100,000 tons (Case 2).

(2) Bagasse

Bagasse required is 0.325 ton per ton of briquette production on wet base. The ex-mill price of bagasse on wet base is 119 rupees per ton and the transportation cost to the plant is 78.5 rupees per ton; therefore, annual bagasse cost is 3.2 million rupees in Cases 1 and 3 and 6.4 million rupees in Case 2.

(3) Slaked lime

Slaked lime required is 63 kg per ton of briquette on wet base. The price of slaked lime and transportation cost are 671 rupees and 41.1 rupees per ton, respectively; therefore, the annual cost is 2.2 million rupees in Cases 1 and 3 and 4.5 million rupees in Case 2.

(4) Slack wax

Slack wax for coating the briquette surface required is 6 kg per ton of briquette. The price and transportation cost are 2,690 rupees and 196 rupees per ton, respectively, and the annual cost is 0.9 million rupees in Cases 1 and 3 and 1.7 million rupees in Case 2.

(5) Light fuel oil

Light diesel oil required as solvent of the slack wax is 52 liters or 44 kg per ton of briquette. The price and the transportation cost are 2,786 rupees and 87.8 rupees per ton of the oil, respectively. Annual cost and light fuel oil is 6.3 million rupees in Cases 1 and 3 or 12.6 million rupees in Case 2.

15-2-2 Utility Cost

(1) Electricity

The plant requires 1,300 kW for coal briquette production and plant office use in Cases 1 and 3, and 2,500 kW in Case 2. Tariff of electric power is 90 rupees per kilowatt per month

on receiving demand and 0.45 rupees per kilowatt-hour consumed. Annual electric consumption of the plant is 5,184 MWh in Cases 1 and 3 and 10,368 MWh in Case 2; therefore, the cost of electricity is 3.7 million rupees and 7.4 million rupees per year, respectively.

(2) Water

Coal washing water required is 0.25 ton per ton of product. Cost charged for water supply is 12.75 rupees per ton for transportation by water tank lorry; accordingly, annual water cost is 0.17 million rupees in Cases 1 and 3 and 0.34 million rupees in Case 2.

The water required for living needs is a relatively small amount compared with that for coal washing so that its cost may be included in the plant overhead cost.

15-2-3 Handling Cost

The coal and bagasse to be fed to the plant will be transported and handled by contract labor in the plant. Charge for the contract labor is 6.25 rupees per ton of materials handled. The amount of coal and bagasse fed to the briquetting machine and coal for stove is 1.948 tons per ton of briquette produced; therefore, material transportation and handling cost in the plant is 12.18 rupees per ton of product, and 0.6 million rupees per annum in Cases 1 and 3 and 1.2 million rupees per annum in Case 2.

15-3 Fixed Operating Cost

Fixed operating costs include direct labor cost, maintenance cost, insurance, and plant overhead. Table 15-3-1 summarizes fixed operating costs required for the plant in both Cases 1 and 3 and Case 2.

The fixed costs estimated at current prices are escalated until the time when the plant construction starts based on the following assumptions.

1)Labor cost : 3.5 percent escalation per year
2)Spare parts : 2.5 percent escalation per year
3)Insurance : No escalation

Table 15-3-1 Annual Fixed Operating Cost

(Unit : Rupees)

Items	Case 1,3		Case 2	
	A	B	A	B
Labor cost	1,056,000	1,056,000	1,497,600	1,497,600
Maintenance cost	5,175,900	4,930,100	9,518,100	9,141,500
Insurance costs:				
Fire insurance	841,000	678,800	1,487,000	1,254,100
Group insurance	7,100	7,100	9,600	9,600
Worker's compensation	12,000	12,000	20,900	20,900
Plant overhead	1,056,000	1,056,000	1,497,600	1,497,600
Total cost	8,148,000	7,740,000	14,030,800	13,421,300

15-3-1 Labor Cost

Based on the organization program for the plant and the Hyderabad office described in Chapter 12, the direct labor cost is calculated to be 1.1 million rupees per year in Cases 1 and 3 and 1.5 million rupees in Case 2 applying salaries and wages as shown in

Table 15-3-2.

Table 15-3-2 Salaries and Wages

(Unit : Rupees)

Employees	Monthly payment per person
Plant manager	8,900
Assistant manager	5,000
Plant engineer	5,000
Assistant chemist	5,000
Assistant accountant	5,000
Cashier/Account assistant	2,000
Office assistant	1,800
Store-keeper	1,600
Foreman	3,300
Chief operator	2,000
Operator	1,600
Driver	1,300
Security guard	1,100
Janitor	1,100

15-3-2 Maintenance Cost

The maintenance cost consists of labor and spare-part costs. For the maintenance of plant equipment and facilities, the plant operators would be assigned to conduct daily maintenance works and regular repair for every certain period. The annual maintenance cost is estimated to be 5.2 million rupees in Cases 1A and 3A, 4.9 million rupees in Cases 1B and 3B, 9.5 million rupees in Case 2A and 9.1 million rupees in Case 2B.

15-3-3 Insurance Cost

The kinds of insurance required for the plant operation are fire insurance, workers accident insurance referred to as "group insurance," and unemployment insurance referred to as "worker's compensation."

(1) Fire Insurance

Cost of insurance against fire covering the book value of insured building, equipment and facilities is calculated based on the insurance charge as follows:

Insured item	Premium per 1,000 rupees insured
Equipment	6.5 rupees
Building	0.9
Vehicle	8.7

The fire insurance cost declines year by year in proportion as the plant depreciates in value.

(2) Group Insurance

Group insurance coverage is effective on employees in the case of loss of life both on- and off-duty. Insurance cost is calculated based on the insured amount and premium as follows:

Employee	Amount insured (Rupee)	Premium(Rupee) per 1,000 rupees insured
Officers above deputy manager	150,000	5.00
Officers up to deputy manager	100,000	5.00
Workers	30,000	3.75

(3) Worker's compensation

Worker's compensation is an unemployment insurance for workers. Cost for this insurance is calculated by the following premium depending on the payment:

Worker	Premium(Rupee) per 1,000 rupees of wages
Cashier/Account assistant	1.5
Office assistant	1.5
Store-keeper	1.5
Foreman	20.0
Chief operator	20.0
Operator	20.0
Driver	20.0
Security guard	20.0
Janitor	1.5

15-3-4 Plant Overhead

Plant overhead cost covers various expenses such as office supplies, communication, travel and other indirect costs. For the purpose of calculating production cost, the annual plant overhead costs are set at 1.06 million rupees in Cases 1 and 3 and 1.50 million rupees in Case 2 both equivalent to 100 percent of each direct labor cost, through the discussions with PMDC.

15-4 Summary of Operating Expense

The annual operating expenses for producing 50,000 tons and 100,000 tons of coal briquettes are summarized in Table 15-4-1.

Table 15-4-1 Operating Expenses Summary

(Unit : Rs.thousand)

Items	Case 1,3		Case 2	
	A	B	A	B
Variable Operating Costs:				
Raw material	37,934	37,934	75,871	75,871
Utility	3,909	3,909	7,709	7,709
Handling	609	609	1,218	1,218
Fixed Operating Costs:				
Labor	1,056	1,056	1,498	1,498
Maintenance	5,176	4,930	9,518	9,142
Insurance	860	698	1,518	1,285
Plant overhead	1,056	1,056	1,498	1,498
Total Operating Expenses	50,600	50,192	98,830	98,221

CHAPTER 16 FINANCIAL ANALYSIS

16-1 Methodology for Financial Analysis

For the purpose of financially evaluating the project, financial analysis is conducted in the manner usually applied to industrial investment projects. Namely, the following financial statements reflecting the expected financial conditions of the project are prepared; and, as indicators of financial profitability of the project, net present value (NPV) and financial internal rate of return (FIRR) are calculated by a method known as discounted cash flow method.

1) Production cost accounting table
2) Profit/loss & cash flow statement
3) Fund flow table
4) Projected balance sheet

16-2 Major Premises for Financial Analysis

The financial calculation adopts the date and conditions assumed as below.

16-2-1 Price Base

All prices and costs such as investment cost and production cost are calculated at the fixed price as of January 1990 when the plant construction will start. The calculation for the financial analysis is based on local Rupee currency; therefore, the foreign currency required is converted to the local currency using the following exchange rates:

U.S.$1.00 = Rs.18.11
Rs.1.00 = Japanese ¥7.32

16-2-2 Operation

(1) Project life

Life of the project is assumed to be 22 years covering:

Construction, 24 months from January 1990

Operation, 20 years from January 1992.

(2) Plant capacity and production

Two cases of initially installed plant capacity, Cases 1 and 3 starting at 50,000 tons and Case 2 starting at 100,000 tons, are studied. Capacity expansion and production schedule in both cases based on the market study are as shown in Table 16-2-1.

Operating conditions of the plant are assumed as below:

Annual operating days, 300 days

Operation time, 24 hours per day

Table 16-2-1 Plant Capacity and Production Schedule

(Unit : thousand tons/year)

Project year	Case 1		Case 2		Case 3		Sales price (Rs./t)
	Cap	Pro	Cap	Pro	Cap	Pro	
1	50	50	100	59	50	50	1,191
2	50	50	100	64	50	50	1,290
3	50	50	100	70	50	50	1,397
4	75	75	100	77	50	50	1,513
5	75	75	100	91	50	50	1,513
6	75	75	150	108	50	50	1,513
7	100	100	150	127	50	50	1,513
8	100	100	150	150	100	100	1,513
9	150	150	200	178	100	100	1,513
10	150	150	200	197	100	100	1,513
11	200	200	300	218	100	100	1,513
12	200	200	300	241	200	200	1,513
13	250	250	300	266	200	200	1,513
14	250	250	300	294	200	200	1,513
15+	300	300	300	300	300	300	1,513

(3) Sales

Annual sales amount is assumed to be equal to the production of the same year. As has been established in the market study, sales price of the coal briquette is 1,191 rupees per ton ex-plant in the first year and increases up to 1,513 rupees in the fourth year and after as shown in Table 16-2-1.

16-2-3 Tax and Depreciation

(1) Income tax

A 55 % income tax is levied against net annual income except for the first four years after the start of operation. In case that loss is counted in the account, it can be carried forward for the next six years.

(2) Depreciation

Depreciation charges that can be deducted from taxable income are calculated according to the following methods and rates.

	Method	Salvage value(%)
Machinery & equipment	10 years straight line	0
Building & structure	20 years straight line	0
Transportation vehicle	5 years straight line	0

16-2-4 Working Capital

Net working capital is calculated as current assets minus current liabilities, both assumed as follows:

(1) Current assets

(a) Cash-in-hand

Cash prepared in the initial working capital is counted as cash-in-hand. Additionally, any positive surplus cash balance in the account will be retained in cash-in-hand.

(b) Accounts receivable

Sales revenue equivalent to 1/24 of annual revenue is counted to the accounts receivable assuming that sales proceeds will be collected half a month after the sales.

(c) Raw material inventory

Raw materials required for the following operation are reserved as inventories as shown below:

Coal	5 days
Bagasse	150 days
Slaked lime	10 days
Slack wax	10 days
Light fuel oil	10 days

(d) Product inventory

The amount of cash covering 10-day operating costs is counted as finished briquettes inventory.

(e) Spare parts

Spare parts required for two year operation are on reserve.

(2) Current liabilities

The following costs are counted as accounts payable:

(a) Raw materials payable

The equivalent of 10-day raw-material costs

(b) Utilities payable

The equivalent of 10-day utility costs

(c) Other payable

The equivalent of one-month direct labor cost

16-2-5 Financing Plan

Actual financial planning for the project has not been decided yet; however, a project financing scheme available at the feasi-

bility stage has been discussed with PMDC, that is, a general financing pattern for industrial projects to cover the capital investment by equity and long-term loan debt. It is adopted here for financial calculation.

(1) Sources of financing for initial investment

Of the total initial investment estimated in Chapter 14, 40 percent are covered by the government funds as equity capital and other 60 percent by long-term loan. The financing conditions of long-term loans are as follows:

(a) Local currency loan

Interest rate	14.6%p.a.
Repayment	25 years annual
Grace period	5 years from the date of disbursement

(b) Foreign currency loan

Interest rate	14.0%p.a.
Exchange risk coverage fee	7.3%p.a.
Repayment	15 years semi-annual
Grace period	5 years from the date of disbursement

(2) Source of financing for operational fund shortage

In case that fund shortage occurs in plant operation, the shortage will be covered by a short-term loan finance on the conditions as follows:

Interest rate	18.6%p.a.
Repayment	In the following year

(3) Source of financing for re-investment

Investment required for capacity expansion during the operation period will be covered by own fund, namely, accumulated surplus fund until the year in which new equipment and facilities are installed will be used for the investment. When the source of fund is not sufficient to cover the investment, a long-term loan which makes up the shortage will be borrowed on the same conditions as those for the initial investment.

16-3 Capital Requirement

Initial investment estimated as the total capital requirement in Chapter 14 and additional investment required for the expansion of plant capacity for Cases 1, 2 and 3 are summarized in Tables 16-3-1 and 16-3-2.

Table 16-3-1 Initial Investment

(Unit : Rs.thousand)

Project year	-2	-1	Total
Case 1A,3A			
Plant Investment:			
Machinery and equipment	39,497	76,961	116,458
Building and structure	617	10,304	10,921
Vehicle	0	8,529	8,529
Pre-operating Expenses	3,418	12,394	15,812
Initial Working Capital	0	12,975	12,975
Interest During Construction	1,750	8,116	9,866
Total	45,282	129,279	174,560
Case 1B,3B			
Plant Investment:			
Machinery and equipment	27,992	63,603	91,595
Building and structure	646	9,565	10,211
Vehicle	0	8,529	8,529
Pre-operating Expenses	3,418	9,114	12,532
Initial Working Capital	0	12,228	12,228
Interest During Construction	175	3,911	4,086
Total	32,231	106,950	139,181
Case 2A			
Plant Investment:			
Machinery and equipment	67,151	139,100	206,251
Building and structure	1,506	19,981	21,487
Vehicle	0	14,604	14,604
Pre-operating Expenses	3,417	18,070	21,488
Initial Working Capital	0	23,988	23,988
Interest During Construction	2,370	12,746	15,116
Total	74,444	228,491	302,935
Case 2B			
Plant Investment:			
Machinery and equipment	52,716	117,879	170,595
Building and structure	971	19,242	20,213
Vehicle	0	14,604	14,604
Pre-operating Expenses	3,417	14,790	18,208
Initial Working Capital	0	22,866	22,866
Interest During Construction	175	6,707	6,882
Total	57,279	196,088	253,368

Table 16-3-2 Additional Investment

(Unit : Rs.thousand)

Case 1

Project year	3	6	8	10	12	14
Machinery and equipment	45,872	38,564	79,166	92,152	79,166	79,166
Building and structure	3,252	1,568	4,548	5,221	4,003	3,930
Vehicle	2,293	3,478	7,491	6,918	7,530	6,345
Total	51,417	43,610	91,205	104,291	90,699	89,441

Case 2

Project year	5	8	10
Machinery and equipment	79,166	92,152	158,331
Building and structure	4,548	5,221	7,533
Vehicle	7,491	6,918	13,874
Total	91,205	104,291	179,738

Case 3

Project year	7	11	14
Machinery and equipment	84,436	171,318	158,331
Building and structure	4,820	9,769	7,533
Vehicle	5,771	14,409	13,874
Total	95,027	195,496	179,738

16-4 Production Cost

Production cost consists of operating expenses, depreciation and financial costs. The operating expenses mentioned in Chapter 15 vary depending on the plant capacity installed and the operating rate. Depreciation charges and financial costs also vary every year. Table 16-4-1 summarizes annual production costs in Cases 1, 2 and 3 for the years in which the operation starts and when 100,000 and 300,000 ton capacities are installed.

Table 16-4-1 Production Cost Summary

(Unit : Rs. thousand)

Case 1A	Year 1	7	15
Capacity(ton/year)	50,000	100,000	300,000
Production(ton/year)	50,000	100,000	300,000
Variable Operating Costs	42,452	84,796	254,281
Fixed Operating Costs	8,148	12,904	32,704
Depreciation	13,898	22,031	42,652
Interest	17,920	35,253	51,452
Total Production Cost	82,418	154,984	381,089
Case 1B			
Variable Operating Costs	42,452	84,796	254,281
Fixed Operating Costs	7,740	12,593	32,458
Depreciation	11,376	19,509	42,617
Interest	9,922	21,546	34,869
Total Production Cost	71,490	138,444	364,224

Case 2A	Year 1	11
Capacity(ton/year)	100,000	300,000
Production(ton/year)	59,000	218,000
Variable Operating Costs	50,074	184,729
Fixed Operating Costs	14,032	33,436
Depreciation	24,620	39,063
Interest	31,883	99,779
Total Production Costs	120,610	357,006
Case 2B		
Variable Operating Costs	50,074	184,729
Fixed Operating Costs	13,422	33,059
Depreciation	20,991	38,999
Interest	22,813	62,485
Total Production Costs	107,300	319,271

Case 3A	Year 1	8	15
Capacity(ton/year)	50,000	100,000	300,000
Production(ton/year)	50,000	100,000	300,000
Variable Operating Costs	42,452	84,796	254,281
Fixed Operating Costs	8,148	13,586	34,216
Depreciation	17,920	22,031	48,717
Interest	17,920	37,924	67,400
Total Production Cost	82,418	158,336	404,614
Case 3B			
Variable Operating Costs	42,452	84,796	254,281
Fixed Operating Costs	7,740	13,291	33,970
Depreciation	11,376	19,509	48,682
Interest	9,952	20,538	49,060
Total Production Cost	71,490	138,134	385,993

16-5 Financial Profitability

16-5-1 Financial Internal Rate of Return

The internal rate of return (IRR) is the discount rate at which the present value of cash inflow is equal to the present value of cash outflow; in other words, it is the rate at which the present value of the receipts from the project is equal to the present value of the investment, and then, the net present value (NPV) is zero.

$$NPV = \sum_{i=1}^{n} \frac{Ci}{(1 + r)^{i-1}} = 0$$

where, n : project life, years
Ci: cash flow
r : internal rate of return

In a study of financial profitability, the IRR is referred to as financial internal rate of return (FIRR) which distinguishes the rate from economic internal rate of return (EIRR) which is used in national economic analysis.

Calculated FIRRs on investment (ROI) and on equity (ROE) and net present value (NPV) at a 10 percent discounted rate for all cases of this project based on the before-mentioned premises are as follows:

	Case 1		Case 2		Case 3	
FIRR(%)	A	B	A	B	A	B
ROI before tax	18.51	20.43	15.97	17.45	19.48	21.75
ROI after tax	12.29	13.72	10.51	11.51	14.37	16.25
ROE before tax	17.42	22.79	7.70	16.73	14.38	22.37
ROE after tax	11.16	16.65	n.r.	11.37	8.27	17.73
NPV at 10% (Rs.thousand)						
ROI after tax	60,558	88,598	17,796	49,121	104,395	132,434
ROE after tax	11,742	76,706	-101,352	17,170	-12,762	77,839

In Case 2A, no return on equity after tax is expected. Although ROI in Case 3 is the highest in both A and B cases, ROE after tax in Case 3A is only 8.27 percent which is the lowest in all cases except Case 2A. These FIRRs and NPV at 10 percent which is negative in both Cases 2A and 3A show that the project will be not feasible when it is executed on the schemes of these two cases.

A comparison between Cases 1B and 3B in FIRR, show that both cases show similar profitabilities; however, as indicated by the results for Case 3A, the profitability of Case 3A is more sensitive to the plant investment cost than that of Case 1A. Therefor, Case 1B is judged to be superior to Case 3B in this respect.

According to these results of FIRR study, Cases 1A and 1B for 50,000 ton capacity and Case 2B for 100,000 ton capacity are selected for further analysis.

16-5-2 Financial Statement

The results of financial calculation for Cases 1A, 1B and 2B are shown in the financial statement provided in this chapter. Each statement indicates the expected financial conditions of the project as described below.

(1) Production cost accounting table

The unit production cost is higher than the briquette sales price during the first eight years in Case 1A, three years in Case 1B and six years in Case 2B, chiefly because of high depreciation and financial costs. The depreciation and financial costs in Cases 1A and 1B, which account for over 30 percent of the total production cost, decrease to under 30 percent level after 200,000 ton and 150,000 ton production, respectively; however, they remain at over 30 percent of the total until 241,000 ton production in Case 2B.

The average unit production cost for 20 years in Case 2B, which is higher than that in both Cases 1A and 1B, shows that economies of scale may not be expected in Case 2B. Reasons for

this disadvantage are that the fixed operating cost of briquette production occupies a relatively small portion, approximately 10 percent of the production cost; and the operation rate in Case 2B does not reach 100 percent until the year in which 300,000 ton production starts, with the exception of the eighth year.

(2) Profit/loss & cash flow statement

The briquette sale makes a profit in and after the ninth year in Case 1A, the fourth year in Case 1B and the seventh year in Case 2B. The profit after tax for the project life amounts to 236.8 million rupees in Case 1A, 398.7 million rupees in Case 1B and 250.4 million rupees in Case 2B. In Cases 1B and 2B, no income tax is paid for four years after that positive profits are accounted; however, in Case 1A, no tax period is two years. The income tax reaches a total of 359.1 million rupees in Case 1A, 487.3 million rupees in Case 1B and 385.4 million rupees in Case 2B.

(3) Fund flow table

During the first eight years in Case 1A, three years in Case 1B and six years in Case 2B, the source of fund runs short of covering the fund applications, such as the increase in working capital or repayment of long-term loan, unless short-term loan is borrowed. Total short-term loan borrowed is 144.6 million rupees in Case 1A, 13.6 million rupees in Case 1B and 160.5 million rupees in Case 2B. For the total re-investments made for capacity expansion, 470 million rupees in Case 1 and 375 million rupees in Case 2, the cumulative cash-in-hand is sufficient to cover 34 percent of fund source for Case 1A and 57 percent for Case 1B; whereas, 81 percent of the total should be financed by long-term loan debt for Case 2B.

(4) Projected balance sheet

The initial plant investment is highest for Case 2B of these three cases; however, its book value of the plant assets is extremely lower than those of Cases 1A and 1B on the last project year, because the installation of 300,000 ton capacity is earlier and more assets have been depreciated in Case 2.

16-5-3 Financial Indicators

The following major financial indicators are calculated to evaluate the soundness of financial status of the project.

Profit break-even point (Profit BEP)
= (Fixed operating cost + Depreciation + Financial cost) / (Sales revenue -Variable operating cost) x 100

Cash break-even point (Cash BEP)
= (Production cost - Variable operating cost - Depreciation) / (Sales revenue - Variable operating cost) x 100

Debt service coverage ratio (DSC)
= (Profit after tax + Depreciation + Interest - Net working capital increase) / (Repayment + Interest)

Current ratio (CR)
= Current assets / Current liabilities

Financial indicators of the project are calculated as shown in Table 16-5-1.

(1) Profit break-even point

Profit break-even point represented by plant operation rate is the point at which profit and loss break even. In Case 1B no profit will be brought about on operation even at full capacity in the first three years, but after the sixth year the operation at a rate of 90 percent will be sufficient to obtain positive profit. For the first eight years in Case 1A and for the first six years in Case 2B, over-capacity production will be necessary to make profit.

(2) Cash break-even point

Cash break-even point is the point at which positive and negative cash generations break even. For the first year in Case 1B and for the first three years in Cases 1A and 2B, rates of production exceeding 100 percent will be required to generate cash to meet the required applications.

(3) Debt service coverage ratio

Debt service coverage ratio indicates that all loans and the related financial expenses can be repaid in the agreed yearly installments without relying on the makeshift funds when the ratio is larger than 1. Generally, the ratios of 1.5 to 3.0 range are acceptable and satisfactory. In Case 1B, after the first three years, the ratios remain over 1.5 except 1.46 and 1.48 in the fourth and sixth years; whereas, in Cases 1A and 2B the ratios are below 1 in the first six and eight years, and in succeeding 11 to 13 years ratios are barely over 1 but under 2. In the last year of the project, all the debt is assumed to be cleared, so the ratios in all cases are smaller than 1.

(4) Current ratio

Current ratio is an approximate indicator of a company's ability to meet current liabilities. The ratios of 2.0 to 1.2 can be considered a satisfactory range. The ratios in the ninth year and onwards in Case 1A, in the fourth year and onwards in Case 1B or in the seventh year and onwards in Case 2B are extremely high, because the entire cash surplus obtained is reserved.

Table 16-5-1 Financial Indicators

year	Profit BEP(%)			Cash BEP(%)			DSC			CR		
	1A	1B	2B	1A	1B	2B	1A	1B	2B	1A	1B	2B
1	233.8	169.8	283.4	152.5	103.3	179.4	0.26	0.52	0.11	1.3	2.9	1.3
2	197.4	148.5	215.5	134.4	96.9	141.2	0.40	0.76	0.30	0.8	3.1	0.9
3	165.0	120.1	164.2	114.3	78.6	109.6	0.30	0.75	0.39	0.8	4.1	0.8
4	124.6	96.3	124.7	86.2	63.0	83.7	0.58	1.46	0.54	1.0	17.8	1.0
5	122.5	94.4	104.1	84.1	61.1	69.4	0.67	1.94	0.63	1.3	26.6	1.7
6	116.1	91.2	118.8	81.2	61.4	80.2	0.63	1.48	0.76	1.5	19.6	2.3
7	105.5	80.7	98.4	72.4	51.3	65.6	0.85	2.07	1.06	2.9	24.9	14.3
8	101.6	80.5	79.7	68.5	51.2	52.0	0.91	1.61	1.73	6.3	20.4	21.2
9	92.1	74.0	93.4	60.9	45.3	60.9	1.42	1.91	1.68	17.1	22.2	25.5
10	90.4	73.6	84.4	59.1	44.9	55.0	1.44	1.71	1.65	19.4	19.6	20.8
11	79.9	67.1	92.7	57.1	44.3	65.8	1.74	2.00	1.49	22.9	22.5	25.0
12	78.7	66.3	82.8	56.3	43.9	58.5	1.38	1.84	1.54	17.3	19.0	28.8
13	72.4	63.0	74.0	48.7	39.4	52.0	1.75	2.32	1.67	21.1	24.0	32.7
14	67.9	59.0	65.4	47.9	39.0	46.1	1.53	2.03	1.72	17.6	19.3	36.2
15	63.5	55.1	62.9	42.2	33.7	44.1	1.90	2.64	1.81	22.2	25.0	42.2
16	61.6	53.6	56.4	40.9	33.0	42.9	1.90	2.63	1.66	29.1	33.4	47.7
17	58.2	50.8	54.9	39.5	32.0	41.5	1.93	2.67	1.70	35.9	41.7	53.4
18	56.0	49.1	53.5	38.0	31.1	40.0	1.95	2.66	1.75	42.6	49.8	59.2
19	50.5	44.1	47.4	36.5	30.1	38.5	1.94	2.65	1.72	49.0	57.6	64.6
20	48.4	42.5	46.0	35.1	29.2	37.1	0.37	0.50	0.32	26.9	45.2	38.2

16-6 Sensitivity Analysis

Using sensitivity analysis it is possible to show the degree to which the project's profitability is affected by changes in various parameters which relate to the project economics. In this study the effects on FIRRs and financial status by changing the following parameters are analyzed.

Plant cost
Raw material cost
Sales price
Operation rate
Interest rate on long-term loan

Table 16-6-1 shows the variation of expected FIRRs, profits, income tax, cash-in-hand and loans with changes of the above parameters.

Of these parameters the most sensitive to the financial profitability is the briquette sales price. If the price is eight percent lower than the base case in Cases 1A and 2B or 12 percent lower in Case 1B, the project will sustain a shortage of fund for all years after the start of operation. Following the briquette price the next most effective is the material cost, especially the coal cost(ex-mine price plus transportation cost); when it is 22 percent higher in Case 1A, 35 percent higher in Case 1B or 23 percent in Case 2B, the project will never escape from a shortage of fund.

The financial condition of the project will not be remarkably improved nor worsened with variation of the initial plant investment cost in positive and negative 20 percent in Case B.

Table 16-6-1(1) Sensitivity Analysis (Case 1A)

(Unit : Rs.thousand)

Parameter	IRROI(%) b/tax	IRROI(%) a/tax	IRROE(%) b/tax	IRROE(%) a/tax	Profit a/tax total	Income tax total	Cumulative cash-in-hand	S-T loan total
Plant cost								
+20 %	16.1	10.4	12.6	6.2	-17,190	148,706	-56,506	398,195
+10	17.3	11.3	15.3	9.4	129,691	263,691	56,004	232,597
Base	18.5	12.3	17.4	11.2	236,840	359,117	134,817	144,629
-10	19.9	13.4	19.4	13.2	333,592	445,628	212,412	96,416
-20	21.4	14.7	21.4	14.9	415,720	524,914	282,843	68,191
Coal cost								
+20 %	15.3	9.7	n.r	n.r	-229,764	36,446	-331,787	1,535,685
+10	17.0	11.0	12.5	4.4	51,286	190,563	-50,737	417,957
Base	18.5	12.3	17.4	11.2	236,840	359,117	134,817	144,629
-10	20.0	13.5	20.6	14.6	386,684	506,265	284,661	59,728
-20	21.4	14.7	23.0	16.8	521,957	639,697	419,934	30,875
Bagasse cost								
+20 %	18.1	12.0	16.4	10.0	193,649	318,528	91,626	188,363
+10	18.3	12.1	16.9	10.6	215,357	338,960	113,334	166,496
Base	18.5	12.3	17.4	11.2	236,840	359,117	134,817	144,629
-10	18.7	12.5	17.9	11.7	257,648	378,334	155,625	125,088
-20	18.9	12.6	18.3	12.3	277,454	396,842	175,431	110,360
Other material cost								
+20 %	17.4	11.3	14.2	7.5	106,290	238,396	4,267	318,547
+10	17.9	11.8	15.8	9.4	173,025	299,607	71,002	211,353
Base	18.5	12.3	17.4	11.2	236,840	359,117	134,817	144,629
-10	19.1	12.8	18.7	12.7	295,423	414,563	193,400	100,644
-20	19.6	13.2	19.9	14.0	352,202	469,518	250,179	71,656
Briquette price								
+20 %	26.1	18.8	30.3	22.0	909,780	1,111,953	803,218	1,913
+10	22.6	15.7	24.8	18.1	622,743	761,130	518,450	23,841
Base	18.5	12.3	17.4	11.2	236,840	359,117	134,817	144,629
-10	13.6	8.4	n.r	n.r	-884,763	0	-984,517	4,307,807
-20	6.5	2.7	n.r	n.r	-3,182,533	0	-3,280,018	13,771,404
Long-term loan rate								
+20 %	18.5	12.3	10.0	n.r	-4,682	159,485	-106,705	620,361
+10	18.5	12.3	15.1	8.5	138,989	272,516	36,966	301,468
Base	18.5	12.3	17.4	11.2	236,840	359,117	134,817	144,629
-10	18.5	12.3	19.2	13.4	316,885	428,107	214,862	72,651
-20	18.5	12.3	20.7	14.7	378,219	486,432	276,196	45,174
Operation rate								
Base	18.5	12.3	17.4	11.2	236,840	359,117	134,817	144,629
-10 %	15.9	10.2	n.r	n.r	-146,060	91,673	-244,523	1,299,515
-20	13.7	8.6	n.r	n.r	-934,497	0	-1,029,401	4,773,045

Note) n.r : no return

Table 16-6-1(2) Sensitivity Analysis (Case 1B)

(Unit : Rs.thousand)

Parameter	IRROI(%) b/tax	IRROI(%) a/tax	IRROE(%) b/tax	IRROE(%) a/tax	Profit a/tax total	Income tax total	Cumulative cash-in-hand	S-T loan total
Plant cost								
+20 %	17.9	11.7	20.6	15.9	266,856	348,647	208,652	16,721
+10	19.1	12.6	21.6	16.2	337,361	419,067	251,804	15,141
Base	20.4	13.7	22.8	16.7	398,686	487,283	292,070	13,596
-10	21.9	15.0	24.2	17.3	448,747	548,469	326,640	12,095
-20	23.6	16.3	26.0	18.3	497,246	607,745	362,906	10,651
Coal cost								
+20 %	16.9	10.8	15.0	8.7	115,356	205,199	8,739	81,148
+10	18.7	12.3	19.6	14.0	268,458	349,364	161,841	33,537
Base	20.4	13.7	22.8	16.7	398,686	487,283	292,070	13,596
-10	22.1	15.1	25.5	18.6	502,515	614,185	395,899	2,278
-20	23.7	16.4	28.0	20.2	604,257	738,536	497,640	0
Bagasse cost								
+20 %	20.0	13.4	22.1	16.1	370,315	452,607	263,698	17,947
+10	20.2	13.6	22.4	16.4	384,728	470,223	278,112	15,772
Base	20.4	13.7	22.8	16.7	398,686	487,283	292,070	13,596
-10	20.7	13.9	23.2	16.9	412,332	503,962	365,716	11,421
-20	20.9	14.1	23.5	17.2	425,844	520,476	319,228	9,245
Other material cost								
+20 %	19.2	12.7	20.5	14.8	304,102	385,035	197,485	26,382
+10	19.8	13.2	21.7	15.9	356,512	436,090	249,896	19,989
Base	20.4	13.7	22.8	16.7	398,686	487,283	292,070	13,596
-10	21.0	14.2	23.8	17.4	438,300	535,701	331,684	7,203
-20	21.7	14.7	24.8	18.1	476,725	582,664	370,108	3,172
Briquette price								
+20 %	29.0	21.0	35.8	26.4	1,017,407	1,193,706	906,251	0
+10	24.9	17.5	29.9	21.7	705,192	851,831	596,306	0
Base	20.4	13.7	22.8	16.7	398,686	487,283	292,070	13,596
-10	15.1	9.4	n.r	n.r	-64,521	56,744	-168,868	244,245
-20	7.7	3.8	n.r	n.r	-2,112,405	0	-2,214,484	8,551,427
Long-term loan rate								
+20 %	20.4	13.7	20.2	14.5	299,746	386,380	193,129	31,126
+10	20.4	13.7	21.6	15.8	356,736	440,039	250,119	21,242
Base	20.4	13.7	22.8	16.7	398,686	487,283	292,070	13,596
-10	20.4	13.7	23.9	17.4	431,958	527,948	325,341	5,950
-20	20.4	13.7	24.9	18.1	461,282	563,790	354,666	2,823
Operation rate								
Base	20.4	13.7	22.8	16.7	398,686	487,283	292,070	13,596
-10 %	17.5	11.3	16.7	10.5	161,512	261,118	58,455	98,369
-20	15.2	9.5	n.r	n.r	-88,253	56,404	-187,750	453,497

Note) n.r : no return

Table 16-6-1(3) Sensitivity Analysis (Case 2B)

(Unit : Rs.thousand)

Parameter	IRROI(%) b/tax	IRROI(%) a/tax	IRROE(%) b/tax	IRROE(%) a/tax	Profit a/tax total	Income tax total	Cumulative cash-in-hand	S-T loan total
Plant cost								
+20 %	15.3	9.9	14.8	10.3	90,242	277,386	177,161	188,488
+10	16.3	10.7	15.7	10.8	173,184	328,082	202,532	172,563
Base	17.5	11.5	16.7	11.4	250,369	385,388	231,362	160,549
-10	18.7	12.5	18.0	12.4	324,879	446,220	266,491	151,390
-20	20.1	13.7	19.5	13.6	398,391	508,931	309,221	142,460
Coal cost								
+20 %	14.4	9.3	n.r	n.r	-151,838	98,251	-170,845	1,190,378
+10	16.0	10.4	12.1	3.9	58,550	243,984	39,544	347,362
Base	17.5	11.5	16.7	11.4	250,369	385,388	231,362	160,549
-10	18.8	12.7	19.6	14.5	419,221	535,372	400,215	82,840
-20	20.1	13.8	21.9	16.5	552,797	675,641	533,790	48,235
Bagasse cost								
+20 %	17.1	11.2	15.8	10.3	206,685	345,031	187,679	194,649
+10	17.3	11.4	16.3	10.9	228,206	365,557	209,199	175,745
Base	17.5	11.5	16.7	11.4	250,369	385,388	231,362	160,549
-10	17.6	11.7	17.2	11.9	272,625	450,090	253,619	147,835
-20	17.8	11.8	17.6	12.4	294,881	424,792	275,875	135,122
Other material cost								
+20 %	16.4	10.7	13.6	7.1	106,745	275,302	87,739	282,807
+10	16.9	11.1	15.3	9.8	185,571	326,676	166,565	212,393
Base	17.5	11.5	16.7	11.4	250,369	385,388	231,362	160,549
-10	18.0	12.0	17.9	12.8	316,018	443,040	297,012	123,188
-20	18.5	12.4	19.0	13.9	379,454	497,575	360,447	95,942
Briquette price								
+20 %	24.6	17.6	28.4	21.0	984,792	1,203,635	961,247	7,687
+10	21.2	14.7	23.6	17.7	659,056	805,513	637,781	39,322
Base	17.5	11.5	16.7	11.4	250,369	385,388	231,362	160,549
-10	12.9	8.1	n.r	n.r	-793,457	0	-810,194	4,129,000
-20	6.2	2.3	n.r	n.r	-3,521,576	0	-3,536,043	15,613,900
Long-term loan rate								
+20	17.5	11.5	11.9	3.0	45,506	249,278	26,500	437,157
+10	17.5	11.5	14.6	8.7	149,820	309,988	130,813	261,289
Base	17.5	11.5	16.7	11.4	250,369	385,388	231,362	160,549
-10	17.5	11.5	18.3	13.2	336,235	454,993	317,228	100,048
-20	17.5	11.5	19.6	14.5	406,065	514,183	387,058	66,880
Operation rate								
+10 % (100 %)	19.1	12.9	20.1	14.9	451,414	570,848	428,722	91,552
Base	17.5	11.5	16.7	11.4	250,369	385,388	231,362	160,549
-10 % (82 %)	15.7	10.2	10.9	n.r	24,919	218,473	9,599	351,656
-20 (72 %)	13.6	8.7	n.r	n.r	-331,687	24,390	-343,322	1,923,580

16-7 Reference Study

In according with the results of the tentative study showing the economic advantages of coal washing, the project adopts the coal washing process prior to briquetting. In this financial study, profitability of a reference case without coal washing and the case with washing are comparatively studied.

The two cases, one with and one without coal washing, are based on 50,000 ton capacity installing imported machine, i.e.,Case A with no expansion. Table 16-7-1 summarizes the condition and results of calculation.

Table 16-7-1 Reference Study Summary

(Unit : Rs.thousand)

	With washing	Without washing
Capital cost		
Plant investment	135,908	114,330
Pre-operating cost	15,812	11,388
Initial working capital	12,975	10,977
Interest during construction	9,866	7,973
Total	174,560	144,668
Production cost		
Variable cost	42,452	33,684
Fixed cost	8,148	7,068
Depreciation	13,898	11,738
Financial cost	17,920	14,011
Total	82,418	66,501
Unit cost (Rs./ton,briquette)	1,648	1,330
Sales price (Rs./ton)	1,191-1,513	738-980
IRROI before tax	13.19 %	1.72 %
IRROI after tax	8.70	no return
IRROE before tax	no return	no return
IRROE after Tax	no return	no return

Although the process without coal washing is 318 rupees lower in unit production cost than that with washing, this cost will be over 35 percent higher of the sales price of the former owing to the reduction in calorific value of product; therefore, the project will make no profit without coal washing process except in terms of ROI before tax, even which is only 1.72 percent return.

16-8 Evaluation

The following conclusion and evaluation for the project are drawn from an overall assessment of the results of a series of financial analyses.

(1) When the project is executed on the scheme of Case A which is using import machine, it is financially feasible in Case 1A but not in Cases 2A and 3A. Although ROIs in Case 3A are one or two percent higher than those in Case 1A, however, ROE after tax which indicates a substantial profit to the the investor is not in the viable range.

(2) Among the cases in Case B which is using all local made machine, Cases 1B and 3B show similar FIRRs both higher than that in Case 2B. According to the sensitivity analyses, financial difficulties in Case 2B could not be averted when factors such as raw material prices, sales prices or operation rate, which influence the profitability of the project vary only within a probable range. Whereas, in Case 1B, variation of these factors within the same range can be sustained without incurring financial difficulties.

(3) The profits mentioned in the financial study can be obtained when the conditions assumed in the study are fulfilled. The production schedules in all cases reflect the potential market of coal briquette conservatively in Cases 1 and 3 and optimistically in Case 2. Difference in the premises between Cases 1 and 3 depends on the energy policy of the Government. As indicated in the results of FIRR study, the change in the investment cost, i.e., the difference between A and B, is more sensitive to FIRR in Case 3. Under these circumstances, Case 1 is concluded to be acceptable in view of financial evaluation.

(4) The result of reference study for coal washing supports that as long as Lakhra coal is used, coal washing is an essential process to the success of the project.

PRODUCTION COST ACCOUNTING TABLE 1A-1

(Unit : Rs. thousand)

Project year		1	2	3	4	5	6	7	8	9	10
Year		1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Annual production volume (ton)		50,000	50,000	50,000	75,000	75,000	75,000	100,000	100,000	150,000	150,000
VARIABLE OPERATING COSTS	- Unit cost - (Rs/product, ton)										
Coal	505.89	25,294	25,294	25,294	37,942	37,942	37,942	50,589	50,589	75,883	75,883
Bagasse	64.19	3,209	3,209	3,209	4,814	4,814	4,814	6,419	6,419	9,628	9,628
Slaked lime	44.86	2,243	2,243	2,243	3,365	3,365	3,365	4,486	4,486	6,729	6,729
Slack wax	17.32	866	866	866	1,299	1,299	1,299	1,732	1,732	2,597	2,597
Light fuel oil	126.45	6,322	6,322	6,322	9,484	9,484	9,484	12,645	12,645	18,967	18,967
Electricity	46.66	2,333	2,333	2,333	3,499	3,499	3,499	4,666	4,666	6,998	6,998
Demand charge	1,080/kW	1,404	1,404	1,404	2,052	2,052	2,052	2,700	2,700	3,996	3,996
Water	3.43	172	172	172	257	257	257	343	343	515	515
Handling	12.18	609	609	609	913	913	913	1,218	1,218	1,826	1,826
Sub-total	--	42,452	42,452	42,452	63,624	63,624	63,624	84,796	84,796	127,140	127,140
FIXED OPERATING COSTS											
Salaries & wages		1,056	1,056	1,056	1,152	1,152	1,152	1,498	1,498	1,594	1,594
Maintenace		5,176	5,176	5,176	7,404	7,404	7,404	9,865	9,865	12,955	12,955
Insurance :											
Fire insurance		841	750	980	889	764	921	811	1,254	1,112	1,574
Group insurance		7	7	7	8	8	8	10	10	10	10
Worker's compensation		12	12	12	14	14	14	21	21	23	23
Plant overheads		1,056	1,056	1,056	1,152	1,152	1,152	1,498	1,498	1,594	1,594
Miscellaneouse		0	0	0	0	0	0	0	0	0	0
Sub-total		8,148	8,057	8,287	10,619	10,494	10,652	12,904	13,346	17,288	17,750
DEPRECIATION											
Machinery & equipment		11,646	11,646	11,646	16,233	16,233	16,233	20,089	20,089	28,006	28,006
Buildings		546	546	546	709	709	709	787	787	1,014	1,014
Transportation vehicles		1,706	1,706	1,706	2,164	2,164	459	1,154	1,154	2,194	2,194
Sub-total		13,898	13,898	13,898	19,106	19,106	17,400	22,031	22,031	31,214	31,214
FINANCIAL COSTS											
Interest on long-term foreign currency loan		12,160	12,160	12,160	12,160	12,101	11,742	10,974	10,163	9,352	8,542
Interest on long-term local currency loan		5,761	6,957	6,957	14,464	14,464	14,464	20,552	20,274	33,312	32,733
Interest on Short-term Loan		0	2,460	3,917	5,744	4,888	3,642	3,727	1,739	784	0
Sub-total		17,920	21,577	23,033	32,367	31,453	29,847	35,253	32,176	43,448	41,275
TOTAL PRODUCTION COST		82,418	85,983	87,670	125,717	124,677	121,523	154,984	152,349	219,091	217,380
UNIT PRODUCTION COST (Rs/product, ton)		1,648	1,720	1,753	1,676	1,662	1,620	1,550	1,523	1,461	1,449

PRODUCTION COST ACCOUNTING TABLE 1A-2

(Unit : Rs. thousand)

Project year Year	11 2002	12 2003	13 2004	14 2005	15 2006	16 2007	17 2008	18 2009	19 2010	20 2011	Total
Annual production volume (ton)	200,000	200,000	250,000	250,000	300,000	300,000	300,000	300,000	300,000	300,000	3,575,000
VARIABLE OPERATING COSTS											
Coal	101,178	101,178	126,472	126,472	151,767	151,767	151,767	151,767	151,767	151,767	1,808,554
Bagasse	12,838	12,838	16,047	16,047	19,256	19,256	19,256	19,256	19,256	19,256	229,470
Slaked lime	8,972	8,972	11,216	11,216	13,459	13,459	13,459	13,459	13,459	13,459	160,383
Slack wax	3,463	3,463	4,329	4,329	5,195	5,195	5,195	5,195	5,195	5,195	61,905
Light fuel oil	25,289	25,289	31,612	31,612	37,934	37,934	37,934	37,934	37,934	37,934	452,049
Electricity	9,331	9,331	11,664	11,664	13,997	13,997	13,997	13,997	13,997	13,997	166,795
Demand charge	5,292	5,292	6,588	6,588	7,992	7,992	7,992	7,992	7,992	7,992	95,472
Water	686	686	858	858	1,029	1,029	1,029	1,029	1,029	1,029	12,262
Handling	2,435	2,435	3,044	3,044	3,653	3,653	3,653	3,653	3,653	3,653	43,526
Sub-total	169,485	169,485	211,829	211,829	254,281	254,281	254,281	254,281	254,281	254,281	3,030,415
FIXED OPERATING COSTS											
Salaries & wages	2,681	2,681	2,873	2,873	2,873	2,873	2,873	2,873	2,873	2,873	41,154
Maintenace	17,450	17,450	21,340	21,340	25,229	25,229	25,229	25,229	25,229	25,229	310,738
Insurance :											
Fire insurance	1,372	1,757	1,565	1,881	1,667	1,390	1,125	885	658	483	22,678
Group insurance	17	17	18	18	18	18	18	18	18	18	263
Worker's compensation	40	40	44	44	44	44	44	44	44	44	598
Plant overheads	2,681	2,681	2,873	2,873	2,873	2,873	2,873	2,873	2,873	2,873	41,154
Miscellaneouse	0	0	0	0	0	0	0	0	0	0	0
Sub-total	24,242	24,627	28,713	29,029	32,704	32,427	32,162	31,922	31,695	31,520	416,585
DEPRECIATION											
Machinery & equipment	25,575	25,575	33,492	28,905	36,821	36,821	32,965	32,965	25,048	25,048	483,044
Buildings	1,276	1,276	1,476	1,476	1,672	1,672	1,672	1,672	1,672	1,672	22,903
Transportation vehicles	3,577	2,882	4,388	2,890	4,159	2,775	2,775	1,269	1,269	0	42,584
Sub-total	30,428	29,733	39,355	33,270	42,652	41,269	37,412	35,906	27,990	26,721	548,531
FINANCIAL COSTS											
Interest on L/t foreign currency loan	7,731	6,920	6,110	5,299	4,489	3,678	2,867	2,057	1,246	494	152,402
Interest on L/t local currency loan	43,999	43,421	46,250	45,417	46,964	45,598	43,758	41,918	39,932	37,946	605,139
Interest on Short-term Loan	0	0	0	0	0	0	0	0	0	0	26,901
Sub-total	51,730	50,341	52,360	50,716	51,452	49,276	46,625	43,975	41,178	38,440	784,442
TOTAL PRODUCTION COST	275,885	274,185	332,257	324,844	381,089	377,252	370,480	366,084	355,144	350,961	4,779,973
UNIT PRODUCTION COST (Rs/product.ton)	1,379	1,371	1,329	1,299	1,270	1,258	1,235	1,220	1,184	1,170	1,337

--- The Islamic Republic of Pakistan / Coal Briquettes Development Project < Case 1A > ---

	--IRROI--	--IRROE--
Before Tax	18.51 %	17.42 %
After Tax	12.29 %	11.16 %
NPV at 10%	60,558	11,742

PROFIT / LOSS & CASH FLOW STATEMENT 1A-1

(Unit : Rs. thousand)

Project year	-2	-1	1	2	3	4	5	6	7	8	9	10
Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Annual production volume (ton)	--	--	50,000	50,000	50,000	75,000	75,000	75,000	100,000	100,000	150,000	150,000
SALES REVENUE												
Coal briquette sales (ton)	0	0	50,000	50,000	50,000	75,000	75,000	75,000	100,000	100,000	150,000	150,000
[Sales price (Rs/ton)]	--	--	(1,191)	(1,290)	(1,397)	(1,513)	(1,513)	(1,513)	(1,513)	(1,513)	(1,513)	(1,513)
Total sales revenue	0	0	59,550	64,500	69,850	113,475	113,475	113,475	151,300	151,300	226,950	226,950
COSTS & EXPENSES												
Variable operating costs	0	0	42,452	42,452	42,452	63,624	63,624	63,624	84,796	84,796	127,140	127,140
Fixed operating costs	0	0	8,148	8,057	8,287	10,619	10,494	10,652	12,904	13,346	17,288	17,750
Total costs & expences	0	0	50,600	50,509	50,739	74,244	74,119	74,276	97,700	98,142	144,429	144,891
DEPRECIATION & AMORTIZATION												
Depreciation	0	0	13,898	13,898	13,898	19,106	19,106	17,400	22,031	22,031	31,214	31,214
FINANCIAL COSTS												
Interest on long-term loan	0	0	17,920	19,116	19,116	26,623	26,565	26,205	31,526	30,437	42,664	41,275
Interest on short-term loan	0	0	0	2,460	3,917	5,744	4,888	3,642	3,727	1,739	784	0
Total finacial costs	0	0	17,920	21,577	23,033	32,367	31,453	29,847	35,253	32,176	43,448	41,275
NET INCOME BEFORE TAX	0	0	-22,868	-21,483	-17,820	-12,242	-11,202	-8,048	-3,683	-1,049	7,859	9,571
INCOME TAX	0	0	0	0	0	0	0	0	0	0	0	0
NET INCOME AFTER TAX	0	0	-22,868	-21,483	-17,820	-12,242	-11,202	-8,048	-3,683	-1,049	7,859	9,571
CASH INFLOW												
Sales revenues	0	0	59,550	64,500	69,850	113,475	113,475	113,475	151,300	151,300	226,950	226,950
Financial resources total	19,818	84,917	13,228	21,058	82,299	26,279	19,579	63,648	9,351	95,420	0	81,127
CASH OUTFLOW												
Investments	45,282	129,279	0	0	51,417	0	0	43,610	0	91,205	0	104,291
Operating costs	0	0	50,600	50,509	50,739	74,244	74,119	74,276	97,700	98,142	144,429	144,891
Increase in working capital	0	0	4,258	244	5,902	2,261	-4	4,498	1,948	10,134	3,926	11,347
Repayments on debt	0	0	0	13,228	21,058	30,882	27,487	24,893	25,750	15,062	11,984	7,768
Interests on debt	0	0	17,920	21,577	23,033	32,367	31,453	29,847	35,253	32,176	43,448	41,275
Income tax	0	0	0	0	0	0	0	0	0	0	0	0
(Income tax-ROI)	(0)	(0)	(0)	(0)	(0)	(0)	(11,138)	(11,989)	(17,363)	(17,120)	(28,219)	(27,965)
CASHFLOW - ROI BEFORE TAX	-45,282	-121,163	4,692	13,747	-38,208	36,970	39,361	-8,908	51,653	-48,182	78,595	-33,578
CASHFLOW - ROI AFTER TAX	-45,282	-121,163	4,692	13,747	-38,208	36,970	28,223	-20,898	34,289	-65,302	50,376	-61,543
CASHFLOW - ROE BEFORE TAX	-25,464	-44,362	0	0	0	0	0	0	0	0	23,164	-1,494
CASHFLOW - ROE AFTER TAX	-25,464	-44,362	0	0	0	0	0	0	0	0	23,164	-1,494

PROFIT / LOSS & CASH FLOW STATEMENT 1A-2

(Unit : Rs. thousand)

Project year Year	11 2002	12 2003	13 2004	14 2005	15 2006	16 2007	17 2008	18 2009	19 2010	20 2011	Total
Annual production volume (ton)	200,000	200,000	250,000	250,000	300,000	300,000	300,000	300,000	300,000	300,000	3,575,000
SALES REVENUE											
Coal briquette sales (ton)	200,000	200,000	250,000	250,000	300,000	300,000	300,000	300,000	300,000	300,000	3,575,000
[Sales price (Rs/ton)]	(1,513)	(1,513)	(1,513)	(1,513)	(1,513)	(1,513)	(1,513)	(1,513)	(1,513)	(1,513)	--
Total sales revenue	302,600	302,600	378,250	378,250	453,900	453,900	453,900	453,900	453,900	453,900	5,375,930
COSTS & EXPENSES											
Variable operating expenses	169,485	169,485	211,829	211,829	254,281	254,281	254,281	254,281	254,281	254,281	3,030,415
Fixed operating expenses	24,242	24,627	28,713	29,029	32,704	32,427	32,162	31,922	31,695	31,520	416,585
Total costs & expences	193,726	194,111	240,542	240,858	286,985	286,708	286,443	286,203	285,976	285,801	3,447,000
DEPRECIATION & AMORTIZATION											
Depreciation	30,428	29,733	39,355	33,270	42,652	41,269	37,412	35,906	27,990	26,721	548,531
FINANCIAL COSTS											
Interest on long-term loan	51,730	50,341	52,360	50,716	51,452	49,276	46,625	43,975	41,178	38,440	757,541
Interest on short-term loan	0	0	0	0	0	0	0	0	0	0	26,901
Total finacial costs	51,730	50,341	52,360	50,716	51,452	49,276	46,625	43,975	41,178	38,440	784,442
NET INCOME BEFORE TAX	26,716	28,415	45,994	53,407	72,811	76,648	83,420	87,816	98,756	102,939	595,957
INCOME TAX	1,503	15,628	25,296	29,374	40,046	42,157	45,881	48,299	54,316	56,617	359,117
NET INCOME AFTER TAX	25,213	12,787	20,697	24,033	32,765	34,492	37,539	39,517	44,440	46,323	236,840
CASH INFLOW											
Sales revenues	302,600	302,600	378,250	378,250	453,900	453,900	453,900	453,900	453,900	453,900	5,375,930
Financial resources total	0	25,086	0	19,950	0	0	0	0	0	0	561,759
CASH OUTFLOW											
Investments	0	90,699	0	89,441	0	0	0	0	0	0	645,224
Operating costs	193,726	194,111	240,542	240,858	286,985	286,708	286,443	286,203	285,976	285,801	3,447,000
Increase in working capital	3,929	10,132	3,923	10,130	3,925	-9	-9	-8	-8	-6	76,514
Repayments on debt	7,768	9,513	9,513	13,161	13,161	16,406	16,406	17,410	17,410	262,901	561,759
Interests on debt	51,730	50,341	52,360	50,716	51,452	49,276	46,625	43,975	41,178	38,440	784,442
Income tax	1,503	15,628	25,296	29,374	40,046	42,157	45,881	48,299	54,316	56,617	359,117
(Income tax-ROI)	(43,145)	(43,316)	(54,094)	(57,267)	(68,345)	(69,258)	(71,525)	(72,485)	(76,964)	(77,758)	(747,953)
CASHFLOW - ROI BEFORE TAX	104,946	7,657	133,786	37,822	162,990	167,202	167,466	167,705	167,932	314,276	1,361,478
CASHFLOW - ROI AFTER TAX	61,800	-35,658	79,691	-19,446	94,645	97,944	95,941	95,220	90,968	236,518	613,526
CASHFLOW - ROE BEFORE TAX	45,447	-27,111	71,913	-6,105	98,377	101,520	104,435	106,321	109,344	12,936	568,920
CASHFLOW - ROE AFTER TAX	43,944	-42,739	46,617	-35,479	58,331	59,363	58,554	58,022	55,028	-43,681	209,804

FUND FLOW STATEMENT 1A-1

(Unit : Rs. thousand)

Project year Year	-2 1990	-1 1991	1 1992	2 1993	3 1994	4 1995	5 1996	6 1997	7 1998	8 1999	9 2000	10 2001
SOURCES OF FUNDS												
Funds provided from operations :												
Net income	0	0	-22,868	-21,483	-17,820	-12,242	-11,202	-8,048	-3,683	-1,049	7,859	9,571
Depreciation	0	0	13,898	13,898	13,898	19,106	19,106	17,400	22,031	22,031	31,214	31,214
Increase in owner's equity	25,463	44,361	0	0	0	0	0	0	0	0	0	0
Increase in long-term debt :												
Foreign currency loan	19,818	37,269	0	0	0	0	0	0	0	0	0	0
Local currency loan	0	47,648	0	0	51,417	0	0	43,610	0	91,205	0	81,127
Short-term debt	0	0	13,228	21,058	30,882	26,279	19,579	20,038	9,351	4,215	0	0
Increase in account payable	0	0	1,483	0	0	704	0	0	724	0	1,399	0
Total sources	45,282	129,278	5,740	13,472	78,377	33,847	27,483	73,000	28,422	116,402	40,473	121,912
APPLICATIONS OF FUNDS												
Acquisition of plant assets	40,114	95,794	0	0	51,417	0	0	43,610	0	91,205	0	104,291
Pre-production expenditures	3,418	12,394	0	0	0	0	0	0	0	0	0	0
Intial working capital	0	12,975	0	0	0	0	0	0	0	0	0	0
Interest during construction	1,750	8,116	0	0	0	0	0	0	0	0	0	0
Increase in account receivable	0	0	2,978	248	267	2,181	0	0	1,891	0	3,783	0
Increase in inventory :												
Raw materials	0	0	1,076	0	1,170	0	0	1,170	0	2,341	0	2,341
Products	0	0	1,687	-3	8	783	-4	5	781	15	1,543	15
Spare parts	0	0	0	0	4,457	0	0	3,322	0	7,779	0	8,991
Repayment on foreign currency loan	0	0	0	0	0	0	1,208	3,408	3,806	3,806	3,806	3,806
Repayment on local currency loan	0	0	0	0	0	0	0	1,906	1,906	1,906	3,963	3,963
Repayment on short-term debt	0	0	0	13,228	21,058	30,882	26,279	19,579	20,038	9,351	4,215	0
Total applications	45,282	129,279	5,740	13,472	78,377	33,847	27,483	73,000	28,422	116,402	17,308	123,406
SURPLUS FUNDS	0	0	0	0	0	0	0	0	0	0	23,164	-1,494
CUMULATIVE SURPLUS FUNDS	0	0	0	0	0	0	0	0	0	0	23,164	21,669

FUND FLOW STATEMENT 1A-2

(Unit : Rs. thousand)

Project year Year	11 2002	12 2003	13 2004	14 2005	15 2006	16 2007	17 2008	18 2009	19 2010	20 2011	Total
SOURCES OF FUNDS											
Funds provided from operations :											
Net income	25,213	12,787	20,697	24,033	32,765	34,492	37,539	39,517	44,440	46,323	236,840
Depreciation	30,428	29,733	39,355	33,270	42,652	41,269	37,412	35,906	27,990	26,721	548,531
Increase in owner's equity	0	0	0	0	0	0	0	0	0	0	69,824
Increase in long-term debt :											
Foreign currency loan	0	0	0	0	0	0	0	0	0	0	57,087
Local currency loan	0	25,086	0	19,950	0	0	0	0	0	0	360,043
Short-term debt	0	0	0	0	0	0	0	0	0	0	144,629
Increase in account payable	1,482	0	1,407	0	1,395	0	0	0	0	0	8,594
Total sources	57,123	67,605	61,460	77,253	76,812	75,760	74,951	75,423	72,430	73,043	1,425,549
APPLICATIONS OF FUNDS											
Acquisition of plant assets	0	90,699	0	89,441	0	0	0	0	0	0	606,571
Pre-production expenditures	0	0	0	0	0	0	0	0	0	0	15,812
Intial working capital	0	0	0	0	0	0	0	0	0	0	12,975
Interest during construction	0	0	0	0	0	0	0	0	0	0	9,866
Increase in account receivable	3,783	0	3,783	0	3,783	0	0	0	0	0	22,695
Increase in inventory :											
Raw materials	0	2,341	0	2,341	0	0	0	0	0	0	12,779
Products	1,628	13	1,548	11	1,538	-9	-9	-8	-8	-6	9,527
Spare parts	0	7,779	0	7,779	0	0	0	0	0	0	40,197
Repayment on foreign currency loan	3,806	3,806	3,806	3,806	3,806	3,806	3,806	3,806	3,806	2,995	57,087
Repayment on local currency loan	3,963	5,707	5,707	9,355	9,355	12,600	12,600	13,604	13,604	259,905	360,043
Repayment on short-term debt	0	0	0	0	0	0	0	0	0	0	144,629
Total applications	13,179	110,344	14,843	112,732	18,481	16,397	16,397	17,402	17,402	262,895	1,292,092
SURPLUS FUNDS	43,944	-42,739	46,617	-35,479	58,331	59,363	58,554	58,022	55,028	-189,851	133,458
CUMULATIVE SURPLUS FUNDS	65,613	22,874	69,491	34,012	92,343	151,706	210,260	268,282	323,310	133,458	133,458

PROJECTED BALANCE SHEET 1A-1

(Unit : Rs. thousand)

Project year	-2	-1	1	2	3	4	5	6	7	8	9	10
Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
ASSETS												
CURRENT ASSETS :												
Cash	0	1,359	1,359	1,359	1,359	1,359	1,359	1,359	1,359	1,359	24,522	23,028
Accounts receivable	0	0	2,978	3,225	3,493	5,674	5,674	5,674	7,565	7,565	11,348	11,348
Inventories :												
Raw materials	0	1,265	2,341	2,341	3,511	3,511	3,511	4,681	4,681	7,022	7,022	9,363
Products	0	0	1,687	1,684	1,691	2,475	2,471	2,476	3,257	3,271	4,814	4,830
Spare parts	0	10,352	10,352	10,352	14,809	14,809	14,869	18,131	18,131	25,910	25,910	34,901
Total current assets	0	12,975	18,715	18,960	24,862	27,827	27,823	32,320	34,992	45,127	73,616	83,468
PROPERTIES :												
Plant & equipment :												
Machinery & equipment	39,497	116,458	116,458	104,812	139,038	127,393	111,160	133,491	117,258	176,334	156,245	220,391
Buildings	617	10,921	10,921	10,375	13,081	12,535	11,827	12,686	11,977	15,738	14,951	19,158
Vehicles	0	8,529	8,529	6,823	7,410	5,705	3,540	4,854	4,395	10,732	9,578	14,302
Others	0	0	0	0	0	0	0	0	0	0	0	0
Less : Accumulated depreciation	0	0	13,898	13,898	13,898	19,106	19,106	17,400	22,031	22,031	31,214	31,214
Net properties	40,114	135,908	122,011	108,113	145,632	126,526	107,420	133,630	111,599	180,774	149,559	222,636
OTHER ASSETS :												
Intangibles	5,168	25,678	25,678	25,678	25,678	25,678	25,678	25,678	25,678	25,678	25,678	25,678
Deffered charges	0	0	0	0	0	0	0	0	0	0	0	0
Total other assets	5,168	25,678	25,678	25,678	25,678	25,678	25,678	25,678	25,678	25,678	25,678	25,678
TOTAL ASSETS	45,282	174,561	166,404	152,750	196,172	180,031	160,921	191,628	172,269	251,578	248,853	331,782
LIABILITIES AND SHAREHOLDERS' EQIUTY												
CURRENT LIABILITIES :												
Accounts payable :												
Raw materials	0	0	1,265	1,265	1,265	1,897	1,897	1,897	2,529	2,529	3,794	3,794
Utilities	0	0	130	130	130	194	194	194	257	257	384	384
Others	0	0	88	88	88	96	96	96	125	125	133	133
Short-term debt	0	0	13,228	21,058	30,882	26,279	19,579	20,038	9,351	4,215	0	0
Total current liabilities	0	0	14,711	22,540	32,365	28,465	21,765	22,225	12,261	7,126	4,310	4,310
LONG-TERM DEBT :												
Foreign currency loan	19,818	57,087	57,087	57,087	57,087	57,087	55,879	52,471	48,665	44,859	41,053	37,248
Local currency loan	0	47,648	47,648	47,648	99,065	99,065	99,065	140,769	138,864	228,163	224,200	301,365
Total long-term debt	19,818	104,735	104,735	104,735	156,152	156,152	154,944	193,240	187,528	273,022	265,253	338,612
SHAREHOLDERS' EQUITY :												
Capital stock	25,463	69,824	69,824	69,824	69,824	69,824	69,824	69,824	69,824	69,824	69,824	69,824
Retained earnings	0	0	-22,868	-44,351	-62,170	-74,412	-85,614	-93,662	-97,346	-98,395	-90,536	-80,965
Total shareholders' equity	25,463	69,824	46,956	25,473	7,653	-4,589	-15,791	-23,839	-27,522	-28,571	-20,712	-11,142
TOTAL LIABILITIES AND EQUITY	45,282	174,561	166,404	152,750	196,172	180,031	160,921	191,628	172,269	251,578	248,853	331,782

PROJECTED BALANCE SHEET 1A-2

(Unit : Rs. thousand)

Project year	11	12	13	14	15	16	17	18	19	20
Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
ASSETS										
CURRENT ASSETS :										
Cash	66,972	24,233	70,850	35,371	93,701	153,065	211,619	269,641	324,669	134,817
Accounts receivable	15,130	15,130	18,913	18,913	22,695	22,695	22,695	22,695	22,695	22,695
Inventories :										
Raw materials	9,363	11,703	11,703	14,044	14,044	14,044	14,044	14,044	14,044	14,044
Products	6,458	6,470	8,018	8,029	9,566	9,557	9,548	9,540	9,533	9,527
Spare parts	34,901	42,680	42,680	50,459	50,459	50,459	50,459	50,459	50,459	50,459
Total current assets	132,823	100,216	152,163	126,814	190,465	249,819	308,364	366,378	421,399	231,541
PROPERTIES :										
Plant & equipment :										
Machinery & equipment	192,385	245,975	220,400	266,074	237,169	200,348	163,526	130,561	97,596	72,548
Buildings	18,143	20,871	19,595	22,049	20,574	18,902	17,229	15,557	13,885	12,213
Vehicles	12,108	16,061	13,179	15,136	12,247	8,088	5,313	2,538	1,269	0
Others	0	0	0	0	0	0	0	0	0	0
Less : Accumulated depreciation	30,428	29,733	39,355	33,270	42,652	41,269	37,412	35,906	27,990	26,721
Net properties	192,208	253,174	213,819	269,990	227,337	186,069	148,657	112,750	84,761	58,040
OTHER ASSETS :										
Intangibles	25,678	25,678	25,678	25,678	25,678	25,678	25,678	25,678	25,678	25,678
Deffered charges	0	0	0	0	0	0	0	0	0	0
Total other assets	25,678	25,678	25,678	25,678	25,678	25,678	25,678	25,678	25,678	25,678
TOTAL ASSETS	350,708	379,068	391,659	422,482	443,480	461,566	482,699	504,807	531,837	315,259
LIABILITIES AND SHAREHOLDERS' EQIUTY										
CURRENT LIABILITIES :										
Accounts payable :										
Raw materials	5,058	5,058	6,323	6,323	7,587	7,587	7,587	7,587	7,587	7,587
Utilities	510	510	637	637	767	767	767	767	767	767
Others	223	223	239	239	239	239	239	239	239	239
Short-term debt	0	0	0	0	0	0	0	0	0	0
Total current liabilities	5,792	5,792	7,199	7,199	8,594	8,594	8,594	8,594	8,594	8,594
LONG-TERM DEBT :										
Foreign currency loan	33,442	29,636	25,830	22,024	18,219	14,413	10,607	6,801	2,995	0
Local currency loan	297,402	316,781	311,074	321,669	312,313	299,713	287,113	273,509	259,905	0
Total long-term debt	330,844	346,417	336,904	343,693	330,532	314,126	297,720	280,310	262,901	0
SHAREHOLDERS' EQUITY :										
Capital stock	69,824	69,824	69,824	69,824	69,824	69,824	69,824	69,824	69,824	69,824
Retained earnings	-55,753	-42,966	-22,269	1,764	34,529	69,021	106,560	146,077	190,518	236,840
Total shareholders' equity	14,071	26,858	47,555	71,588	104,353	138,845	176,384	215,901	260,341	306,664
TOTAL LIABILITIES AND EQUITY	350,708	379,068	391,659	422,482	443,480	461,566	482,699	504,807	531,837	315,259

PRODUCTION COST ACCOUNTING TABLE 1B-1

(Unit : Rs. thousand)

Project year		1	2	3	4	5	6	7	8	9	10
Year		1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Annual production volume (ton)		50,000	50,000	50,000	75,000	75,000	75,000	100,000	100,000	150,000	150,000
VARIABLE OPERATING COSTS	- Unit cost - (Rs/product.ton)										
Coal	505.89	25,294	25,294	25,294	37,942	37,942	37,942	50,589	50,589	75,883	75,883
Bagasse	64.19	3,209	3,209	3,209	4,814	4,814	4,814	6,419	6,419	9,628	9,628
Slaked lime	44.86	2,243	2,243	2,243	3,365	3,365	3,365	4,486	4,486	6,729	6,729
Slack wax	17.32	866	866	866	1,299	1,299	1,299	1,732	1,732	2,597	2,597
Light fuel oil	126.45	6,322	6,322	6,322	9,484	9,484	9,484	12,645	12,645	18,967	18,967
Electricity	46.66	2,333	2,333	2,333	3,499	3,499	3,499	4,666	4,666	6,998	6,998
Demand charge	1,080/kW	1,404	1,404	1,404	2,052	2,052	2,052	2,700	2,700	3,996	3,996
Water	3.43	172	172	172	257	257	257	343	343	515	515
Handling	12.18	609	609	609	913	913	913	1,218	1,218	1,826	1,826
Sub-total	--	42,452	42,452	42,452	63,624	63,624	63,624	84,796	84,796	127,140	127,140
FIXED OPERATING COSTS											
Salaries & wages		1,056	1,056	1,056	1,152	1,152	1,152	1,498	1,498	1,594	1,594
Maintenace		4,930	4,930	4,930	7,159	7,159	7,159	8,820	8,820	12,709	12,709
Insurance :											
Fire insurance		679	604	850	775	667	840	746	1,205	1,080	1,558
Group insurance		7	7	7	8	8	8	10	10	10	10
Worker's compensation		12	12	12	14	14	14	21	21	23	23
Plant overheads		1,056	1,056	1,056	1,152	1,152	1,152	1,498	1,498	1,594	1,594
Miscellaneouse		0	0	0	0	0	0	0	0	0	0
Sub-total		7,740	7,665	7,911	10,260	10,151	10,325	12,593	13,051	17,010	17,488
DEPRECIATION											
Machinery & equipment		9,159	9,159	9,159	13,747	13,747	13,747	17,603	17,603	25,520	25,520
Buildings		511	511	511	673	673	673	752	752	979	979
Transportation vehicles		1,706	1,706	1,706	2,164	2,164	459	1,154	1,154	2,194	2,194
Sub-total		11,376	11,376	11,376	16,584	16,584	14,878	19,509	19,509	28,692	28,692
FINANCIAL COSTS											
Interest on long-term foreign currency loan		1,964	1,964	1,964	1,964	1,958	1,906	1,786	1,655	1,524	1,393
Interest on long-term local currency loan		7,958	10,846	10,846	18,353	18,353	18,353	19,760	19,326	26,643	25,909
Interest on Short-term Loan		0	894	814	821	0	0	0	0	0	0
Sub-total		9,922	13,704	13,624	21,138	20,311	20,259	21,546	20,981	28,168	27,303
TOTAL PRODUCTION COST		71,490	75,197	75,363	111,606	110,671	109,086	138,444	138,338	201,010	200,623
UNIT PRODUCTION COST (Rs/product.ton)		1,430	1,504	1,507	1,488	1,476	1,454	1,384	1,383	1,340	1,337

PRODUCTION COST ACCOUNTING TABLE 1B-2

(Unit : Rs. thousand)

Project year	11	12	13	14	15	16	17	18	19	20	Total
Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	
Annual production volume (ton)	200,000	200,000	250,000	250,000	300,000	300,000	300,000	300,000	300,000	300,000	3,575,000
VARIABLE OPERATING COSTS											
Coal	101,178	101,178	126,472	126,472	151,767	151,767	151,767	151,767	151,767	151,767	1,808,554
Bagasse	12,838	12,838	16,047	16,047	19,256	19,256	19,256	19,256	19,256	19,256	229,470
Slaked lime	8,972	8,972	11,216	11,216	13,459	13,459	13,459	13,459	13,459	13,459	160,383
Slack wax	3,463	3,463	4,329	4,329	5,195	5,195	5,195	5,195	5,195	5,195	61,905
Light fuel oil	25,289	25,289	31,612	31,612	37,934	37,934	37,934	37,934	37,934	37,934	452,049
Electricity	9,331	9,331	11,664	11,664	13,997	13,997	13,997	13,997	13,997	13,997	166,795
Demand charge	5,292	5,292	6,588	6,588	7,992	7,992	7,992	7,992	7,992	7,992	95,472
Water	686	686	858	858	1,029	1,029	1,029	1,029	1,029	1,029	12,262
Handling	2,435	2,435	3,044	3,044	3,653	3,653	3,653	3,653	3,653	3,653	43,526
Sub-total	169,485	169,485	211,829	211,829	254,281	254,281	254,281	254,281	254,281	254,281	3,030,415
FIXED OPERATING COSTS											
Salaries & wages	2,681	2,681	2,873	2,873	2,873	2,873	2,873	2,873	2,873	2,873	41,154
Maintenace	17,205	17,205	21,094	21,094	24,984	24,984	24,984	24,984	24,984	24,984	305,822
Insurance :											
Fire insurance	1,372	1,757	1,565	1,881	1,666	1,389	1,125	885	658	483	21,783
Group insurance	17	17	18	18	18	18	18	18	18	18	263
Worker's compensation	40	40	44	44	44	44	44	44	44	44	598
Plant overheads	2,681	2,681	2,873	2,873	2,873	2,873	2,873	2,873	2,873	2,873	41,154
Miscellaneouse	0	0	0	0	0	0	0	0	0	0	0
Sub-total	23,995	24,381	28,467	28,783	32,458	32,181	31,916	31,676	31,449	31,274	410,773
DEPRECIATION											
Machinery & equipment	25,575	25,575	33,492	28,905	36,821	36,821	32,965	32,965	25,048	25,048	458,181
Buildings	1,240	1,240	1,440	1,440	1,637	1,637	1,637	1,637	1,637	1,637	22,192
Transportation vehicles	3,577	2,882	4,388	2,890	4,159	2,775	2,775	1,269	1,269	0	42,584
Sub-total	30,393	29,697	39,320	33,235	42,617	41,233	37,377	35,871	27,954	26,685	522,958
FINANCIAL COSTS											
Interest on L/t foreign currency loan	1,262	1,131	1,000	869	739	608	477	346	215	90	24,816
Interest on L/t local currency loan	33,709	32,974	36,056	35,248	34,130	33,013	31,553	30,094	28,480	26,865	498,470
Interest on Short-term Loan	0	0	0	0	0	0	0	0	0	0	2,529
Sub-total	34,971	34,105	37,056	36,118	34,869	33,620	32,030	30,440	28,694	26,955	525,814
TOTAL PRODUCTION COST	258,844	257,668	316,672	309,964	364,224	361,315	355,604	352,268	342,379	339,195	4,489,960
UNIT PRODUCTION COST (Rs/product ton)	1,294	1,288	1,267	1,240	1,214	1,204	1,185	1,174	1,141	1,131	1,256

--- The Islamic Republic of Pakistan / Coal Briquettes Development Project < Case 1B > ---

	--IRROI--	--IRROE--
Before Tax	20.43 %	22.79 %
After Tax	13.72 %	16.65 %
NPV at 10%	88,598	76,706

PROFIT / LOSS & CASH FLOW STATEMENT 1B-1

(Unit : Rs. thousand)

Project year	-2	-1	1	2	3	4	5	6	7	8	9	10
Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Annual production volume (ton)	--	--	50,000	50,000	50,000	75,000	75,000	75,000	100,000	100,000	150,000	150,000
SALES REVENUE												
Coal briquette sales (ton)	0	0	50,000	50,000	50,000	75,000	75,000	75,000	100,000	100,000	150,000	150,000
[Sales price (Rs/ton)]	--	--	(1,191)	(1,290)	(1,397)	(1,513)	(1,513)	(1,513)	(1,513)	(1,513)	(1,513)	(1,513)
Total sales revenue	0	0	59,550	64,500	69,850	113,475	113,475	113,475	151,300	151,300	226,950	226,950
COSTS & EXPENSES												
Variable operating costs	0	0	42,452	42,452	42,452	63,624	63,624	63,624	84,796	84,796	127,140	127,140
Fixed operating costs	0	0	7,740	7,665	7,911	10,260	10,151	10,325	12,593	13,051	17,010	17,488
Total costs & expences	0	0	50,192	50,117	50,363	73,884	73,775	73,949	97,389	97,848	144,150	144,628
DEPRECIATION & AMORTIZATION												
Depreciation	0	0	11,376	11,376	11,376	16,584	16,584	14,878	19,509	19,509	28,692	28,692
FINANCIAL COSTS												
Interest on long-term loan	0	0	9,922	12,810	12,810	20,317	20,311	20,259	21,546	20,981	28,168	27,303
Interest on short-term loan	0	0	0	894	814	821	0	0	0	0	0	0
Total finacial costs	0	0	9,922	13,704	13,624	21,138	20,311	20,259	21,546	20,981	28,168	27,303
NET INCOME BEFORE TAX	0	0	-11,940	-10,697	-5,513	1,869	2,804	4,389	12,856	12,962	25,940	26,327
INCOME TAX	0	0	0	0	0	0	0	0	0	3,702	14,257	14,480
NET INCOME AFTER TAX	0	0	-11,940	-10,697	-5,513	1,869	2,804	4,389	12,856	9,260	11,673	11,847
CASH INFLOW												
Sales revenues	0	0	59,550	64,500	69,850	113,475	113,475	113,475	151,300	151,300	226,950	226,950
Financial resources total	3,453	80,056	4,808	4,374	55,831	0	0	12,610	0	53,089	0	58,447
CASH OUTFLOW												
Investments	32,231	106,950	0	0	51,417	0	0	43,610	0	91,205	0	104,291
Operating costs	0	0	50,192	50,117	50,363	73,884	73,775	73,949	97,389	97,848	144,150	144,628
Increase in working capital	0	0	4,244	245	5,903	2,262	-4	4,498	1,948	10,135	3,927	11,348
Repayments on debt	0	0	0	4,808	4,374	4,414	170	3,484	3,586	3,586	5,643	5,643
Interests on debt	0	0	9,922	13,704	13,624	21,138	20,311	20,259	21,546	20,981	28,168	27,303
Income tax	0	0	0	0	0	0	0	0	0	3,702	14,257	14,480
(Income tax-ROI)	(0)	(0)	(0)	(0)	(0)	(0)	(12,714)	(13,556)	(18,921)	(18,669)	(29,759)	(29,496)
CASHFLOW - ROI BEFORE TAX	-32,231	-103,039	5,114	14,138	-37,833	37,329	39,703	-8,582	51,963	-47,887	78,873	-33,317
CASHFLOW - ROI AFTER TAX	-32,231	-103,039	5,114	14,138	-37,833	37,329	26,990	-22,138	33,042	-66,556	49,114	-62,813
CASHFLOW - ROE BEFORE TAX	-28,778	-26,894	0	0	0	11,777	19,223	-19,715	26,831	-19,366	45,063	-7,815
CASHFLOW - ROE AFTER TAX	-28,778	-26,894	0	0	0	11,777	19,223	-19,715	26,831	-23,068	30,796	-22,295

PROFIT / LOSS & CASH FLOW STATEMENT 1B-2

(Unit : Rs. thousand)

Project year Year	11 2002	12 2003	13 2004	14 2005	15 2006	16 2007	17 2008	18 2009	19 2010	20 2011	Total
Annual production volume (ton)	200,000	200,000	250,000	250,000	300,000	300,000	300,000	300,000	300,000	300,000	3,575,000
SALES REVENUE											
Coal briquette sales (ton)	200,000	200,000	250,000	250,000	300,000	300,000	300,000	300,000	300,000	300,000	3,575,000
[Sales price (Rs/ton)]	(1,513)	(1,513)	(1,513)	(1,513)	(1,513)	(1,513)	(1,513)	(1,513)	(1,513)	(1,513)	--
Total sales revenue	302,600	302,600	378,250	378,250	453,900	453,900	453,900	453,900	453,900	453,900	5,375,930
COSTS & EXPENSES											
Variable operating expenses	169,485	169,485	211,829	211,829	254,281	254,281	254,281	254,281	254,281	254,281	3,030,415
Fixed operating expenses	23,995	24,381	28,467	28,783	32,458	32,181	31,916	31,676	31,449	31,274	410,773
Total costs & expences	193,480	193,865	240,295	240,612	286,739	286,462	286,197	285,957	285,730	285,555	3,441,188
DEPRECIATION & AMORTIZATION											
Depreciation	30,393	29,697	39,320	33,235	42,617	41,233	37,377	35,871	27,954	26,685	522,958
FINANCIAL COSTS											
Interest on long-term loan	34,971	34,106	37,056	36,118	34,869	33,620	32,030	30,440	28,694	26,955	523,285
Interest on short-term loan	0	0	0	0	0	0	0	0	0	0	2,529
Total finacial costs	34,971	34,106	37,056	36,118	34,869	33,620	32,030	30,440	28,694	26,955	525,814
NET INCOME BEFORE TAX	43,757	44,932	61,579	68,287	89,676	92,585	98,297	101,633	111,522	114,706	885,970
INCOME TAX	24,066	24,713	33,868	37,558	49,322	50,922	54,063	55,898	61,337	63,088	487,283
NET INCOME AFTER TAX	19,690	20,219	27,710	30,729	40,354	41,663	44,234	45,735	50,185	51,618	398,686
CASH INFLOW											
Sales revenues	302,600	302,600	378,250	378,250	453,900	453,900	453,900	453,900	453,900	453,900	5,375,930
Financial resources total	0	26,639	0	0	0	0	0	0	0	0	299,307
CASH OUTFLOW											
Investments	0	90,699	0	89,441	0	0	0	0	0	0	609,844
Operating costs	193,480	193,865	240,295	240,612	286,739	286,462	286,197	285,957	285,730	285,555	3,441,188
Increase in working capital	3,929	10,132	3,923	10,130	3,925	-9	-9	-8	-8	-6	76,506
Repayments on debt	5,643	6,147	6,147	8,271	8,271	10,609	10,609	11,674	11,674	184,553	299,307
Interests on debt	34,971	34,106	37,056	36,118	34,869	33,620	32,030	30,440	28,694	26,955	525,814
Income tax	24,066	24,713	33,868	37,558	49,322	50,922	54,063	55,898	61,337	63,088	487,283
(Income tax-ROI)	(43,300)	(43,471)	(54,249)	(57,422)	(68,500)	(69,413)	(71,680)	(72,640)	(77,119)	(77,913)	(758,822)
CASHFLOW - ROI BEFORE TAX	105,191	7,904	134,032	38,068	163,236	167,448	167,712	167,951	168,178	314,022	1,397,374
CASHFLOW - ROI AFTER TAX	61,891	-35,567	79,783	-19,355	94,737	98,035	96,033	95,311	91,059	236,109	639,151
CASHFLOW - ROE BEFORE TAX	64,577	-5,711	90,828	-6,321	120,096	123,219	125,073	125,837	127,809	102,514	868,248
CASHFLOW - ROE AFTER TAX	40,511	-30,423	56,960	-43,879	70,775	72,297	71,010	69,939	66,472	39,426	380,965

FUND FLOW STATEMENT 1B-1

(Unit : Rs. thousand)

Project year	-2	-1	1	2	3	4	5	6	7	8	9	10
Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
SOURCES OF FUNDS												
Funds provided from operations :												
Net income	0	0	-11,940	-10,697	-5,513	1,869	2,804	4,389	12,856	9,260	11,673	11,847
Depreciation	0	0	11,376	11,376	11,376	16,584	16,584	14,878	19,509	19,509	28,692	28,692
Increase in owner's equity	28,778	26,894	0	0	0	0	0	0	0	0	0	0
Increase in long-term debt :												
Foreign currency loan	3,453	5,768	0	0	0	0	0	0	0	0	0	0
Local currency loan	0	74,288	0	0	51,417	0	0	12,610	0	53,089	0	58,447
Short-term debt	0	0	4,808	4,374	4,414	0	0	0	0	0	0	0
Increase in account payable	0	0	1,483	0	0	704	0	0	724	0	1,399	0
Total sources	32,231	106,950	5,727	5,053	61,694	19,157	19,389	31,877	33,089	81,858	41,765	98,987
APPLICATIONS OF FUNDS												
Acquisition of plant assets	28,639	81,696	0	0	51,417	0	0	43,610	0	91,205	0	104,291
Pre-production expenditures	3,418	9,114	0	0	0	0	0	0	0	0	0	0
Intial working capital	0	12,228	0	0	0	0	0	0	0	0	0	0
Interest during construction	175	3,911	0	0	0	0	0	0	0	0	0	0
Increase in account receivable	0	0	2,978	248	267	2,181	0	0	1,891	0	3,783	0
Increase in inventory :												
Raw materials	0	0	1,076	0	1,170	0	0	1,170	0	2,341	0	2,341
Products	0	0	1,673	-2	8	784	-4	6	781	15	1,543	16
Spare parts	0	0	0	0	4,457	0	0	3,322	0	7,779	0	8,991
Repayment on foreign currency loan	0	0	0	0	0	0	170	512	615	615	615	615
Repayment on local currency loan	0	0	0	0	0	0	0	2,972	2,972	2,972	5,028	5,028
Repayment on short-term debt	0	0	0	4,808	4,374	4,414	0	0	0	0	0	0
Total applications	32,231	106,950	5,727	5,053	61,694	7,379	166	51,592	6,259	104,926	10,969	121,281
SURPLUS FUNDS	0	0	0	0	0	11,777	19,223	-19,715	26,831	-23,068	30,796	-22,295
CUMULATIVE SURPLUS FUNDS	0	0	0	0	0	11,777	31,000	11,285	38,116	15,048	45,844	23,549

FUND FLOW STATEMENT 1B-2

(Unit : Rs. thousand)

Project year Year	11 2002	12 2003	13 2004	14 2005	15 2006	16 2007	17 2008	18 2009	19 2010	20 2011	Total
SOURCES OF FUNDS											
Funds provided from operations :											
Net income	19,690	20,219	27,710	30,729	40,354	41,663	44,234	45,735	50,185	51,618	398,686
Depreciation	30,393	29,697	39,320	33,235	42,617	41,233	37,377	35,871	27,954	26,685	522,958
Increase in owner's equity	0	0	0	0	0	0	0	0	0	0	55,672
Increase in long-term debt :											
Foreign currency loan	0	0	0	0	0	0	0	0	0	0	9,221
Local currency loan	0	26,639	0	0	0	0	0	0	0	0	276,490
Short-term debt	0	0	0	0	0	0	0	0	0	0	13,596
Increase in account payable	1,482	0	1,407	0	1,395	0	0	0	0	0	8,594
Total sources	51,565	76,555	68,438	63,964	84,366	82,896	81,610	81,605	78,139	78,303	1,285,217
APPLICATIONS OF FUNDS											
Acquisition of plant assets	0	90,699	0	89,441	0	0	0	0	0	0	580,998
Pre-production expenditures	0	0	0	0	0	0	0	0	0	0	12,532
Intial working capital	0	0	0	0	0	0	0	0	0	0	12,228
Interest during construction	0	0	0	0	0	0	0	0	0	0	4,086
Increase in account receivable	3,783	0	3,783	0	3,783	0	0	0	0	0	22,695
Increase in inventory :											
Raw materials	0	2,341	0	2,341	0	0	0	0	0	0	12,779
Products	1,628	13	1,548	11	1,538	-9	-9	-8	-8	-6	9,519
Spare parts	0	7,779	0	7,779	0	0	0	0	0	0	40,107
Repayment on foreign currency loan	615	615	615	615	615	615	615	615	615	547	9,221
Repayment on local currency loan	5,028	5,533	5,533	7,656	7,656	9,994	9,994	11,060	11,060	184,006	276,490
Repayment on short-term debt	0	0	0	0	0	0	0	0	0	0	13,596
Total applications	11,054	106,979	11,478	107,842	13,591	10,600	10,600	11,666	11,667	184,548	994,251
SURPLUS FUNDS	40,511	-30,423	56,960	-43,879	70,775	72,297	71,010	69,939	66,472	-106,245	290,966
CUMULATIVE SURPLUS FUNDS	64,060	33,637	90,597	46,718	117,493	189,790	260,800	330,739	397,211	290,966	290,966

PROJECTED BALANCE SHEET 1B-1

(Unit : Rs. thousand)

Project year	-2	-1	1	2	3	4	5	6	7	8	9	10
Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
ASSETS												
CURRENT ASSETS :												
Cash	0	1,104	1,104	1,104	1,104	12,881	32,103	12,389	39,220	16,151	46,947	24,653
Accounts receivable	0	0	2,978	3,225	3,493	5,674	5,674	5,674	7,565	7,565	11,348	11,348
Inventories :												
Raw materials	0	1,265	2,341	2,341	3,511	3,511	3,511	4,681	4,681	7,022	7,022	9,363
Products	0	0	1,673	1,671	1,679	2,463	2,459	2,465	3,246	3,262	4,805	4,821
Spare parts	0	9,860	9,860	9,860	14,317	14,317	14,317	17,639	17,639	25,418	25,418	34,409
Total current assets	0	12,228	17,955	18,200	24,103	38,846	58,064	42,848	72,351	59,418	95,540	84,593
PROPERTIES :												
Plant & equipment :												
Machinery & equipment	27,992	91,595	91,595	82,435	119,148	109,988	96,242	121,059	107,312	168,875	151,272	217,904
Buildings	646	10,211	10,211	9,701	12,442	11,931	11,258	12,153	11,480	15,276	14,525	18,767
Vehicles	0	8,529	8,529	6,823	7,410	5,705	3,540	4,854	4,395	10,732	9,578	14,302
Others	0	0	0	0	0	0	0	0	0	0	0	0
Less : Accumulated depreciation	0	0	11,376	11,376	11,376	16,584	16,584	14,878	19,509	19,509	28,692	28,692
Net properties	28,639	110,335	98,959	87,583	127,624	111,040	94,456	123,188	103,679	175,375	146,682	222,281
OTHER ASSETS :												
Intangibles	3,593	16,618	16,618	16,618	16,618	16,618	16,618	16,618	16,618	16,618	16,618	16,618
Deffered charges	0	0	0	0	0	0	0	0	0	0	0	0
Total other assets	3,593	16,618	16,618	16,618	16,618	16,618	16,618	16,618	16,618	16,618	16,618	16,618
TOTAL ASSETS	32,231	139,181	133,532	122,401	168,345	166,504	169,138	182,654	192,648	251,411	258,840	323,492
LIABILITIES AND SHAREHOLDERS' EQIUTY												
CURRENT LIABILITIES :												
Accounts payable :												
Raw materials	0	0	1,265	1,265	1,265	1,897	1,897	1,897	2,529	2,529	3,794	3,794
Utilities	0	0	130	130	130	194	194	194	257	257	384	384
Others	0	0	88	88	88	96	96	96	125	125	133	133
Short-term debt	0	0	4,808	4,374	4,414	0	0	0	0	0	0	0
Total current liabilities	0	0	6,291	5,857	5,897	2,186	2,186	2,186	2,911	2,911	4,310	4,310
LONG-TERM DEBT :												
Foreign currency loan	3,453	9,221	9,221	9,221	9,221	9,221	9,051	8,539	7,924	7,309	6,695	6,080
Local currency loan	0	74,288	74,288	74,288	125,705	125,705	125,705	135,343	132,372	182,489	177,461	230,880
Total long-term debt	3,453	83,509	83,509	83,509	134,926	134,926	134,756	143,882	140,296	189,799	184,156	236,960
SHAREHOLDERS' EQUITY :												
Capital stock	28,778	55,672	55,672	55,672	55,672	55,672	55,672	55,672	55,672	55,672	55,672	55,672
Retained earnings	0	0	-11,940	-22,637	-28,150	-26,281	-23,476	-19,087	-6,231	3,029	14,702	26,549
Total shareholders' equity	28,778	55,672	43,733	33,036	27,523	29,392	32,196	36,585	49,441	58,701	70,374	82,221
TOTAL LIABILITIES AND EQUITY	32,231	139,181	133,532	122,401	168,345	166,504	169,138	182,654	192,648	251,411	258,840	323,492

PROJECTED BALANCE SHEET 1B-2

(Unit : Rs. thousand)

Project year	11	12	13	14	15	16	17	18	19	20
Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
ASSETS										
CURRENT ASSETS :										
Cash	65,164	34,740	91,700	47,822	118,597	190,893	261,904	331,843	398,315	292,070
Accounts receivable	15,130	15,130	18,913	18,913	22,695	22,695	22,695	22,695	22,695	22,695
Inventories :										
Raw materials	9,363	11,703	11,703	14,044	14,044	14,044	14,044	14,044	14,044	14,044
Products	6,449	6,462	8,010	8,020	9,558	9,549	9,540	9,532	9,524	9,519
Spare parts	34,409	42,188	42,188	49,967	49,967	49,967	49,967	49,967	49,967	49,967
Total current assets	130,515	110,224	172,514	138,766	214,860	287,148	358,149	428,080	494,545	388,294
PROPERTIES :										
Plant & equipment :										
Machinery & equipment	192,385	245,975	220,400	266,074	237,169	200,348	163,526	130,561	97,596	72,548
Buildings	17,788	20,551	19,311	21,801	20,361	18,724	17,087	15,451	13,814	12,177
Vehicles	12,108	16,061	13,179	15,136	12,247	8,088	5,313	2,538	1,269	0
Others	0	0	0	0	0	0	0	0	0	0
Less : Accumulated depreciation	30,393	29,697	39,320	33,235	42,617	41,233	37,377	35,871	27,954	26,685
Net properties	191,888	252,890	213,570	269,776	227,160	185,927	148,550	112,679	84,725	58,040
OTHER ASSETS :										
Intangibles	16,618	16,618	16,618	16,618	16,618	16,618	16,618	16,618	16,618	16,618
Deffered charges	0	0	0	0	0	0	0	0	0	0
Total other assets	16,618	16,618	16,618	16,618	16,618	16,618	16,618	16,618	16,618	16,618
TOTAL ASSETS	339,021	379,732	402,702	425,160	458,638	489,693	523,317	557,378	595,888	462,952
LIABILITIES AND SHAREHOLDERS' EQIUTY										
CURRENT LIABILITIES :										
Accounts payable :										
Raw materials	5,058	5,058	6,323	6,323	7,587	7,587	7,587	7,587	7,587	7,587
Utilities	510	510	637	637	767	767	767	767	767	767
Others	223	223	239	239	239	239	239	239	239	239
Short-term debt	0	0	0	0	0	0	0	0	0	0
Total current liabilities	5,792	5,792	7,199	7,199	8,594	8,594	8,594	8,594	8,594	8,594
LONG-TERM DEBT :										
Foreign currency loan	5,465	4,851	4,236	3,621	3,006	2,392	1,777	1,162	547	0
Local currency loan	225,852	246,958	241,426	233,769	226,113	216,119	206,125	195,066	184,006	0
Total long-term debt	231,317	251,809	245,661	237,391	229,120	218,511	207,902	196,228	184,553	0
SHAREHOLDERS' EQUITY :										
Capital stock	55,672	55,672	55,672	55,672	55,672	55,672	55,672	55,672	55,672	55,672
Retained earnings	46,240	66,459	94,169	124,898	165,252	206,916	251,149	296,884	347,069	398,686
Total shareholders' equity	101,912	122,131	149,842	180,571	220,925	262,588	306,822	352,556	402,741	454,359
TOTAL LIABILITIES AND EQUITY	339,021	379,732	402,702	425,160	458,638	489,693	523,317	557,378	595,888	462,952

PRODUCTION COST ACCOUNTING TABLE 2B-1

(Unit : Rs. thousand)

Project year		1	2	3	4	5	6	7	8	9	10
Year		1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Annual production volume (ton)		59,000	64,000	70,000	77,000	91,000	108,000	127,000	150,000	178,000	197,000
VARIABLE OPERATING COSTS	- Unit cost - (Rs/product, ton)										
Coal	505.89	29,847	32,377	35,412	38,953	46,036	54,636	64,248	75,883	90,048	99,660
Bagasse	64.19	3,787	4,108	4,493	4,942	5,841	6,932	8,152	9,628	11,425	12,645
Slaked lime	44.86	2,647	2,871	3,140	3,454	4,082	4,845	5,698	6,729	7,985	8,838
Slack wax	17.32	1,022	1,108	1,212	1,333	1,576	1,870	2,199	2,597	3,082	3,411
Light fuel oil	126.45	7,460	8,093	8,851	9,736	11,507	13,656	16,059	18,967	22,508	24,910
Electricity	46.66	2,753	2,986	3,266	3,593	4,246	5,039	5,925	6,998	8,305	9,191
Demand charge	1,080/kW	1,637	1,767	1,922	2,104	2,467	2,907	3,400	3,996	4,722	5,214
Water	3.43	202	220	240	264	312	370	436	515	611	676
Handling	12.18	718	779	852	937	1,108	1,315	1,546	1,826	2,167	2,398
Sub-total	--	50,074	54,309	59,390	65,318	77,174	91,571	107,662	127,140	150,853	166,944
FIXED OPERATING COSTS											
Salaries & wages		1,498	1,498	1,498	1,498	1,498	1,594	1,594	1,594	2,681	2,681
Maintenace		9,141	9,141	9,141	9,141	9,141	13,031	13,031	13,031	17,526	17,526
Insurance :											
Fire insurance		1,254	1,117	980	842	1,289	1,152	975	1,463	1,286	2,194
Group insurance		10	10	10	10	10	10	10	10	17	17
Worker's compensation		21	21	21	21	21	23	23	23	40	40
Plant overheads		1,498	1,498	1,498	1,498	1,498	1,594	1,594	1,594	2,681	2,681
Miscellaneouse		0	0	0	0	0	0	0	0	0	0
Sub-total		13,422	13,285	13,147	13,010	13,457	17,404	17,227	17,715	24,232	25,140
DEPRECIATION											
Machinery & equipment		17,060	17,060	17,060	17,060	17,060	24,976	24,976	24,976	34,191	34,191
Buildings		1,011	1,011	1,011	1,011	1,011	1,238	1,238	1,238	1,499	1,499
Transportation vehicles		2,921	2,921	2,921	2,921	2,921	1,498	1,498	1,498	2,882	2,882
Sub-total		20,991	20,991	20,991	20,991	20,991	27,712	27,712	27,712	38,572	38,572
FINANCIAL COSTS											
Interest on long-term foreign currency loan		1,964	1,964	1,964	1,964	1,958	1,906	1,786	1,655	1,524	1,393
Interest on long-term local currency loan		20,849	20,849	20,849	20,849	20,849	34,165	33,331	32,497	46,348	45,514
Interest on Short-term Loan		0	3,788	6,118	7,004	5,746	4,132	3,073	0	0	0
Sub-total		22,813	26,601	28,931	29,817	28,553	40,203	38,190	34,152	47,872	46,907
TOTAL PRODUCTION COST		107,300	115,185	122,459	129,136	140,175	176,891	190,792	206,719	261,529	277,563
UNIT PRODUCTION COST (Rs/product, ton)		1,819	1,800	1,749	1,677	1,540	1,638	1,502	1,378	1,469	1,409

PRODUCTION COST ACCOUNTING TABLE 2B-2

(Unit : Rs. thousand)

Project year Year	11 2002	12 2003	13 2004	14 2005	15 2006	16 2007	17 2008	18 2009	19 2010	20 2011	Total
Annual production volume (ton)	218,000	241,000	266,000	294,000	300,000	300,000	300,000	300,000	300,000	300,000	3,940,000
VARIABLE OPERATING COSTS											
Coal	110,284	121,919	134,567	148,731	151,767	151,767	151,767	151,767	151,767	151,767	1,993,203
Bagasse	13,993	15,469	17,074	18,871	19,256	19,256	19,256	19,256	19,256	19,256	252,899
Slaked lime	9,780	10,812	11,933	13,190	13,459	13,459	13,459	13,459	13,459	13,459	176,757
Slack wax	3,775	4,173	4,606	5,091	5,195	5,195	5,195	5,195	5,195	5,195	68,225
Light fuel oil	27,565	30,474	33,635	37,175	37,934	37,934	37,934	37,934	37,934	37,934	498,202
Electricity	10,171	11,244	12,410	13,717	13,997	13,997	13,997	13,997	13,997	13,997	183,825
Demand charge	5,759	6,355	7,003	7,728	7,992	7,992	7,992	7,992	7,992	7,992	104,933
Water	748	827	912	1,008	1,029	1,029	1,029	1,029	1,029	1,029	13,514
Handling	2,654	2,934	3,239	3,579	3,653	3,653	3,653	3,653	3,653	3,653	47,970
Sub-total	184,729	204,207	225,379	249,092	254,281	254,281	254,281	254,281	254,281	254,281	3,339,527
FIXED OPERATING COSTS											
Salaries & wages	2,873	2,873	2,873	2,873	2,873	2,873	2,873	2,873	2,873	2,873	46,362
Maintenace	25,305	25,305	25,305	25,305	25,305	25,305	25,305	25,305	25,305	25,305	372,903
Insurance :											
Fire insurance	1,946	1,693	1,441	1,189	949	709	545	380	215	111	21,732
Group insurance	18	18	18	18	18	18	18	18	18	18	294
Worker's compensation	44	44	44	44	44	44	44	44	44	44	694
Plant overheads	2,873	2,873	2,873	2,873	2,873	2,873	2,873	2,873	2,873	2,873	46,362
Miscellaneouse	0	0	0	0	0	0	0	0	0	0	0
Sub-total	33,059	32,806	32,554	32,302	32,062	31,822	31,857	31,493	31,328	31,224	488,347
DEPRECIATION											
Machinery & equipment	32,965	32,965	32,965	32,965	32,965	25,048	25,048	25,048	15,833	15,833	500,244
Buildings	1,876	1,876	1,876	1,876	1,876	1,876	1,876	1,876	1,876	1,876	30,523
Transportation vehicles	4,158	4,158	4,158	2,775	2,775	0	0	0	0	0	42,887
Sub-total	38,999	38,999	38,999	37,615	37,615	26,924	26,924	26,924	17,709	17,709	573,654
FINANCIAL COSTS											
Interest on L/t foreign currency loan	1,262	1,131	1,000	869	739	608	477	346	215	90	24,816
Interest on L/t local currency loan	61,222	59,856	58,489	57,123	55,169	53,215	50,599	47,983	45,368	42,752	827,872
Interest on Short-term Loan	0	0	0	0	0	0	0	0	0	0	29,862
Sub-total	62,485	60,987	59,490	57,992	55,907	53,822	51,076	48,329	45,582	42,842	882,550
TOTAL PRODUCTION COST	319,271	336,999	356,422	377,001	379,866	366,849	363,938	361,027	348,901	346,055	5,284,079
UNIT PRODUCTION COST (Rs/product.ton)	1,465	1,398	1,340	1,282	1,266	1,223	1,213	1,203	1,163	1,154	1,341

	--IRROI--	--IRROE--
Before Tax	17.45 %	16.73 %
After Tax	11.51 %	11.37 %
NPV at 10%	49,121	17,170

PROFIT / LOSS & CASH FLOW STATEMENT 2B-1

(Unit : Rs. thousand)

Project year	-2	-1	1	2	3	4	5	6	7	8	9	10
Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Annual production volume (ton)	--	--	59,000	64,000	70,000	77,000	91,000	108,000	127,000	150,000	178,000	197,000
SALES REVENUE												
Coal briquette sales (ton)	0	0	59,000	64,000	70,000	77,000	91,000	108,000	127,000	150,000	178,000	197,000
[Sales price (Rs/ton)]	--	--	(1,191)	(1,290)	(1,397)	(1,513)	(1,513)	(1,513)	(1,513)	(1,513)	(1,513)	(1,513)
Total sales revenue	0	0	70,269	82,560	97,790	116,501	137,683	163,404	192,151	226,950	269,314	298,061
COSTS & EXPENSES												
Variable operating costs	0	0	50,074	54,309	59,390	65,318	77,174	91,571	107,662	127,140	150,853	166,944
Fixed operating costs	0	0	13,422	13,285	13,147	13,010	13,457	17,404	17,227	17,715	24,232	25,140
Total costs & expences	0	0	63,496	67,593	72,537	78,328	90,631	108,975	124,890	144,855	175,085	192,084
DEPRECIATION & AMORTIZATION												
Depreciation	0	0	20,991	20,991	20,991	20,991	20,991	27,712	27,712	27,712	38,572	38,572
FINANCIAL COSTS												
Interest on long-term loan	0	0	22,813	22,813	22,813	22,813	22,807	36,071	35,117	34,152	47,872	46,907
Interest on short-term loan	0	0	0	3,788	6,118	7,004	5,746	4,132	3,073	0	0	0
Total finacial costs	0	0	22,813	26,601	28,931	29,817	28,553	40,203	38,190	34,152	47,872	46,907
NET INCOME BEFORE TAX	0	0	-37,031	-32,625	-24,669	-12,635	-2,492	-13,487	1,360	20,231	7,785	20,498
INCOME TAX	0	0	0	0	0	0	0	0	0	0	0	0
NET INCOME AFTER TAX	0	0	-37,031	-32,625	-24,669	-12,635	-2,492	-13,487	1,360	20,231	7,785	20,498
CASH INFLOW												
Sales revenues	0	0	70,269	82,560	97,790	116,501	137,683	163,404	192,151	226,950	269,314	298,061
Financial resources total	3,453	148,567	20,367	32,893	37,658	30,892	113,422	16,522	0	100,583	0	113,304
CASH OUTFLOW												
Investments	57,279	196,088	0	0	0	0	91,205	0	0	104,291	0	179,738
Operating costs	0	0	63,496	67,593	72,537	78,328	90,631	108,975	124,890	144,855	175,085	192,084
Increase in working capital	0	0	4,327	893	1,087	1,589	9,654	2,306	2,516	12,067	3,146	18,015
Repayments on debt	0	0	0	20,367	32,893	37,658	31,062	28,441	22,848	6,327	6,327	6,327
Interests on debt	0	0	22,813	26,601	28,931	29,817	28,553	40,203	38,190	34,152	47,872	46,907
Income tax	0	0	0	0	0	0	0	0	0	0	0	0
(Income tax-ROI)	(0)	(0)	(0)	(0)	(0)	(0)	(14,334)	(14,694)	(21,752)	(29,910)	(30,611)	(37,073)
CASHFLOW - ROI BEFORE TAX	-57,104	-189,381	2,446	14,074	24,166	36,584	-53,808	52,123	64,746	-34,263	91,084	-91,776
CASHFLOW - ROI AFTER TAX	-57,104	-189,381	2,446	14,074	24,166	36,584	-68,141	37,429	42,994	-64,174	60,472	-128,849
CASHFLOW - ROE BEFORE TAX	-53,826	-47,521	0	0	0	0	0	0	3,708	25,841	36,885	-31,705
CASHFLOW - ROE AFTER TAX	-53,826	-47,521	0	0	0	0	0	0	3,708	25,841	36,885	-31,705

PROFIT / LOSS & CASH FLOW STATEMENT 2B-2

(Unit : Rs. thousand)

Project year Year	11 2002	12 2003	13 2004	14 2005	15 2006	16 2007	17 2008	18 2009	19 2010	20 2011	Total
Annual production volume (ton)	218,000	241,000	266,000	294,000	300,000	300,000	300,000	300,000	300,000	300,000	3,940,000
SALES REVENUE											
Coal briquette sales (ton)	218,000	241,000	266,000	294,000	300,000	300,000	300,000	300,000	300,000	300,000	3,940,000
[Sales price (Rs/ton)]	(1,513)	(1,513)	(1,513)	(1,513)	(1,513)	(1,513)	(1,513)	(1,513)	(1,513)	(1,513)	--
Total sales revenue	329,834	364,633	402,458	444,822	453,900	453,900	453,900	453,900	453,900	453,900	5,919,835
COSTS & EXPENSES											
Variable operating expenses	184,729	204,207	225,379	249,092	254,281	254,281	254,281	254,281	254,281	254,281	3,339,527
Fixed operating expenses	33,059	32,806	32,554	32,302	32,062	31,822	31,657	31,493	31,328	31,224	488,347
Total costs & expences	217,787	237,013	257,933	281,394	286,343	286,103	285,938	285,774	285,609	285,505	3,827,874
DEPRECIATION & AMORTIZATION											
Depreciation	38,999	38,999	38,999	37,615	37,615	26,924	26,924	26,924	17,709	17,709	573,654
FINANCIAL COSTS											
Interest on long-term loan	62,485	60,987	59,490	57,992	55,907	53,822	51,076	48,329	45,582	42,842	852,688
Interest on short-term loan	0	0	0	0	0	0	0	0	0	0	29,862
Total finacial costs	62,485	60,987	59,490	57,992	55,907	53,822	51,076	48,329	45,582	42,842	882,550
NET INCOME BEFORE TAX	10,563	27,634	46,036	67,821	74,035	87,051	89,962	92,873	105,000	107,845	635,757
INCOME TAX	1,346	15,199	25,320	37,302	40,719	47,878	49,479	51,080	57,750	59,315	385,388
NET INCOME AFTER TAX	9,217	12,435	20,716	30,519	33,316	39,173	40,483	41,793	47,250	48,530	250,369
CASH INFLOW											
Sales revenues	329,834	364,633	402,458	444,822	453,900	453,900	453,900	453,900	453,900	453,900	5,919,835
Financial resources total	0	0	0	0	0	0	0	0	0	0	617,661
CASH OUTFLOW											
Investments	0	0	0	0	0	0	0	0	0	0	628,601
Operating costs	217,787	237,013	257,933	281,394	286,343	286,103	285,938	285,774	285,609	285,505	3,827,874
Increase in working capital	2,922	2,911	3,204	2,402	448	-8	-5	-5	-5	-3	67,460
Repayments on debt	9,975	9,975	9,975	13,998	13,998	18,530	18,530	18,530	18,530	293,369	617,661
Interests on debt	62,485	60,987	59,490	57,992	55,907	53,822	51,076	48,329	45,582	42,842	882,550
Income tax	1,346	15,199	25,320	37,302	40,719	47,878	49,479	51,080	57,750	59,315	385,388
(Income tax-ROI)	(40,176)	(48,742)	(58,039)	(69,197)	(71,468)	(77,480)	(77,571)	(77,661)	(82,820)	(82,878)	(834,408)
CASHFLOW - ROI BEFORE TAX	109,125	124,709	141,321	161,027	167,109	167,805	167,967	168,132	168,296	263,663	1,498,046
CASHFLOW - ROI AFTER TAX	68,949	75,967	83,282	91,829	95,641	90,325	90,397	90,471	85,476	180,785	663,638
CASHFLOW - ROE BEFORE TAX	36,666	53,747	71,857	89,036	97,204	95,453	98,361	101,273	104,184	-72,547	608,614
CASHFLOW - ROE AFTER TAX	35,319	38,548	46,537	51,735	56,485	47,575	48,882	50,192	46,434	-131,862	223,226

FUND FLOW STATEMENT 2B-1

(Unit : Rs. thousand)

Project year	-2	-1	1	2	3	4	5	6	7	8	9	10
Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
SOURCES OF FUNDS												
Funds provided from operations :												
Net income	0	0	-37,031	-32,625	-24,669	-12,635	-2,492	-13,487	1,360	20,231	7,785	20,498
Depreciation	0	0	20,991	20,991	20,991	20,991	20,991	27,712	27,712	27,712	38,572	38,572
Increase in owner's equity	53,826	47,521	0	0	0	0	0	0	0	0	0	0
Increase in long-term debt :												
Foreign currency loan	3,453	5,768	0	0	0	0	0	0	0	0	0	0
Local currency loan	0	142,799	0	0	0	0	91,205	0	0	100,583	0	113,304
Short-term debt	0	0	20,367	32,893	37,658	30,892	22,217	16,522	0	0	0	0
Increase in account payable	0	0	1,770	139	167	195	390	481	529	640	870	529
Total sources	57,279	196,088	6,097	21,399	34,147	39,442	132,311	31,228	29,601	149,166	47,227	172,903
APPLICATIONS OF FUNDS												
Acquisition of plant assets	53,687	151,725	0	0	0	0	91,205	0	0	104,291	0	179,738
Pre-production expenditures	3,417	14,790	0	0	0	0	0	0	0	0	0	0
Intial working capital	0	22,866	0	0	0	0	0	0	0	0	0	0
Interest during construction	175	6,707	0	0	0	0	0	0	0	0	0	0
Increase in account receivable	0	0	3,513	615	761	936	1,059	1,286	1,437	1,740	2,118	1,437
Increase in inventory :												
Raw materials	0	0	467	281	328	655	796	889	1,077	1,311	889	983
Products	0	0	2,117	137	165	193	410	611	530	666	1,008	567
Spare parts	0	0	0	0	0	0	7,779	0	0	8,991	0	15,557
Repayment on foreign currency loan	0	0	0	0	0	0	170	512	615	615	615	615
Repayment on local currency loan	0	0	0	0	0	0	0	5,712	5,712	5,712	5,712	5,712
Repayment on short-term debt	0	0	0	20,367	32,893	37,658	30,892	22,217	16,522	0	0	0
Total applications	57,279	196,088	6,097	21,399	34,147	39,442	132,311	31,228	25,893	123,325	10,342	204,609
SURPLUS FUNDS	0	0	0	0	0	0	0	0	3,708	25,841	36,885	-31,706
CUMULATIVE SURPLUS FUNDS	0	0	0	0	0	0	0	0	3,708	29,549	66,434	34,728

FUND FLOW STATEMENT 2B-2

(Unit : Rs. thousand)

Project year Year	11 2002	12 2003	13 2004	14 2005	15 2006	16 2007	17 2008	18 2009	19 2010	20 2011	Total
SOURCES OF FUNDS											
Funds provided from operations :											
Net income	9,217	12,435	20,716	30,519	33,316	39,173	40,483	41,793	47,250	48,530	250,369
Depreciation	38,999	38,999	38,999	37,615	37,615	26,924	26,924	26,924	17,709	17,709	573,654
Increase in owner's equity	0	0	0	0	0	0	0	0	0	0	101,347
Increase in long-term debt :											
Foreign currency loan	0	0	0	0	0	0	0	0	0	0	9,221
Local currency loan	0	0	0	0	0	0	0	0	0	0	447,891
Short-term debt	0	0	0	0	0	0	0	0	0	0	160,549
Increase in account payable	600	640	696	779	171	0	0	0	0	0	8,594
Total sources	48,816	52,074	60,411	68,914	71,102	66,097	67,407	68,717	64,959	66,239	1,551,624
APPLICATIONS OF FUNDS											
Acquisition of plant assets	0	0	0	0	0	0	0	0	0	0	580,646
Pre-production expenditures	0	0	0	0	0	0	0	0	0	0	18,208
Intial working capital	0	0	0	0	0	0	0	0	0	0	22,866
Interest during construction	0	0	0	0	0	0	0	0	0	0	6,882
Increase in account receivable	1,589	1,740	1,891	2,118	454	0	0	0	0	0	22,695
Increase in inventory :											
Raw materials	1,077	1,170	1,311	281	0	0	0	0	0	0	11,515
Products	857	641	697	782	165	-8	-5	-5	-5	-3	9,517
Spare parts	0	0	0	0	0	0	0	0	0	0	32,327
Repayment on foreign currency loan	615	615	615	615	615	615	615	615	615	547	9,221
Repayment on local currency loan	9,360	9,360	9,360	13,383	13,383	17,916	17,916	17,916	17,916	292,821	447,891
Repayment on short-term debt	0	0	0	0	0	0	0	0	0	0	160,549
Total applications	13,497	13,526	13,874	17,179	14,617	18,522	18,525	18,525	18,525	293,365	1,322,316
SURPLUS FUNDS	35,319	38,548	46,537	51,735	56,485	47,575	48,882	50,192	46,434	-227,126	229,309
CUMULATIVE SURPLUS FUNDS	70,048	108,596	155,133	206,867	263,352	310,926	359,809	410,001	456,435	229,309	229,309

PROJECTED BALANCE SHEET 2B-1

(Unit : Rs. thousand)

Project year	-2	-1	1	2	3	4	5	6	7	8	9	10
Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
ASSETS												
CURRENT ASSETS :												
Cash	0	2,054	2,054	2,054	2,054	2,054	2,054	2,054	5,761	31,603	68,488	36,782
Accounts receivable	0	0	3,513	4,128	4,890	5,825	6,884	8,170	9,608	11,348	13,466	14,903
Inventories :												
Raw materials	0	2,529	2,996	3,277	3,605	4,260	5,056	5,945	7,022	8,333	9,222	10,205
Products	0	0	2,117	2,253	2,418	2,611	3,021	3,633	4,163	4,829	5,836	6,403
Spare parts	0	18,283	18,283	18,283	18,283	18,283	26,062	26,062	26,062	35,053	35,053	50,610
Total current assets	0	22,866	28,963	29,995	31,249	33,033	43,077	45,864	52,616	91,164	132,065	118,903
PROPERTIES :												
Plant & equipment :												
Machinery & equipment	52,716	170,595	170,595	153,536	136,476	119,417	181,523	164,464	139,488	206,663	181,687	305,827
Buildings	971	20,213	20,213	19,202	18,191	17,181	20,718	19,707	18,469	22,452	21,214	27,248
Vehicles	0	14,604	14,604	11,683	8,763	5,842	10,412	7,491	5,993	11,413	9,914	20,907
Others	0	0	0	0	0	0	0	0	0	0	0	0
Less : Accumulated depreciation	0	0	20,991	20,991	20,991	20,991	20,991	27,712	27,712	27,712	38,572	38,572
Net properties	53,687	205,412	184,421	163,430	142,439	121,448	191,662	163,950	136,237	212,816	174,244	315,410
OTHER ASSETS :												
Intangibles	3,592	25,089	25,089	25,089	25,089	25,089	25,089	25,089	25,089	25,089	25,089	25,089
Deffered charges	0	0	0	0	0	0	0	0	0	0	0	0
Total other assets	3,592	25,089	25,089	25,089	25,089	25,089	25,089	25,089	25,089	25,089	25,089	25,089
TOTAL ASSETS	57,279	253,367	238,473	218,514	198,777	179,570	259,828	234,902	213,942	329,070	331,398	459,402
LIABILITIES AND SHAREHOLDERS' EQIUTY												
CURRENT LIABILITIES :												
Accounts payable :												
Raw materials	0	0	1,492	1,619	1,770	1,947	2,301	2,731	3,212	3,794	4,502	4,982
Utilities	0	0	153	166	181	199	234	277	325	384	455	503
Others	0	0	125	125	125	125	125	133	133	133	223	223
Short-term debt	0	0	20,367	32,893	37,658	30,892	22,217	16,522	0	0	0	0
Total current liabilities	0	0	22,137	34,802	39,735	33,163	24,877	19,663	3,670	4,310	5,180	5,708
LONG-TERM DEBT :												
Foreign currency loan	3,453	9,221	9,221	9,221	9,221	9,221	9,051	8,539	7,924	7,309	6,695	6,080
Local currency loan	0	142,799	142,799	142,799	142,799	142,799	234,004	228,292	222,580	317,451	311,739	419,331
Total long-term debt	3,453	152,020	152,020	152,020	152,020	152,020	243,055	236,831	230,504	324,761	318,434	425,411
SHAREHOLDERS' EQUITY :												
Capital stock	53,826	101,347	101,347	101,347	101,347	101,347	101,347	101,347	101,347	101,347	101,347	101,347
Retained earnings	0	0	-37,031	-69,655	-94,325	-106,960	-109,452	-122,938	-121,579	-101,348	-93,563	-73,065
Total shareholders' equity	53,826	101,347	64,316	31,691	7,022	-5,613	-8,105	-21,591	-20,232	-1	7,784	28,282
TOTAL LIABILITIES AND EQUITY	57,279	253,367	238,473	218,514	198,777	179,570	259,828	234,902	213,942	329,070	331,398	459,402

PROJECTED BALANCE SHEET 2B-2

(Unit : Rs. thousand)

Project year	11	12	13	14	15	16	17	18	19	20
Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
ASSETS										
CURRENT ASSETS :										
Cash	72,101	110,649	157,186	208,921	265,405	312,980	361,862	412,054	458,488	231,362
Accounts receivable	16,492	18,232	20,123	22,241	22,695	22,695	22,695	22,695	22,695	22,695
Inventories :										
Raw materials	11,282	12,452	13,763	14,044	14,044	14,044	14,044	14,044	14,044	14,044
Products	7,260	7,900	8,598	9,380	9,545	9,537	9,531	9,526	9,520	9,517
Spare parts	50,610	50,610	50,610	50,610	50,610	50,610	50,610	50,610	50,610	50,610
Total current assets	157,744	199,844	250,280	305,196	362,299	409,866	458,742	508,929	555,357	328,228
PROPERTIES :										
Plant & equipment :										
Machinery & equipment	271,636	238,671	205,706	172,741	139,776	106,811	81,763	56,715	31,666	15,833
Buildings	25,749	23,873	21,998	20,122	18,246	16,371	14,495	12,619	10,743	8,868
Vehicles	18,025	13,866	9,708	5,550	2,775	0	0	0	0	0
Others	0	0	0	0	0	0	0	0	0	0
Less : Accumulated depreciation	38,999	38,999	38,999	37,615	37,615	26,924	26,924	26,924	17,709	17,709
Net properties	276,411	237,412	198,412	160,797	123,182	96,258	69,334	42,410	24,701	6,992
OTHER ASSETS :										
Intangibles	25,089	25,089	25,089	25,089	25,089	25,089	25,089	25,089	25,089	25,089
Deffered charges	0	0	0	0	0	0	0	0	0	0
Total other assets	25,089	25,089	25,089	25,089	25,089	25,089	25,089	25,089	25,089	25,089
TOTAL ASSETS	459,244	462,344	473,782	491,082	510,570	531,212	553,165	576,428	605,147	360,309
LIABILITIES AND SHAREHOLDERS' EQIUTY										
CURRENT LIABILITIES :										
Accounts payable :										
Raw materials	5,513	6,095	6,727	7,435	7,587	7,587	7,587	7,587	7,587	7,587
Utilities	556	614	678	748	767	767	767	767	767	767
Others	239	239	239	239	239	239	239	239	239	239
Short-term debt	0	0	0	0	0	0	0	0	0	0
Total current liabilities	6,309	6,949	7,644	8,423	8,594	8,594	8,594	8,594	8,594	8,594
LONG-TERM DEBT :										
Foreign currency loan	5,465	4,851	4,236	3,621	3,006	2,392	1,777	1,162	547	0
Local currency loan	409,971	400,611	391,251	377,867	364,484	346,568	328,653	310,737	292,821	0
Total long-term debt	415,436	405,462	395,487	381,488	367,490	348,960	330,429	311,899	293,369	0
SHAREHOLDERS' EQUITY :										
Capital stock	101,347	101,347	101,347	101,347	101,347	101,347	101,347	101,347	101,347	101,347
Retained earnings	-63,848	-51,412	-30,696	-176	33,139	72,312	112,795	154,588	201,838	250,369
Total shareholders' equity	37,499	49,934	70,651	101,170	134,486	173,659	214,142	255,935	303,185	351,715
TOTAL LIABILITIES AND EQUITY	459,244	462,344	473,782	491,082	510,570	531,212	553,165	576,428	605,147	360,309

CHAPTER 17 ECONOMIC ANALYSIS

17-1 Methodology for Economic Analysis

This economic analysis shows how the project contributes to Pakistani national economy by producing smokeless coal briquettes with Lakhra coal. First, the economic internal rate of return (EIRR) of the project measured at economic prices that reflect the true value to the country instead of market prices is calculated in an economic benefit-cost analysis. Then, effects on the balance of payments expected by the project are studied to quantify the contribution to the national economy. Secondary effects of the project extended to the country are also discussed to evaluate the project from a national economic point of view. As a series of study continued from the former financial analysis, the economic analysis is carried out on Cases 1A, 1B and 2B.

Benefits and costs associated with the project have been measured at market prices to evaluate the financial profitability of the project in previous chapters; however, economic value of those should be revalued taking national parameters of the country into account. The following parameters are used here.

1) Foreign exchange premium
2) Unskilled labor premium

17-1-1 Foreign Exchange Premium

Since the financial calculation was based on the domestic currency, the project's net present economic value should be adjusted by an appropriate foreign exchange premium, assuming that foreign exchange is more valuable than indicated by the official exchange rate. The following formula is a simplified approach generally used to obtain a shadow exchange rate(SER) which includes the foreign exchange premium(FEP) with the official exchange rate(OER).

$$SER = OER \times (1 + FEP)$$

$$= OER \times \frac{(M + Ti) + (X + Sx - Tx)}{M + X}$$

where, M : c.i.f. value of imports
X : f.o.b. value of exports
Ti : import tax revenue
Sx : export subsidies
Tx : export tax revenue

A tentative calculation before the study had produced the average foreign exchange premium at 0.05 as follows.

Value of major imports and exports for the fiscal years from 1980-81 to 1985-86 based on the annual reports 1983-84, 1984-85 and 1985-86 by the STATE BANK OF PAKISTAN and the estimated import and export duties for each commodity are as show below.

Major imports in 1980-81 to 1985-86 (Rs.million) (Total imports : Rs.438,606 million)		% in total	Duty (%)
Petroleum/products & chemicals	134,809	31	20
Iron/steel & machinery	84,866	19	20
Vegetable oils & fats	29,347	7	40
Road vehicles	22,822	5	100
Fertilizers	11,955	3	0
Total	283,799	65	28*

Major exports in 1980-81 to 1985-86 (Rs.million) (Total exports : Rs.214,902 million)		% in total	Duty (%)
Textile yarn & fabrics	81,497	38	40
Rice	27,972	13	14
Cotton	27,029	13	40
Apparel & clothing accessories	17,238	8	40
Leathers	10,906	5	40
Total	164,642	77	34*

(* : weighted average)

Putting these data to the formula, the foreign exchange premium is obtained as follows:

$$\frac{(283,799 + 283,799 \times 0.28) + (164,642 - 164,642 \times 0.34)}{283,799 + 164,642} - 1 = 0.05$$

This result was carried into the discussion with PMDC which concluded that the premium seemed to rather reflect the foreign exchange situation of the country. Accordingly, the foreign exchange premium is set at 0.05 in this economic study.

17-1-2 Unskilled Labor Premium

The project will hire skilled labor (labor with moderate education) and some unskilled labor. One major effect this project will have on the economy will be the hiring of previously unemployed or unskilled labor. In view of the wage states of unskilled labor working daily works in the rural area around the plant site of the project, it may be assumed that unskilled labor to be employed as workers for the plant construction, security guards or janitors of the plant would receive shadow wages 50 percent of the market wages applied to the project. The unskilled labor premium is, therefore, set at -(negative)0.5 for the study.

17-2 Economic Benefit-Cost Analysis

The following economic benefits and costs are identified and applied in calculation of EIRR.

Economic benefits
- Direct benefit
- Indirect benefit

Economic costs
- Investment cost
- Production cost

17-2-1 Direct Economic Benefit

Direct benefit of the project is the economic value of coal briquettes produced in the plant.

In the project the production volume of coal briquette reflects its forecast demand which is based on the estimated rate of replacement of kerosene and firewood. The replacement of firewood will be, however, in the far future and at so small a rate that the great majority of coal briquette produced would be replacing kerosene. Since the coal briquette as well as kerosene is a source of energy which can be quantified at calorific value, the real value of coal briquette supplied is simply the calorific value of kerosene replaced by the briquette.

Assuming that the economic value of kerosene is measured by its free market price, the economic value of the briquette is, therefore, set at 1,052 rupees per ton by the following calculation using the international market price of kerosene.

$$\text{Economic value of briquette} = \frac{Pk \times Hb \times Eb}{Hk \times Ek} = \text{Rs.1,052/ton}$$

where, Pk : International market price of kerosene
= US$160/ton = Rs.3,042/ton
(June,1988 by Platt's Oilgram Price Report)

Hb : Calorific value of coal briquette
= 5,381 kcal/kg
Hk : Calorific value of kerosene
= 19,600 BTU/lb = 10,889 kcal/kg
Eb : Thermal efficiency of coal briquette
Ek : Thermal efficiency of kerosene
Eb/Ek = 0.70

17-2-2 Indirect Economic Benefit

As will be described in the subsequent section "17-4 Secondary Effect", the following indirect benefits are expected of the project besides the above direct benefit.

(1) Contribution to the government policy of coal utilization
(2) Increase in employment opportunities
(3) Increase in business opportunities
(4) Effects on environmental protection
(5) Contribution to the economic development
(6) Transfer of advanced technology

17-2-3 Economic Cost for Investment

Economic cost for investment includes the initial investment for the plant construction and the investment additionally required for the capacity expansion after the operation start-up.

Economic cost for the initial investment is calculated by re-evaluating the total capital requirement estimated for the financial analysis. Of the capital requirement the import duty and other taxes and the interest on local currency loan during construction are excluded from the economic cost because tax and interest are considered as transferable costs in the national economy in economic analysis. Initial working capital is also assumed to be excluded from the investment, because it is not directly consumed for briquette supply. As summarized in Table 17-2-1, the economic cost for the initial investment is 150

Table 17-2-1 Economic Cost for Investment

(Unit : Rs.thousand)

	Financial cost				Economic cost		
	Project year				Project year		
	-2	-1	Total	Premium	-2	-1	Total
Case 1A							
Local currency costs:							
Domestic material	18,238	63,683	81,921	0	18,238	63,683	81,921
Skilled labor	3,258	1,885	5,143	0	3,258	1,885	5,143
Unskilled labor	0	5,485	5,485	-0.5	0	2,743	2,743
Foreign exchange cost	19,818	37,270	57,088	0.05	28,808	31,134	59,942
-- Total --	41,314	108,323	149,637		50,304	99,445	149,749
Case 1B							
Local currency costs:							
Domestic material	24,641	78,670	103,311	0	24,641	78,670	103,311
Skilled labor	4,125	1,885	6,010	0	4,125	1,885	6,010
Unskilled labor	0	5,485	5,485	-0.5	0	2,743	2,743
Foreign exchange cost	3,453	5,768	9,221	0.05	3,626	6,056	9,682
-- Total --	32,219	91,808	124,027		32,392	89,354	121,746
Case 2B							
Local currency costs:							
Domestic material	46,139	148,553	194,692	0	46,139	148,553	194,692
Skilled labor	7,668	2,770	10,438	0	7,668	2,770	10,438
Unskilled labor	0	10,403	10,403	-0.5	0	5,202	5,202
Foreign exchange cost	3,453	5,768	9,221	0.05	3,626	6,056	9,682
-- Total --	57,260	167,494	224,754		57,433	162,581	220,014

Table 17-2-2 Economic Cost for Reinvestment

(Unit : Rs.thousand)

Case 1A, 1B

	Project year						
	3	6	8	10	12	14	Total
Local currency costs:							
Domestic material	47,599	40,524	84,302	94,902	83,760	82,502	433,589
Skilled labor	2,418	1,864	4,282	5,227	4,282	4,282	22,355
Unskilled labor	347	302	649	1,031	649	3,627	3,627
Foreign exchange cost	0	0	0	0	0	0	0
-- Total --	50,364	42,690	89,234	101,160	88,691	87,434	459,571

Case 2B

	Project year			
	5	8	10	Total
Local currency costs:				
Domestic material	84,302	94,902	165,933	345,137
Skilled labor	4,282	5,227	8,565	18,074
Unskilled labor	649	1,031	1,298	2,978
Foreign exchange cost	0	0	0	0
-- Total --	89,234	101,160	175,796	366,190

million rupees in Case 1A, 122 million rupees in Case 1B and 220 million rupees in Case 2B.

Economic costs for the investment during operating period calculated in the same manner are shown in Table 17-2-2.

17-2-4 Economic Cost for Production

(1) Labor cost

The labor cost for skilled labor is considered equal to the financial cost. For the unskilled labor employed in the plant, the economic cost is calculated using the shadow wage price, 50 percent of the market price.

(2) Transportation and handling cost

The financial transportation costs are calculated on the basis of transport by trucks and tank lorries, consisting of labor and fuel costs. Of the transportation cost, 93 percent is labor cost, of which 92 percent is for unskilled labor. The fuel cost may include some amount of tax which should be deducted from the economic cost, but it would be a negligibly small part of the transportation cost. Therefore, the economic transportation cost is evaluated at 57 percent of the financial cost.

The material handling cost is based on the wage for unskilled labor. Therefore, the economic cost is evaluated to be 50 percent of the financial cost.

(3) Raw material cost

As will be described below the economic value of raw materials are considered equal to their financial price excluding tax.

(a) Coal

Lakhra coal is currently used for burning bricks and there is no immediate plan for alternative utilization. The price of coal supplied may be set with the profit left out of consideration for this project only and with royalty to the

government, 15 rupees per ton but no tax include. The economic value of coal is, therefore, regarded as equal to the price in financial analysis excluding the royalty.

(b) Bagasse

In Pakistan 3/4 of bagasse is used as fuel in sugar mills. However, because of difficulty in handling the bagasse, the economic value may not be as high as that of fuel oil. In this study the economic value of bagasse is regarded as equal to the market price excluding 12.5 % sales tax.

(c) Slaked lime, slack wax and light fuel oil

The project will use only a small portion of these products in domestic market and will not disrupt their supply and demand balances. Therefore, their economic value is regarded as equal to each of their market prices excluding 12.5 % sales tax.

(4) Utilities

At present electric power generated and consumed in Pakistan is not exported nor imported; therefore, the economic cost of electricity is regarded as equal to the financial cost.

The only cost for water is the transportation cost. Therefore, the economic cost for transportation is adopted as the economic cost for water.

(5) Other economic cost

In addition to those mentioned above, there are costs for maintenance and plant overhead. The sale tax on spare parts is deducted from the maintenance cost. Because the interest on local currency loan and the insurance cost are regarded as only internal transfer of cash in the country, the economic costs for those are evaluated to be zero.

17-2-5 Economic Internal Rate of Return

From the balance of the direct economic benefit and economic

costs for the project life given in Table 17-2-3, Economic Internal Rate of Return (EIRR) is calculated to be 1.88 % in Case 1B and 2.09 % in Case 2B. In Case 1A, total economic cost for the project life slightly exceeds total economic benefit.

Table 17-2-3 Economic Benefit and Cost

(Unit : Rs. million)

Project year	-2	-1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total
Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	
[Case 1A]																							EIRR = n.r.
Economic Benefit																							
Coal briquette	0	0	53	53	53	79	79	79	105	105	158	158	210	210	263	263	316	316	316	316	316	316	3,761
Economic Cost																							
Investment	50	99	0	0	50	0	0	43	0	89	0	101	0	89	0	87	0	0	0	0	0	0	609
Raw materials	0	0	35	35	35	52	52	52	69	69	104	104	138	138	173	173	207	207	207	207	207	207	2,470
Utilities	0	0	4	4	4	6	6	6	8	8	11	11	15	15	19	19	23	23	23	23	23	23	269
Labor	0	0	1	1	1	1	1	1	1	1	2	2	3	3	3	3	3	3	3	3	3	3	40
Other costs	0	0	14	14	14	16	16	16	17	16	19	19	23	22	26	25	28	27	27	26	26	25	417
Total	50	99	53	53	104	75	75	117	95	184	136	236	179	267	220	307	261	260	260	259	258	258	3,807
Balance	-50	-99	-1	-1	-51	4	4	-38	10	-79	22	-79	31	-57	43	-44	55	55	56	57	57	58	-46
[Case 1B]																							EIRR = 1.88%
Economic Benefit																							
Coal briquette	0	0	53	53	53	79	79	79	105	105	158	158	210	210	263	263	316	316	316	316	316	316	3,761
Economic Cost																							
Investment	32	89	0	0	50	0	0	43	0	89	0	101	0	89	0	87	0	0	0	0	0	0	581
Raw materials	0	0	35	35	35	52	52	52	69	69	104	104	138	138	173	173	207	207	207	207	207	207	2,470
Utilities	0	0	4	4	4	6	6	6	8	8	11	11	15	15	19	19	23	23	23	23	23	23	269
Labor	0	0	1	1	1	1	1	1	1	1	2	2	3	3	3	3	3	3	3	3	3	3	40
Other costs	0	0	7	7	7	9	9	9	10	10	14	14	19	18	22	22	25	25	25	25	25	25	325
Total	32	89	46	46	96	67	67	110	89	178	130	231	174	263	216	304	258	258	258	258	258	257	3,687
Balance	-32	-89	6	6	-44	12	12	-31	17	-72	28	-74	36	-53	47	-41	58	58	58	58	58	58	74
[Case 2B]																							EIRR = 2.09%
Economic Benefit																							
Coal briquette	0	0	62	67	74	81	96	114	134	158	187	207	229	254	280	309	316	316	316	316	316	316	4,145
Economic Cost																							
Investment	57	163	0	0	0	0	89	0	0	101	0	176	0	0	0	0	0	0	0	0	0	0	586
Raw materials	0	0	41	44	48	53	63	75	88	104	123	136	151	167	184	203	207	207	207	207	207	207	2,723
Utilities	0	0	5	5	5	6	7	8	0	11	13	15	16	18	20	22	23	23	23	23	23	23	287
Labor	0	0	1	1	1	1	1	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	46
Other costs	0	0	11	11	11	11	11	14	14	14	19	19	26	26	26	26	25	25	25	25	25	25	389
Total	57	163	58	61	66	71	171	99	104	232	158	348	196	213	232	254	258	258	258	258	258	258	4,031
Balance	-57	-163	5	6	8	10	-76	15	30	-74	29	-141	34	40	48	56	57	57	58	58	58	58	114

17-3 Effect on Balance of Payments

The project's contribution to the balance of payment is estimated on the following basis.

(1) All saving of kerosene brought by coal briquette sales is regarded as substitute for the imports, i.e., foreign currency inflow.

(2) No foreign currency flows out for the operation costs except for the interest payment on long-term foreign currency loan. Foreign currency loan borrowed for the initial investment will be offset in the same amount by the repayment as foreign currency outflow.

Table 17-3-1 shows the balance of foreign currency for Cases 1A, 1B and 2B. Total foreign currency saving by the project is 3,590 million rupees in Case 1A, 3,733 million rupees in Case 1B and 4,117 million rupees in Case 2B.

Table 17-3-1 Balance of Foreign Currency

(Unit : Rs. million)

	-2 1990	-1 1993	1 1992	2 1993	3 1994	4 1995	5 1996	6 1997	7 1998	8 1999	9 2000	10 2001	11 2002	12 2003	13 2004	14 2005	15 2006	16 2007	17 2008	18 2009	19 2010	20 2011	Total
[Case 1A]																							
Foreign Currency Inflow																							
Import substitute	0.0	0.0	52.6	52.6	52.6	78.9	78.9	78.9	105.2	105.2	157.8	157.8	210.4	210.4	263.0	263.0	315.6	315.6	315.6	315.6	315.6	315.6	3,760.9
Foreign Currency Outflow																							
L-T loan repayment	0.0	0.0	0.0	0.0	0.0	0.0	1.3	3.6	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	3.1	59.9
L-T loan interest	1.2	4.8	8.4	8.4	8.4	8.4	8.4	8.1	7.6	7.0	6.5	5.9	5.3	4.5	4.2	3.7	3.1	2.5	2.0	1.4	0.9	0.3	110.9
Total	1.2	4.8	8.4	8.4	8.4	8.4	9.6	11.7	11.6	11.0	10.4	9.9	9.3	8.5	8.2	7.7	7.1	6.5	6.0	5.4	4.9	3.5	170.8
Balance	-1.2	-4.8	44.2	44.2	44.2	70.5	69.3	67.2	93.6	94.2	147.4	147.9	201.1	201.9	254.8	255.3	308.5	309.1	309.6	310.2	310.7	312.1	3,590.1
[Case 1B]																							
Foreign Currency Inflow																							
Import substitute	0.0	0.0	52.6	52.6	52.6	78.9	78.9	78.9	105.2	105.2	157.8	157.8	210.4	210.4	263.0	263.0	315.6	315.6	315.6	315.6	315.6	315.6	3,760.9
Foreign Currency Outflow																							
L-T loan repayment	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	9.7
L-T loan interest	0.1	0.7	1.4	1.4	1.4	1.4	1.4	1.3	1.2	1.1	1.1	1.0	0.9	0.8	0.7	0.6	0.5	0.4	0.3	0.2	0.2	0.1	18.0
Total	0.1	0.7	1.4	1.4	1.4	1.4	1.5	1.9	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.2	1.1	1.0	0.9	0.8	0.6	27.7
Balance	-0.1	-0.7	51.2	51.2	51.2	77.5	77.4	77.0	103.3	103.4	156.1	156.2	208.9	209.0	261.7	261.8	314.4	314.5	314.6	314.7	314.8	315.0	3,733.2
[Case 2B]																							
Foreign Currency Inflow																							
Import substitute	0.0	0.0	52.1	67.3	73.6	81.0	95.7	113.6	133.6	157.8	187.3	207.2	229.3	253.5	279.8	309.3	315.6	315.6	315.6	315.6	315.6	315.6	4,144.9
Foreign Currency Outflow																							
L-T loan repayment	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	9.7
L-T loan interest	0.1	0.7	1.4	1.4	1.4	1.4	1.4	1.3	1.2	1.1	1.1	1.0	0.9	0.8	0.7	0.6	0.5	0.4	0.3	0.2	0.2	0.1	18.0
Total	0.1	0.7	1.4	1.4	1.4	1.4	1.5	1.9	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.2	1.1	1.0	0.9	0.8	0.6	27.7
Balance	-0.1	-0.7	60.7	66.0	72.3	79.6	94.2	111.8	131.7	156.0	185.6	205.6	227.8	252.1	278.5	308.0	314.4	314.5	314.6	314.7	314.8	315.0	4,117.2

17-4 Secondary Effects

In addition to such quantifiable direct benefits as economic net cash flow, economic internal rate of return and contribution to the improvement of balance of payments, the implementation of the project is expected to bring about the following indirect benefits.

(1) Contribution to the government policy to promote coal use

As mentioned in previous chapters the coal domestically produced is used almost entirely for burning bricks; in other words, the domestic coal is not effectively employed for the purpose of power generation, running manufacturing industry, transportation, to say nothing of household fuel in spite of the fact that coal is the greatest underground fossil energy resources Pakistan has. By contrast, the consumption of petroleum and gas has been increasing rapidly, though Pakistan's own crude oil production meets only 20 percent of the consumption of oil products; the reserve of gas is not necessarily very large and therefore it must be used sparingly. Against such a background the government has promulgated a policy to promote utilization of Pakistan's domestic coal in the Sixth Five Year Plan as quoted on 3-3 National Policy on, and Present Situation of Coal Industry.

It has already been decided to install coal-fired power plants as indicated in 6-2-2 Power Supply. However, the penetration of coal into household fuel has been almost nil so far. In view of the rapid increase of the consumption of kerosene as household fuel, something must be done to promote utilization of coal as household fuel; however, coal as mined is not suited as kitchen fuel because of its marked tendency for spontaneous ignition, irritating sulfur dioxide produced at the point of consumption, tendency to collapse into small particles on weathering, irregular sizes and shapes, etc. Stoves for effectively burning coal would not be manufactured and sold unless the quality of coal is stabilized and supply guaranteed.

This project would solve all these unfavorable aspects of coal and pave the way for coal to be extensively employed as household fuel. In the development of this study, due consideration is given to the quality and price of coal briquettes as being competitive with kerosene in the area most promising as market and distribution and marketing channels to reach a multitude of consumers across the nation. Once this project proves itself as a success, then there will be other coal briquette projects to emulate this in other coal mines in Punjab or Baluchistan.

(2) Increase in employment opportunities

The project would create employment opportunities; the direct employees would total 127 persons when the 300,000 ton capacity is reached and the number of indirect labors for material transportation and handling would amount to approximately 1,300 persons at maturity.

This is only a part of the story in the grand perspective of this project. In the field of professionals and skilled workers, this project would generate design works for the nation's mechanical engineers, civil engineers and electrical engineers as this project plans local design and fabrication of machines. The design works always need supportive works by draftsmen and computer operators. When the drawings come to the fabrication plants, the chosen machine shops will be busy involving a large number of skilled workers operating welders, lathes, and a variety of other machine tools. After shop fabrication has been completed, the plant site will be busy with erection, installation, testing and commissioning. This project would procure ready-made local materials like bricks, cement, asbestos plates, sheet glass, window sashes, steel rods, section steels, belt conveyers, electric motors, cables, electric gears, electric appliances, paints, insulating materials, etc. The procurement of all these creates job opportunities.

One good thing about this project is that there will be stepwise expansions of capacity which will actually be additions

of a complete plant; each expansion would repeat the similar operations.

When the project enters the operating stage, the raw materials and the products will be transported by trucks, mostly 10-ton trucks. The 1,300 indirect employment opportunities mentioned before include the truck drivers who will bring the raw materials to the plant site but do not include the truck drivers to deliver the coal briquettes. Supposing that 300,000 tons of coal briquettes are all shipped by 10-ton trucks and each round-trip takes an average of four days, then the number of truck drivers needed is calculated to be 329; actually more drivers than calculated will be needed. Placing on service of such a number of trucks would naturally require additional works at repair shops and service stations.

(3) Increase in business opportunities

There would be new business opportunities associated with the construction of the plant and also with the operation of the plant. PMDC would concentrate on the management of the plant. PMDC would entrust a consulting company with basic design and preparation of tender documents for selection of the main contractors. The selected main contractor will employ subcontractors of various expertise to cover a wide range of trades. These subcontractors will in turn mobilize a number of enterprises mostly operating in Hyderabad-Lakhra area to put together work forces of skilled and unskilled labors. These business opportunities would be of temporary nature destined to end when the plant construction is complete; but they would be repeatedly called upon every time expansion takes place. Assuming the total spending in the domestic currency for capital goods excluding the interest during construction and working capital to represent the magnitude of business opportunities associated with the plant construction, the business opportunities would amount to approximately 570 to 580 million rupees in each case.

The business opportunities generated in association with the operation concern the transportation of the raw materials and

water to the site and shipping, distribution and marketing of the product. The transportation of some 300,000 tons of goods to and from the site represents big business opportunities. The total transportation cost to the plant per one ton of product is Rs. 48.6; therefore, the magnitude of this business opportunities throughout the project life is 174 million, 191 million and 153 million rupees for Cases 1, 2 and 3, respectively. Using the transportation cost of 350 Rs. per ton to Zone 3 and the sales margin of 200 Rs. per ton, the magnitude of business opportunities associated with shipping, transportation and marketing of the product amounts to 1,966 million, 2,169 million and 1,733 million rupees for Cases 1, 2 and 3, respectively, throughout the project life.

There would also be a peripheral business opportunity which is the manufacture of stoves suited for combustion of coal briquettes for cooking and household heating. Supposing a 50-rupee stove could burn two tons of coal briquettes before it breaks, the cumulative magnitude of this business is 179 million, 183 million and 156 million rupees for Cases 1, 2 and 3, respectively.

Providing a constant and dependable outlet for small lime kilns may deserve mentioning, because their present outlets are stucco and agricultural uses; none of them would be a steady market.

(4) Effects on environmental protection

Any attempt to reduce the consumption of kerosene without providing an alternative at easy reach of the consumers would inevitably increase the consumption of firewood, which means deterioration of the environmental conditions. Although this project does not positively aims to replace firewood, this project would provide a certain latitude within which Pakistan could control the consumption of kerosene without adversely affecting the environments.

In addition, this project would perhaps represent the first instance in which coal is burned with controlled emission of

sulfur dioxide. If use of coal, particularly a high-sulfur coal like Lakhra coal, is promoted without appropriate measures taken to control the emission of sulfur dioxide, serious environmental problems may result. This project would set an example for other coal-burning industries to emulate by showing how a high-sulfur coal could be effectively utilized without causing environmental problems.

(5) Contribution to the economic development

Lakhra happens to be one of the least developed areas of Pakistan, a barren terrain without industry except for the coal mine. Establishing a manufacturing industry in this least developed area would mean a great deal in the context of providing business and employment opportunities.

The principal subordinate raw materials, bagasse and slaked lime, are both low-valued products produced in the project area. Providing constant demands for local bagasse and slaked lime is meaningful from the standpoint of the local economy. Worth particular mention is the fact that this project would not divert the proceeds abroad or other parts of the nation but would channel the benefit to the local economy.

(6) Transfer of advanced technology

If this project, particularly the first plant, is realized with introduction of appropriate technologies on the key machines and manufacture of coal briquettes themselves, these would prove to be valuable assets when the opportunity for expansion comes.

On the grass-roots level, the introduction of recommended designs of stoves for burning coal briquettes to the cottage industries distributed nationwide would also turn out to be very effective in the proliferation of coal briquettes among the general consumers.

17-5 Evaluation

This project contributes to the betterment of the national economy with direct and indirect benefits. The project will make a foreign currency saving more than 500 times the foreign currency outflow for the project.

Although the expected EIRR shows that a modest amount of return is brought to the economy, the project would give a wide range of beneficial effects indirectly to the country. The social significance of this project is great in terms of its contribution to the acceleration of promoting the utilization of local coal and to the diversification of domestic energy supply sources.

CHAPTER 18 OVERALL EVALUATION AND RECOMMENDATION

18-1 Overall Evaluation of Project

As mentioned at various parts of this report, this feasibility study investigates six cases; Cases 1A, 1B, 2A, 2B, 3A and 3B. All cases are expanded in their capacities as the demand for coal briquettes grows. The expansion program of Cases 1A and 1B is modest; in other words, the capacities are increased so that no extra capacity will be created. Cases 2A and 2B are more optimistic, always with some extra capacities to meet additional demands. Cases 3A and 3B are sensitivity cases which assume continuation of the current subsidy price of kerosene. Cases with A and the corresponding cases with B are the same in capacity throughout the project life. Cases with A use imported washing and mixing/briquetting machines for the first plant while cases with B use all domestically produced machines.

Cases with B naturally show better financial returns than their corresponding cases with A, because of the lower costs of the domestic machines and lower associated costs; however, the differences are not very great in terms of ROI before and after tax. From the point of view of ensuring reliable operation, cases with A should have priority over their corresponding cases with B, especially when the differences in ROI between the corresponding cases with A and B are small.

Regarding the choice among Cases 1, 2 and 3, Case 1 is evaluated as more desirable than Case 2, as will be discussed in 18-1-1, Marketability. The choice between Cases 1A and 1B is a tradeoff between profitability and reliability of operation. The profitability itself depends upon the reliability of operation; therefore, as will be discussed later, this feasibility study recommends Case 1A over Case 1B.

All cases except for Case 2A may be regarded as financially justifiable with their modest returns on investment in view of this project being a national project. Secondly, this project would

make a positive contribution to the improvement of the nation's balance of payments and support the established policy of the government to promote the use of domestic coal.

This project would also give a wide range of secondary and tertiary effects among which worth particular mention are:

(1) Transfer of technology of manufacturing coal briquettes to PMDC,

(2) Transfer of technology of manufacturing a whole range of equipment constituting the coal briquette plant,

(3) Creation of employment opportunities,

(4) Creation of business opportunities associated with the construction and operation of the plants,

(5) Utilization of the domestic resources in a manner to replace an imported commodity, namely kerosene,

(6) Establishment of an industry in a less developed region of the nation,

(7) Introduction of standard designs of stoves suited for burning coal briquettes to Pakistan for the cottage industry to utilize and market the stoves it makes,

(8) Contribution to the diversification of the domestic fuel supplies to the general consumers and thus making the household economy of the general populace less vulnerable to price fluctuation of energy in the international market, and

(9) Establishing the coal briquetting industry as an example that entrepreneurs in the private sector can emulate.

Of the three alternative capacities, Case 1 starting with 50,000 tons per year is financially better than Case 2 starting with

100,000 tons per year capacity. Although Case 1 has a definite economic advantage over Case 2, Case 2 will provide greater flexibility to meet sudden and unexpected surges of demand that may be created as a result of sharp increases of petroleum prices in the international market, which could happen any moment. However, it would be expecting too much of a nascent industry like this one to meet unexpected demand surges, particularly at the initial stage. Such an advantage of Case 2 would not offset its greater marketing risk associated with its greater production capacity. In short, Case 1 is evaluated as more recommendable than Case 2. Case 3, a sensitivity case, will make sense only if the government of Pakistan should opt to continue subsidy on kerosene price.

Overall, this project, except for Case 2A, may be evaluated as being financially feasible, economically viable, expected to provide favorable secondary and tertiary benefits to the society and nation; in short, this project may be evaluated as worthy of implementation but under carefully prepared conditions.

18-1-1 Marketability

With the price and quality of the coal briquettes proposed in PROJECT SCHEME, this project would be able to market the product coal briquettes as discussed in Chapter 4, COAL BRIQUETTE MARKET.

The capacity of Case 1 is designed not to have idle capacity throughout the project life; in other words, Case 1 gives priority to economic condition of the plant rather than to meeting the demand. On the other hand, Case 2 puts meeting supply responsibility, with some extra capacity, ahead of economics of the project. Naturally, Case 2 is at a disadvantage in economic terms in comparison with Case 1: Cases 1A and 2A give IRR's on investment of 12.3 and 10.5, respectively.

For a country like Pakistan where import of energy is under control of the government, the government and semi-governmental organizations like PMDC or PSO have responsibility for providing

a stable supply of energy; in this respect the choice between Cases 1 and 2 has special implications. Perhaps there are some who may argue that a public project like this should give priority to supply responsibility even at some economic sacrifice. Such an argument cannot be dismissed entirely. However, the study team believe that at the initial stage of operation this project should not be loaded with any such social responsibility until this project firmly establishes itself in the socio-economic fabric of Pakistan; in other words, the project should demonstrate its economic feasibility while attaining full-capacity operation to supply quality coal briquettes at competitive prices at consumers end. In short, Case 1 should be considered to satisfy the objective of this project more than Case 2.

This study recommends that the product be sold ex-plant; this is exactly what PMDC does for the sale of coal and rock salt. PMDC would not have to bear the burden of uncontrollable magnitude of marketing by adopting this system. Besides, this project could expect participation of the very effective distribution and marketing channels that already exist. They are rock salt dealers of PMDC, kerosene dealers of PSO, coal dealers of PMDC, and free merchants including firewood and charcoal dealers.

With such arrangements and marketing potentials discussed in Chapter 4, COAL BRIQUETTE MARKET, the marketing feasibility may be evaluated as positive.

Regarding the quality of the coal briquettes there are inherent disadvantages to coal briquettes as compared with kerosene which the coal briquettes are intended to replace. The calorific value of the coal briquettes is approximately only half that of kerosene. Coal briquettes also produce ashes while kerosene does not.

Notwithstanding, the design of the quality of coal briquettes takes into consideration every attribute household fuel should have in the Pakistani household environment. It must be admitted that kerosene is superior to coal briquettes as household fuel in relative terms. Nevertheless, the coal briquettes of this pro-

ject would be a good household fuel meeting nearly all requirements as fuel for average Pakistani households.

Even with all these comparative disadvantages of the coal briquettes to kerosene, at the price incentive given to the coal briquettes against kerosene, the coal briquettes will be accepted by the general consumers. The price incentive this study gives to the coal briquettes is based upon the difference, plus some discount, in thermal efficiency between these two fuels confirmed by the burning test conducted by the study team under simulated household conditions.

18-1-2 Technical Evaluation

First and foremost, the experimental production of coal briquettes from the local raw materials and their burning test have established the feasibility of producing coal briquettes of the desired quality level from Lakhra coal, bagasse, slaked lime, slack wax, and light oil. All these materials are easily procurable at and around the site. It should be noted that the briquetting experiments were conducted at a commercial plant; therefore, the classic problem of unexpected troubles occurring one after another in the process of commercializing an experimentally proven process would be avoided. The plant is designed to consist of a series of processes, each proven with firmly established methods of design calculation. The process and equipment are not particularly specialized; therefore, no unusual difficulty is expected in the startup and breaking-in of the plant.

The plant site and infrastructure at and surrounding the plant site would not pose any problem beyond control of or unmanageable by the project; the only improvements that should be provided by the project are supply of electricity, supply of water, construction of a lateral road, all of which can be done easily. The road running through the Lakhra mine area will suffice for the transportation of the construction materials to the site and also transportation of the product from the plant to the markets stretching across the nation. Therefore,the project does not need to construct a road of its own accord for such purposes.

The project area is not a hazard-prone area although this area is hit, but only very rarely, by cyclones and heavy rains. They would not affect the plant or operations very seriously, because the plant site is on a hilly location and the soil is firm. Overall, the candidate site have conditions that are favorable to constructing and operating the plant.

The necessary technology, skills and facilities exist in Pakistan to provide construction materials, labor and machines needed to construct the plant. The local supplies are in general of acceptable quality and are priced lower than imports. The maximum utilization of local supplies intended for this project would make the plant cost economical enough to make this project financially feasible. Some of the best manufacturers of machines may be regarded as basically capable of manufacturing machines constituting the coal briquette plant. Actually, they supply sugar mills and cement plant on turn-key basis. However, none of them has had practical experience in manufacturing these machines. Therefore, this feasibility study compares cases with imported washing and mixing/briquetting machines and cases with all domestic machines. The commercially tried imported machines should be regarded as more reliable than the first domestic machines. Naturally, the domestic machines are cheaper than the imported ones; however, their effects on financial feasibility are small as explained in 18-1-4, Financial and Economic Evaluations. Besides, the economic advantage of the domestic machines would be easily wiped out if use of domestic machines adversely affects operation rates. Fortunately, Case 1A is found to give an acceptable returns in view of the nature of this project as a national project.

Thus, the technical aspects of this project are generally favorable; none of them presents a problem serious enough to jeopardize the feasibility of the project. However, it is very important to maintain a high operation rate in order to be viable.

18-1-3 Raw Materials

The availability, price, quality, ease or difficulty of procurement, and level of inventory required were investigated for all the candidate raw materials preliminarily selected for scrutiny: Lakhra coal, bagasse, wheat straw, cotton oil cake, limestone, slaked lime, cement, slack wax, and light fuel oil. Among them wheat straw, cotton oil cake, limestone and cement were dropped for the reason explained in Chapter 8, PROJECT SCHEME. All the selected raw materials are available in sufficient quantities within Sind to support the project through the project life, though there is seasonal fluctuations in availability of bagasse. Their prices are reasonable and their qualities are sufficiently good. A scarcity of raw materials would not occur to any degree that would threaten the feasibility of the project during the project life.

The only concern is that there may arise in Sind such industries that consume bagasse, even at higher prices, as raw materials. The conceivable candidate industries are paper making and board manufacturing. At present, there is no such industries in Sind. Pakistan makes good use of bagasse. With rapidly increasing population, the demands for such products will naturally increase; there is no denying the possibility of such industry starting in Sind. Even in such a case, the scales of these industry or their consumption of bagasse would not be so great as to threaten the stable and economical supply of bagasse to this project at least in the short run. Even in the long run the effect of these industries on bagasse price would in all probability be within the range of price tested by the sensitivity analysis of financial evaluation.

18-1-4 Financial and Economic Evaluations

The major results of financial and economic evaluations are as follows:

	Case 1		Case 2		Case 3	
	A	B	A	B	A	B
ROI before tax	18.5	20.4	16.0	17.4	19.5	21.8
ROI after tax	12.3	13.7	10.5	11.5	14.4	16.3
ROE before tax	17.4	22.8	7.7	16.7	14.4	22.4
ROE after tax	11.2	16.7	N.R.	11.4	8.3	17.7

Cases 2A and 2B give much lower profitabilities than Case 1A and 1B because of the former's anticipated lower rates of operation. Case 1A and 1B give healthy rates of return on investment and equity. Though not shown here Case 1A and 1B could stand fluctuations of raw material prices, construction cost, etc. as indicated by the sensitivity analysis presented in Chapter 16, FINANCIAL EVALUATION.

As far as the results of financial and economic analyses indicate, cases with B appear preferable to cases with A. This would hold, however, only if cases with B attain the same operation rate as cases with A; this prerequisite may not be met.

This project is expected to make a substantial contribution to the improvement of the balance of payments situation; Cases 1A and 1B are expected to improve the balance of payments by respectively Rs.3,590 million and Rs.3,733 million throughout the project life.

To conclude, Case 1 may be evaluated more preferable to Case 2. With regard to comparison between Case 1A and Case 1B, Case 1A is recommended, although Case 1B shows better returns on calculation.

18-1-5 Social Contribution

This project supports the government policy of promoting utilization of coal: a policy explicitly declared in the Sixth Five Year Plan, 1983-88, of promoting utilization of coal hitherto used almost entirely for baking bricks, and specifically a policy of setting up smokeless briquetting plants of economical size based on major coal fields as a substitute for kerosene.

This project would increase the freedom the government and people in general, particularly those in the middle and lower income strata, could exercise in selecting household fuels. The supply of non-commercial fuels like firewood and charcoal is inherently limited; increasing it beyond limit will inevitably result in devastation of the already impaired natural environment. The supply of natural gas and electricity is rather rigid, meaning that they could be supplied only to the areas where pipelines and power lines of ample capacity are connected. The only measure Pakistan now has at its disposal for adjusting to the changes of demand or supply of household fuel is through adjustment of the volumes of importation of kerosene without regard to the price. At the beginning of the project when the capacity of coal briquette manufacturing is still small, the degree of freedom the government would have by virtue of this project is only symbolic. However, when the government policy mentioned above is fully realized, the degree of freedom would no longer be symbolic and both the government and the consumers would be able to exercise options.

Besides these, as explained in Chapter 17, ECONOMIC ANALYSIS, this project would bring about various social benefits among which the following are important:

1. Creation of business opportunities,
2. Creation of employment opportunities, direct and indirect,
3. Transfer of technology.

Of these, only direct employment opportunities are quantifiable.

The direct employment opportunities to be created by this project at maturity are 127. Other unquantifiable merits are significant. The business opportunities to be created include detail design of equipment to be installed, construction of the plant, transportation of the raw materials and product, distribution and marketing of coal briquettes, those industries who serve the above, manufacture and sale of stoves for burning coal briquettes, etc. There would be additional employment opportunities in all these sectors of industry. The transfer of technology would be made in the fields of plant design and construction, coal briquette manufacturing and stove design.

18-2 Recommendation for Implementation

To conclude this feasibility study the following recommendations are presented:

1. Implementation of Case 1A of this project is recommended.

2. For the best interests of this project, the project scheme proposed in Chapter 8 should be followed.

3. PMDC should concentrate in the production of coal briquettes entrusting the distribution and marketing of coal briquettes to such marketers of demonstrated capability as PMDC' rock salt dealers, PMDC' coal dealers, PSO's kerosene dealers and firewood and charcoal dealers.

4. If such arrangement is possible, coal briquettes of the quality comparable to the one planned by this study should be imported before the start of the operation to market them through the planned channels. This operation would accustom the consumers to coal briquettes.

5. PMDC should assign the managers, engineers, and operators with the highest qualifications to the operation of this project. PMDC should organize the operation of this plant to be simple and effective so that the economy of the project is not burdened by unnecessary manpower.

6. PMDC should employ the best consultants, design engineers, equipment manufacturers, construction companies, contractors for the construction of the plant.

7. If such arrangement is possible, the managers and engineers should be given opportunities to receive training at a coal briquette plant manufacturing the coal briquettes of the quality comparable to that planned by this project.

8. Although there is one coal briquette plant operating in

Quetta, it caters only to the localized demand of the army in that area. The quality of the briquettes being made by the existing plant is entirely different from the quality of briquettes of this project intended chiefly to be household fuel. Therefore, this project may be considered to be the first enterprise of its kind in Pakistan. To make the first enterprise a success is by no means easy. Matters of crucial importance are:

(1) Construction of a dependable plant,
(2) Sufficient implementation of management and operation knowledge, and
(3) Establishment of marketing channels.

9. PMDC should maintain the operation rate not lower than 90 percent, the threshold value to keep the project viable, particularly by promoting sales and maintaining the reliability of the plant.

APPENDIX

LIST OF ABBREVIATION

BBL	Barrel
BPSD	Barrels per stream day
BTU	British Thermal Unit
Comm	Commercial
Consmptn	Consumption
dom.cr	domestic crude
fm	from
F.O.	Furnace Oil
GDP	Gross Domestic Product
Govt	Government
GWT	Giga watt
HOBC, H.O.B.C.	High Octane Blending Component
HSD, H.S.D.	High Speed Diesel
hydel	hydroelectric
IBRD	International Bank of Reconstruction and Development
IEDC	IEDC Consultants
imp.cr	imported crude
JICA	Japán International Cooperation Agency
Kcal	Kilocalorie
Kero	Kerosene
KESC	Karachi Electric Supply Corporation
KgOE	Kilogram Oil Equivalent
lb	pound
L.D.O.	Light Diesel Oil
LPG	Liquefied Petroleum Gas
MCFT	Thousand cubic feet
MMBTU	Million British Thermal Unit
MMRs	Million Rupees
MT,M.T.	Metric ton
MW	Mega Watt
Non-com	Non-commercial
NWFP	North West Frontier Province
OE	Oil Equivalent
Petrlm	Petroleum

PMDC	Pakistan Mineral Development Corporation
Prod.	Product
PSO	Pakistan State Oil Corporation
Rs	Pakistan Rupees
SCF	Standard cubic feet
WAPDA	Water and Power Development Authority