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**GEF SUPPORT TO COUNTRIES WITH ECONOMIES IN TRANSITION IN  
PHASING OUT OF ANNEX C1 AND E SUBSTANCES OF THE  
MONTREAL PROTOCOL**

1. This paper responds to a decision by the Council in May 2001 asking the Secretariat to prepare a paper on the potential costs and operational implications of GEF support for further efforts to reduce use of two additional ozone depleting substances, methyl bromide and HCFCs, consistent with amendments to the Protocol. This decision was in turn based on requests from the Parties to the Montreal Protocol at their 12<sup>th</sup> Meeting in Burkina Faso, December 11-14, 2000, as well as a similar inquiry from the political focal point for the Government of Poland.

2. The Secretariat identified an expert consultant to assess available information concerning the issues raised by the Council decision. This cover note summarizes the major findings; the full report follows as Annex A.

3. The context for this assessment is the addition of requirements for reducing use of two ozone depleting substances, methyl bromide and HCFCs, in the 1992 Copenhagen Amendment to the Montreal Protocol. At present, 18 Countries with Economies in Transition (CEITs) have ratified the Montreal Protocol but to date only 11 have ratified the Copenhagen Amendment and are fully eligible for support.<sup>1</sup> This assessment makes the assumption of ratification by all 18 countries, recognizing that the availability of GEF assistance would encourage such actions. Additional requirements created by the Beijing Amendment are not included in the assessment (notably restrictions on production of methyl bromide) as this Amendment has yet to obtain the requisite number of ratifications to become effective.

4. The analysis is based on the reduction schedule applicable to the non-Article 5 countries. If the GEF were to provide assistance consistent with the support available for Article 5 countries, lower funding levels would be appropriate as a slower timetable applies for methyl bromide and no reductions are currently required for HCFCs.

5. The implications for GEF support to CEITs to comply with the Montreal Protocol with regard to Methyl Bromide (MB, Annex E substance) and HCFCs (Annex C1) are substantially different for the two substances. They differ with respect to phase-out schedules, their uses and alternatives, and the status of phase-out efforts. The compliance issues are also much greater for methyl bromide than for HCFCs.

6. The phase-out schedule for MB requires the CEITs to completely phase-out the substance by 2005. Based on the available consumption and production data, the volume to be phased out is 206.5-454.2 ODPt. More than half of the amount is attributed to a country that has not ratified the Copenhagen Amendment, the Ukraine (254.4 ODPt reported in 1999), but with a high degree of uncertainty about the actual level of consumption. It is also assumed that the Ukraine would ratify the Copenhagen Amendment. [Funding policies adopted under the Protocol also recognize the appropriateness of support for capacity building and technology transfer to facilitate ratification when the country formally indicates its intent to ratify within 12 months.]

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<sup>1</sup> The 7 CEIT countries currently non-Article 5 that have so far ratified the Copenhagen Amendment are Azerbaijan, Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia, Slovenia and Uzbekistan. The seven who have not ratified the Copenhagen Amendment are Armenia, Belarus, Kazakhstan, Russia, Tajikistan, Turkmenistan, and Ukraine.

7. Assuming average cost of phase-out of \$20/ODPkg (based on experience of the Multilateral Fund) and adding non-investment activities and administrative cost, the total cost for MB phase-out are estimated to be between \$5.0 and \$11.0 million.<sup>2</sup> The funds would be required immediately and utilized over three years (2002-2004).

8. The Implementing Agencies, particularly UNEP, have established programs to summarize and disseminate experience relevant to reducing use of methyl bromide with GEF support. FAO and UNIDO also have relevant expertise.

9. The phase-out schedule for HCFCs in non-Article 5 countries extends to 2020 (-99.5% as compared to baseline use), requiring the CEITs to comply with three intermediate reduction goals.<sup>3</sup> At present, all CEITs are in compliance with the initial required 35% phase-out by 2004 and only two (Hungary and Poland) are not satisfying the reduction target of 65% to be achieved by 2010. This compliance is mainly due to the industrial restructuring taking place in the countries, such that future economic growth may lead to non-compliance unless financial and technical assistance becomes available. The expert report recommends that GEF support be limited to technology transfer activities and other technical assistance for HCFC reductions in order to prevent a resurgence of consumption.

10. Total consumption of HCFCs in CEIT countries has, according to most recent data reports to the Ozone Secretariat under Article 7 of the Montreal Protocol (1998, 1999 or 2000), been 362.9 ODP t. Three countries, Russia, Hungary, and Poland, account for almost 85 percent of the total.

11. There are several challenges with respect to estimating the costs of phasing out HCFCs. The first and foremost is that as the Multilateral Fund has so far not financed HCFC phase-out projects, documented costs and experience is limited. Estimates of phase-out costs are so far based largely on experience with CFCs adjusted for differences in the relative ODP. Additional sources of uncertainty include the fact that (i) an unknown number of CEIT countries may accede to the EU in the years to come;<sup>4</sup> (ii) HCFC phase-out within the next two decades may lead to reduced capital costs by allowing equipment to be replaced at the end of its normal life; and (iii) technological progress over the extended time period allowed for reductions might reduce costs.

12. Allowing for the uncertainties, the expert consultant estimates that the direct costs for a gradual phase-out are between \$3.4-\$10.19 million until 2010 and \$27.22 and \$81.65 million until 2020. Adding non-investment activities and administrative cost increases the overall cost to \$5.8-17.3 million by 2010 and \$33.4-100.4 million until 2020.

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<sup>2</sup> UNEP proposes that an additional \$1 million is justified for non-investment activities in order to help prevent growth in demand likely to occur due to expanding agricultural production and methyl bromide marketing efforts.

<sup>3</sup> There has so far been no decision to reduce HCFC use in Annex 5 Countries and therefore no funding under the Multilateral Ozone Fund is available; a proposal to study the issue was rejected at the most recent meeting of the parties in Sri Lanka.

<sup>4</sup> Nine of the 18 otherwise potentially eligible CEIT countries are currently in negotiations with the EU about the possibility of accession: Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia, and Slovenia. As noted in paragraph 5 of the Expert Paper (Annex A), the EU has adopted regulations on HCFCs and methyl bromide more stringent than those under the Montreal Protocol.

13. Not all HCFC uses are likely to be eligible for GEF support. In some cases HCFC use was funded as a CFC substitute, and existing policies under the Montreal Protocol preclude funding for a second substitution. However, the exact amount of HCFC consumption in CEIT countries that was introduced as a transitional replacement for other ODS with GEF funding is unavailable.

14. Additional policy considerations may also be relevant to the issue of funding replacements for HCFCs. Although regulated by the Montreal Protocol, HCFCs are also a greenhouse gas, and GEF financing might be viewed as consistent with the objectives of the climate convention. At the same time, GEF assistance for HCFC phase-out could be viewed as a precedent for the Multilateral Fund as the Fund has yet to take a position on the issue (except for the decision not to fund reductions in HCFC use in enterprises where the chemicals were introduced as transitional substances with assistance of the Multilateral Fund or GEF).

15. An alternative to an immediate commitment to fund alternatives to HCFCs would be to focus on financing country needs assessments, non-investment activities and provision of information on HCFC alternatives in order to prevent the CEITs from increasing their HCFC use. This could be done as an incentive to ratify the Copenhagen Amendment and as the basis for collecting better information on HCFC consumption (and production) patterns.

ANNEX A: REPLACEMENT OF HCFCs AND METHYL BROMIDE IN COUNTRIES WITH ECONOMIES IN  
TRANSITION IN ACCORDANCE WITH THE MONTREAL PROTOCOL POTENTIAL COSTS AND  
OPERATIONAL IMPLICATIONS OF A GEF COMMITMENT

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BACKGROUND

1. In May 2001, the GEF Council requested the Secretariat to assess the potential costs and operational implications of a commitment to provide funding to the countries with economies in transition (CEIT countries) for the replacement of HCFCs and methyl bromide in accordance with the Montreal Protocol. This assessment is to be considered at the Council meeting in December 2001 as well as in the discussions on the third replenishment of the GEF Trust Fund.
2. The GEF Secretariat has subsequently asked Ecologic to undertake an independent assessment to explore the need and possibility to implement measures with the assistance of the GEF to ensure compliance with the Montreal Protocol by CEIT countries. This paper presents the result of the assessment.

ELIGIBLE COUNTRIES

3. Developing countries operating under Article 5, paragraph 1, of the Montreal Protocol (Article 5 countries) receive assistance for the phase-out of ozone depleting substances (ODS) from the Multilateral Fund for the Implementation of the Montreal Protocol. Recognising the special situation of CEIT countries, the GEF has been willing to support CEIT countries not operating under Article 5, paragraph 1, of the Montreal Protocol in order to enable their adherence to the Montreal Protocol. The following 18 CEIT countries are currently non-Article 5 countries and are thus generally eligible for GEF assistance for ODS phase-out: Armenia, Azerbaijan, Belarus, Bulgaria, Czech Republic, Estonia, Hungary, Kazakhstan, Latvia, Lithuania, Poland, Russia, Slovakia, Slovenia, Tajikistan, Turkmenistan, Ukraine, Uzbekistan.
4. The GEF Operational Strategy so far determined that countries needed to have ratified the London Amendment to the Montreal Protocol adopted in 1990 in order to be eligible for receiving GEF assistance. However, only countries that have also ratified the subsequent Copenhagen Amendment of 1992 are subject to the control measures regarding HCFCs and methyl bromide under the Montreal Protocol. In order to ensure that GEF assistance is in accordance with countries' commitments to the Montreal Protocol and consistent with the policies of the Multilateral Fund, only countries that have ratified the 1992 Copenhagen Amendment could be eligible for GEF assistance for phasing out HCFCs and methyl bromide. As of 29 August 2001, the following 7 of the aforementioned 18 CEIT countries had not ratified the Copenhagen Amendment: Armenia, Belarus, Kazakhstan, Russia, Tajikistan,

Turkmenistan, Ukraine. GEF assistance for methyl bromide and HCFC phase-out could provide an important incentive for, and could enable, these countries to ratify the Copenhagen Amendment. The assessment provided in the following is based on the assumption that eventually all mentioned CEIT countries will ratify the Copenhagen Amendment.

5. It should further be noted that nine out of the 18 mentioned CEIT countries are currently in negotiations with the European Union (EU) about their accession to the EU, namely: Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia, Slovenia. Many if not all of them are expected to become EU member states within the next decade or so. The EU has established regulations with respect to HCFCs and methyl bromide that are more stringent than those under the Montreal Protocol.<sup>5</sup> These countries may therefore have to implement a phase-out of these substances irrespective of and in advance of international controls; this may be particularly relevant for HCFC phase-out that is only required internationally by 2020/30. In addition, country-specific consumption/import data regarding ODS will not be available for those countries that have become part of the EC Common Market. It would thus appear that GEF support might not be required and that the conditions for such support would not be met in these cases. However, it is still uncertain which countries will accede to the EU and at what point in time.

#### 6. Methyl Bromide

7. **General:** Methyl bromide is mainly used as a soil fumigant in agriculture. A smaller fraction of overall consumption occurs for treatment of durable and perishable commodities and structures (disinfestation of buildings, ships, containers, etc.).

8. **Control measures:** As all other non-Article 5 countries, CEIT countries have to phase out production and consumption of methyl bromide by the end of 2004. Several steps in the phase-out process have been stipulated in the Montreal Protocol, for which production/consumption in 1991 provides the baseline:

- 1995: freeze
- 1999: -25%
- 2001: -50%
- 2003: -70%
- 2005: -100%.

9. Until 2002, a level of production of up to 15 per cent of the production in 1991 is permitted for export to developing countries to meet their basic domestic needs. Thereafter, this extra production is limited to the average production for this purpose in 1995-1998. This level of production for the basic

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<sup>5</sup> See Regulation (EC) No. 2037/2000 of the European Parliament and of the Council of 29 June 2000 on Substances that Deplete the Ozone Layer.

domestic needs of developing countries is to be reduced by 20% by 2005 and to be phased out fully by 2015 (in line with the phase-out schedule applying to developing countries).<sup>6</sup>

10. Amounts of methyl bromide used in quarantine and pre-shipment applications (QPS) are exempted from international controls. Such amounts are generally reported separately to the Ozone Secretariat in Nairobi under Article 7 of the Montreal Protocol. They are not included in the production and consumption figures that the Ozone Secretariat makes available. The figures published by the Ozone Secretariat therefore contain net-amounts of methyl bromide subject to international controls under the Montreal Protocol.

11. **Current production and consumption:** Ukraine is the only CEIT country that has ever reported controlled production of methyl bromide. It has done so only for one year (1995: 841.2 ODP t).<sup>7</sup> Later data suggest that no methyl bromide production subject to international controls exists anymore in CEIT countries. Total consumption of methyl bromide in CEIT countries has, according to most recent data reports to the Ozone Secretariat under Article 7 of the Montreal Protocol (in most cases for 1999), been 412.9 ODP t (see Table 1). More than half of this amount (254.4 ODP t) was reported by Ukraine, which had reported zero figures in the previous years. It is therefore uncertain whether the reported consumption in 1999 reflects actual demand. In addition to Ukraine, five CEIT countries reported methyl bromide consumption of more than 10 ODP t: Azerbaijan, Bulgaria, Hungary, Kazakhstan and Poland. Only two other CEIT countries have reported – minor – consumption of methyl bromide (Czech Republic and Latvia).

12. The data used involve some uncertainties and may not necessarily reflect actual demand. Some countries' consumption data have fluctuated considerably over the years (Ukraine, Azerbaijan). It is also uncertain whether Ukraine is still producing methyl bromide. If Ukraine's reported consumption figures for 1999 turned out to have been due in major part to stockpiling, actual annual consumption in CEIT countries might turn out to be close to 200 ODP t rather than 400 ODP t. On the other side, there is little indication that actual consumption is higher than the reported data. The uncertainty range can therefore be put at –50 - +10 per cent (Table 1). Actual consumption of/demand for methyl bromide in CEIT countries can therefore be estimated to be in a range between 206.5 and 454.2 ODP t.

13. *Eligible* consumption may even be lower since the GEF Operational Strategy on ozone layer depletion determines that not more can be funded than was consumed at the time of ratification. This could be relevant for three CEIT countries. Azerbaijan, the Czech Republic, and Latvia had all reported zero consumption for the year when the Copenhagen Amendment entered into force for them. In contrast, they reported positive consumption in their most recent data (Azerbaijan: 55.7 ODP t; the

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<sup>6</sup> Article 2H of the Montreal Protocol as adjusted by the eleventh Meeting of the Parties to the Montreal Protocol in Beijing in 1999.

<sup>7</sup> Data used in this paper are generally taken from UNEP/OzL.Pro.13/3, Report of the Secretariat on Information Provided by the Parties in Accordance with Article 7 of the Montreal Protocol on Substances that Deplete the Ozone Layer, 20 August 2001 or have been provided by the Ozone Secretariat in Nairobi; see also on the quality of the data Sebastian Oberthür, Production and Consumption of Ozone Depleting Substances 1986-1999. The Data Reporting System under the Montreal Protocol, Eschborn: GTZ 2001.

Czech Republic: 2.2 ODP t; Latvia: 0.5 ODP t). It would need to be clarified whether the most recently reported data reflect eligible consumption (e.g. because earlier data reports were wrong and need to be modified). Obviously, the consumption figure of Azerbaijan would make a significant difference. In the following, it is assumed that the 2000 consumption data of Azerbaijan reflects eligible consumption.

14. **Action needed for compliance:** In order to achieve compliance with the Montreal Protocol, a full phase-out of all reported (production and) consumption subject to international controls (i.e. not including amounts used for QPS) needs to be achieved by the end of 2004, i.e. within three years. That means that consumption needs to be reduced from the *current* levels given above to zero by 2005.

**Table 1: Methyl Bromide Consumption in CEIT Countries and the Costs of Phase-out**

Country	Methyl Bromide Consumption (ODP t) [year in brackets]	Cost of Phase-out (20 US\$ per ODP kg; in US\$)
Armenia	0.0 (1999)	0
Azerbaijan	55.7 (2000)	1,114,000
Belarus	0.0 (2000)	0
Bulgaria	13.2 (2000)	264,000
Czech Republic	2.2 (1999)	44,000
Estonia	0.0 (1999)	
Hungary	24.0 (2000)	480,000
Kazakhstan	18.0 (1998)	360,000
Latvia	0.5 (2000)	10,000
Lithuania	0.0 (1999)	0
Poland	53.9 (1999)	1,078,000
Russian Federation	0.0 (1999)	0
Slovakia	0.0 (1999)	0
Slovenia	0.0 (1999)	0
Tajikistan	0.0 (1999)	0
Turkmenistan	0.0 (1999)	0
Ukraine	245.4 (1999)	4,908,000
Uzbekistan	0.0 (1999)	0
<b>Sum</b>	<b>412.9</b>	<b>8,258,000</b>
<b>Sum with uncertainty range (-50% - +10%)</b>	<b>206.5-454.2</b>	<b>4,013,000 -9,084,000</b>
<b>Non-investment activities</b>	–	<b>4-900,000</b>
<b>Administrative costs</b>	–	<b>500,000-1,200,000</b>
<b>Total costs (rounded)</b>	–	<b>5-11,000,000</b>

15. **Costs:** The Technology and Economic Assessment Panel (TEAP) of the Montreal Protocol estimated in 1999 the average cost of phasing out methyl bromide in developing countries at US\$ 12 per ODP kg.<sup>8</sup> Since then, more experience has been gained within the framework of the Multilateral

<sup>8</sup> Technology and Economic Assessment Panel, Supplementary Report to „Assessment of the Funding Requirement for the Replenishment of the Multilateral Fund for the Period 2000-2002”, August 1999, p. 16 et seq.

Fund. The average costs can be put at a maximum of US\$ 15-20 per ODP kg.<sup>9</sup> Taking the upper bound of that range as a basis for calculation, the total cost of phasing out methyl bromide in CEIT countries can be estimated at US\$ 4-9 million (see Table 1). Table 1 contains the estimated costs per country on the basis of the most recent data and a cost efficiency of US\$ 20 per ODP kg methyl bromide to be phased out.

16. A more precise cost estimate would depend upon information about the specific crops for which methyl bromide is currently used. If a major part of methyl bromide turned out to be used for growing tobacco (as may be the case in Ukraine), for example, specific mitigation costs might be lower. Other factors may lead to further cost reductions or could result in increased costs (e.g. level of training of farmers, general cost level in CEIT countries).

17. The phase-out of methyl bromide poses special problems since it does not involve a one-time conversion to a new technology. Rather, it requires a change in farming practices that needs to be sustained year after year. Only if alternatives are applied successfully by farmers, will they not revert back to methyl bromide. While each and every farmer thus needs to apply alternatives, not each farmer requires a specific project. The experience in the Multilateral Fund shows that projects can be bundled together and that they best be combined in sectoral phase-out plans/umbrella projects. This can also reduce administrative costs.

18. Some additional funding will be required for non-investment activities (capacity building, training, institutional strengthening). Such non-investment activities have proven crucial in the previous ODS phase-out efforts funded by the GEF.<sup>10</sup> Non-investment activities might indeed be the only measure required in countries consuming less than 10 ODP t of methyl bromide. These countries could especially benefit from a regional co-ordination of efforts (as has been done during the first phase of GEF assistance for ODS phase-out in CEIT countries). In order to maximise benefits and reduce costs, such regional activities might partially address both methyl bromide and HCFC phase-out. In the Multilateral Fund context, non-investment activities have been assessed to cost about 10 per cent of direct phase-out costs.<sup>11</sup> Accordingly the costs of non-investment activities for methyl bromide phase-out in CEIT countries can be estimated at US\$ 4-900,000.

19. In addition, administrative costs of the Implementing Agencies need to be covered. These have traditionally been 13 per cent of project costs, although the Multilateral Fund has succeeded in reducing this percentage somewhat for large projects. Even though a different system for determining administrative costs is operated under the GEF, the level of administrative costs is in a similar order. Administrative costs might therefore be estimated at US\$ 0.5-1.2 million.

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<sup>9</sup> See UNEP/OzL.Pro/ExCom/34/9, Consolidated Progress Report, 16 June 2001, that gives a cost efficiency figure of US\$ 15.07 per ODP kg in the fumigants sector for ongoing projects.

<sup>10</sup> See Sebastian Oberthür, Study of Impacts of GEF Activities on Phase-out of Ozone Depleting Substances, GEF Evaluation Report No. 1-00.

<sup>11</sup> Technology and Economic Assessment Panel, Assessment of the Funding Requirement for the Replenishment of the Multilateral Fund for the Period 2000-2002, April 1999.

20. *The maximum total costs for phasing out methyl bromide in CEIT countries including costs of non-investment activities and administrative costs can therefore be estimated to be US\$ 5-11 million.*

21. **Further considerations/conclusions**: The Montreal Protocol requires full phase-out of methyl bromide by 2005. This poses a particular challenge for the GEF. If additional assistance is to be provided for CEIT countries from 2003, this would only leave roughly two years to implement the phase-out. Given the experience, project development and implementation within such a short timeframe appears to be unrealistic and unfeasible.

22. The conclusion of sectoral phase-out/umbrella agreements in which governments commit to a fixed phase-out schedule and payment of funds is made dependent on meeting certain performance standards/benchmarks could be considered in order to speed up implementation. Such agreements have proven as a useful means of supporting quick and flexible implementation by recipient countries in the context of the Multilateral Fund. Measures are implemented flexibly by the recipient country as necessary with the assistance of an Implementing Agency (as appropriate). In order to come to a fair and accurate agreement, it needs to be based on an independent assessment of the use of methyl bromide in the country concerned.

23. In order to counter a potential incentive to increase consumption in the years to come (prior to GEF assistance) a maximum consumption that might be eligible for GEF assistance could be fixed. The GEF Council could, for example, determine that the most recently reported consumption data at the time of the decision to provide GEF assistance for methyl bromide phase-out would represent the maximum eligible consumption (i.e. the maximum eligible consumption would create an upper limit that would not necessarily be exhausted).

24. In order to provide an incentive for taking early action (which would appear to be necessary in order to achieve a phase-out of methyl bromide by 2005) the GEF Council could modify the Operational Strategy on ozone layer depletion with respect to retroactive financing. For example, the GEF Council could determine that any project/activity/measure aiming at the phase-out of methyl bromide initiated after the decision to provide GEF assistance could be eligible for funding (if it complies with the other applicable requirements).

25. The GEF Operational Strategy on ozone layer depletion furthermore determines that GEF operational policies will be consistent with those of the Multilateral Fund. It also stipulates that the toxicity of ODS substitutes will be taken into account in project preparation and implementation. Consequently, the guidelines for methyl bromide projects of the Multilateral Fund<sup>12</sup> would need to be taken into account. The GEF could furthermore determine that integrated pest management (IPM) without the use of chemical pesticides should be given priority to the extent that it is technically feasible, environmentally sound and economically acceptable.

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<sup>12</sup> Revised Strategy and Guidelines for Projects in the Methyl Bromide Sector, in: Policies, Procedures, Guidelines and Criteria of the Multilateral Fund available at <http://www.unmfs.org/menu.asp>.

## HYDROCHLOROFLUOROCARBONS (HCFCs)

26. **General:** Hydrochlorofluorocarbons (HCFCs) are mainly used as substitutes for CFCs in the foam sector and in refrigeration and air-conditioning. The main technical alternative to HCFCs in foam production are hydrocarbons which require substantial investments in safety equipment and water-based technology. The costs of hydrocarbon technology have so far prevented its widespread use in small and medium-sized enterprises. Further alternatives to the use of HCFCs are also proven (CO<sub>2</sub>, other chemical substitutes). Proven alternatives to the use of HCFCs also exist in virtually all areas of refrigeration and air-conditioning, including hydrofluorocarbons (HFCs), ammonium, hydrocarbons, etc. HFCs are powerful greenhouse gases and have been regulated internationally by the 1997 Kyoto Protocol to the UN Framework Convention on Climate Change (see also below).

27. **Control measures:** As all other non-Article 5 countries, CEIT countries have to phase out consumption of HCFCs by 2030. The baseline for the stepwise phase-out schedule is calculated adding up 1989 HCFC consumption and 2.8 per cent of 1989 CFC consumption (in ODP weighted terms). On this basis, the following reduction steps are determined in the Montreal Protocol:

- 1996: freeze
- 2004: –35%
- 2010: –65%
- 2015: –90%
- 2020: –99.5%
- 2030: –100%.

28. The Parties to the Montreal Protocol agreed at their eleventh meeting in Beijing in 1999 to also control production of HCFCs. Accordingly, HCFC production in non-Article 5 countries is to be frozen by 2004 at a level that is the average of (1) HCFC production in 1989 plus 2.8 per cent of 1989 CFC production and (2) 1989 HCFC consumption plus 2.8 per cent of 1989 CFC consumption. This level may be exceeded by up to 15 per cent in order to satisfy the basic domestic needs of developing countries.<sup>13</sup> However, the relevant Beijing Amendment to the Montreal Protocol has not entered into force yet and the only CEIT producer of HCFCs, the Russian Federation, has not ratified it so far.

29. **Production and consumption to be phased out:** The Russian Federation is the only CEIT country that has ever reported controlled production of HCFCs. For 1999, it reported HCFC production of 146.3 ODP t. This level of production is clearly below its calculated baseline for the freeze in HCFC production (4.066 ODP t). There is therefore, on the basis of the current control measures under the Montreal Protocol, no need to implement further measures in order to ensure compliance with international controls.

30. Total consumption of HCFCs in CEIT countries has, according to most recent data reports to the Ozone Secretariat under Article 7 of the Montreal Protocol (1998, 1999 or 2000), been 362.9

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<sup>13</sup> Article 2F of the Montreal Protocol as amended by the eleventh Meeting of the Parties to the Montreal Protocol in Beijing in 1999.

ODP t (see Table 2). Four countries reported consumption of more than 10 ODP t: Belarus, Hungary, Poland, and Russia.

31. If the provision of the GEF Operational Strategy that not more can be funded than was consumed at the time of ratification was applied, Hungary's eligible consumption would be reduced by about a third and Bulgaria's by somewhat more than 1 ODP t, as compared with the figures in Table 2. The logic of that provision, however, appears to be less relevant to HCFCs, use of which as transitional substances has increased in the process of CFC phase-out, which has taken longer in CEIT countries than in other industrialised countries. The further considerations are thus based upon the most recently reported data given in Table 2.

32. All eligible CEIT countries have reported data for either 1998, 1999, or 2000. Experience shows that reported figures may have to be revised when more up-to-date information becomes available. In general, however, no major revisions of the available data are expected.

33. **Action needed for compliance:** No further action is required for Russia to achieve compliance with the HCFC production controls once it ratifies the Beijing Amendment (see above). HCFC consumption needs to be phased out fully essentially by 2020. In the short to medium term, there is only very limited need to implement specific phase-out measures in order to achieve compliance with the Montreal Protocol control measures. As is shown in Table 2, all eligible CEIT countries already comply with the 35-per cent cut mandated for 2004, and all but two countries already comply with the 65-per cent reduction mandated for 2010.

34. On the basis of the available data, only Hungary and Poland would need to reduce their HCFC consumption from current levels by 2010. Both Hungary and Poland are expected to have joined the EU by 2010. Separate accounting of HCFC consumption (i.e. imports) in these countries would not occur once they had joined the EC Common Market and GEF assistance might not be required.

**Table 2: HCFC Consumption in CEIT Countries and Reductions Required by 2010**

Country	Baseline (ODP t)	HCFC Consumption (ODP t)	Reduction from Baseline (%)	Further Reduction Required by 2004 (in ODP t)	Further Reduction Required by 2010 (in ODP t)
Armenia	n.a.	0.8 (1999)	n.a.	n.a.	n.a.
Azerbaijan	14.8	0.4 (2000)	-98%	0.0	0.0
Belarus	50.0	16.0 (2000)	-68%	0.0	0.0
Bulgaria	81.8	6.5 (2000)	-92%	0.0	0.0
Czech Republic	155.8	8.8 (1999)	-94%	0.0	0.0
Estonia	5.7	1.3 (1999)	-77%	0.0	0.0
Hungary	135.9	73.4 (2000)	-46%	0.0	25.8
Kazakhstan	39.5	0.3 (1998)	-99%	0.0	0.0
Latvia	137.9	2.5 (2000)	-98%	0.0	0.0
Lithuania	155.6	2.6 (1999)	-98%	0.0	0.0
Poland	194.6	87.6 (1999)	-55%	0.0	19.5
Russian Federation	3,996.9	146.9 (1999)	-96%	0.0	0.0
Slovakia	58.2	2.4 (1999)	-96%	0.0	0.0
Slovenia	68.1	5.9 (1999)	-91%	0.0	0.0
Tajikistan	n.a.	1.6 (1999)	n.a.	n.a.	n.a.

Turkmenistan	5.6	1.2 (1999)	-79%	0.0	0.0
Ukraine	164.2	4.7 (1999)	-97%	0.0	0.0
Uzbekistan	74.8	0.0 (1999)	-100%	0.0	0.0
<b>Total</b>	–	<b>362.9</b>	–	<b>0.0</b>	<b>45.3</b>

35. **Costs:** The incremental phase-out cost per kg HCFCs can vary significantly depending on the sector, the type and the size of the investment. Experience with the phase-out of HCFCs is extremely scarce since the Multilateral Fund has so far not financed HCFC phase-out projects. Under the circumstances, the best estimate is that HCFC phase-out would involve the same level of cost effectiveness as the phase-out of CFCs. The cost effectiveness of CFC phase-out has been in a range of 5-15 US\$ per kg.

36. The similarity in cost effectiveness needs to be related to the actual amount being phased out, i.e. the costs of phasing out one kg of HCFCs in refrigeration would be roughly similar to the costs of phasing out one kg of CFCs in refrigeration. However, HCFCs have far lower ODP values than CFCs. Whereas the most important CFCs have an ODP value of 1 and metric tonnes are therefore roughly equivalent to ODP tonnes, the ODP values of the most important HCFCs are in the range of 0.022 (HCFC-124) and 0.11 (HCFC-141b). The most common HCFC-22 has an ODP value of 0.055. Judging from available production data of western chemical industry,<sup>14</sup> the average ODP of the most common HCFCs may be estimated at 0.065-0.07. Consequently, about 15 times the amount of funding that would be needed to phase out one ODP kg of CFCs might be required to phase out one ODP kg of HCFCs.

37. On this basis, the direct cost for phasing out the current consumption of 362.9 ODP t of HCFCs in CEIT countries would be between US\$ 27.22 and 81.65 million (see Table 3; also for country-specific figures). As total phase-out is required essentially by 2020, the costs would also occur over this period of time. The direct costs for realising the reductions required to meet the 65-per cent reduction required by 2010 in all countries can be estimated to be 3.4-10.19 million US\$.

38. However, not all the incremental costs occurring during HCFC phase-out in CEIT countries would be eligible for GEF assistance. The Executive Committee of the Multilateral Fund decided in 1996 that enterprises receiving assistance for conversion to HCFCs as 'transitional substances' would not be eligible for funding for the phase-out of these HCFCs.<sup>15</sup> The part of current HCFC consumption in CEIT countries that is caused by enterprises which converted to HCFC technology with assistance of the GEF, would therefore not be eligible for further GEF funding aimed at HCFC phase-out. No detailed data about the ineligible share of CFC consumption is available, but apparently only two subprojects in the previous ODS phase-out efforts of the GEF were converted to HCFCs (according to original phase-out planning).<sup>16</sup> The ineligible part of current HCFC consumption should thus be small.

<sup>14</sup> See <http://www.afeas.org>; metric tonne figures are not available for CEIT countries.

<sup>15</sup> See Decision 19/2 of the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol in UNEP/OzL.Pro/ExCom/19/64, p. 7.

<sup>16</sup> See Sebastian Oberthür, Study of Impacts of GEF Activities on Phase-out of Ozone Depleting Substances, GEF Evaluation Report No. 1-00, p. 16.

Exact figures may, however, only become available as a result of a more detailed assessment of the situation.

39. Some additional funding will again be required for non-investment activities (capacity building, training, institutional strengthening). Taking the same proxy as in the case of the methyl bromide phase-out (see above), the overall costs of non-investment activities for HCFC phase-out in CEIT countries can be estimated at US\$ 2.7-8.2 million, and for compliance by 2010 at US\$ 0.3-1.0 million (see Table 3).

40. In addition, administrative costs of the Implementing Agencies need to be covered. On the basis of 13 per cent of project costs, these might amount to US\$ 3.5-10.5 million for HCFC phase-out in CEIT countries, and for compliance by 2010 to US\$ 0.34-1.3 million (see Table 3).

41. The total costs for phasing out HCFC in CEIT countries including non-investment activities and administrative costs can therefore be estimated to be US\$ 33.4-100.4 million. The corresponding total costs for compliance by 2010 would be US\$ 4.0-12.5 million (Table 3).

42. Furthermore, the GEF Operational Strategy aims at avoiding transfer of negative environmental impacts between focal areas. As regards the ozone layer, the “GEF will fund the conversion to the technology with the least impact on global warming that is technically feasible, environmentally sound, and economically acceptable”.<sup>17</sup> The adoption of the Kyoto Protocol in 1997 reinforced this notion in particular with respect to the use of hydrofluorocarbons (HFCs) that are controlled under the Kyoto Protocol.

**Table 3: Costs of HCFC Phase-out in CEIT Countries**

Country	HCFC Consumption (ODP t)	Cost for Phase-out (75-225 US\$/kg ODP) (mio. US\$)
Armenia	0.8 (1999)	0.06-0.18
Azerbaijan	0.4 (2000)	0.03-0.09
Belarus	16.0 (2000)	1.2-3.6
Bulgaria	6.5 (2000)	0.49-1.46
Czech Republic	8.8 (1999)	0.66-1.98
Estonia	1.3 (1999)	0.10-0.29
Hungary	73.4 (2000)	5.51-16.52
Kazakhstan	0.3 (1998)	0.02-0.07
Latvia	2.5 (2000)	0.19-0.56
Lithuania	2.6 (1999)	0.20-0.59
Poland	87.6 (1999)	6.57-19.71
Russian Federation	146.9 (1999)	11.02-33.05
Slovakia	2.4 (1999)	0.18-0.54
Slovenia	5.9 (1999)	0.44-1.33
Tajikistan	1.6 (1999)	0.12-0.36
Turkmenistan	1.2 (1999)	0.09-0.27
Ukraine	4.7 (1999)	0.35-1.06
Uzbekistan	0.0 (1999)	0.00

<sup>17</sup> GEF Operational Strategy, Chapter 5; see also GEF Operational Strategy, Chapter 1.

<b>Sum</b>	<b>362.9</b>	<b>27.22-81.65</b>
<b>Non-investment activities</b>	–	<b>2.7-8.2</b>
<b>Administrative costs</b>	–	<b>3.5-10.5</b>
<b>Total cost (rounded)</b>	–	<b>33.4-100.4</b>
<u>Costs for compliance by 2010</u>		
<b>Sum of direct phase-out costs (see Table 2)</b>	<b>62.8</b>	<b>3.4-10.19</b>
<b>Non-investment activities</b>	–	<b>0.3-1.0</b>
<b>Administrative costs</b>	–	<b>0.34-1.3</b>
<b>Total cost (rounded)</b>	–	<b>4.0-12.5</b>

43. Giving clear preference for non-HFC alternatives in the HCFC phase-out wherever technically feasible would involve additional costs. The TEAP estimated in 1999 that costs could double in those cases where HFCs are the alternative of choice in the domestic refrigeration sector. At the same time, currently about half of the HCFC used could be technically replaced without use of HFCs. Obviously, this share may vary between different countries depending on their pattern of HCFC use.<sup>18</sup> It is unknown for which share of the HCFC consumption the proxy of a doubling of costs mentioned above would apply. If it applied to the estimated half of current HCFC consumption that could be technically phased out without using HFCs, the total eligible costs of HCFC phase-out might increase by half. However, such estimates remain speculative pending a fuller assessment.

44. Overall, the figures presented show a relatively wide range and are characterised by a high degree of uncertainty. This uncertainty is due to a number of factors. First, little experience exists with regard to the phase-out of HCFCs and its cost. Second, an unknown number of the indicated CEIT countries may not request GEF assistance for HCFC phase-out due to their accession to the EU in the years to come (or they may not be able to fulfil the necessary conditions upon EU accession). Third, HCFC phase-out needs to be realised only within the next two decades. This should allow reducing the capital costs of doing so by replacing equipment at its normal end of life. The savings that might be realised thereby are unknown. Fourth, technology development might well reduce the costs of HCFC phase-out over the next two decades to an uncertain extent. And finally, the exact amount of HCFC consumption in CEIT countries that was introduced as a transitional replacement for other ODS with GEF funding is unavailable.

45. Further uncertainties exist with regard to the additional costs for giving preference to climate-friendly alternatives. Furthermore, those CEIT countries listed in Annex I of the UN Framework Convention on Climate Change that become Parties to the Kyoto Protocol have a self-interest in

<sup>18</sup> No proven alternatives to the use of HFCs exist in mobile air conditioning and some other applications; see, for example, IPCC/TEAP, Meeting Report of the Joint IPCC/TEAP Expert Meeting on Options for the Limitation of Emissions of HFCs and PFCs. Petten, The Netherlands, 26-28 May 1999, Petten: IPCC/TEAP.

avoiding HFC emissions. Avoiding such emissions even creates some monetary value in the context of the emissions trading system to be established under the Kyoto Protocol. The calculation of the 'incremental costs' of a policy giving priority to climate-friendly solutions would thus need to take this into account, but the value of avoided HFC emissions is not yet known.

46. Under these circumstances, further assessments of the needs with regard to HCFC phase-out for those CEIT countries that request assistance for that purpose may be required. At the same time, some non-investment and institutional strengthening activities might usefully be initiated (which might be carried out in conjunction with similar activities regarding methyl bromide, including in a regional context). In order to facilitate HCFC phase-out, the GEF could set up a 'help-desk' operated via internet to assist CEIT countries in identifying suitable options for replacing/doing without HCFCs. Thereby, countries could receive useful support in efforts to avoid investment in HCFC technology in the normal investment cycle. Such a help-desk might be operated by/integrated in the Sustainable Alternatives Network supported by the GEF (<http://www.sustainablealternatives.net/>).

47. Only when more detailed information is available might it be sensible to initiate concrete phase-out activities. An immediate need to do so may only exist in few countries (see Table 2). To achieve the 65-per cent cut required by 2010 no more than about US\$ 12.5 million are likely to be required (Table 3). If at all, only very limited activities would need to start prior to 2006 in this respect. On the basis of an average implementation time of projects of five years, 20 per cent of the overall amount might constitute a maximum of funding, if the GEF decided to provide support prior to 2006 for early phase-out activities in CEIT countries requiring GEF assistance for HCFC phase-out.

48. **Further considerations/conclusions:** There is no immediate urgent need for substantial GEF assistance in order to ensure compliance with the Montreal Protocol and phase out HCFCs in CEIT countries. Rather, such phase-out needs to be achieved in the medium to long term. At the same time, high uncertainties exist about eligible costs and needs of countries regarding HCFC phase-out.

49. Therefore, while some funding of non-investment activities, that may be combined with similar activities regarding methyl bromide as appropriate, could proceed, a further assessment of country needs may be required before targeted activities to support HCFC phase-out in CEIT countries can be initiated. On this basis, the GEF may then provide assistance for investment activities to eligible CEIT countries. Initiating such activities around the middle of the current decade should be sufficient to ensure compliance with the Montreal Protocol and phase out HCFC consumption by 2020 (or even earlier).

50. As in the case of methyl bromide, umbrella/sectoral agreements might provide a suitable means for channelling the assistance to CEIT countries for HCFC phase-out. Such agreements provide flexibility in the allocation of resources to the recipients while minimising the administrative burden on both donor and recipient. The latter appears to be relevant in particular taking into account the long timeframe of HCFC phase-out, that is to be completed by 2020/2030.

51. Once the GEF decides to provide support for HCFC phase-out in CEIT countries, a maximum consumption that might be eligible for GEF assistance should be fixed in order to avoid providing an

incentive for increasing consumption afterwards. The GEF Council could, for example, determine that the most recently reported consumption data at the time of the decision to provide GEF assistance for HCFC phase-out would represent the maximum eligible consumption (i.e. the maximum eligible consumption would create an upper limit that would not necessarily be exhausted). Such a decision would also constitute an effective tool for preventing increasing future demand and consumption of HCFCs, that could endanger compliance with the Montreal Protocol and hamper complete phase-out of HCFCs.

52. A general problem that needs to be considered in deciding on GEF assistance for HCFC phase-out is the precedence this could set for the Multilateral Fund. Except for the decision not to fund phasing out HCFCs in enterprises where HCFCs have been introduced as transitional substances with assistance of the Multilateral Fund, the Fund has not yet taken decisions on this issue. Furthermore, recent discussions about HCFCs in the framework of the Montreal Protocol have confirmed political sensitivities surrounding the issue. It is likely that countries will consider the implications of any GEF decision in this respect.

## CONCLUSIONS

53. Based on the data given above, the total incremental cost of phasing out methyl bromide and HCFCs in CEIT countries can be estimated at a maximum of US\$ 31-91 million excluding non-investment activities and administrative costs, and US\$ 38-111 million including these indirect costs. The estimated total *eligible* cost is lower, since part of HCFC consumption that has been introduced as a transitional solution with assistance from the GEF is ineligible for GEF support. This part is unknown but likely to be very limited.

54. The cost might further increase if clear priority is given to climate-benign alternatives in HCFC phase-out. Covering the incremental part of these costs would be in line with established GEF policies that aim at avoiding transfer of negative environmental impacts between focal areas. It is, however, currently not possible to estimate the incremental cost of giving preference to climate-benign alternatives, also because recipient countries can create additional emissions credits under the Kyoto Protocol to the UN Framework Convention on Climate Change – and may sell such credits on the emerging emissions trading market – by implementing climate-benign options.

55. The cost estimates are highly uncertain, which is also reflected in their relatively wide range. Cost estimates for methyl bromide phase-out range from US\$ 5-11 million mainly due to uncertainty about actual consumption in CEIT countries. Cost estimates for HCFC phase-out have a wider range and are more uncertain due to several factors, including uncertain costs of phase-out, uncertain amounts of eligible consumption and the relatively long timeframe over which HCFC phase-out needs to be implemented (i.e. by 2020). Reducing these uncertainties will require undertaking more detailed, country-specific assessments of the user sectors, previous GEF support for the introduction of HCFCs, the costs of conversion and the needs of each CEIT country.

56. There is time to initiate such an assessment (e.g. by elaborating country programmes), since all eligible CEIT countries are already in compliance with international controls applicable until 2010. The

action needed to achieve the 65-per cent reduction mandated by the Montreal Protocol for 2010 is limited, and there is sufficient time to base such action on an improved knowledge base.

57. The potential costs of providing funding to CEIT countries for the replacement of HCFCs and methyl bromide in accordance with the Montreal Protocol until 2006 can be put at US\$ 6-14 million.<sup>19</sup> Given the uncertainties, *a funding level of US\$ 11-13.2 million would provide sufficient funding for the urgently required methyl bromide phase-out while also leaving some resources for initiating early action on HCFCs.*

58. Table 4 gives the breakdown of these costs. The estimated direct costs of methyl bromide phase-out of US\$ 7-9 million take into account the fact that the 1999 reported methyl bromide consumption of Ukraine is unlikely to reflect actual annual demand. Given the high degree of uncertainty and the less urgent need for immediate action with respect to HCFCs, an amount of US\$ 1 million has been included. This amount could first of all be used to carry out more detailed country assessments and to offer an internet-based ‘help-desk’ to CEIT countries for early action on HCFCs (that could be linked to the Sustainable Alternatives Network). In addition, the cost estimate includes a contingency of 10 per cent in order to safeguard against additional funding needs that may arise in particular given the uncertainties involved.

59. The funding estimate in total is at the upper end of the cost estimates for methyl bromide phase-out (see Table 1). It should thus in any event be possible to cover the costs of methyl bromide phase-out in CEIT countries therefrom. If these costs turned out to be lower than expected, there would be room to re-allocate part of the funds to supporting early HCFC phase-out in advance of the control measures mandated by the Montreal Protocol, as appropriate.

**Table 3: Cost of Phasing out Methyl Bromide and HCFCs in CEIT Countries until 2006**

<b>Cost item</b>	<b>Costs until 2006 (in million US\$)</b>
Methyl bromide	
Direct costs	7-9
Non-investment activities	0.8
Administrative costs	1.2
.....	.....
HCFCs	
Non-investment activities and early action	1
.....	.....
<b>Total</b>	<b>10-12</b>
.....	.....
Contingency (10%)	1-1.2

<sup>19</sup> The lower estimate is derived as follows: US\$ 5 million for methyl bromide phase-out (low cost estimate; see Table 1); US\$ 1 million for non-investment measures, including assessment of country needs/preparation of country programmes, and early action in the area of HCFC phase-out. The higher estimate is composed of: US\$ 11 million for methyl bromide phase-out (high cost estimate; see Table 1); US\$ 3 million for early action on HCFCs and for related non-investment activities, including assessment of country needs/preparation of country programmes.

60. Sectoral or umbrella agreements on ODS phase-out have proven a successful means of implementation in the context of the Multilateral Fund. In such agreements, recipient countries commit to a fixed phase-out schedule and other parameters of their phase-out efforts, while payment of funds is made dependent on meeting certain performance standards/benchmarks (e.g. the reduction steps of the phase-out schedule). Measures are then implemented flexibly by the recipient country with the assistance of an Implementing Agency as appropriate. Such umbrella agreements should be a useful means also for implementing the phase-out of both methyl bromide and HCFCs. In the case of methyl bromide, the flexibility such agreements provide might prove particularly useful given the short time remaining until the phase-out determined by the Montreal Protocol by 2005. With respect to HCFCs, such umbrella agreements could provide a useful means to reduce administrative burdens in a phase-out process that is scheduled to last until 2020/30.

61. In order to avoid any incentive for increasing consumption after a decision of the GEF to fund methyl bromide and HCFC phase-out in CEIT countries, the GEF Council could fix a maximum consumption that might be eligible for GEF assistance. The GEF Council could, for example, determine that the most recently reported consumption data at the time of the decision to provide GEF assistance would represent the maximum eligible consumption (i.e. the maximum eligible consumption would create an upper limit that would not necessarily be exhausted).

62. In this context, it is worth noting that the determination that eligible consumption could not be higher than the amount of consumption at the time of ratification (contained in the current GEF Operational Strategy) might not fit the case of HCFCs. HCFC production and consumption have been increased in most countries during the phase-out of other ODS, as they have been used as transitional substitutes. As the phase-out of other ODS has been delayed in CEIT countries, it cannot be fairly assumed that HCFC consumption should necessarily have declined after ratification of the relevant Copenhagen Amendment.

63. Given the short time remaining until total phase-out of methyl bromide is required by the Montreal Protocol, quick and early action is required in order to ensure compliance. In order to provide an incentive for such early action, the GEF Council could determine that any project/activity/measure aiming at the phase-out of methyl bromide initiated after the decision to provide GEF assistance could be eligible for retroactive funding (if it complies with the other applicable requirements).

64. In summary, providing GEF assistance to CEIT countries for the replacement of HCFCs and methyl bromide in accordance with the Montreal Protocol could enable, and could provide an important incentive for, CEIT countries that have not yet ratified the Copenhagen Amendment to do so. Ratification of the Copenhagen Amendment which contains the applicable international controls would need to be an eligibility requirement for receiving GEF assistance for HCFC and methyl bromide phase-out. In this context, it needs to be considered that by ratifying the Copenhagen Amendment countries commit to phasing out both methyl bromide and HCFCs. A decision to provide assistance for the phase-out of methyl bromide only might therefore leave significant impediments to ratifying the Copenhagen Amendment unmitigated