# PLANT ECONOMICS

Fixed Capital Investments = Rs $2.5*10^8$

Base year = 1971

Cost index at 1971 = 132

Cost index at 2002 = 402

Present cost = $2.5*10^8 *(402 / 132)$ = Rs. $761.36*10^6$

## DETAILED COST ANALYSIS

### *I.* Direct Costs:

Material and labor involved in actual installation of complete facility (70 – 85% of fixed capital investment). Assume direct cost to be 75% of fixed capital investment.

(A) Purchased cost + Installation cost + Instrumentation and controls installed +Electrical installation.

(1) Purchased equipment cost (15 – 40 % of Fixed Capital Investment).
Assume 35% of Fixed Capital Investment = $0.35 * 761.36*10^6$
= Rs. $266.477*10^6$

(2) Installation cost, including insulation and painting (25-55% of purchased cost)
Assume 45% of Purchased Cost = $0.45*266.477*10^6$ = Rs. $119.915*10^6$

(3) Instrumentation and controls cost (6-30% of Purchased Cost)
Assume 20% of Purchased Cost = $0.20*266.477*10^6$ = Rs. $53.295*10^6$

(4) Piping installation cost (10-80% of Purchased Cost)
Assume 50% of Purchased Cost = $0.50*266.477*10^6$ = Rs. $133.238*10^6$

(5) Electrical costs (10-40% of Purchased Cost)
Assume 30% of Purchased Cost = $0.3*266.477*10^6$ = Rs. $79.943*10^6$

(B) Building, process and auxiliary (10-70% of Purchased Cost)

Assume 50% of Purchased Cost = $0.5*266.477*10^6$ = Rs. $133.238*10^6$

(C) Service facilities and yard improvements (40-100% of Purchased Cost)

Assume 70% of Purchased Cost = $0.7*266.477*10^6$ = Rs. $186.534*10^6$

(D) Land (4-5% of Purchased Cost)

Assume 5% of Purchased Cost = $0.05*266.477*10^6$ = Rs. $13.324*10^6$

Direct costs = A + B + C + D

= Rs. $571.02*10^6$

**II. Indirect costs:**

*These are not directly involved.

(A) Engineering and supervision (5-30% of Direct Cost)

Assume 20% of Direct Cost = $0.2*571.02*10^6$ = Rs. $114.204*10^6$

(B) Construction expenses and contractors feed (6-30% of Direct Cost)

Assume 10% of Direct Cost = $0.10*571.02*10^6$ = Rs. $57.102*10^6$

(C) Contingency costs ( 5- 15% of Present Cost)

Assume 10% of Present Cost = $0.10*761.36*10^6$ = Rs. $76.136*10^6$

Indirect costs = A + B + C

= Rs. $247.442*10^6$

**III. Fixed Capital Investments:**

= Direct + Indirect costs

= Rs. $1.79*10^9$

**IV. Working Capital** (10-20% of Fixed Capital Investment)

Assume 15% of Fixed Capital Investment = $0.15*1.79*10^9$ = Rs. $268.656*10^6$

**V. Total Capital Investment**

= Fixed + Capital Investment.

= Rs. $2.058*10^9$

## ESTIMATION OF TOTAL PRODUCT COST

## I. Manufacturing Cost:

**1. Depreciation**

10% of Fixed Capital Investment for machinery = Rs. $72.33*10^6$

3% of building value for building = Rs. $3.997*10^6$

**2. Local taxes** (3-4% of Fixed Capital Investment)

Assumed value, 3% of Fixed Capital Investment = Rs. $21.698*10^6$

**3. Insurances** (0.4 – 1 % of Fixed Capital Investment)

Assumed value, 1% of Fixed Capital Investment = Rs. $72.33*10^6$

**4. Rent** (8-12% of the rented land and buildings)

Assumed value, 10% of building value = $0.1*133.238*10^6$ = Rs. $13.324*10^6$

Now,

Fixed Costs = 10% of Purchased Cost = Rs. $18.368*10^6$

Total Product Cost = Rs. $183.68*10^6$

## II Direct Production

(1) **Raw materials** (10-50% of Total Product Cost)

Assumed value, 30% of Total Product Cost = $0.3*18.368*10^7$ = Rs. $55.104*10^6$

(2) **Operating labor** (10-20% of Total Product Cost)

Assumed value, 15% of Total Product Cost = $0.15*18.368*10^7$ = Rs. $27.55*10^6$

(3) **Direct supervisory and electrical labor** (10-25% of Operating labor)

Assumed value, 20% of Operating labor = $0.2*27.55*10^6$ = Rs. $5.51*10^6$

(4) **Utilities** (10-20% of Total Product Cost)

Assumed value, 15% of Total Product Cost = $0.15*18.368*10^7$ = Rs.$27.55*10^6$

(5) **Maintenance and repairs** (2-10% of Fixed Capital Investment)

Assumed value, 8% of Fixed Capital Investment = $0.08*723.292*10^6$ = Rs. $57.86*10^6$

(6) **Operating supplies** (10-20% of cost of maintenance and repair)

Assumed value, 10% = $0.1*57.86*10^6$ = Rs. $5.786*10^6$

(7) **Laboratory charges** (0-20% of operating labor)

Assumed value, 10% of Operating labor = $0.1*27.55*10^6$ = Rs. $2.755*10^6$

(8) **Patents and royalties** (0-6% of Total Product Cost)

Assumed value, 5% of Total Product Cost = $0.05*18.368*10^7$=Rs. $9.184*10^6$

**Direct Production cost** = Sum 0f (1), (2), (3), (4), (5), (6), (7) and (8)

= Rs. $191.299*10^6$

1.***Plant overhead costs*** 12% of Total Product Cost = $0.12*18.368*10^7$ = Rs. $22.042*10^6$

**2. General Expenses** (includes administration expenses, distribution prices and also R&D costs)

Assumed value, 6% =$0.06*18.368*10^7$ = Rs. $29.3884*10^6$

**3. Total product cost**

= Manufacturing cost + general expenses

= $801.77*10^6 + 29.388*10^6$

= Rs. $831.158*10^6$

**4. Current selling price**

Cost of xylenes = Rs. 58 / kg

Total selling price per annum = $35000 \times 10^3 \times 58$

= Rs. $2.03 \times 10^9$ /annum.

**5. Gross earnings**

= Total selling price – Total product cost

= Rs. $1.1988*10^9$

**6. Tax**

= $0.4 *1.1988*10^9$

= Rs. $479.537*10^6$

**7. Net profits**

= Gross earnings – tax

= Rs. $719.26*10^6$

**8. Rate of return**

= (Net profit / fixed capital investment)

= ($719.26 *10^6$ / $2.058*10^9$)

= 34.95%