ANNEX IV

METHODOLOGY FOR CALCULATION OF INCREMENTAL OPERATIONAL COSTS IN METHYLENE CHLORIDE PROJECTS

Factors to be Considered in Calculating the Incremental Operational Costs (IOC)

(a) Relative prices of methylene chloride and CFC-11

The prices should be determined locally using the ratio MC/CFC-11 of 0.9/1.0. All pricing should also be guided by Executive Committee decision regarding pricing of commodities, namely that national pricing be used except where it was higher than 20% of the regional border price (UNEP/OzL.Pro/ExCom/12/37, para. 62). For 1995 the prices of urethane grade and non-urethane grade MC may not exceed US $1.00 and US $0.80 respectively. Where available, the price of urethane grade MC should be used.

(b) Catalysts

Amine: A 10% increase in amine catalyst corresponds to 10 pphp[1] MC. The need for additional or different catalyst should be justified. (Current price of catalyst is US $7.50/kg).

Tin: A 25% increase in tin octoate, corresponding to 10 pphp MC should be allowed (Current price is US $6-8/kg)

(c) Polyol

If the need for a better or different stabilized polyol as well as its local availability are established price increase of up to US $0.10/kg should be allowed.

(d) Toluene diisocyanate (TDI)

When forced cooling or softening technologies are used both the increased use of TDI and decreased use of MC should be taken into account in the IOC calculation. Replacement of ten parts of MC by 10 parts of TDI and one part of water should be considered.

[1] pphp: parts per hundred parts of polyol, the standard expression in foam formulations. If pphp are assumed kg's then a standard formulation would amount to about 150 kg, after accounting for gas losses. Such conversion has been used in the calculation of the IOC effect of the use of a softener.

(e) Softener

The cost of softener may be taken into account only when detailed formulations are developed. The calculation should also take account of adjustments in MC use.

(f) Yield loss

Initial incremental yield loss of 3% declining by 1% each year should be allowed.

(g) Incremental energy costs

Incremental energy costs will be eligible only in the event that the substitute technology results in increased energy consumption. However, if this increase results in expansion in production capacity of the foam (whether intentional or inadvertent) it should not be considered in the calculation of IOC. Calculation of incremental energy cost should be based on KW multiplied by run hours per year and local unit price.

(h) Incremental maintenance costs

Maintenance costs should be based on additional eligible equipment installed. The incremental maintenance costs should be calculated based on 5% of the eligible incremental equipment investment costs.

Factors not to be Considered in Calculating the Incremental Operational Costs

(a) Cost of Water

Cost of water is usually minimal. Generally, de-ionized water is used in foam formulations. This is particularly critical if MC is used, since iron content could trigger scorching. Therefore where not already installed, a water softener or de-ionizer would usually be included in the investment costs.

(b) Equipment type

Does not have any incremental effect on operational costs.

(c) Equipment Condition

This should be the liability of the enterprise concerned.

(d) Proficiency (Expertise)

Since differences in proficiency or expertise at the plant level is usually taken into account when assessing technology transfer and/or training costs, proficiency or expertise should not be considered in IOC calculation.

(e) Recurrent training

Only staff time is involved and cannot be considered as incremental.

(f) Safety

MC does not cause any safety concerns beyond those that have been dealt with under investment and chemical use. Hence, health and safety issues other than those considered already should not be taken into account, e.g. incremental operational cost of occupational health or safety monitoring programmes, etc.

SAMPLE INCREMENTAL OPERATIONAL COST CALCULATION

ASSUMPTIONS

Item	Price (US $/t)	Consumption (t/y)		Information Source
		Before	After	
CFC-11	2,000	18	-	Navin Fluorine
MC	800	-	16.2	U-Foam
Amines	7,500	3	3.1	Standard
Tin	8,000	4	4.25	Standard
Energy (/KWh)	0.10		45,000	Power Cy.
Production	2,000	900	900	Recipient

Investment in equipment : US $150,000
CFC/MC Ratio : 1.00/0.90
Yield loss : 3/2/1/0%/y on 25% of production
(Only 25% of the production uses MC)
Maintenance : 5% of equipment investment

CALCULATION

Cost Item	1995 US $ X 1,000	1996 US $ X 1,000	1997 US $ X 1,000	1998 US $ X 1,000	Total
BASELINE					
CFC-11	36	36	36	36	
Amines	22.5	22.5	22.5	22.5	
Tin	32	32	32	32	
Total	**90.5**	**90.5**	**90.5**	**90.5**	
POST-PROJECT					
MC	13	13	13	13	
Amines	23.3	23.3	23.3	23.3	
Tin	34	34	34	34	
Incr. Yield Loss	13.5	9	4.5	0	
Incr. Energy	4.5	4.5	4.5	4.5	
Incr. Maintenance	7.5	7.5	7.5	7.5	
Total	**95.8**	**91.3**	**86.8**	**82.3**	
IOC	5.3	0.8	(3.7)	(7.2)	
Discount Factor	0.91	0.83	0.75	0.68	
NPV	**4.8**	**0.7**	**(2.8)**	**(4.9)**	**(2.2)**

Costs determined as follows:

1. Baseline Costs

Baseline costs of chemicals calculated by multiplying the price of the chemical by annual use. No sales increases allowed.

2. Post Project Costs

(a) MC: 90% of CFC-11 use multiplied by MC price. No sales increases included.
(b) Amine: Increase by 10% on MC foam alone.
(c) Tin: Increase by 25% on MC foam alone.
(d) Yield loss: Calculated on MC foam alone.

3. Incremental Operational Cost (IOC)

(a) IOC: Difference between baseline cost and post project cost.
(b) Discount factor: Based on 10% interest rate.
(c) Net Present Value (NPV): IOC X Discount factor.