



**United Nations  
Environment  
Programme**

Distr.  
LIMITED

UNEP/OzL.Pro/ExCom/38/39  
26 October 2002

ORIGINAL: ENGLISH



EXECUTIVE COMMITTEE OF  
THE MULTILATERAL FUND FOR THE  
IMPLEMENTATION OF THE MONTREAL PROTOCOL  
Thirty-eighth Meeting  
Rome, 20-22 November 2002

**PROJECT PROPOSALS: KOREA, DPR**

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

Solvent:

- Conversion of cleaning processes from CTC (formerly methyl chloroform) to perchloroethylene cleaning at the Plating Workshop (PLT) of the refrigeration factory of the 5 October Automation Complex, Pyongchon District, Pyongyang City UNIDO
- Conversion of methyl chloroform and CTC to non-ODS solvent cleaning in the plating workshop of the Taedong-gang Television Factory (PTV), Taedong-gang District, Pyongyang City UNIDO
- Conversion of cleaning processes from CTC to perchloroethylene cleaning at the galvanising workshop of the Pyongyang Illuminating Fixtures Factory (PIF) UNIDO

## PROJECT EVALUATION SHEET KOREA

SECTOR: Solvent ODS use in sector (2000): 1,065 ODP tonnes

Sub-sector cost-effectiveness thresholds: n/a

**Project Titles:**

- (a) Conversion of cleaning processes from CTC (formerly methyl chloroform) to perchloroethylene cleaning at the Plating Workshop (PLT) of the refrigeration factory of the 5 October Automation Complex, Pyongyang District, Pyongyang City
- (b) Conversion of methyl chloroform and CTC to non-ODS solvent cleaning in the plating workshop of the Taedong-gang Television Factory (PTV), Taedong-gang District, Pyongyang City
- (c) Conversion of cleaning processes from CTC to perchloroethylene cleaning at the galvanising workshop of the Pyongyang Illuminating Fixtures Factory (PIF)

Project Data	CTC	CTC	CTC
	PLT	PTV	PIF
Enterprise consumption (ODP tonnes)	69.30	59.80	29.70
Project impact (ODP tonnes)	69.30	59.80	29.70
Project duration (months)	24	24	18
Initial amount requested (US \$)	533,597	709,466	264,091
Final project cost (US \$):			
Incremental capital cost (a)	404,224	488,880	191,156
Contingency cost (b)	40,422	48,888	19,116
Incremental operating cost (c)	68,822	74,718	24,700
Total project cost (a+b+c)	513,468	612,486	234,972
Local ownership (%)	100%	100%	100%
Export component (%)	0%	0%	0%
<b>Amount requested (US \$)</b>	<b>508,068</b>	<b>597,886</b>	<b>230,172</b>
Cost effectiveness (US \$/kg.)	7.41	9.99	7.75
Counterpart funding confirmed?	Yes	Yes	Yes
National coordinating agency	National Co-ordinating Committee for Environment		
Implementing agency	UNIDO		

<b>Secretariat's Recommendations</b>			
Amount recommended (US \$)			230,172
Project impact (ODP tonnes)			29.70
Cost effectiveness (US \$/kg)			7.75
Implementing agency support cost (US \$)			29,922
Total cost to Multilateral Fund (US \$)			260,094

## SECTOR BACKGROUND

1. The latest consumption reported in the solvent sector in DPR Korea is 1,065 ODP tonnes for the year 2000. Of this, the consumption of CTC is 1045 ODP tonnes. Two projects are under implementation with a phase out yet to be achieved of 407 ODP tonnes of CTC. On the basis of officially reported consumption, the CTC consumption yet to be addressed in the solvent sector is 638 ODP tonnes.

2. However UNIDO has conducted surveys in DPRK and has advised that, in addition to the consumption of 159 ODP tonnes in the three projects submitted to the 38<sup>th</sup> Meeting, it believes the remaining CTC use (other than feedstock for CFC production) to be as indicated in the table below. For the solvent sector, the amounts included in the table are consistent with the consumption officially reported. UNIDO has provided this information to UNEP in relation to any possible update of DRR Korea's country programme.

### Carbon tetrachloride (CTC) use in DPR Korea as identified by UNIDO (excluding feedstock for CFC production)

No.	Enterprise	CTC use in ODP tonnes				Remarks
		Fumigant	Solvent	Process Agent	Formula-tion Agent (miscellaneous)	
1.	Several Cooperatives	164.0				Grain storage
2.	Several Cooperatives	169.0				Soil fumigation*
3.	Sungri 58 Factory (Trucks)		203.5			
4.	Moranbong Instruments Factory		52.8			
5.	Integrated Circuit Factory		17.6			
6.	Senal Electrical Factory		37.4			
7.	Heungnam Pharmaceutical Factory			73.4		Cipro, Norfloxacin
8.	Heungnam Pharmaceutical Factory			66.7		Dichlorisocyanurate
9.	2.8 Vinalon Factory Complex			158.4		Chlorinated polymer
10	Sinuiju Chemical Fibre Complex			110.0		Chlorinated rubber
11.	Wonsan Chemical Company				156.2	Asbestos products
12.	Hungnam Fertilizer Complex				89.1	Anticorrosion paint
<b>Subtotals</b>		<b>333.0</b>	<b>310.3</b>	<b>408.5</b>	<b>245.3</b>	
<b>Total (ODP tonnes)</b>						<b>1297.1</b>

Note \* In soil fumigation an additional 15 ODP tonnes of methyl bromide has been identified

## PROJECT DESCRIPTIONS

Conversion of cleaning processes from CTC (formerly methyl chloroform) to perchloroethylene cleaning at the Plating Workshop (PLT) of the refrigeration factory of the 5 October Automation Complex, Pyongchon District, Pyongyang City

Conversion of methyl chloroform and CTC to non-ODS solvent cleaning in the plating workshop of the Taedong-gang Television Factory (PTV), Taedong-gang District, Pyongyang City

Conversion of cleaning processes from CTC to perchloroethylene cleaning at the galvanising workshop of the Pyongyang Illuminating Fixtures Factory (PIF)

3. The above enterprises consume a total of 159 ODP tonnes of ODS annually, 69.3 ODP tonnes and 29.7 ODP tonnes of CTC respectively at PLT and PIF, and a combination of 4.8 ODP tonnes of TCA and 55 ODP tonnes of CTC at PTV. The ODS are used as solvents for cleaning metal parts in the manufacture of light bulbs at PIF (70 million per year), television sets at PTV (250,000 per year) and electrical instruments and refrigerator parts at PLT (235 tonnes of parts per year). The projects will result in the complete phase-out of all CTC and other ODS solvent use in the three enterprises. The enterprises were established and the relevant equipment installed prior to July 1995.

4. The PTV and PLT enterprises used TCA for all their metal cleaning until 1998. Between 1998 and 2001 the production of TCA in DPR Korea gradually ceased and the two enterprises switched over to CTC which was still readily available. PIF has always used CTC.

5. The baseline equipment consists of open cleaning machines. Some are in the form of simple tanks, other are in the form of tanks with addition of heating and cooling coils and circulation pumps to improve cleaning performance and reduce vapour emissions.

6. In all cases the phase-out is to be achieved by installing new, low-emission metal cleaning machines designed to use perchloroethylene (PCE), a non-ODS solvent. On the basis of current levels of production, the projects propose the installation of two machines at PIF, seven machines at PTV and four machines at PLT. Estimated machine costs range from US \$66,000 for the smallest machine to US \$142,000 for the largest, with additional allowances for installation. However in line with previous projects in the sector, enterprise contributions of up to 50 percent have been incorporated to take account of the acceptance of environmental costs by the enterprises concerned and for technological upgrade. PTV and PLT will be equipped with a solvent recovery unit (US \$33,000) to reduce solvent consumption. This is not requested for PIF because the solvent savings do not justify the capital cost. Additional capital costs of around US\$16,000 per enterprise are requested for technical assistance. The enterprises will contribute additional minor capital costs for safety equipment.

7. Incremental operating costs calculated for four years arise from the additional cost of electric power for the new cleaning machines, offset by the substantial decreases in the use of solvent (82 to 93 percent reduction).

8. The incremental capital and operating costs requested for each project are indicated on the cover of this evaluation sheet.

## SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

### COMMENTS

9. The Secretariat sought clarification as to why two of the enterprises, PTV and PLT, had converted from the use of the solvent TCA (ODP of 0.1) to the use of CTC (ODP of 1.1). UNIDO advised its view that the changeover was not voluntary but resulted from the production sector phase-out plan for DPR Korea that focussed on TCA first. The Secretariat notes that TCA production was reduced in 1999 because of energy shortages and the TCA plant was dismantled in May 2001, as verified in the technical audit report of ODS production in DPR Korea. The production sector plan was not approved until July 2001.

10. The Secretariat discussed with UNIDO the capacity of the equipment proposed to be supplied. The information provided by UNIDO shows that specifications for the new equipment will be based on the current operating levels of the enterprises. The Secretariat also discussed the enterprise contributions for environmental measures and technological upgrade. The enterprises will contribute to the cost of each new cleaning machine at a level of between 20 and 50 percent dependent on the configuration of the baseline cleaning equipment. The total contributions to be provided directly (e.g. provision of facilities or local equipment) or indirectly (e.g. use of incremental operating costs for capital equipment) by each enterprise are as indicated below:

Enterprise	Direct beneficiary contribution US \$	Indirect beneficiary contribution US \$
PLT	5,400	81,356
PTV	14,600	151,360
PIF	4,800	71,984

11. The costs of proposed UNIDO visits were rationalised to take account of the additional approved project projects now under implementation in DPR Korea. Minor adjustments were made to the incremental costs for technical support.

12. For PIF and PLT minor adjustments were also made to incremental operating costs to take account of revised figures for energy use of the new machines. For PLT, an error was discovered in the calculation of incremental operating costs, leading to an underestimate of US \$61,553 in the total cost of the project as submitted. After adjustment of the incremental capital costs for new machines as described in the paragraph above, the overall incremental costs for the project show a slight reduction.

13. The cost effectiveness of the projects after review is as follows:

Enterprise	Cost-effectiveness US \$/kg
PLT	7.41
PTV	9.99
PIF	7.75

## RECOMMENDATIONS

14. Approval of the project for PIF is recommended at a cost of US \$230,172, plus support costs for UNIDO of US \$29,922.

15. The Executive Committee may wish to consider the eligibility of the requested funding for the projects for PLT and PTV in view of the conversion of each enterprise from the use of TCA to the use of CTC in the period 2000-2001.

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