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EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Forty-first Meeting
Montreal, 17 - 19 December 2003

PROJECT PROPOSAL: DEMOCRATIC PEOPLE'S REPUBLIC OF KOREA

This document consists of the comments and recommendations of the Fund Secretariat on the following project proposal:

Solvent

- Plan for terminal phase-out of CTC (first tranche)

UNIDO

**PROJECT EVALUATION SHEET
D.P.R. KOREA**

SECTOR: CTC ODS use in sector (2002): 2,027.3 ODP tonnes

Sub-sector cost-effectiveness thresholds: N/A

Project Titles:

(a) Plan for terminal phase-out of CTC (first tranche)

Project Data	Phase-out Plan
Enterprise consumption (ODP tonnes)	1,441.4
Project impact (ODP tonnes)	700.0*
Project duration (months)	48
Initial amount requested (US \$)	4,832,114
Final project cost (US \$):	
Incremental capital cost (a)	
Contingency cost (b)	
Incremental operating cost (c)	
Total project cost (a+b+c)	5,684,840
Local ownership (%)	100
Export component (%)	0
Amount requested for first tranche (US \$)	4,832,114
Cost effectiveness (US \$/kg.)	8.12**
Counterpart funding confirmed?	
National coordinating agency	National Coordinating Committee for Environment
Implementing agency	UNIDO

Secretariat's Recommendations	
Amount recommended (US \$)	
Project impact (ODP tonnes)	
Cost effectiveness (US \$/kg)	
Implementing agency support cost (US \$)	
Total cost to Multilateral Fund (US \$)	

* 700.0 ODP tonnes is the total fundable consumption (impact) of the project. However, the impact of the first tranche is 526.6 ODP tonnes with cost-effectiveness of US \$8.12/kg.

** The cost-effectiveness of the first tranche is US \$9.18/kg

PROJECT DESCRIPTION

Terminal plan for phase-out of CTC consumption in the Democratic People's Republic of Korea

1. UNIDO has submitted for consideration at the 41st Meeting a terminal plan for phase-out of CTC consumption in the Democratic People's Republic of Korea. According to UNIDO the objective of the terminal plan is to facilitate planning, formulation and implementation of the investment projects for replacement of carbon tetrachloride (CTC) in the solvent cleaning, process agent and fumigation sectors by alternative technologies in a timely and cost-effective manner.

Background information

2. UNIDO submitted a plan for the phase-out of CTC in the cleaning solvent sub-sector to the 40th Meeting. Analysis of the CTC consumption data made by the Secretariat at the time showed significant discrepancies between the CTC consumption data provided in the project document and the data which had been audited as part of the verification of the country's production and consumption data in connection with the CFC and CTC production closure agreement with the Executive Committee. In view of the difficulty in establishing the level of CTC consumption eligible for funding, UNIDO withdrew the request from consideration at the 40th Meeting to enable the issue to be further addressed by the Government to facilitate the determination of the CTC consumption eligible for funding.

3. D.P.R. Korea reported CTC consumption data for 2001 and 2002 to both the Ozone Secretariat and the Fund Secretariat based on information from the country programme update prepared by UNEP which showed about 100% increase over the 2000 figures. The CTC consumption for the years 2000-2002 is shown in the table below.

Year	CTC consumption ODP tonnes
2000	1,045.0
2001	2,077.9
2002	2,027.3
Baseline (average 1998-2000)	1,258.0

CTC sector phase-out plan and CTC consumption eligible for funding

4. Against the background of the urgent need for D.P.R. Korea to meet its 2005 CTC phase-out reduction obligations and the difficulties that have been encountered in determining the CTC consumption eligible for funding, the Secretariat and UNIDO in collaboration with the Government of D.P.R. Korea explored various possibilities for resolving the data difficulties consistent with the rules of the Fund. As a result, the following proposal was agreed for submission for consideration by the Executive Committee.

- (a) The remaining fundable CTC consumption will be calculated based on D.P.R. Korea's baseline CTC consumption from which has been deducted the

consumption of all CTC projects approved but not implemented as of 2000. The remaining fundable CTC consumption was thus calculated to be 700 ODP tonnes;

- (b) The distribution of the fundable consumption will be as follows:
- Solvent cleaning: based on actual consumption reported in project documents already submitted to the Fund Secretariat;
 - Process agents and fumigation: based on claimed 2002 consumption prorated against the baseline consumption;
- (c) The cost-effectiveness for projects in the three sectors should not exceed the levels shown below. The cost-effectiveness levels were based on the weighted average cost-effectiveness of similar projects approved for D.P.R. Korea or where no projects have been approved for the country, the cost-effectiveness level was based on the weighted average cost-effectiveness of projects of similar magnitude in the sector.
- | | |
|-------------------|--------------|
| Solvent cleaning: | US \$7.94/kg |
| Process agent: | US \$6.07/kg |
| Fumigant: | US \$8.20/kg |
- (d) Consistent with the agreement to use the baseline CTC consumption as the basis for determining the fundable level of CTC consumption in D.P.R. Korea, it was agreed to link the fundable level of CTC application not yet classified as process agents also with the baseline consumption. Therefore, based on the baseline CTC consumption of 1,285.0 ODP tonnes, out of 229.9 ODP tonnes claimed to be currently (2002) in use in applications not yet classified as process agents, the remaining potentially fundable consumption will not exceed 146 ODP tonnes;
- (e) Should the currently ineligible process agent applications become eligible for funding under the Multilateral Fund in future, D.P.R. Korea's request for funding for phase-out should be calculated in the same manner as the costs of the projects submitted to the 41st Meeting. In this regard the cost-effectiveness should not exceed US \$6.07/kg.

5. On the basis of the above understanding, UNIDO has prepared the CTC terminal phase-out plan based on the following:

Sub-sector	Consumption ODP tonnes	Cost-effectiveness US \$/kg	Calculated grant US \$
Solvent cleaning	332	7.94	2,636,080
Process agents, excluding unapproved uses	228	6.07	1,383,960
Fumigation	140	8.20	1,148,000
Sub-total	700	7.38	5,168,040
Policy management			516,800
Total	700	8.12	5,684,840

6. Since the phase-out of over 70% of the CTC consumption under the plan should be accomplished by the end of 2004, about 85% of the agreed funding is requested at the 41st Meeting in December 2003. Consequently, the following performance targets and disbursement schedule are proposed by UNIDO.

Performance targets and disbursement schedule

Year (as of 1 Jan.)	CTC phase-out target (ODP MT)			Remaining eligible CTC consumption in Solvent Sector (ODP MT)	Total US\$
	From approved ongoing projects	From Phase-out Plan	Total		
2003	0	0	0	1,365.8	4,832,114
2004	565.8	526.6	1,092.4	192.8	426,363
2005	0	92.8	92.8	92.8	213,182
2006	0	50	50	100	213,181
2007	0	50	50	50	0
TOTAL	565.8	719.4	1,285.2		5,684,840

7. A draft agreement to which have been appended the performance targets and funding requirements, as well the institutional arrangements for achieving the objectives of the phase-out plan and the role of UNIDO in its implementation plan was attached to the plan.

Draft agreement and implementation programme

8. The draft agreement and the 2004 implementation programme are under discussion with UNIDO. The final drafts will be communicated to the Sub-Committee on Project Review.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

9. The results described in the preceding paragraphs were achieved following extensive discussion and interaction between the Secretariat, UNIDO and the Government of D.P.R. Korea and represent an agreed position on eligibility and incremental cost.

RECOMMENDATIONS

10. The Executive Committee is invited to:

- (a) Endorse the approach adopted by the Secretariat and UNIDO to determine the remaining eligible consumption of D.P.R. Korea as described in paragraph 4 above, and on that basis to consider the terminal plan for the phase-out of CTC consumption in D.P.R. Korea;
- (b) Note that the Government of D.P.R. Korea undertakes not to submit any projects in the CTC consumption sector except for process agent applications currently ineligible for funding and that in such case the amount of CTC eligible for funding under the Multilateral Fund will not exceed 146 ODP tonnes and the funding level will not exceed US \$6.07/kg.

MULTILATERAL FUND FOR THE IMPLEMENTATION OF THE MONTREAL PROTOCOL ON SUBSTANCES THAT DEplete THE OZONE LAYER			
PROJECT COVER SHEET			
COUNTRY	D.P.R. of Korea	IMPLEMENTING AGENCY	UNIDO
PROJECT TITLE	Plan for Terminal Phase-out of CTC		
PROJECT IN CURRENT BUSINESS PLAN	Yes		
SECTOR	Solvent		
SUB-SECTORS	Cleaning, Process Agent, Fumigation		
ODS USE IN SECTOR	Baseline (Average of reported 1998-2000)	1,285.2	MT ODP
	Consumption in 2002	2,027.3	MT ODP
	From approved ongoing Cleaning projects	585.6	MT ODP
	From remaining Cleaning eligible projects	332	MT ODP
	From Process Agent eligible consumption	228	MT ODP
	From Process Agent ineligible consumption	316	MT ODP
	From Fumigation eligible consumption	140	MT ODP
	From Fumigation non-eligible consumption	195.5	MT ODP
	From as yet unapproved Process Agent uses	229.9	MT ODP
PROJECT IMPACT	Reflecting the net ODP value	700	MT ODP
	Including approved ongoing projects	1,285.6	MT ODP
PROJECT DURATION	4 years		
PROJECT COSTS			
	Incremental Capital Costs	US\$	4,271,107
	Contingencies	US\$	427,111
	Incremental Operating Costs	US\$	469,822
	Policy & Management Support	US\$	516,800
	Total Project Costs	US\$	5,684,840
LOCAL OWNERSHIP			100%
EXPORT COMPONENT			0%
REQUESTED GRANT	US\$	5,684,840	
COST EFFECTIVENESS	US\$/kg	8.12	
IMPLEMENTING AGENCY SUPPORT COSTS	US\$	426,363	
TOTAL COST OF PROJECT TO MULTILATERAL FUND	US\$	6,111,203	
STATUS OF COUNTERPART FUNDING	No required funding		
PROJECT MONITORING MILESTONES	Included		
NATIONAL COORDINATING BODY	NCCE, Ozone Cell		

Plan summary

UNIDO will submit a Terminal CTC Phase-Out Plan to the December 2003 Executive Committee meeting. This Plan will eliminate the remaining eligible CTC consumption of 700 ODP MT in the D.P.R. Korea by the end of 2007. The Phase-out Plan will cover the technology conversions in the remaining eligible enterprises and ensure timely, sustainable and cost-effective phase-out through a combination of investment, technical support and policy/management support components. The total eligible incremental costs and the requested grant for the Terminal Phase-out Plan of CTC in the D.P.R. Korea amount to US\$ 5,684,840. Should the as yet unapproved Process Agent applications be approved by the Technical and Economic Advisory Panel, an additional pro-rated 145.7 ODP MT CTC will become eligible for funding.

Impact of the project on the country's Montreal protocol obligations:

The approval of this project will help D.P.R. Korea meet its Montreal Protocol obligations, such as the phased reductions in CTC consumption according to the agreed schedules.

PREPARED BY
REVIEWED BY

UNIDO
Clinton Norris

DATE Nov. 2003
DATE Nov. 2003

**PROJECT OF GOVERNMENT OF THE DEMOCRATIC
PEOPLE'S REPUBLIC OF KOREA (D.P.R. Korea)**

Plan for Terminal CTC phase-out in the D.P.R. Korea

1. PROJECT OBJECTIVES

UNIDO will submit a Terminal Phase-Out Plan to the December 2003 Executive Committee meeting.

The objectives of this project are:

- (a) To achieve complete phase-out of carbon tetrachloride (CTC) in the D.P.R. Korea by 31 December 2007.
- (b) To enable D.P.R. Korea to meet its obligations of CTC reduction and elimination in accordance with the control schedule of the Montreal Protocol.
- (c) To ensure timely, sustainable and cost-effective CTC phase-out through appropriate investment, technical support and management support.

2. INSTITUTIONAL FRAMEWORK

The Democratic People's Republic of Korea ratified by accession the Vienna Convention and the Montreal Protocol on 24 January 1995. At the request of the Government of The Democratic People's Republic of Korea, the Ozone Cell of the National Coordinating Committee for the Environment (NCCE) submitted in December 1996 the Country Programme, a prerequisite activity for assistance from the Multilateral Fund for the Implementation of the Montreal Protocol (Multilateral Fund). The Secretariat of the Fund has certified that the D.P.R. Korea Country Programme conforms to the format of the approved guidelines. This 1996 Country Programme (CP) has been revised by the 2000 CP Amendment and now by an Update of March 2003. The data in this Update reflect the 2002 production and consumption data.

In 1974 National Coordinating Committee for Environment (NCCE) was set up and chaired by the vice-minister of the Ministry of Foreign Affairs. NCCE is composed of representatives from various ministries including Ministry of the Land and Environment Protection, Ministry of Chemical Industry, the State Planning Committee, Academy of Sciences and so on. NCCE is a leading body coordinating and consulting ozone issues. All the environment issues and draft policies including ozone issues are discussed and reviewed in NCCE and then NCCE makes recommendation to the Cabinet regarding environment issues. National Ozone Unit (NOU) was set up under NCCE in 1997, responsible for implementation of the country program. Currently NOU has 7 staff involved in the daily administration and management on MP implementation, data collection, regulatory actions, coordination, monitoring, and recommendations on the policy issues.

Ministry of Chemical Industry is responsible for management on production and consumption of ODS and monitor the production of ODS. State Planning Committee formulates the plan of ODS production. Ministry of Metal and Machinery Industry and Ministry of Electronics Industry are responsible for management on consumption of CTC, MCF and CFC-113 in metal and electronic parts cleaning. General Bureau of External Service is in charge of repairing refrigerant equipment. Ministry of Land and Environment Protection is in charge of environment legislation and control, research on substitutes to ODS and environment standards. All sales of ODS and goods containing ODS domestically

produced or imported are classified through the sales organisation of the Ministry of Chemical Industry who collects data on production and sales and then reports to the State Planning Commission and the Central Bureau of Statistics. All imports of ODS or goods containing ODS are monitored and recorded by the General Bureau of Customs. These are available to the NOU.

Relevant Regulations

D.P.R. Korea has a centralized and planned economic system. The production of ODS and products using ODS are approved in compliance with the plan and administrative requirements from the State Planning Committee. Therefore implementation of ODS phase-out measures, including reduction in the production, would be achieved within the existing framework.

D.P.R. Korea will implement licensing system with quota on ODS production, import and consumption. Several ministries are involved in the licensing process, such as NCCE, State Planning Committee, Ministry of Chemical Industry, Ministry of Foreign Trade, Ministry of Commerce and Ministry of Land and Environment Protection.

Table 1 lists the Regulations concerning ODS that have been issued to date in D.P.R. Korea.

Table 1: Regulations issued in D.P.R. Korea

No.	Regulation	Brief description	Promulgating Agency	Came into force
1	Regulation "Ban of import of cars with CFC-12 air conditioner"	All the institutions, which plan to import cars, should have permission from Ministry of Land Environment Protection, Ministry of Machine Industry and Ministry of Foreign Trade	Jointly promulgated by Ministry of Land Environment Protection, Ministry of Machine Industry and Ministry of Foreign Trade	January 2000
2	Regulation " Ban of import of refrigeration equipment using CFC-12"	Institutions or person, who plan to import any refrigeration equipment, should submit specification of the equipment and have permission identifying non-ODS using refrigeration.	Jointly promulgated by Ministry of Land Environment Protection, Ministry of Machine Industry and Ministry of Foreign Trade	1999
3	Ban of construction of new factories manufacturing CFC-11 and CFC-12 based equipment	All factories, in construction and planned to be constructed, should not have installations manufacturing CFC-11 and CFC-12 based equipment.	Jointly promulgated by Ministry of Land Environment Protection, Ministry of Machine Industry and State Planning Committee	1999

Table 2 lists the Regulations that will be issued in D.P.R. Korea.

Table 2: Regulations to be issued in D.P.R. Korea

No.	Regulation	Brief Description	Promulgating Agency	Planned date
1	Ban the installation of freon-based air-conditioners on all newly manufactured vehicles.	Conversion from freon to substitute refrigerant in air-conditioners to be completed before 01/01/2004. Use only substitute refrigerant as of 1/1/2005. Installation of freon-based air-conditioner on any newly manufactured vehicles will be banned	Jointly promulgated by Ministry of Land Environment Protection and Ministry of Machine Industry.	First half of 2003, effective on 1/1/2005.
2	Ban the import of industrial refrigerating equipment using ODS	Import of industrial refrigerating equipment using ODS to be banned as of 01/07/2004	Jointly promulgated by Ministry of Land Environment Protection and Ministry of Foreign Trade.	First half of 2003 effective on 01/07/2004.
3	Ban the manufacture of refrigeration equipment using ODS (domestic & public service refrigerator)	Use of ODS as refrigerant to be banned in newly manufactured domestic and public service refrigerators.	Jointly promulgated by Ministry of Land Environment Protection, Ministry of Machine Industry and Ministry of Electronic Industry	First half of 2004 effective on 01/01/2005
4	Ban the manufacture of industrial refrigerating equipment using ODS	Substitute refrigerants to be used in newly manufactured industrial refrigerating equipment as of 1/1/2004	Jointly promulgated by Ministry of Land Environment Protection and Ministry of Machine Industry	First half of 2003 effective on 01/01/2004
5	Ban import of CFC-11/12/113, MCF, CTC, Halons and MBr; Ban export of CFC-11/12/CTC	Bans on import and export of ODS	Jointly promulgated by Ministry of Land and Environment Protection and Ministry of Foreign Trade	2007

3 Background of the Solvent Sector

The 1996 Country Programme (CP) and the 2000 CP Amendment reported the use of three solvents in the Solvent Sector, namely carbon tetrachloride (CTC), methyl chloroform (MCF) and CFC-113. Only the Cleaning Solvent Sub-Sector was covered.

The Update of 2003 now includes the Process Agent and Fumigation Sub-Sectors. Methyl chloroform (MCF) and CFC-113 are no longer used in the Solvent Sector.

3.1 Production Phase-Out

The Multilateral Fund (MLF) had a Techno-economic Audit of Production of Ozone Depleting Substances (ODS) in the Democratic People's Republic of Korea (D.P.R. Korea) conducted in 2001. The Final Report was issued on 8 November 2001.

D.P.R. Korea and the Executive Committee of Multilateral Fund (ExCom) agreed at the 36th Meeting of Executive Committee on the terms of timing and compensation for the complete closure of all ODS production facilities.

D.P.R. Korea shut down both the Methyl Chloroform (MCF) and CFC-113 production in May 2001 and dismantled them. The CFC-11/CFC-12 facilities will be closed in 2003 and the CTC facility will be closed in 2005. These are the only ODS production plants in the D.P.R. Korea and they are located in the February 8th Vinalon Complex.

The schedule of closures and disbursement is listed in Exhibit 1:

Exhibit 1

Facility	Closure	Verification	Disbursement, US\$
CFC-113	May 2001	August 2001 (Wakim), July 2002 (UNIDO)	687,700
Methyl chloroform	May 2001	August 2001 (Wakim), July 2002 (UNIDO)	656,650
CFC-11/12	2003	2003	733,700
CTC	2005	2005	488,750
Total			2,566,800

3.2 Consumption of CTC in the Solvent Sector

Carbon tetrachloride (CTC) is the only ODS solvent still in use in the Solvent Sector. Consumption of CTC reported by D.P.R. Korea to UNEP for the years 1998 to 2002 is given in Exhibit 2:

Exhibit 2

Year	1998	1999	2000	2001	2002
ODP MT	1,424.5	1,386.0	1,045.0	2,077.9	2,027.3

3.2.1 Baseline

The baseline for CTC consumption is set by the average of the reported data for the years 1998 to 2000, as published in UNEP/Ozl.Pro/ExCom/38/58. The baseline is 1,285.2 ODP MT CTC and this is the maximum quantity that can be funded under the rules of the Multilateral Fund.

3.2.2 Determination of quantities of CTC eligible for funding

The jump in consumption that can be seen in Exhibit 2 between 2000 and 2001 is not due to a real increase in consumption. It arises from the fact that 2001 was the first year in which D.P.R. Korea started to include Process Agent quantities in the reported consumption, as noted in the 2003 CPU. A current consumption of 2,027.3 ODP MT versus a fundable baseline of 1,285.2 ODP MT represents a considerable challenge in the process of a complete phase-out of CTC in the D.P.R. Korea.

Extensive discussions between the Government of D.P.R. Korea, UNIDO and the Secretariat of the Multilateral Fund came to the conclusion that the way forward lay in applying agreed cost-effectiveness factors to the quantities in each of the three sub-sectors that were deemed to be eligible. The results are expressed in Exhibit 3a.

Exhibit 3a

Sub-sector	Cost-Effectiveness, US \$/kg	Submitted Consumption (ODP Tonnes)	Eligible Consumption (ODP Tonnes)	Calculated Grant (US \$)
Solvent cleaning	7.94	917.4	332	2,636,080
Process agent, excluding unapproved uses	6.07	544	228	1,383,960
Fumigation	8.2	335.5	140	1,148,000
Total		1,796.9	700	5,168,040

The breakdown of Investment Cost (Grant) is taken for the purpose of the Plan as 90% Increased Capital Cost (ICC) and 10% Increased Operating Cost (IOC).

When 565.8 ODP MT are added to the eligible unfunded 700 ODP MT, a total of 1,265.8 ODP MT is reached. In addition 19.8 ODP MT were eliminated in 2001 when the Ceramic Tools Factory project was completed. The total is then 1,285.6 ODP MT, i.e. the fundable baseline quantity.

The Process Agent uses of CTC in the manufacture of Ciprofloxacin, Norfloxacin, Dichloroisocyanurate and Vitamin C are not yet listed as approved by the Technical and Economic Advisory Panel (TEAP) of UNEP.

If and when these processes are approved by TEAP, applications to the Executive Committee for funding will be made on a pro-rated basis. The CTC consumption in 2002 due to the unapproved process agent uses will be adjusted by the ratio of the baseline CTC consumption to the CTC consumption in 2002, as shown in Exhibit 3b. In this event, the resulting quantity, up to 145.7 ODP MT, will be eligible for funding at the C/E appropriate to Process Agent applications.

Exhibit 3b

Baseline CTC consumption	1,285.2
CTC consumption in 2002	2,027.3
CTC consumption in 2002 due to the unapproved process agent uses	229.9
Remaining consumption for unapproved process agent uses corrected to the baseline consumption	145.7

3.2.3 Non-funded quantities

The difference between the quantity of CTC eligible for funding (700 ODP MT plus 565.8 ODP MT already approved) and the current (2002) CTC consumption of 2,027.3 presents a challenge to find ways and means to eliminate the difference of some 762 ODP MT of CTC.

This will be accomplished by such measures as:

- Further rationalisation of the cleaning operations in the four enterprises of the Cleaning Solvent Sub-Sector, by merging cleaning lines of Workshops where possible.
- Workshops will be merged where possible; the local costs to be borne by the enterprises.
- Enterprises will assume responsibility for other expenses involving local currency.
- The Process Agent projects include three new production units for paints; these will be merged to give two or even one new unit.
- The Fumigation projects will need to be rationalised, for example by reducing the financing of new pesticide plants.
- Projects will be carefully scrutinised for equipment designated for destruction that could be salvaged and renovated for re-use in the same or in another project.

The Management Committee (5.3.1 below) will address these points as a priority.

3.2.4 Fumigation Sub-Sector

The fumigation project will completely phase out the use of carbon tetrachloride (CTC), 305 ODS MT (335.5 ODP MT) at 2002 levels, in soil and grain storage fumigation.

Grafting technology, Cadusafos and Hymexazol, combined with soil solarization and biofumigation, has been selected as CTC alternative in protected horticulture sector and seedbeds (Seedling production).

Chloropyriphos Methyl (contact insecticide) has been selected as the most suitable alternatives for grain storage fumigation in the D.P.R. of Korea.

The Fumigation Phase-Out Plan (Attachment III) foresees a two year program for the phase-out of the current (2002) consumption of 335.3 ODP MT, taking into account the upgrading of the chemical plant for Carbosulfan, Hymexazol and Chlorpyriphos methyl production, installation of grafting equipment and the implementation of the training program.

The reduction would be 323 ODP MT in 2004 and the remaining 12.5 ODP MT in 2005.

3.2.5 Cleaning Solvent Sub-Sector; progress to date

The consumption of CTC in the Cleaning Solvent Sub-Sector reported by the 2000 CP Amendment is detailed in Exhibit 4.

Exhibit 4 Consumption of CTC by enterprise in 1996-1999 (MT)

Enterprise/Year	1996	1997	1998	1999
Unsan Tools Factory	218	250	256	153
Pyongyang September 18 Bearing Factory	94	116	110	122
Ceramics Tools Factory	16	21	19	17
Sungri Truck Factory	224	165	210	176
Huichon Parts for Trucks	68	56	84	95
Illuminating Fixtures Factory	48	30	25	46
Gumsong Tractor Factory	100	116	62	128
Others (small users)	27	61	16	83

Nine Projects to eliminate CTC in the Cleaning Solvent Sub-Sector have been approved, of which four have been completed and five are being implemented. These are listed in Exhibit 5.

Exhibit 5 CTC Projects approved

Beneficiary	ODP MT	Approved	Completed
Unsan Tools Factory, Phase 1		11/1997	06/1999
Unsan Tools Factory, Phase 2		11/1998	06/2000
September 8 Bearings Factory		11/1998	06/2000
Ceramic Tools Factory	19.8	07/1999	12/2001
Gumsong Tractor Factory	198	03/2002	
Huichon Parts for Trucks Factory	209	07/2002	
Taedong-gang TV Factory	59.8	11/2002	
October 5 Automation Instrument Complex	69.3	11/2002	
Illuminating Light Fixtures Factory	29.7	11/2002	
Total ODP MT CTC, 2001-2003	585.6		

3.2.6 Remaining CTC Users in Cleaning and Process Agent Sub-Sectors

The remaining users of CTC in the Solvent Sector (Cleaning and Process Agent Sub-Sectors) are listed in Exhibit 6, which includes those that have been identified recently. After the intensive market research by NCCE, Ozone Cell and UNIDO, it is most unlikely that further users remain to be identified.

Exhibit 6 CTC Users in Cleaning and Process Agent Sub-Sectors

Enterprise	2002 MT CTC	2002 ODP MT	SUB-SECTOR	COMMENTS
Sungri 58 Factory (Trucks)	197	216.7	Cleaning Solvent	Surface cleaning
Moranbong Instruments Factory	52	57.2	Cleaning Solvent	Surface cleaning
Integrated Circuit Factory	19	20.9	Cleaning Solvent	Surface cleaning
Seanal Electrical Factory	34	37.4	Cleaning Solvent	Surface cleaning
Heungnam Pharmaceutical Factory	75	82.5	Process Solvent	Ciprofloxacin, Norfloxacin
Heungnam Pharmaceutical Factory	62	68.2	Process Solvent	Dichloroisocyanurate
Lanam Pharmaceutical Factory	72	79.2	Process Solvent	Vitamin C
2.8 Vinalon Factory Complex	157	172.7	Process Solvent	Chlorinated and chloro-sulphonated polyethylenes
Sinuiju Chemical Fibre Complex	99	108.9	Process Solvent	Chlorinated rubber
Wonsan Chemical Company	145	159.5	Process Solvent	Asbestos products
Hungnam Fertiliser Complex	94	103.4	Process Solvent	Anticorrosion paints
Total	1,006	1,107		

Status: 12 March 2003

The Process Agent uses of CTC in the manufacture of Ciprofloxacin, Norfloxacin, Dichloroisocyanurate and Vitamin C are not yet listed as recognised applications by the Technical and Economic Advisory Panel (TEAP) of UNEP. Applications to the Executive Committee for funding will follow their official listing.

4. PHASE-OUT STRATEGY

The Government of the Democratic Peoples' Republic of Korea has set the goal to achieve the phase-out of 85% of CTC by 1 January 2005. This target will be achieved by investment, non-investment, technical assistance and capacity building activities.

As a major contribution to this goal, UNIDO will implement the Terminal CTC Phase-out Plan, to be submitted to the 41st meeting of the Executive Committee. The purpose is to speed the implementation process and ensure that D.P.R. Korea meets its commitment to eliminate 85% of CTC use by the end of 2004.

5. IMPLEMENTATION

5.1 Management and Execution

The overall management of the Plan will be carried out by UNIDO with the assistance of Government of the Democratic Peoples' Republic of Korea.

NCCE, Ozone Cell, will be responsible for monitoring the implementation of the Terminal CTC Phase-out Plan. The Ozone Cell will be responsible for tracking the promulgation and enforcement of policy and legislation and will assist UNIDO with the preparation of the implementation plan and progress report to the Executive Committee of Multilateral Fund.

5.2 Performance and Disbursement Schedule

Exhibit 7 gives an overview of the annual phase-out targets for the Terminal CTC Phase-out Management Plan. The first tranche of US\$ 4,832,114 should be available by the end of 2003 to start project activities in 2004.

Exhibit 7

Year (as of 1 Jan.)	CTC phase-out target (ODP MT)			Remaining eligible CTC consumption in Solvent Sector (ODP MT)	Total US\$
	From approved ongoing projects	From Phase-out Plan	Total		
2003	0	0	0	1,365.8	4,832,114
2004	565.8	526.6	1,092.4	192.8	426,363
2005	0	92.8	92.8	92.8	213,182
2006	0	50	50	100	213,181
2007	0	50	50	50	0
TOTAL	565.8	719.4	1,285.2		5,684,840

5.3 Funding Arrangements

5.3.1 Work Plan for 2004

5.3.1.1 Establishment of mechanism

Upon approval by Multilateral Fund of the Terminal CTC Phase-out Plan, the Government of the Democratic Peoples' Republic of Korea, through UNIDO, requests the Executive Committee to authorise disbursement of the first tranche in 2003. The implementation plan for 2004 is:

- a) Establishment of operational mechanism for management and monitoring of the Phase-out Plan. This could take the form of a Management Committee and a Monitoring Committee.
- b) Formulation of detailed terms of reference and work plans for various activities under the Technical Support and Policy & Management Support components
- c) Establishment of an operational mechanism for participation in the Phase-out Plan and for obtaining phase-out commitments from enterprises
- d) One workshop under the Technical Support component for technology assistance to participant enterprises in the sector.
- e) One workshop under the Policy & Management Support component for public awareness and information dissemination in the Cleaning Solvent and Process Agent Sub-Sectors.
- f) Two workshops under the Policy & Management Support component for public awareness and information dissemination in the Fumigation Sub-Sector. This Sub-Sector covers the whole country and addresses a different audience, so two workshops are required for a comprehensive coverage.

Since the average duration for completion of a sub-project is expected to be about 12 months, the phase-out activities initiated at the beginning of 2004 will not produce results until the end of 2004, contributing to the reduction of consumption starting 2005. Therefore, the Government of the Democratic Peoples' Republic of Korea through UNIDO, will request the disbursement of the 2004 funding not later than the last Meeting of the Executive Committee in 2003.

As noted in 3.2.3 above, the difference between the quantity of CTC eligible for funding and the current (2002) CTC consumption presents a challenge to find ways and means to eliminate the difference of some 762 ODP MT of CTC.

This will be accomplished by such measures as:

- Further rationalisation of the cleaning operations in the four enterprises of the Cleaning Solvent Sub-Sector, by merging cleaning lines of Workshops where possible.
- Workshops will be merged where possible; the local costs to be borne by the enterprises.
- Enterprises will assume responsibility for other expenses involving local currency.
- The Process Agent projects include three new production units for paints; these will be merged to give two or even one new unit.
- Projects will be carefully scrutinised for equipment designated for destruction that could be salvaged and renovated for re-use in the same or in another project.
- For the Fumigation project, all equipment and materials locally available will be (tentatively) provided by the enterprises, unless the supply proposed does not meet the specifications requested.

The Management Committee will need to address these points as a priority.

5.3.1.2 Actions for 2004

Specific actions needed at the beginning of 2004 are:

- Initiate bid procedures and procurement of equipment for the four Cleaning projects.
- Initiate bid procedures and procurement of equipment for the approved Process Agent projects.
- Initiate bid procedures and procurement of equipment for the Fumigation projects.
- Establish health and safety training projects for operators of the new open-top cleaners.
- Organize a survey of small enterprises (provincial factories) re-using discarded CTC for cleaning purposes.

5.4 Investment Component

The investment component of the plan will focus on enabling the participant enterprises to physically eliminate CTC from their production activities and consists of the following elements:

- Assessment of the technical requirements of conversion
- Determining the scope of international and local procurement
- Development of technical specifications and terms of reference for procurement
- Pre-qualification and short-listing of vendors
- International/local competitive bidding
- Procurement contracts
- Site preparation
- Customs clearance and delivery
- Installation and start-up
- Product and process trials
- Operator training
- Commissioning and phase-in of CTC-free production
- Destruction of baseline equipment

This approach draws on previous implementation experience and has been designed based on the size, level of organization, location and customer base of enterprises concerned and also

based on ease and convenience for execution and management. Given the medium to large size of the remaining enterprises in the sub-sector, the need for adequate investments for plant and process changes, supported by investments on adequate technical assistance, trials and training, is critical and will involve significant inputs. It is foreseen that the duration for the project would be set in such a way as to ensure that the verifiable performance targets would be quantifiable and achievable. CTC phase-out in ineligible enterprises will not be funded under the umbrella plan and is expected to take place through Government policy and regulatory actions. Any unaccounted or unidentified eligible enterprises will be identified and accommodated within the resources approved for this phase-out plan.

5.4.1 Plant and process investments

UNIDO will ensure the installation of modern technologies that are best adapted to the needs of the enterprises. Equipment will continue to be specified for solvent cleaning so as to ensure protection of workers, together with measures to recycle solvent where economically practical.

Aqueous cleaning techniques will continue to be preferred and applied where they are best suited, with provision for protection of the environment from discharges of untreated wastes.

5.4.2 Product and Process Trials

Trials will be required to validate the new equipment as well as the production process using the new technology, specifically to establish their performance and suitability for the conversion in accordance with specifications and project objectives. Trials will also be needed to evaluate and establish satisfactory end product properties. Trial costs will cover the cost of chemicals, raw materials, components, consumables and utilities required during site preparation and commissioning. These costs are normally provided by the enterprise and some may be included in the supplier budget.

5.5 Technical Support Component

Since the Terminal CTC Phase-out Plan will address the entire Sub-Sector, the industry as a whole will need to be supported through provision of a technical support component for ensuring that their phase-out actions and initiatives are not only technically sound but also sustainable. They should be consistent with the important priorities of the Government, which are to prevent industrial dislocation and obsolescence.

5.5.1 Technical Support Component Actions

The Technical Support Component will:

- (a) Establish quality and performance standards for the CTC-free products and applications within the sector.
- (b) Interact with the user industry to provide technology assistance for sustainability of CTC-free applications, through technical workshops and meetings.
- (c) Establish a training, certification and licensing program for production operators and technicians, to sustain the CTC-free technologies.
- (d) Conduct one workshop to ensure a high level of professional technical assistance in the fields of health and safety and for protection of the environment.

- (e) Conduct one workshop for technology assistance to participant enterprises in the sector
- (f) Conduct one training workshop for small enterprises re-using spent CTC solvent
- (g) Conduct three training workshops in 2004 and one in 2005 for the Fumigation Sub-Sector. This Sub-Sector covers the whole country and addresses a different audience, so four workshops are required for a comprehensive coverage.

The workshop to ensure a high level of assistance in the fields of health and safety and for protection of the environment is necessary because closed equipment for chlorinated solvent cleaning has so far been supplied to D.P.R. Korea factories. The projects in this phase-out plan include open-top cleaners for use with perchloroethylene. While they are of modern design, considerably more attention is needed in their operation than is the case with closed equipment, in order to ensure optimum protection for health and safety and for the environment.

5.6 Policy & Management Support Component

The implementation of the Terminal CTC Phase-out Plan will need to be closely aligned and co-ordinated with the various policy, regulatory, fiscal, awareness and capacity-building actions the Government of the Democratic Peoples' Republic of Korea is taking to ensure that the implementation of the Phase-out Plan is consistent with the Government priorities. Further, in view of the performance-based targets needed to be achieved under the terms of the Phase-out Plan, the implementation of the Plan will need to be closely and efficiently managed and will introduce additional co-ordinating, reporting and monitoring activities.

The Terminal CTC Phase-out Plan will be managed by a dedicated Management Committee, consisting of a co-ordinator to be designated by the Government and supported by representatives and experts from the implementing/executing agency and the necessary support infrastructure. The Management Support component of the Phase-out Plan will include the following activities for the duration of the Plan:

- (a) Management and co-ordination of the Plan implementation with the various Government policy actions pertaining to the Solvent Sector
- (b) Establishment of a policy development and enforcement program, covering various legislative, regulatory, incentive, disincentive and punitive actions to enable the Government to acquire and exercise the required mandates in order to ensure compliance by the industry with the phase-out obligations
- (c) Development and implementation of training, awareness and capacity-building activities for key government departments, legislators, decision-makers and other institutional stakeholders, to ensure a high-level commitment to the Plan objectives and obligations
- (d) Awareness creation of the Phase-out Plan and the Government initiatives in the Sector among consumers and public, through workshops, media publicity and other information dissemination measures
- (e) Development of a programme and procedures to address the impact of CTC phase-out on the large number of small scale enterprises (SSE) in D.P.R. Korea re-using spent CTC, in view of the hardship that CTC elimination will cause them
- (f) Preparation of implementation plan including determining the sequence of enterprise participation in planned sub-projects

- (g) Verification and certification of CTC phase-out in completed projects within the Plan through plant visits and performance auditing
- (h) Establishment and operation of a reporting system for use of CTC substitutes by enterprises
- (i) Establishment and operation of a decentralised mechanism for monitoring and evaluation of Plan outputs, in association with provincial regulatory environmental bodies to ensure sustainability.

It may be desirable to establish a separate Monitoring Committee.

6. SELECTION OF TECHNOLOGIES

The selection of approved alternative technologies for conversion is governed by the following:

- (a) Proven and reasonably mature technology
- (b) Cost-effective conversion
- (c) Availability of the systems at favourable pricing
- (d) Critical properties that have to be obtained in the end product
- (e) Compliance with established (local and international) standards on safety and environment.

The technology selected would also need to be easily adaptable at the recipient enterprises, which would be participating in this project. The selection of the technology would also need to be consistent with the priorities of the Government and industry and to ensure sustainability of the technology in the long-term.

Details are to be found in the three original Phase-Out Plans, Attachments I-III.

1: INCREMENTAL CAPITAL COSTS

A. Investment Component

The breakdown of Investment Component (**Exhibit 3a**) is taken for the purpose of the Plan as 90% Increased Capital Cost (ICC) and 10% Increased Operating Cost (IOC).

The following table summarises the basis and considerations for calculating the incremental capital costs, for the remaining unfunded eligible enterprises in the Terminal Phase-out Plan:

Sub-sector	Incremental Capital Costs (US\$)		Total (US\$)
	Equipment	Contingencies, (US\$)	
Cleaning solvent	2,178,578	217,858	2,396,436
Process Agent	1,143,769	114,377	1,258,146
Fumigation	948,760	94,876	1,043,636
Total	4,271,107	427,111	4,698,218

B. Policy & Management Support Component; Cleaning Solvent and Process Agent Sub-Sectors

Activity	Cost (US\$)
*Management, coordination and monitoring, communications and transportation (detailed breakdown below)	102,000
Verification and certification, 50 days each in 2004 and 2005, 5 days each in 2006 and 2007 @ US\$ 200/day	22,000
*One Workshop in 2004 for training and capacity-building activities for government/industry stakeholders and decision makers, Cleaning Solvents and Process Agents	30,000
*Two Workshops in 2004 for training and capacity-building activities for government./industry stakeholders and decision makers; Fumigation	60,000
Survey to identify small factories re-using spent CTC solvent	15,818
Contingency @ 10%	22,982
Total	252,800

* Management, coordination and monitoring is by NCCE, Ozone Cell of D.P.R. Korea and requires:

Personnel, estimated 400 days in 2004, 100 days in 2005 and 50 days each in 2006-7, at US \$60/day; total US \$36,000

Communications, estimated US \$2,000 in 2004 and US \$1,000 per year in 2005-7; total US \$7,000

Transport, estimated US \$6,000 in 2004 and US \$2,000 per year in 2005-7; total US \$12,000

Miscellaneous expenses estimated at US\$ 22,000 in 2004, US\$ 15,000 in 2005 and US \$5,000 in 2006 and in 2007 (local experts, advertisement, leaflets preparation, room renting, etc.); total US \$ 47,000

Sub-total: US \$ 36,000 + 7,000 + 12,000 + 47,000 = US \$ 102,000.

*Each Workshop requires the participation of one UNIDO staff member with associated costs, for transport and one week subsistence, of US\$ 5,000, and one consultant, with associated costs for compensation, transport and one week subsistence, of US \$10,000. Miscellaneous expenses totalling US \$ 15,000 for conduction of Workshop (accommodation of local participants in a hotel, one dinner, secretary services, printing of reports, room renting, etc) are also required. Total US \$ 30,000 per workshop.

The Phase-out Plan will be managed by a dedicated management team, comprising of a coordinator from the Ozone Cell, to be designated by the Government and supported by representatives and experts from the implementing/executing Ministries and the necessary support infrastructure. The Policy & Management Support component of the Phase-out Plan will include the following activities, for the duration of the Plan:

1. Management and coordination of the Plan implementation with the various Government policy actions pertaining to the Sub-Sector
2. Establishment of a policy development and enforcement program, covering various legislative, regulatory, incentive, disincentive and punitive actions to enable the Government to acquire and exercise the required mandates in order to ensure compliance by the industry with the phase-out obligations.
3. Development and implementation of training, awareness and capacity-building activities for key government departments, legislators, decision-makers and other institutional stakeholders, to ensure a high-level commitment to the Plan objectives and obligations.
4. Preparation of the implementation plan including determining the sequence of enterprise participation in the planned projects.
5. Verification and certification of CTC phase-out in completed projects within the Plan through plant visits and performance auditing.
6. Establishment and operation of a reporting system of use of substitutes by enterprises.

These require the investment of significant resources by NCCE and the responsible Ministries, which are covered in the table above.

C. Technical component

Activity	Cost (US\$)
*Health, safety and environmental protection training technical workshop, with international expert	30,000
*Training workshop for small enterprises re-using spent CTC solvent	30,000
One workshop for technology assistance to participant enterprises	30,000
One training workshop for small enterprises re-using spent CTC solvent	30,000
Three technical training workshops in 2004 and one in 2005 for the Fumigation area	120,000
10% contingency	24,000
Total	264,000

* Each Workshop requires the participation of one UNIDO staff member with associated costs, for transport and one week subsistence, of US\$ 5,000, and one consultant, with associated costs for compensation, transport and one week subsistence, of US\$ 10,000. Miscellaneous expenses totalling US\$ 15,000 for conduction of Workshop (accommodation of local participants in a hotel, one dinner, secretary services, printing of reports, room renting, etc) are also required. Total US\$ 30,000 per workshop.

D. SUMMARY

Activity	Cost (US\$)
Investment Component	4,698,218
Policy & Management Support Component	252,800
Technical Support Component	264,000
TOTAL	5,215,018

2: COST EFFECTIVENESS

A. ODP Impact of the Project

SUBSTANCE	ODP	CONSUMPTION (ODS KG)	NET ODP KG
CTC	1.10	636,364	700,000
Remaining ODP Consumption in the Sub-Sector			0

B. Cost-effectiveness Calculation

PARAMETER/COST HEAD	UNIT	TOTAL
Total Project Costs		
A. Incremental Capital Costs	US\$	4,271,107
B. Contingencies (10% of A)	US\$	427,111
C. Policy & Management and Technical Support Components	US\$	516,800
D. Incremental Operating Costs	US\$	469,822
E. Total Project Costs (A + B + C + D)	US\$	5,684,840
Adjustments to Project Costs		
F. Adjustment for non-Article-5 ownership	US\$	0
G. Adjustment for export to non-Article-5	US\$	0
Net Project Costs		
H. Net Project Costs (E – [F + G])	US\$	5,684,840
ODS Phase-out		
I. Total ODS phase-out	kg	636,364
J. Net ODP phase-out	ODP kg	700,000
Cost-effectiveness		
K. Cost-effectiveness (H/J)	US\$/kg/y	8.12
Eligible Multilateral Fund Funding	US\$	5,684,840

3: ENVIRONMENTAL ASSESSMENT

Details are to be found in the three original Phase-Out Plans, Attachments I-III.

4: PROJECT DOCUMENTS

Details are to be found in the three original Phase-Out Plans, Attachments I-III.