,167,556	83,830,007	10.79	60,533,127	6,852,179	67,385,306	80.38
Cameroon Projects	UNIDO	645	645	4,861,458	629,355	5,490,813	12.95	4,861,458	629,354	5,490,812	
Cameroon NPP	UNIDO	27	13	735,000	55,125	790,125		274,007	20,551	294,558	
Cameroon Total		672		5,596,458	684,480	6,280,938	12.23	5,135,465	649,905	5,785,370	92.11
Egypt Projects											
Egypt	Germany	100	100	940,700	118,560	1,059,260		940,700	118,560	1,059,260	
Egypt	WB	-	-	1,856,116	-			1,856,116	-		
Egypt	UNDP	2,422	2,421	13,265,822	1,722,907	14,988,729		13,196,832	1,715,588	14,912,420	
Egypt	UNIDO	779	631	17,719,880	1,974,140	19,694,020		11,826,049	1,532,103	13,358,152	
Egypt Solv Proj CFC-113	UNIDO	16	16	275,736	35,846	311,582		275,736	35,845	311,581	
Total Egypt Projects		3,300		33,782,518	3,815,606	35,742,009	11.29				
Egypt NPP											
Egypt	UNIDO	472	190	2,874,967	219,746	3,094,713		1,119,734	88,104	1,207,838	
Grand Total Egypt		3,772		36,657,485	4,035,352	38,836,722	11.01	13,221,519	1,656,052	14,877,571	38.31
Romania	Austria	10	-	131,790	-			116,628	-		
Romania	UNIDO	1,279	1,276	4,389,141	559,460	4,948,601		4,372,981	558,005	4,930,986	
Total Romania Projects		1,289		4,520,931	559,460	5,080,391	12.37	4,489,609	558,005	4,930,986	97.06
Romania NPP											
Romania	Sweden	-	-	178,900	23,257	202,157		76,901	10,722	87,623	
Romania	UNIDO	65	65	434,788	32,608	467,396		43,519	3,263	46,782	
Total Romania NPP		65	65	613,688	55,865	669,553		120,420	13,985	134,405	20.07
Grand Total Romania		1,354		5,134,619	615,325	5,749,944		4,610,029	571,990	5,065,391	88.09

Annex 10: Examples of illegal trade in ODS reported in CEITs

Country	Brief description of event	Implied source of ODS	Substance	ODP-tonnes	Tonnes	Year	Information source
Armenia	Waste ODS mixture incorrectly labelled as new HFC-134a	United Arab Emirates	CFC, HCFC	Unknown	Unknown	2007	UNEP 2008 p.2
Armenia	Contaminated CFC imported from Saudi Arabia, incorrectly labelled as new CFC	Saudi Arabia	CFC	Unknown	Unknown	Unknown	UNEP ECA 2007 p.2
Azerbaijan	Three mislabelled shipments of blends containing CFC-12; 100 CFC-12 cylinders were seized from a ship in Caspian Sea	Unknown	Blends with CFC-12 and CFC-12	Unknown	Unknown	2007	Azerbaijan, see Chapter 5
Belarus	Company imported and sold CFC under other names	Unknown	CFC-12	Unknown	Unknown	2003	Rodichkin 2008 p.28
Czech Republic	Heat pumps containing ODS were imported illegally	Unknown	HCFC-22	0.02	0.37	2002	UNEP 2004 p.2
Czech Republic	Air-conditioning units containing ODS were exported illegally	Czech Rep.	HCFC-22	0.001	0.01	2002	UNEP 2004 p.2
Czech Republic	Air-conditioning units containing ODS were imported illegally	Unknown	HCFC-22	Unknown	Unknown	2003	UNEP 2004 p.2
Estonia	10 companies were fined a total of \$5,000 for smuggling various types of ODS	Unknown	Unknown	Unknown	Unknown	Unknown	Estonia, see Chapter 5
Estonia	Owners of 2 ships were fined for exporting halon to Russia and Georgia	Estonia	Halon	~ 2.4 ?	0.4	2007	Estonia, see Chapter 5
Estonia	ODS were exported illegally to a Russian ship	Estonia	HCFC	0.004 ?	0.07	2005	UNEP 2008 p.3
Kazakhstan	8 cylinders containing ODS were hidden from customs in a train coming from Russia	Russia	HCFC-22, 124, 142b	~ 0.006	0.11	2007	Rodichkin 2008 p.29
Kazakhstan	Companies stated that cheap CFCs from Russia and China can be purchased on the market	Russia, China	CFCs	Unknown	Unknown	2009	Kazakhstan, see Chapter 5
Poland	Illegal trade has been detected and smugglers fined e.g. HCFCs illegally imported from Ukraine	Ukraine	HCFCs	Unknown	Unknown	Unknown	Poland, see Chapter 5
Poland	Attempted import of CFC from Ukraine in private car	Ukraine	CFC-12	0.15	0.15	2005	UNEP 2008 p.3
Russian Fed.	Indications that some CFCs on sale did not come from local stocks but potential illegal imports from China and other countries	China and other countries	CFCs	200	200	2009	Russian Fed., see Chapter 5
Russian Fed.	Attempted export of methyl chloroform to the United Arab Emirates without required documents	Russia	MCF	6.22	62.2	2007	Rodichkin 2008, p.34
Russian Fed.	Customs detected 300 cylinders containing ODS imported illegally from China	China	CFC-12 ?	4.08	4.08	2007	Rodichkin 2008, p.34

Country	Brief description of event	Implied source of ODS	Substance	ODP-tonnes	Tonnes	Year	Information source
Russian Fed.	False information (description and codes) for 160 barrels of CFC-113 imported from China	China	CFC-113	34.944	43.68	2007	Rodichkin 2008, p.34
Russian Fed.	Container(s) transported from Germany via Smolensk region to Vladimir	Germany	Unknown	1.113	Unknown	2008	UNEP 2009 p.10
Slovakia	20 recorded cases of fines imposed by customs officers for illegal ODS	Unknown	Unknown	Unknown	Unknown	2004 - 2009	Slovakia, see Chapter 5
Tajikistan	Several cases of illegal trade, mainly smugglers carrying small quantities of ODS without licences	Unknown	Mainly CFC-12	Unknown	Unknown	Unknown	Tajikistan, see Chapter 5
Turkmenistan	Plentiful supply of CFC-12 at relatively low price indicates potential illegal imports	Unknown	CFC-12	Unknown	Unknown	2009	Turkmenistan, see Chapter 5
Turkmenistan	Imported ODS was detained because it exceeded the permitted quota	Unknown	Unknown	Unknown	1.224	2006	Turkmenistan, see Chapter 5
Ukraine	Risk of illegal CFC imports	Unknown	CFC	Unknown	Unknown	2009	Ukraine, see Chapter 5
Uzbekistan	Several instances of smuggling of refrigerators containing ODS	Unknown	CFC ?	Unknown	Unknown	2002	UNEP 2007 p.26
Uzbekistan	Instances of illegal importation of CFC and HCFC	Unknown	CFC-12, HCFC-22	Unknown	Unknown	2003	UNEP 2007 p.26
Uzbekistan	Illegal imports of CFC were intercepted and destroyed	Unknown	CFC-12	0.328	0.328	By 2007	UNEP 2007 p.26
Uzbekistan	24 cylinders of ODS bearing a Chinese trade name were detected in a private vehicle	China	CFC	~ 0.024	0.024	2007	Rodichkin 2008 p.37
Uzbekistan	Compressors for refrigerators and containers of ODS bearing a Chinese trade name were found in a private vehicle	China	Unknown	Unknown	0.0001	2007	Rodichkin 2008 p.37
Uzbekistan	Cylinders of ODS bearing a Chinese trade name were found in a private vehicle	China	CFC	Unknown	72 litres	2007	Rodichkin 2008 p.37
Uzbekistan	Attempted illegal import from Kyrgyzstan of 36 cylinders of ODS bearing a Chinese trade name	Kyrgyzstan	CFC	~ 0.036	0.036	2007	Rodichkin 2008 p.38
Uzbekistan	30 cylinders of ODS produced in China, illegally imported from Kyrgyzstan, hidden in luggage area of a bus	Kyrgyzstan, made in China	Unknown	Unknown	0.408	2008	*RILO CIS 2009 p.1
Uzbekistan	4 cylinders of ODS produced in China was illegally imported from Kyrgyzstan, hidden in a car	Kyrgyzstan, made in China	Unknown	Unknown	0.054	2008	RILO CIS 2009 p.1
Uzbekistan	Air-conditioner unit containing ODS produced in China was imported illegally	China	Unknown	Unknown	1 piece	2008	RILO CIS 2009 p.1
Uzbekistan	2 cylinders of ODS produced in China were imported illegally from Kyrgyzstan, hidden in a car	Kyrgyzstan, made in China	Unknown	Unknown	0.027	2008	RILO CIS 2009 p.1

Country	Brief description of event	Implied source of ODS	Substance	ODP-tonnes	Tonnes	Year	Information source
Uzbekistan	12 cylinders of ODS with Chinese trade name were detected hidden in a car	Kyrgyzstan, possibly made in China	CFC	Unknown	Unknown	2008	RILO CIS 2009 p.1
Uzbekistan	25 refrigerators + 4 cylinders containing ODS were detected during a documentary check	China to Tajikistan via Uzbekistan	Unknown	Unknown	0.091	2008	RILO CIS 2009 p.1
Uzbekistan	49 litres of ODS were detected hidden in a car	Uzbekistan	Unknown	Unknown	49 litres	2008	RILO CIS 2009 p.1
Uzbekistan	48 cylinders of ODS produced in China were illegally imported from Kyrgyzstan, hidden in a car	Kyrgyzstan, made in China	Unknown	Unknown	0.048	2008	RILO CIS 2009 p.1
Uzbekistan	12 cylinders of ODS produced in China were illegally imported from Kyrgyzstan, hidden in a car	Kyrgyzstan, made in China	Unknown	Unknown	0.163	2008	RILO CIS 2009 p.1
Uzbekistan	13.6 kg ODS produced in China were illegally imported from Kyrgyzstan, hidden in a car	Kyrgyzstan, made in China	Unknown	Unknown	0.014	2008	RILO CIS 2009 p.2
Uzbekistan	195 cans of ODS pesticides intercepted	Kyrgyzstan	Methyl bromide	Unknown	Unknown	2008	RILO CIS 2009 p.2
Uzbekistan	9 cylinders of ODS produced in China were illegally imported from Kyrgyzstan, hidden in a car	Kyrgyzstan, made in China	Unknown	Unknown	0.122	2008	RILO CIS 2009 p.2
Uzbekistan	6 cylinders of ODS produced in China were illegally imported from Kyrgyzstan, hidden in a car	Kyrgyzstan, made in China	Unknown	Unknown	0.082	2008	RILO CIS 2009 p.2
Uzbekistan	27 cylinders of ODS produced in China were illegally imported from Kyrgyzstan, hidden in a car	Kyrgyzstan, made in China	Unknown	Unknown	0.367	2008	RILO CIS 2009 p.2

See Bibliography for full details of information sources cited above. Additional information was also taken from (Dialog Concept Note, 2009). *[Regional Intelligence Network Organisation \(RILO\)](#) for Asia and the Pacific Region, which operates under the World Customs Organisation (WCO). Rodichkin is also reporting activities under RILO.