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**DESK STUDY ON THE
EVALUATION OF CTC PROCESS AGENT PROJECTS
AND PHASE-OUT AGREEMENTS**

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I. Background and Objective

1. The CTC sector evaluation is part of the 2006 Monitoring and Evaluation Work Programme. It focuses on CTC used as process agents and on CTC production. The present desk study establishes an initial assessment of progress achieved based on project documents and on the progress and completion reports received. The study then identifies the main evaluation issues to be covered and suggests a tentative work plan for the field phase. The main question to be addressed is whether the Fund has the right portfolio and has taken the appropriate approach to facilitate achievement of the 85% reduction in 2005. The final report, including country case studies, is scheduled for presentation at the 51st Meeting of the Executive Committee in the Spring of 2007.

2. The CTC sector is unique in the sense, that most CTC use is not controlled under the Montreal Protocol, the largest part being the volumes produced and consumed for feedstock applications. Moreover, the number of controlled uses is a moving target as gradually more process agent uses are recognized by the Meeting of the Parties (by decisions X/14, XV/6 and 7 and most recently by decisions XVII/7 and 8). The 17th Meeting the Parties also requested TEAP in decision XVII/6 to prepare a study on process agents for the 19th Meeting, which is to review the list of process agents again. CTC is also unique in the sense that it is an unavoidable byproduct of certain processes and is cheap, so its use particularly as a solvent in numerous small enterprises is very tempting. The juxtaposition of controlled and uncontrolled uses makes accurate reporting difficult, and most existing licensing schemes have not covered CTC. At the same time, it is the sector with the most advanced phase-out schedule, jumping from no restrictions to a phase-out of 85 % in 2005 while projects and phase-out agreements have been approved rather late.

3. The relevant projects and phase-out activities are mostly in China, India, D.P.R. Korea, Pakistan and most recently Colombia and Romania (see overview table in Annex II). CTC use as a solvent and in aerosol industries has been covered by the respective sector evaluations and need not be evaluated again, except for analyzing whether the required reduction step of 85 % by the end of 2005 is realistic for the countries with and without related projects.

4. It is recognized that field investigations are required in order to provide definite answers to most evaluation issues identified. This being the case, more precise questions will be developed for the next phase of the evaluation, which will include discussions with the implementing agencies before organizing visits to a sample of Article 5 countries.

5. The following report summarizes the main study, which is available on request and on the intranet of the Secretariat as supplementary information. The draft was circulated to the bilateral and implementing agencies and comments received from Japan, UNDP, UNIDO and World Bank were taken into account in finalizing the document.

II. Overview of CTC Consumption and Production

6. This chapter provides an overview of the CTC phase-out achieved, remaining consumption and risks for non-compliance in Article 5 countries, as well as production in both Article 5 and non-Article 5 countries.

7. Unlike for CFCs and HCFCs, there has been no period of freeze for either production or consumption of CTC between the entry in force of the Protocol and the first reduction step of 85% in 2005.

8. Recent consumption figures for Article 5 countries are shown in Annex I. Most countries are importers of CTC. China, D.P.R. Korea, India and Romania are CTC producers and are discussed in more detail below.

9. The most recent information reported by most countries is for 2004 but in some cases for 2003 only. Using these data, twenty-five countries appear to be at risk of not meeting the 85% reduction target in 2005, for example, the D.P.R. Korea, India and Pakistan (see Annex I). The risk of non-compliance is a soft figure, in particular for CTC, as no restrictions were applied before 2005 and stockpiling is quite likely to be widespread, particularly in 2004. The intention is to give an early warning signal which then needs to be further investigated. Declining stocks might make 2006 a more difficult year in terms of non-compliance for a number of countries than 2005.

10. With the exception of China, Brazil, Colombia, D.P.R. Korea, India and Pakistan, the remaining CTC consumption in Article 5 countries is believed to be in the solvent sector, which is outside the scope of the present study. For process agents, a project has yet to be prepared and approved only for Brazil, in spite of two project preparations approved at the 36th and 42nd Meetings of the Executive Committee. UNDP intends to prepare a CTC phase-out plan for Brazil for the 50th Meeting of the Executive Committee, if additional project preparation funding will be approved at the 48th Meeting.

11. Compliance with the production reduction target of 85% for 2005 remains to be verified for China, India and DPR Korea. For China, the question is what the reported increased use of CTC as feedstock for non-ODS consists of. For India a verification report is foreseen only for the 49th Executive Committee in 2006. For DPR Korea, UNIDO plans a mission in April 2006 to verify the reported cessation of production in 2005 and the destruction of facilities.

12. Non-Article 5 countries reported for 2004 under Article 7 a CTC production of minus 4,313 ODP tonnes, and Article 5 countries a total of 16,488 ODP tonnes, which represents 30% of their baseline production of 54,791 ODP tonnes. According to Article 1 of the Montreal Protocol, "production" means the amount of controlled substances produced, minus the amount destroyed by technologies to be approved by the Parties and minus the amount entirely used as feedstock in the manufacture of other chemicals. The amount recycled and reused is not to be considered as "production". Total controlled consumption of CTC by non-Article 5 countries was reported for 2004 as minus 884 ODP tonnes and by Article 5 countries as 15,907 ODP tonnes.

13. According to industry-based information, the consultant calculated for 2004 a world wide CTC consumption for PA and solvent uses of 35,200 metric tonnes or 38,720 ODP tonnes, 81 % of this, that is 28,500 metric or 31,350 ODP tonnes, is being consumed by the main Article 5 countries. He established the total world-wide CTC production as 183,900 metric tonnes, including 136,000 metric tonnes for feedstock purposes and concluded, based on these figures, that although 14,500 metric tonnes of CTC were destroyed, deliberate production of CTC continued to satisfy the demand for both controlled and non-controlled uses (for details see Section III of the Supplementary Information paper.)

14. The terms of reference for this desk study did not cover reconciliation with the data of the Scientific Assessment Panel, which assumed a higher global CTC production level based on emission levels measured in the atmosphere. Correct production estimates based on emission levels would depend on a combination of accurate historic data on real emissions as well as well-grounded information on the atmospheric degradation profile of CTC, which in view of uncertainties in lifetime estimates for CCl₄ is not clear. On an ongoing basis, however, annual emissions cannot exceed the annual production of CTC less the amount used as feedstock and the volume destroyed.

III. Situation in Selected Article 5 Countries

III.1. Overview

15. 12 individual process agent (PA) projects have been completed so far (all in India) and 2 more are being implemented (Pakistan, Colombia).

Project Number	Agency	Country	Company	Technology	Substitute	Start/Finish	Delay	Volume CTC (ODP tonnes)	Cost-effectiveness US \$/kg
IND/PAG/35/INV/338	UNIDO	India	Amoli	Diclofenac	Cyclohexane	12/2001-08/2004	7 months	38.5	10.01
IND/PAG/28/INV/217	IBRD	India	Excel	Endosulphan	1,2-DCE	07/1999-12/2001	4 months	375.0	0.98
IND/PAG/32/INV/283	UNIDO	India	Alpha	Phenyl glycine	Chloroform	12/2000-03/2003	9 months	69.7	2.09
IND/PAG/32/INV/291	UNIDO	India	Doctors	Ibuprofen	1,2-DCE	12/2000-12/2002	6 months	94.6	2.89
IND/PAG/32/INV/287	UNIDO	India	Sayta Deeptha	Ibuprofen	1,2-DCE	12/2000-12/2002	5 months	27.9	9.32
IND/PAG/32/INV/284	UNIDO	India	Svis Labs	Ibuprofen	1,2-DCE	12/2000-06/2002	5 months	54.2	4.61
IND/PAG/34/INV/313	UNIDO	India	Chiplun	Ibuprofen	1,2-DCE	7/2001-07/2003	5 months	16.7	9.32
IND/PAG/34/INV/303	UNIDO	India	Benzo	Bromhexine	MCB (monochloro-benzene)	7/2001-12/2004	16 months	23.0	5.95
IND/PAG/34/INV/311	UNIDO	India	Pradeep Shetye	Bromhexine	MCB	7/2001-12/2004	16 months	133.9	2.08
IND/PAG/34/INV/314	UNIDO	India	FDC	Bromhexine	MCB	7/2001-12/2004	16 months	34.1	6.99
IND/PAG/34/INV/316	UNIDO	India	GRD	Bromhexine	MCB	7/2001-12/2003	4 months	17.9	7.12
IND/PAG/34/INV/320	IBRD	India	Rishiroop	Chlorinated rubber	Aqueous chlorination	7/2001-10/2003	10 months early	248.8	8.34
PAK/PAG/35/INV/42	UNIDO	Pakistan	Himont	4-Isobutyl acetophenon	1,2-DCE	12/2001-unfinished		80.0	6.07
COL/PAG/47/INV/64	IBRD	Colombia	Prodesal	Elimination of NCl ₃	Caustic soda	11/2005-unfinished		2.0	57.24

Source: Inventory and Progress Reports

16. In addition, multi-year agreements for the phase-out of CTC as process agents and CTC production have been concluded with China, India, Pakistan (consumption only) and most recently with Romania (see Table 2). 25 annual tranches under these agreements have been approved so far and 5 completed (for more details see Annexes II and III).

Country	Application (number)	Total funding in US \$ approved in principle	Executive Committee Meeting approved
China	Process agent phase I	65,000,000	38 th
China	Process agent phase II	46,500,000	47 th
India	Consumption and production	52,000,000	40 th
D.P.R. of Korea	Consumption	5,684,844	41 st
D.P.R. of Korea	Production	2,566,800	36 th
Pakistan	Consumption	2,745,665	41 st
Romania	Production	6,300,000	47 th

Source: Inventory

17. The Implementing Agencies for the PA sector, (mostly UNIDO, and in some cases the World Bank), have provided well-documented information about the CTC substitutes available to manufacturers, and have provided a well-reasoned cost basis on which funding decisions could be made.

III.2. P.R. China

18. China has two parallel programs for CTC process agent phase-out; Phase I which covers the initial 25 applications under decision X/14, and Phase II which encompasses the 13 newly identified process agent uses which were agreed by the Parties under decision XV/6.

19. Permitted CTC consumption in 2005 for all PA uses, including the unidentified uses that represent the difference between known production and known consumption is 8,386 ODP tonnes, composed of 493 ODP tonnes from the initial PA-25 list plus 6,946 ODP tonnes for the new PA-13 applications under Phase 2, and 947 ODP tonnes for unknown uses.

20. The World Bank, as implementing agency, verified consumption in the PA sector in 2004 for the initial PA-25 (phase 1) consumers at 3,886 ODP tonnes, noting that in 2004 1,200 ODP tonnes of CTC consumption has been phased out at 10 of the 15 registered users. 2004 purchases at the five remaining users were 3,067 ODP tonnes, and the consumption in 2004 was 2,583 ODP tonnes. Part of the consumption was recorded as purchases of over 1,000 tonnes from unauthorized dealers, an aspect which should be reviewed. One company (Zhejiang Xin'an) used CTC in both CP-70 and CR manufacture and had made partial closures but with no verification: this might be reviewed.

21. The growth in consumption emphasizes the degree of stock-piling, which stood at 1,372 ODP tonnes at the end of 2004. Despite this, the required drop to 493 ODP tonnes in 2005 looks to be difficult to achieve since the project was approved in December 2002 only, leaving two years for implementation before the reduction step of 85 % set in. Moreover, two applications are subject to emissions management rather than ODS substitution, leaving a residual annual consumption of 200 ODP tonnes. To qualify for exemption from inclusion in controlled CTC consumption, the residual emissions must be 'negligible'. Hence there is a requirement for benchmarking for emission reduction, which should be reviewed by the appropriate body.

22. Of the 15 enterprises in the PA-25 (Phase I) sector, 10 were closed, most after mid-2004 and one in 2003. As no records of the disbursements have been reported, the comparative cost-effectiveness is not transparent.

23. The flexibility clause might allow some transfer of CTC quotas between Phase I and Phase II enterprises.

24. Phase II consumption target requires a drop from 8,302 ODP tonnes allowed in 2004 to 6,946 ODP tonnes in 2005. In 2003, a study by the Beijing University identified 5,411 ODP tonnes of use from the PA-13 applications but recognized that there was some further unknown consumption.

25. It might be noted that there are differences in definitions of consumption between the World Bank verification missions (World Bank document April 2005, page 5) and SEPA. SEPA defines it as “purchase” and issues consumption quotas accordingly, enabling stock-piling. The World Bank makes the point that some large companies acquired large volumes of CTC that they could consume in 2005, distorting the apparent consumption phase-out.

III.3. India

26. In India, permitted CTC consumption in 2005 for all PA uses and solvent uses was 1,726 ODP tonnes, equal to 15% of the baseline volume of 11,505 ODP tonnes. Consumption in 2004 was 7,459 ODP tonnes. Hence, 5,733 ODP tonnes would need to be phased out by the beginning of 2005. India has set a target of 4,336 ODP tonnes.

27. Of the 10 individual projects implemented by UNIDO in India, five suffered a 1-6 month delay, two a 7-12 month delay, and three a 13-24 month delay. Bureaucratic complications, long bidding procedures, delays in equipment delivery, poor site preparation, and commissioning delays are amongst the quoted reasons. All projects, however, were using non-ODS before the end of 2004. The Rishiroop project converting chlorinated rubber production from CTC to aqueous production was completed on time, but it is surmised that the lengthy closure of the plant before the beginning of the project enabled some preparatory work to take place, as well as enabling verification of the patent that was issued. All Indian projects have reported satisfactory conclusion, including documented destruction of the CTC circuits. The status of the remaining PA consumers in India has not been reported.

28. The 2004 phase-out plan, approved at the Meeting of the Executive Committee, sets out a proposal whereby 1,243 tonnes of CTC consumption will be phased out in the PA sector. This is assumed to incorporate the already achieved 1,134 ODP tonnes. The same document outlines 533 ODP tonnes of phase-out in the solvents sector. The 2004 Implementation Plan suggests that 3,462 ODP tonnes of solvent use will remain to be phased out by 2009. However, the 2005 Implementation Plan (27th January 2005 draft) indicates a target consumption of 866 ODP tonnes in solvents and 860 ODP tonnes in PA use. This would represent a 9,779 ODP ton reduction from the base level, with no information about where this has been achieved.

29. This being the case, although the PA sector has documented success in CTC phase-out, and although India has allowed stock-piling in 2004 to enable continued use in 2005, it seems likely that India will be in non-compliance with the overall 1,726 ODP tonnes limit, unless the level of stock can support the required massive reduction.

30. Noting the very high levels of consumption of CTC for the manufacture of DV acid chloride, and considering that CTC in this application acts partly as a process agent and partly as a feedstock, it can be concluded that the process agent part results in release into the atmosphere

of a substantial quantity of CTC. However, this application has not been approved by the Parties as a process agent use, as it has not yet been submitted for consideration by any Party. Therefore, the CTC emitted from the process agent part does not appear to be counted as a controlled use and so is not included in India's reported level of CTC consumption. The DV acid chloride manufacturing process provides an avenue for absorbing CTC produced elsewhere, either for the market or from co-production, and can be expected to grow in proportion to the demand for the end product (pesticides). Thus, in the absence of any form of control of CTC use in this process under the Protocol control measures, the atmospheric emissions could be expected to continue in proportion to the extent of business activity in the sub-sector. This issue may need to be drawn to the attention of the Parties at an appropriate time.

III.4. Democratic People's Republic of Korea

31. In D.P.R. Korea, permitted CTC consumption in 2005 for all PA and solvent uses was 192.8 ODP tonnes, equal to 15% of the baseline level of 1,285 ODP tonnes. Eligible PA consumption was 228 ODP tonnes. Since 2001, consumption of CTC increased to over 2,000 ODP tonnes, although not reflecting increased consumption but applications that had been wrongly interpreted as feedstock use. These uses amounted to a total of 229.9 ODP tonnes in 2002, and since they have been approved subsequently as process agent applications (as per decision XVII/7), they have partly become eligible for funding.

32. Strategic stocks of CTC have been built up by maximized production in 2003 and 2004, which translates into consumption of 2,336 ODP tonnes and 2,199 ODP tonnes respectively in these years. There was a stockpile of 1,094.5 ODP tonnes of CTC at the end of 2004.

33. It seems probable that D.P.R. Korea will be in compliance in 2005, with the stockpiled material helping to supply the newly approved uses and the remaining PA and solvent uses that will largely be phased out in 2005. Compliance in 2006 will depend upon both stock exhaustion and the rate at which conversions or closures can be implemented.

34. Definitional issues and possibly poor communication internally seem to be behind the "discovery" of new PA uses in D.P.R. Korea. UNIDO's documentation has a tendency to waver between different descriptions of the applications of CTC and most recently suggested using the term "process solvent". It is suggested that the IA stays with the present definition of process agent without introducing new terminology ("formulation" or "process" solvent) which may even be behind the early misunderstandings and under-reporting by D.P.R. Korea.

III.5. Pakistan

35. In Pakistan, permitted consumption of CTC in 2005 for all PA and solvent uses is 62 ODP tonnes, which means 15% of the baseline consumption level of 412.9 ODP tonnes. In 2003, actual consumption in all uses recorded by the Implementing Agency, UNIDO, was 589 ODP tonnes (636.9 ODP tonnes in 2002). Since Himont, the only recorded PA consumer in Pakistan with a phase-out project of 80 ODP tonnes, was reported not to be operating in 2003 (nor in 2002), it is assumed that all this use is as a solvent.

36. The United Nations Trade Statistics database shows 2003 imports of CTC into Pakistan at 656.7 ODP tonnes and in 2004 at 824 ODP tonnes. There is no local production.

37. The one PA phase-out project in Pakistan (Himont), linked to Ibuprofen production, which was started in 2001 with a total approved funding of US \$485,701, ran into immediate troubles with the closure of the factory in 2002-2003 due to cheaper imports. Resumption of production based on CTC continued under new management in 2004 but present indications are that the equipment needed to effect the switch to non-ODS technology had not been delivered during 2005.

38. Since the Himont project has had substantial delays and is assumed still to be using CTC in current production, and since the implementing agency (UNIDO) has indicated a plan to phase out 489 ODP tonnes of CTC consumption by 2009, Pakistan will probably be in non-compliance in 2005 unless the substantial imports in 2002 and 2003 have been placed into stock for use in 2005 and onwards.

III.6. Romania

39. Romania has a 372 ODP tonne baseline for CTC production. The recent CTC production phase-out agreement foresees a maximum annual production limit of 170 ODP tonnes of CTC between 2005 and 2007 after which production will cease. Romania had reported large amounts of feedstock production for exports which were deducted from their gross production figures to calculate the baseline. However, if the baseline figure is correct, maximum allowed production would be for 2005 until 2009 only 55.8 ODP tonnes instead of the 170 ODP tonnes foreseen in the phase-out agreement.

40. Two process agent applications, one for 2,4-dichlorophenoxyacetic acid (2,4-D) manufacture at 85.8 ODP tonnes and the other for DEHDC production at 109.7 ODP tonnes have been provisionally approved at the 17th Meeting of the Meeting of the Parties (MOP).

IV. Government Policies and Monitoring

41. The sector approach for CTC phase-out, with the flexibility principle, is a useful tool in particular for Parties that have both CTC production and consumption in their country. It enables a holistic approach to managing the phase-out, by integrating production with defined consumption targets set through quotas for users.

42. The sector principle has been extensively and successfully implemented by China in other ODS areas. However, it seems less transparent both in terms of technologies used and company-level cost-effectiveness.

43. In May 2005, an illegal CTC plant that was under construction in Sichuan province was reportedly tracked down and destroyed (Accelerated Phase-out Plan Document, September 2005, SEPA/US EPA, paragraph 19cii). It would be useful to have more details on how it was found, and who verified the destruction. In a more general sense, what measures could be put in place to prevent such future occurrences in China and elsewhere (note: the equipment required to construct such plants is generally non-specific, and one part of the feedstock slate – methane or methyl chloride – is easily obtainable. Perhaps the chlorine manufacturers, could report all new customers and their applications). Selling such illegal CTC is another issue, since authorized distributors will have links to authorized producers and to users with quotas, and might not wish to risk providing illegal supplies. This might be affirmed with selected distributors and if necessary reinforced by reporting mechanisms. According to the World Bank, the CTC sales

and procurement licensing system seems to be the most effective tool. With the ongoing registration of dealers and users of CTC, a large number of CTC using companies have been identified and illegal distributors and traders found. As it now is clear to the industry that it is necessary to register with SEPA to obtain licenses to buy and sell CTC, companies are coming forward and the amount of "unknown users" are shrinking rapidly.

44. It was reported that Jilin Chemical and Fujian Wantaixing had purchased more than 1,000 metric tonnes of CTC from unlicensed vendors (World Bank, April 2004, Verification Report, 2004 Consumption of CTC in PA Sector). Some of these purchases occurred in the last months of 2004, suggesting a requirement for strict oversight of CTC transactions. It would be interesting to know where the supply to the dealer originated, and what measures have been put in place to prevent future occurrence. According to the World Bank, the sources of supply are checked both by the Bank and SEPA audits. As the two companies have to account for their CTC uses, the suppliers were identified. The suppliers are now registered with SEPA and the trade can be tracked.

45. After an initial series of individual and successful CTC phase-out projects, India has now moved towards a sectoral approach integrating production and consumption phase-out for the remaining CFCs. Since no recent information from India is available, it is not possible to assess how this may be working.

46. D.P.R. Korea imported 524 metric tonnes of CTC in 2000, 2,094 metric tonnes in 2001 and 522 metric tonnes in 2002, according to Brazilian export statistics. These volumes have apparently not been reported by the implementing agency or by the D.P.R. Korea Government. Both cases indicate the continuing need for appropriate and effective control and monitoring systems, and should be followed up. According to UNIDO, it is extremely unlikely that with the strict controls that exist in DPRK, any of this CTC entered DPRK, even though DPRK may have been declared as the destination to the Brazilian authorities.

47. In D.P.R. Korea and China, there is limited information on volume and number of PA applications. To identify all residual uses will not be easy. Producers either supply users directly and have the onus to inform them about legal reporting requirements, or most probably they deliver to regional distributors who repackage the product (and who in turn may deliver to smaller sub-distributors). It is suggested that a legal requirement would be placed on the entire supply chain that CTC packaging should carry information about legal and reporting requirements, advising that quotas may be withdrawn in cases of infraction.

48. Import controls are essential, and this should mean the issuance of "legal importer" status for users/distributors by authorities. Import controls should check real-time data on the status of the users' consumption allowance and its actual use in any given year.

V. Comments on Documentation Reviewed

49. Most of the project documents provided have been either from UNIDO or from the World Bank. The Bank documents generally give a well structured overview but tend to be lighter on technical detail, whilst the UNIDO documents give many technical details but tend to be less well structured overall.

50. It would be helpful to have a standardized reporting format for all annual work programmes of multi-year agreements. One minimum requirement should be a synthesis of achievements to date in tabular format, with a brief description of the particular actions and results of the foregoing year as well as a statement of funding received. This should include a clear statement of actions taken that enabled the specific results. Finally, there should be a summary of the future phase-out planning in tabular form, followed by a brief description of the specific actions planned that will enable compliance.

51. Most project documents contain no headers or footers that would enable their ready identification. Such footers along with dating the documents (i.e. "Draft 1 of 2005 Work Plan, 20 January 2005") would be very beneficial for rapid orientation.

VI. Evaluation Issues and Suggested Work Plan

VI.1. Evaluation Issues

52. The evaluation issues listed below were identified during the comprehensive review of documentation available and checked against the consultant's database on CTC production and use. They relate to Government actions such as: the effectiveness of import controls; licensing; systems and awareness programmes; to the preparation, implementation and monitoring of CTC phase-out projects and agreements; to the support provided by the implementing agencies; to the verification reports; the sustainability; and the lessons learned to improve future implementation and cost-effectiveness.

53. The following general questions are planned to be raised during all field visits. In addition, specific evaluation issues on country- and sometimes enterprise-level are presented in Section VI of the supplementary information which is available on request and on the Intranet of the Secretariat.

(a) Compliance Situation

- (i) What countries are in actual or likely non-compliance with the reduction step of 85% in 2005? If there is non-compliance, what are the reasons and what measures have been taken to ensure rapid return to compliance?
- (ii) What specific steps have been taken to inform all users that CTC will be unavailable in 2010, and that changes in or closure of processes using CTC are required which are eligible for funding?

(b) Project Preparation

- (i) What measures have been taken to identify all possible uses of CTC as PA and solvent? How effective have they been? Are there still data gaps? What solutions are proposed to bridge the sometimes large data gaps in understanding the complete consumption pattern?
- (ii) Has the Fund provided in all cases timely and sufficient assistance in terms of project preparation and approvals? What are the criteria used for determining the level and scheduling of funding? Was the viability of the beneficiary enterprise analyzed?

- (iii) To what extent were beneficiary companies involved in the decision-making process about what substitute to use? For example: most ibuprofen intermediate users of CTC adopted 1,2-DCE as an alternative. Was this the only alternative offered or were more alternatives examined and discussed?

(c) Project Implementation and Results Achieved

- (i) Has the substitution to non-ODS technologies proceeded as planned? Have any technical or financial problems occurred? Were there cases of over or under-funding or of implementation delays that have caused financial damage, loss of market or competitiveness?
- (ii) Have the phase-out targets been respected according to the schedules foreseen in the projects and agreements?
- (iii) To what extent has the sectoral approach adopted for the CTC phase-out agreements in some countries (in contrast to a project by project approach) promoted country ownership, by facilitating the adoption and enforcement of ODS-related legislation and policies, the building of national management teams, the establishment of production quota/license systems, and of national monitoring schemes? How has the flexibility clause in the agreements been used?

(d) Monitoring, Reporting and Verification

- (i) How have IAs assisted national governments in setting up systems to monitor and report on the projects and agreements? Do the annual progress reports and work programmes provide sufficient information for programme adaptations if required, and for Executive Committee decision making?
- (ii) What control measures have been put in place to assure that CTC imports and production do not exceed the allotted quantities under the phase-out agreements?
- (iii) Are verification reports prepared by independent auditors? What are the methods used and what are the results?

(e) Sustainability

- (i) Is the enterprise still producing the substitute funded to replace CTC? If not, why not?
- (ii) What evidence is provided that closed plants have actually destroyed key parts of their CTC production equipment?
- (iii) What are the risks of illegal production and distribution of CTC? What would be the investment cost involved and the distribution system required to avoid detection by authorities and competitors?

(f) Overall Effects

- (i) What was the impact of CTC phase-out projects and agreements on the supply and demand of CTC in the user sectors in the countries concerned? What about balancing of supply and demand of CTC by the government concerned, the consequences of imbalance on the pricing, and the challenge of such imbalance for managing the phase-out in the CTC production and consumption sectors?
- (ii) What have been the volumes and trends of CTC exports from the countries with production sector agreements, how are they verified, and what information exists with regard to the impact of CTC production phase-out in China and India on the supply/demand and pricing of CTC internationally or regionally? This would also imply providing a brief overview of supply and demand for CTC worldwide.

VI.2. Suggested Work Plan

54. Country visits to China, India, D.P.R. of Korea and Pakistan should include meetings with Government Agencies, Importers, Implementing Agencies and selected producers and consumers of CTC. There may also be a short visit required to Romania. The PA sectors in Mexico, Iran and Argentina might require more detailed analysis, especially in Mexico and Argentina where the high level of feedstock imports for CFC may have included imports for other uses of CTC.

55. The evaluation team should consist of an experienced technical specialist familiar with the production and use of CTC, and an evaluator with experience in the MLF operations.

VII. Action Required

56. The Executive Committee might wish to take note of the desk study on the evaluation of CTC projects and phase-out agreements contained in document (UNEP/OzL.Pro/ExCom/48/15), including the proposed evaluation issues and work plan for the second phase of the evaluation.

OVERVIEW OF CTC CONSUMPTION AND PRODUCTION DATA
(Excluding Countries without Consumption or Production)

UNEP/OzL.Pro/ExCom/48/15
Annex I

Country	Year of Latest Consumption	Consumption (ODP Tonnes)						Production (ODP Tonnes)						
		Baseline ⁽¹⁾	Latest Consumption Data ⁽¹⁾	85% Reduction Target	Consumption Over 85% Reduction Target	CTC Phase-Out Plan/Project	Approved Phase-Out ⁽²⁾ Process Agent	Phase-Out Plan	Baseline ⁽¹⁾	Latest Production Data ⁽¹⁾	85% Reduction Target	Production Over 85% Reduction Target	Production Phase-Out Plan	Phase-Out Approved ⁽²⁾
Afghanistan	2004	0,88	0,28	0,13	0,15	Yes								
Albania	2004	3,15	0,00	0,47		Yes		2,30						
Algeria	2004	20,90	2,20	3,14										
Argentina	2004	187,17	25,95	28,08		Yes								
Bahrain	2004	0,73	0,12	0,11	0,01	Yes								
Bangladesh	2004	5,68	5,50	0,85	4,65	Yes								
Bolivia	2004	0,30	0,00	0,05										
Brazil	2004	411,57	222,07	61,74	160,33				11.629,56	3.060,20	1.744,43	1.315,77		
Burundi	2004	0,001	0,00	0,0002										
Chile	2004	0,61	5,05	0,09	4,96	Yes								
China	2004	55.891,37	3.885,76	8.383,71		Yes	4.556,00		29.367,43	3.885,76	4.405,11		Yes	25.466,00
Colombia	2004	6,12	0,79	0,92		Yes	2,00							
Congo	2004	0,60	0,00	0,09										
Congo, DR	2004	15,25	11,00	2,29	8,71									
Costa Rica	2004	0,01	0,00	0,001										
Croatia	2004	3,93	0,56	0,59		Yes								
Cuba	2004	2,68	0,51	0,40	0,10	Yes								
Dominican Republic	2004	28,97	0,00	4,35										
Ecuador	2004	0,52	4,32	0,08	4,25									
Egypt	2004	38,50	12,10	5,78	6,33	Yes								
Ghana	2004	0,37	0,00	0,06		Yes								
Guatemala	2004	10,60	0,00	1,59										
India	2004	11.505,35	7.459,10	1.725,80	5.733,30	Yes	1.134,30	9.779,00	11.552,87	7.459,10	1.732,93	5.726,17	Yes	9.827,00
Indonesia	2004	0,00	16,50	0,00	16,50	Yes								
Iran	2004	77,00	2.169,20	11,55	2.157,65									
Jamaica	2004	2,83	0,00	0,42		Yes								
Jordan	2004	40,33	2,20	6,05		Yes		7,70						
Kenya	2004	65,89	0,28	9,88										
Korea Republic	2004	638,00	-1.274,90	95,70					584,83	-291,50	87,72			
Korea, DPR	2004	1.285,17	2.198,90	192,78	2.006,12	Yes		1.441,40	1.285,17	2.198,90	192,78	2.006,12	Yes	
Kuwait	2004	0,01	0,00	0,002										
Lebanon	2004	0,04	0,00	0,01										
Liberia	2004	0,18	0,00	0,03										
Macedonia	2004	0,07	0,00	0,01										
Madagascar	2004	0,01	0,00	0,002										
Malaysia	2004	4,51	0,00	0,68		Yes								
Mauritius	2004	0,01	0,02	0,002	0,02									
Morocco	2004	1,10	0,04	0,17		Yes								
Nepal	2005	0,89	0,11	0,13		Yes								
Nigeria	2004	152,75	166,65	22,91	143,74	Yes								
Oman	2004	0,11	0,00	0,02		Yes								
Pakistan	2004	412,87	752,40	61,93	690,47	Yes	80,00	426,50						
Paraguay	2004	0,60	1,16	0,09	1,07	Yes								
Peru	2004	0,97	0,00	0,15										
Romania	2004	368,62	176,58	55,29	121,28	Yes			371,54	176,00	55,73	120,27	Yes	
Saudi Arabia	2004	259,23	27,50	38,88										
Sierra Leone	2004	2,57	2,44	0,39	2,06									
Sri Lanka	2004	35,08	27,39	5,26	22,13	Yes								
Sudan	2004	2,20	0,66	0,33	0,33	Yes		0,80						
Tanzania	2004	0,12	0,00	0,02										
Thailand	2004	7,52	0,00	1,13		Yes								
Tunisia	2004	2,93	0,44	0,44	0,0001	Yes								
Turkey	2004	105,12	0,00	15,77		Yes								
Uganda	2004	0,42	0,00	0,06										
Uruguay	2004	0,37	0,34	0,06	0,28	Yes								
Venezuela	2004	1.107,15	0,00	166,07		Yes								
Viet Nam	2004	1,61	0,00	0,24										
Zambia	2004	0,66	0,00	0,10		Yes								
Zimbabwe	2004	11,58	2,56	1,74	0,83									

⁽¹⁾ According to the A7 Data from the Ozone Secretariat on February 14, 2006.

⁽²⁾ According to the Inventory of Approved Projects

OVERVIEW OF CARBON TETRACHLORIDE PROJECTS AND PHASE-OUT AGREEMENTS
Excluding Aerosol, ODS Phase-Out Plan and Solvent Projects

Country	Category	Sector	Number of Projects or Tranches Approved ⁽²⁾	Number of Projects or Tranches Completed ⁽³⁾	Consumption ODP Approved in Principle ⁽¹⁾	Consumption ODP To Be Phased Out ⁽²⁾	Consumption ODP Phased Out ⁽³⁾	Production ODP Approved in Principle ⁽¹⁾	Production ODP To Be Phased Out ⁽²⁾	Production ODP Phased Out ⁽³⁾	Funds Approved in Principle (US\$) ⁽¹⁾	Funds Approved (US\$) ⁽²⁾	Funds Returned (US\$) ⁽²⁾	Funds Disbursed (US\$) ⁽³⁾	PCR Received
China	Multi-Year Agreement	Process Agent (Phase I) ⁽⁴⁾	4	2	11.160	4.556	0	51.935	25.466	9.295	65.000.000	40.000.000	0	30.400.000	N/A
		Process Agent (Phase II)	1	0	Not Available	0	0	Not Available	0	0	46.500.000	15.000.000	0	0	N/A
		CFC, CTC, Halon Accelerated Phased Out Plan	2	0	0	0	0	0	0	0	10.000.000	10.000.000	0	0	N/A
	Total		7	2	11.160	4.556	0	51.935	25.466	9.295	121.500.000	65.000.000	0	30.400.000	N/A
Colombia	Individual	Process Agent	1	0	N/A	2	0	N/A	0	0	N/A	114.480	0	0	0
	Total		1	0	N/A	2	0	N/A	0	0	N/A	114.480	0	0	0
India	Individual	Process Agent	12	12	N/A	1.134	1.134	N/A	0	0	N/A	4.707.677	112.213	4.200.109	11
	Multi-Year Agreement	CTC Phase-Out Plan (Consumption and Production)	10	1	11.505	9.779	0	11.553	9.827	0	52.000.000	30.000.000	0	37.426	N/A
	Total		22	13	11.505	10.913	1.134	11.553	9.827	0	52.000.000	34.707.677	112.213	4.237.535	11
Korea, DPR	Multi-Year Agreement	CTC Phase-Out Plan	3	0	1.634	1.441	614	N/A	0	0	5.684.844	4.800.000	0	289.067	N/A
		ODS Production	2	2	N/A	0	0	4.280	1.750	1.750	2.566.800	2.078.050	0	2.078.050	N/A
	Total		5	2	1.634	1.441	614	4.280	1.750	1.750	8.251.644	6.878.050	0	2.367.117	N/A
Pakistan	Individual	Process Agent	1	0	N/A	80	0	N/A	0	0	N/A	485.701	0	15.830	0
	Multi-Year Agreement	CTC Phase-Out Plan	2	0	489	427	110	N/A	0	0	2.745.665	2.500.000	0	48.882	N/A
	Total		3	0	489	507	110	N/A	0	0	2.745.665	2.985.701	0	64.712	0
Romania	Multi-Year Agreement	ODS Production	1	0	N/A	0	0	175	5	0	6.300.000	3.200.000	0	0	0
	Total		1	0	N/A	0	0	175	5	0	6.300.000	3.200.000	0	0	0
Grand Total			39	17	24.788	17.419	1.858	67.943	37.048	11.045	190.797.309	112.885.908	112.213	37.069.364	11

⁽¹⁾ According to the Multi-Year Agreement approved by the Executive Committee

⁽²⁾ According to the Inventory of Approved Projects

⁽³⁾ According to the 2004 Progress Reports

⁽⁴⁾ According to the Agreement approved at 38th Meeting and Accelerated Phase-Out Plan Approved at the 44th Meeting. Consumption ODP Approved in Principle includes 17.2 ODP tonnes of CFC-113.

CHINA - PROCESS AGENT

PHASE I	Baseline	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total
A7 CTC Production Data (ODP tonnes) ⁽³⁾	29.367	15.633	3.311	20.020	3.886							
Max allowable sum of production and imports of CTC (ODP tonnes) ⁽¹⁾		64.152	64.152	61.514	54.857	38.686	32.044	22.724	12.768	13.415	12.217	N/A
New reduction under plan - Production CTC (ODP Tonnes)				2.638	6.657	16.171	6.642	9.320	9.956	0	551	51.935
Actual phase-out approved - Production CTC (ODP tonnes) ⁽²⁾				2.638	6.657	16.171						25.466
A7 CTC Consumption Data (ODP tonnes) ⁽³⁾	55.891	15.305	3.294	20.020	3.886							
Max allowable CTC consumption in the PA applications (ODP tonnes) ⁽⁴⁾		4.347	5.049	5.049	5.049	493	493	493	493	493	220	N/A
CTC in Other non identified uses (ODP tonnes) ⁽⁴⁾			6.314	3.300	2.200	947	947	947	947	947		N/A
New reduction under plan - CTC (ODP tonnes)				3.014	1.100	5.809					1.220	11.143
Actual phase-out approved - CTC (ODP tonnes) ⁽²⁾						4.556						4.556
Maximum allowable CFC-113 consumption in the PA Sector ⁽⁴⁾	17.2	17.2	17.2	17.2	14.0	14.0	10.8	8.4	0.0	0.0	0.0	N/A
New reduction under plan - CFC (ODP tonnes)					3.2		3.2	2.4	8.4			17.2
Actual phase-out approved - CFC (ODP tonnes) ⁽²⁾												0.0
Funds approved in principle (US \$000)			2.000	20.000	16.000	2.000	16.000	5.000	3.000	1.000		65.000
Actual funds approved (US \$000)			2.000	20.000	16.000	2.000						40.000
PHASE II												
Funds approved in principle (US \$000)						15.000	Not Available					46.500
Actual funds approved (US \$000)						15.000						15.000

(1) According to the Accelerated Phase-Out Plan Approved at the 44th Meeting.

(2) According to the Inventory of Approved Projects

(3) According to the A7 Data from the Ozone Secretariat on February 14, 2006

(4) According to the Agreement Approved at the 38th Meeting.

INDIA - CONSUMPTION AND PRODUCTION OF CTC

	Baseline	2003	2004	2005	2006	2007	2008	2009	2010	Total
A7 CTC Production Data (ODP tonnes)	11.553	10.778	7.459							
Max allowable total production CTC (ODP tonnes)	11.553	N/A	N/A	1.726	1.147	708	268	48	0	N/A
New reduction under plan - Production CTC (ODP Tonnes)				9.827	579	439	440	220	48	11.553
Actual phase-out approved - Production CTC (ODP tonnes)				9.827						9.827
A7 CTC Consumption Data (ODP tonnes)	11.505	10.856	7.459							
Max allowable total CTC consumption (ODP tonnes)	11.505	N/A	N/A	1.726	1.147	708	268	48	0	N/A
New reduction under plan - CTC (ODP Tonnes)				9.779	579	439	440	220	48	11.505
Actual phase-out approved - CTC (ODP tonnes)				9.779						9.779
Funds approved in principle (US \$000)		8.521	13.380	8.099	10.755	4.821	3.212	3.212		52.000
Actual funds approved (US \$000)		8.521	13.380	8.099						30.000

KOREA DPR - CONSUMPTION AND PRODUCTION OF CTC

CONSUMPTION	Baseline	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total
A7 CTC Consumption Data (ODP tonnes)	1.285	2.078	2.027	1.585	2.199							
Max allowable total consumption of CTC (ODP tonnes)				2.200	2.200	193	93	78	38	0		N/A
CTC Reduction from ongoing projects (ODP tonnes)						566						566
New reduction under plan - CTC (ODP Tonnes)						1.441	100	15	40	38		1.634
Actual phase-out approved - CTC (ODP tonnes)						1.441						1.441
Funds approved in principle (US \$000)				3.500	1.000	300	500	285	100			5.685
Actual funds approved (US \$000)				3.500		1.300						4.800
PRODUCTION												
A7 CTC Production Data (ODP tonnes)	1.285	2.078	2.027	1.585	2.199							
New reduction under plan - Production CTC (ODP Tonnes)						2.530						2.530
Actual phase-out approved - Production CTC (ODP tonnes)												0
Funds approved in principle (US \$000)		1.344		734		489						2.567
Actual funds approved (US \$000)		1.344				734						2.078

PAKISTAN - CTC CONSUMPTION

CONSUMPTION	Baseline	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total
A7 CTC Consumption Data (ODP tonnes)	413	656	637	589	752							
Max allowable CTC consumption under the plan (ODP tonnes)				650	389	62	42	32	15	0	0	N/A
Reduction from ongoing projects					161							
New reduction under plan - CTC (ODP tonnes)					100	327	21	10	17	15		489
Actual phase-out approved - CTC (ODP tonnes)				100	327							427
Funds approved in principle (US \$000)				1.200	1.300	246						2.746
Actual funds approved (US \$000)				1.200	1.300							2.500

ROMANIA - CTC PRODUCTION

	Baseline	2003	2004	2005	2006	2007	2008	Total
A7 CTC Production Data (ODP tonnes)	372	200	176					
Max annual allowable Production of CTC for control uses (ODP tonnes)				170	170	170	0	N/A
New reduction under plan - Production CTC (ODP Tonnes)							170	170
Actual phase-out approved - Production CTC (ODP tonnes)								0
Funds approved in principle (US \$000)				3.200	900	1.000	1.200	6.300
Actual funds approved (US \$000)				3.200				3.200

Source: As per agreements approved by the Executive Committee