

9.3 Basic Evaluation Conditions

9.3.1 Set Conditions

The data and conditions used in determining the optimum investment case by the above models are as follow.

(1) Power demand forecast

Of the three cases of power demand forecast (base, high demand, and low demand) set by the energy demand forecast model, the two cases, excepting the case of low demand, shall be discussed. The rate of growth of power demand in each of the two cases is as follows.

Table 9.3.1 ASSUMPTION FOR POWER DEMAND FORECAST

	Annual Growth Rate		
	(1995-2000) (%)	(2001-2010) (%)	(2011-2025) (%)
Base Case	7.50%	7.30%	6.60%
High Case	8.00%	8.40%	7.40%

(2) Power supply plans

For each of the above two cases of power demand, three different power supply plans shall be set as follows. Thus, based on evaluation results, the optimum power supply plan shall be selected for each of the two cases of power demand (base and high demand). Since the supply of power from the existing equipment is an invariable condition which does not influence the process of selection of an optimum plan, it shall be excluded from the power supply plan to simplify the procedure.

Table 9.3.2 ALTERNATIVE CASE

Base Case	I-1	II-1	III-1
High Case	I-2	II-2	III-2

(3) Types of power generating equipment and fuels used

1) From the technical viewpoint, the following types of power generating equipment shall be used in combination for the six different power supply plans shown above.

- a) Diesel generator : 29MW
- b) Diesel generator : 50MW
- c) Gas turbine generator (GT) : 50MW
- d) Gas turbine generator (GT) : 150MW
- e) Combined cycle gas turbine generator (CCGT) : 150MW
- f) Combined cycle gas turbine generator (CCGT) : 225MW
- g) Coal-fired steam turbine generator : 100MW

2) Fuels used

As a rule, the power generating equipment shown above shall use the following fuels. All these fuels shall be imported from abroad. As the fuel prices, those obtained by the energy forecast model shall be applied.

<u>Fuel type</u>	<u>Generator type</u>
a) Heavy oil	: Diesel generator
b) Kerosene oil	: GT and CCGT
c) Coal	: Coal-fired steam turbine generator

(3) General conditions (prices, evaluation conditions, etc.)

1) Base prices and base date

The base date on which to set prices shall be July 1, 1996.

2) Base currency

The base currency used in the evaluation shall be the US dollar.

3) Exchange rate

The rates of conversion from some foreign currencies to the US dollar shall be as follows.

1 US\$ = Rs 20.0965

1 US\$ = J. Yen 110.0153

1 US\$ = F.Fr 5.1735

Since Mauritius employs a complete floating exchange rate system, it is assumed that the exchange rate is free from distortion. Therefore, the shadow exchange rate shall not be applied on the premise that the rupee depreciates 2% annually.

4) Application of escalation

Price increases shall be reflected on all prices. However, since the study period is long (until the year 2025), the escalation shall be applied only as far as 2005 and fixed prices shall be used after that. With the exception of those items which require application of a separate escalation rate (e.g., fuels), the following escalation rates shall as a rule be applied.

For foreign currencies: 2.0% p.a.

For domestic currency: 3.5% p.a.

5) Transfer costs

The transfer costs used in calculating economic costs shall be based on the tax rates and public charges prevailing in 1996.

6) Discount rate

Taking into account the interest rates, discount rates, etc. prevailing in the financial market of Mauritius, 12% shall as a rule be used as the discount rate for calculating the present value of total cost. However, in order to cope with a change of the financial climate in the future and in view of private-participated projects, like BOT and IPP, the model shall be capable of calculating present value with a widely varying discount rate so as to permit analyzing the relative fluctuation of total cost due to a change of discount rate.

<u>Year</u>	<u>Central Bank's discount rate</u>	<u>Call rate</u>
1991	11.3%	12.2%
1992	8.3%	9.0%
1993	8.3%	7.7%
1994	13.8%	10.2%
1995	11.4%	10.3%

(4) Investment cost

1) Investment period

The period of investment includes all investments, from the investment in the Fort George No. 3 power plant (29 MW) to be put into operation in 1997 to the investment in equipment to be put into operation in 2025.

2) Disbursement plan

The disbursement plan (construction plan) for each type of power generating equipment shall be as follows.

<u>Power generating equipment</u>	<u>1st year</u>	<u>2nd year</u>	<u>3rd year</u>	<u>4th year</u>
GT	100%	0%	0%	0%
DIESEL	60%	40%	0%	0%
CCGT	20%	60%	20%	0%
COAL	10%	40%	40%	20%

3) Currencies invested

The currency composition for the investment in equipment shall be as follows.

Foreign currencies: 80%

Domestic currency: 20%

4) Import duties

Import duties applied to the equipment imported shall be as follows.

Imported equipment (complete units): 0%

Spare parts (when imported separately): 15%

5) Base cost of construction

The base cost of construction for each type of power generating equipment per kW on

the base date shall be as follows. It should be noted that the amounts shown include preoperational expenses and initial operating expenses (inventory of fuels, etc.) but that they do not include financial costs, such as the interest during the period of construction.

<u>Equipment type</u>	<u>Base cost per kW (US\$)</u>
a. GT-50	480
b. GT-75	450
c. DIESEL-29	1,530
d. DIESEL-50	1,450
e. CCGT-150	680
f. CCGT-225	570
g. COAL-100 (1/2), (1/3)	1,390
h. COAL-100 (2/2),(2/3)	1,270
i. COAL-100 (3/3)	1,190

Note: Concerning the coal-fired power generating equipment, in the case of the 2-unit package (1/2, 2/2) and 3-unit package (1/3, 2/3, 3/3), the amount of investment becomes smaller for the succeeding units as shown above.

6) Durable periods (operating years)

The operating years of each type of equipment shall be as follows. In the case of a gas turbine generator, it is often converted into a CCGT after one or two years of operation. In this case, the durable period is assumed to be one year (two years) in the schedule.

<u>Equipment type</u>	<u>Durable period</u>
GT	15 年
CCGT	20 年
DIESEL	25 年
COAL	25 年

**Table 9.3.3 CONSTRUCTION COST
(INCLUDING I.D.C. AND PREOPERATIONAL EXPENSES)**

Type	Package Plan	Capacity (MW/Unit)	Construction Cost (US\$/KW)	Construction Period (Year)	Disbursement Schedule (Base Cost)			
					1st Year	2nd Year	3rd Year	4th Year
GT	-	50	480	0.0075	24,000	0	0	0
	-	75	450	0.0075	33,750	0	0	0
CCGT	-	150	680	3	20,400	61,200	20,400	0
	-	225	570	3	25,650	76,950	25,650	0
DIESEL	-	29	1,530	2	26,622	17,748	0	0
	-	50	1,450	2	43,500	29,000	0	0
COAL-1	1st Unit	100	1,390	4	13,900	55,600	55,600	13,900
	2nd Unit	100	1,270	4	12,700	50,800	50,800	12,700
COAL-2	1st Unit	100	1,390	4	13,900	55,600	55,600	13,900
	2nd Unit	100	1,270	4	12,700	50,800	50,800	12,700
	3rd Unit	100	1,190	4	11,900	47,600	47,600	11,900

(5) Operating costs

1) Variable costs

Of the variable costs of the thermal power generation project, the sources of energy (i.e., fuels) account for the great majority. Therefore, they shall be treated separately from the other variable costs.

A. Fuel costs

The fuel prices in the base year based on the energy forecast are as follows.

<u>Fuel type</u>	<u>Domestic price (Rs)</u>	<u>Domestic price (US\$)</u>
Gas oil	Rs5.40 /L	\$0.2687 /L
Kerosene	Rs3.60 /L	\$0.1791 /L
Heavy oil	Rs2.50 /L	\$0.1244 /L
Coal	Rs943.00 /MT	\$46.9236 /MT

The estimated rates of price increases are as follows.

Fuel type	Price increase rate	
	1995-2000	2001-2005
Gas oil	4.564 %	4.753 %
Kerosene	4.809 %	4.661 %
Heavy oil	4.564 %	4.841 %
Coal	3.797 %	3.802 %

The fuel prices used in the present study are as follows.

Fuel type	Import price (CIF Rs/l)	Delivery price (Rs/l)	Tax (Rs/l)	Tax rate
Gas oil	2.4228	4.5201	1.9852	43.92 %
Kerosene	3.1754	3.4200	0.2003	5.86%
Heavy oil	2.2530	2.6311	0.3781	14.37%
Coal	1,083.38	1,486.03	160.55	10.80%

Table 9.3.4 FUEL TABLE

	UNIT	Diesel (29,50 MW)	GT-1 (50 MW)	GT-2 (75 MW)	CCGT (150 MW)	CCGT (225 MW)	Coal (100 MW)
Heat Rate	kJ/kWh	7708	11800		7383	7144	11720
Cal. Value	MJ/kg	40.5	43.4	43.4	43.4	43.4	25.79
CIF Cost	US\$/L or Kg	0.1139	0.1588	0.1588	0.1588	0.1588	0.0570
Delivered Cost	US\$/l	0.1310	0.2043	0.2043	0.2043	0.2043	0.0740
	US\$/MWH	24.96	70.31	63.16	43.99	42.57	33.62
Tax component	%	14.37%	16.67%	16.67%	16.67%	16.67%	10.80%

B. Other variable costs

Though other variable costs differ from one type of equipment to another, they include industrial water (BFW, cooling water, etc.), chemicals, limestone (for desulfurization and denitrification), lubricants, and other consumables. The standard variable costs used in the present study are shown in Table 9.3.5. Concerning the limestone for desulfurization and denitrification in thermal power generation, its cost is estimated to be US\$10 per kilogram considering that it can be procured domestically. If this is impossible for environmental reasons, the limestone has to be imported from Madagascar, etc. In this case, the cost will become higher.

Table 9.3.5 OTHER VARIABLE COSTS

	Unit	Unit Cost (US\$/ Unit)	Diesel (29) (US\$/ MWH)	Diesel (50) (US\$/ MWH)	GT (50) (US\$/ MWH)	GT (75) (US\$/ MWH)	CCGT (150) (US\$/ MWH)	CCGT (225) (US\$/ MWH)	COAL (100) (US\$/ MWH)
Water (L)	US\$/MT	0.3	0.36	0.36	0	0	0	0	0.0954
Limestone (L)	US\$/MT	10	0	0	0	0	0	0	3.694
Chemicals (F)	US\$/Kg	-	0	3.45	1	1	1	1	0
Lubeoil/Consumable (F)	US\$/KL	-	8.73	8.73	1	1	1	1	0
Other (F)	US\$/Lot	-	1	1	1	1	1	1	0.0307
TOTAL			10.09	13.54	3	3	3	3	3.8201
Tax Rate	%		49.07%	41.67%	30.00%	30.00%	30.00%	30.00%	14.63%

2) Fixed costs

The fixed costs consist mainly of labor cost, factory overhead, and general administrative expenses including the head office expenses. In addition, there are repair costs, insurances, taxes, etc. They were all estimated as percents to the fixed cost of investment in the power generating equipment. The labor cost (salaries)--the main part of personnel expenses--was estimated assuming the average factory organization and salaries with the scale of the present factory organization and salary ranking of CEB as a reference. The breakdown of estimated fixed costs of each type of power generating equipment is shown in Table 9.3.6.

Table 9.3.6 FIXED COST

	Unit	F/L	Diesel (29)	Diesel (50)	GT (50)	GT (75)	CCGT (150)	CCGT (225)	COAL (100)	NOTE	Tax Rate
Labor Cost (LC)	% x FIC	L	0.67%	0.67%	1.07%	1.07%	0.26%		0.35%	Based on CEB's practice	20.00%
Factory Overhead Expenses	% x FIC	L	0.40%	0.40%	0.64%	0.64%	0.16%	0.16%	0.21%	Labour cost x 60%	20.00%
Maintenance Cost	% x FIC	F	1.30%	1.30%	1.30%	1.30%	1.30%	1.30%	1.30%	FIC x 1.3%	15.00%
Insurance	% x FIC	L	0.60%	0.60%	0.60%	0.60%	0.60%	0.60%	0.60%	FIC x 0.6%	10.00%
Taxes	% x FIC	L	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	FIC x 0.5%	-
Other	% x FIC	L	0.20%	0.20%	0.20%	0.20%	0.20%	0.20%	0.20%	FIC x 0.2%	10.00%
Total			4.02%	4.02%	4.84%	4.84%	3.15%	3.15%	3.34%		

Table 9.3.7 ADJUSTED FUEL COST

Fuel Cost	Available Capacity(MW)	Unit	Fuel	Unit Cost (US\$/Unit)	Escalation Rate(%)	Tax Rate (%)	Standard (%)	Base Cost (1000\$/Y)
Diesel-29	29	MWH	Fuel Oil	24.96	2.65%	14.37%	61.97%	3,364
Diesel-50	50	MWH	Fuel Oil	24.96	2.65%	14.37%	61.97%	5,801
GT-50	50	MWH	Kerosene	70.31	2.65%	16.67%	61.97%	15,904
GT-75	75	MWH	Kerosene	63.16	2.65%	16.67%	61.97%	21,431
CCGT-150	150	MWH	Kerosene	43.99	2.65%	16.67%	61.97%	29,853
CCGT-225	225	MWH	Kerosene	42.57	2.65%	16.67%	61.97%	43,329
Coal-100(1/2)	100	MWH	Coal	33.62	1.76%	10.80%	61.97%	16,277
Coal-100(2/2)	100	MWH	Coal	33.62	1.76%	10.80%	61.97%	16,277
Coal-100(1/3)	100	MWH	Coal	33.62	1.76%	10.80%	61.97%	16,277
Coal-100(2/3)	100	MWH	Coal	33.62	1.76%	10.80%	61.97%	16,277
Coal-100(3/3)	100	MWH	Coal	33.62	1.76%	10.80%	61.97%	16,277

Table 9.3.8 ADJUSTED VARIABLE COST

Other Variable Cost	Available Capacity(MW)	Unit	F-Cost	L-Cost	Base Cost (US\$/MWH)	Escalation Rate (%)	Tax Rate (%)	Standard Load Factor	Cost in 2005 (1000\$/Y)
Diesel-29	29	MWH	9.73	0.36	10.09	2.05%	49.07%	70.00%	1,794
Diesel-50	50	MWH	13.18	0.36	13.54	2.04%	41.67%	70.00%	4,151
GT-50	50	MWH	3	0	3	2.00%	30.00%	70.00%	920
GT-75	75	MWH	3	0	3	2.00%	30.00%	70.00%	1,380
CCGT-150	150	MWH	3	0	3	2.00%	30.00%	70.00%	2,759
CCGT-225	225	MWH	3	0	3	2.00%	30.00%	70.00%	4,139
Coal-100(1/2)	100	MWH	0.0307	3.7894	3.8201	3.49%	14.63%	70.00%	2,342
Coal-100(2/2)	100	MWH	0.0307	3.7894	3.8201	3.49%	14.63%	70.00%	2,342
Coal-100(1/3)	100	MWH	0.0307	3.7894	3.8201	3.49%	14.63%	70.00%	2,342
Coal-100(2/3)	100	MWH	0.0307	3.7894	3.8201	3.49%	14.63%	70.00%	2,342
Coal-100(3/3)	100	MWH	0.0307	3.7894	3.8201	3.49%	14.63%	70.00%	2,342

Table 9.3.9 ADJUSTED FIXED COST

Type of Unit	Amount	Unit	F-Cost	L-Cost	Base Cost	Escalation Rate	Tax Rate	Cost (% x FIC)
Diesel-29	% x FIC	%	1.30%	2.72%	4.02%	3.01%	1.06%	4.02%
Diesel-50	% x FIC	%	1.30%	2.72%	4.02%	3.01%	1.06%	4.02%
GT-50	% x FIC	%	1.30%	3.54%	4.84%	3.10%	1.06%	4.84%
GT-75	% x FIC	%	1.30%	3.54%	4.84%	3.10%	1.22%	4.84%
CCGT-150	% x FIC	%	1.30%	1.85%	3.15%	2.88%	1.22%	3.15%
CCGT-225	% x FIC	%	1.30%	1.85%	3.15%	2.88%	0.89%	3.15%
Coal-100(1/2)	% x FIC	%	1.30%	2.04%	3.34%	2.92%	0.89%	3.34%
Coal-100(2/2)	% x FIC	%	1.30%	2.04%	3.34%	2.92%	0.92%	3.34%
Coal-100(1/3)	% x FIC	%	1.30%	2.04%	3.34%	2.92%	0.92%	3.34%
Coal-100(2/3)	% x FIC	%	1.30%	2.04%	3.34%	2.92%	0.92%	3.34%
Coal-100(3/3)	% x FIC	%	1.30%	2.04%	3.34%	2.92%	0.92%	3.34%

9.4 Calculation and Evaluation of Overall Costs

(1) Calculated cumulative costs of individual plans

Concerning the three power supply plans (Cases I-1, II-1, and III-1) for base power demand and the three power supply plans (I-2, II-2, and III-3) for high power demand, the costs of investment and operation in terms of finance and economy were calculated. The calculation results are summarized in Tables 9.4.1 through 9.4.12. (See the Appendix for detailed calculation results of costs by year.)

(2) Present values of total costs and selection of minimum investment cost case

- 1) The total costs by year in each of the cases were converted into present values using the discount rates described below. The results are shown in Table 9.4.13 and Figures 9.4.1 through 9.4.4. From the results, with the discount rate fixed at 12.5%, in the case of base demand, Scenario 1 is the minimum cost case in terms of both financial cost and economic cost, whereas in the case of high demand, Scenario 1 is the minimum cost case in terms of financial cost, but in terms of economic cost, there is minimal difference between Scenarios 1 and 3. In any case, Scenario 2 cannot be the minimum cost case.
- 2) In the case of base demand, Scenario 1 and Scenario 3 reverse in economic cost advantage with the discount rate of 11.43% as the border line. At a discount rate below 11.43%, Scenario 3 has the cost advantage, whereas at a higher discount rate, Scenario 1 is advantageous.
- 3) In the case of high demand, the advantages in terms of financial and economic costs shift from Scenario 3 to Scenario 1 at certain discount rates--4.86% for financial cost and 11.43% for economic cost.
- 4) In view of the current financial situation, the most reasonable discount rate is considered to be about 16% for investment by CEB (government agency) and about 21% for private investment (BOT, BOO, etc.).

(3) Sensitivity analysis by cost variation

The main cost items evaluated in the present study were investment cost, fuel cost, other variable costs, and fixed operating costs. Of those, other variable costs and fixed costs account for small proportions in terms of amount, and their variations do not significantly influence the total costs. With respect to the construction cost, the variation may safely be assumed to be about 20% as long as the rise in cost due to inflation is taken into account separately. The fuel costs, by contrast, can rise sharply. Therefore, in the present study, it was assumed that the current costs might rise nearly twofold. The analysis results are shown in Table 9.4.14.

According to the analysis results, if the fuel costs hike twofold, in both cases of base demand and high demand, Scenario 3 becomes the most advantageous in terms of both financial and economic costs. At a discount rate of 12.5%, the border line of fuel cost increase between Scenario 3 and Scenario 1 is as follows.

	Financial cost	Economic cost
Base demand		
High demand		

It should be noted that in the present study, the rates of increase in primary energy cost obtained by a forecast model were previously taken into account. Namely, unexpected cost increases, as during the oil crises in the past, were considered.

(4) Conclusion

The results of the present study show that Scenario 1 is the most advantageous in terms of financial and economic costs in both cases of base demand and high demand.

Table 9.4.1 BASE CASE I-1 (FINANCIAL)

Financial

TOTAL COST

CASE: I-1

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
INVESTMENT COST	26,024	17,748	27,234	18,574	28,504	19,442	49,764	97,706	23,937	53,311	104,681	25,065	54,552	104,681	25,065
FUEL COST	0	0	4,033	4,140	8,499	8,724	13,432	36,111	59,982	58,677	84,374	108,518	105,549	129,693	153,837
OTHER VARIABLE COST	0	0	1,621	1,654	3,377	3,446	5,275	6,301	7,365	8,469	9,615	10,588	11,561	12,534	13,507
FIXED COST	0	0	1,811	1,865	3,932	4,051	6,406	8,162	10,058	11,632	13,811	15,689	17,055	18,932	20,809
TOTAL COST	26,024	17,748	34,699	26,234	44,312	35,662	74,877	148,280	101,342	132,088	212,481	159,859	188,717	265,840	213,218

Financial

PRESENT VALUE

@ Discount Rate of:

0.00%	26,024	17,748	34,699	26,234	44,312	35,662	74,877	148,280	101,342	132,088	212,481	159,859	188,717	265,840	213,218
2.50%	26,675	17,748	33,853	24,970	41,148	32,308	66,180	127,861	85,256	108,411	170,140	124,881	143,829	197,667	154,673
5.00%	27,326	17,748	33,047	23,795	38,278	29,339	58,668	110,649	72,022	89,403	136,967	98,139	110,339	148,030	113,074
7.50%	27,976	17,748	32,278	22,701	35,669	26,704	52,156	96,079	61,084	74,062	110,827	77,562	85,176	111,614	83,275
10.00%	28,627	17,748	31,544	21,681	33,292	24,358	46,493	83,700	52,005	61,620	90,113	61,632	66,144	84,705	61,762
12.50%	29,277	17,748	30,844	20,728	31,122	22,264	41,551	73,142	44,435	51,481	73,612	49,228	51,657	64,683	46,115
15.00%	29,928	17,748	30,173	19,836	29,136	20,390	37,227	64,105	38,098	43,180	60,400	39,515	40,563	49,687	34,654
17.50%	30,579	17,748	29,531	19,001	27,315	18,709	33,432	56,345	32,774	36,355	49,771	31,868	32,018	38,385	26,202
20.00%	31,229	17,748	28,916	18,218	25,643	17,198	30,091	49,659	28,283	30,720	41,180	25,818	25,399	29,816	19,928
22.50%	31,880	17,748	28,326	17,482	24,105	15,837	27,144	43,880	24,481	26,048	34,205	21,008	20,245	23,280	15,242
25.00%	32,530	17,748	27,759	16,790	22,688	14,607	24,536	38,871	21,253	22,161	28,519	17,165	16,211	18,268	11,722
27.50%	33,181	17,748	27,215	16,138	21,379	13,495	22,223	34,516	18,502	18,914	23,863	14,081	13,038	14,405	9,061
30.00%	33,832	17,748	26,691	15,523	20,169	12,486	20,166	30,720	16,151	16,193	20,037	11,596	10,530	11,410	7,040

CASE : I-1

Financial

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
INVESTMENT COST	54,552	104,681	25,065	72,982	136,012	63,030	206,967	80,108	261,396	179,322	163,411	190,441	137,978	103,575	14,621
FUEL COST	150,868	175,012	199,156	196,187	228,720	261,254	261,964	351,175	392,809	392,809	393,519	414,878	455,411	476,771	471,985
OTHER VARIABLE COST	14,480	15,453	16,427	17,400	18,859	20,319	21,779	25,672	29,078	29,078	30,537	33,361	35,250	38,073	37,043
FIXED COST	22,156	24,033	25,911	27,257	29,898	32,538	33,672	40,829	45,366	45,366	46,500	53,882	60,207	67,589	69,045
TOTAL COST	242,056	319,180	266,558	313,826	413,489	377,141	524,381	497,784	728,649	646,574	633,967	692,562	688,846	686,008	592,695

PRESENT VALUE

@ Discount Rate of:

0.00%	242,056	319,180	266,558	313,826	413,489	377,141	524,381	497,784	728,649	646,574	633,967	692,562	688,846	686,008	592,695
2.50%	171,310	220,383	179,560	206,245	265,115	235,912	320,015	296,374	423,246	366,412	350,505	373,561	362,495	352,197	296,868
5.00%	122,255	153,531	122,113	136,921	171,813	149,247	197,634	178,676	249,088	210,506	196,573	204,515	193,732	183,746	151,193
7.50%	87,942	107,872	83,802	91,779	112,489	95,443	123,446	109,009	148,433	122,525	111,754	113,566	105,076	97,342	78,234
10.00%	63,741	76,409	58,011	62,089	74,370	61,666	77,946	67,266	89,512	72,208	64,364	63,921	57,798	52,327	41,099
12.50%	46,535	54,544	40,490	42,374	49,627	40,235	49,728	41,960	54,596	43,064	37,532	36,446	32,222	28,524	21,906
15.00%	34,209	39,225	28,486	29,163	33,412	26,500	32,040	26,448	33,664	25,976	22,147	21,038	18,196	15,758	11,838
17.50%	25,315	28,410	20,192	20,232	22,687	17,611	20,840	16,836	20,974	15,840	13,218	12,289	10,403	8,817	6,483
20.00%	18,853	20,717	14,418	14,145	15,531	11,805	13,678	10,820	13,199	9,760	7,975	7,260	6,017	4,994	3,595
22.50%	14,126	15,205	10,366	9,963	10,716	7,978	9,056	7,018	8,385	6,074	4,867	4,336	3,520	2,862	2,018
25.00%	10,646	11,230	7,503	7,067	7,449	5,435	6,046	4,591	5,376	3,817	2,994	2,616	2,082	1,659	1,146
27.50%	8,068	8,344	5,465	5,047	5,215	3,731	4,069	3,029	3,478	2,420	1,861	1,595	1,244	972	658
30.00%	6,148	6,236	4,006	3,628	3,677	2,580	2,759	2,015	2,269	1,549	1,168	981	751	575	382

CASE: I-1

	2025	TOTAL
INVESTMENT COST	0	2,470,430
FUEL COST	493,345	6,091,428
OTHER VARIABLE COST	39,866	517,986
FIXED COST	75,365	833,828
TOTAL COST	608,576	9,913,673

PRESENT VALUE

@ Discount Rate of:

0.00%	608,576	9,913,673
2.50%	297,388	6,073,183
5.00%	147,851	3,876,218
7.50%	74,726	2,578,351
10.00%	38,364	1,786,513
12.50%	19,994	1,287,663
15.00%	10,570	963,311
17.50%	5,665	745,845
20.00%	3,077	595,689
22.50%	1,692	489,087
25.00%	942	411,425
27.50%	530	353,485
30.00%	302	309,317

Table 9.4.2 BASE CASE I-1 (ECONOMIC)

Economic

TOTAL COST

CASE: I-1

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
INVESTMENT COST	23,829	16,251	24,937	17,008	26,100	17,802	45,566	89,464	21,918	48,814	95,851	22,950	49,951	95,851	22,950
FUEL COST	0	0	3,453	3,545	7,277	7,470	11,501	30,409	50,310	49,231	70,654	90,774	88,300	108,420	128,540
OTHER VARIABLE COST	0	0	826	843	1,720	1,755	2,686	3,384	4,107	4,859	5,639	6,320	7,001	7,682	8,364
FIXED COST	0	0	784	808	1,703	1,754	2,775	3,663	4,624	3,983	5,047	6,015	5,145	6,112	7,079
TOTAL COST	23,829	16,251	30,000	22,203	36,800	28,781	62,529	126,920	80,959	106,887	177,192	126,059	150,397	218,066	166,933

Economic

PRESENT VALUE

@ Discount Rate of:

0.00%
2.50%
5.00%
7.50%
10.00%
12.50%
15.00%
17.50%
20.00%
22.50%
25.00%
27.50%
30.00%

23,829	16,251	30,000	22,203	36,800	28,781	62,529	126,920	80,959	106,887	177,192	126,059	150,397	218,066	166,933
24,425	16,251	29,269	21,133	34,172	26,074	55,266	109,443	68,108	87,727	141,883	98,477	114,624	162,144	121,097
25,021	16,251	28,572	20,139	31,789	23,678	48,993	94,710	57,536	72,345	114,219	77,389	87,934	121,427	88,528
25,616	16,251	27,907	19,213	29,623	21,551	43,555	82,239	48,799	59,932	92,420	61,163	67,881	91,556	65,198
26,212	16,251	27,273	18,349	27,648	19,658	38,825	71,643	41,545	49,864	75,147	48,601	52,713	69,482	48,355
26,808	16,251	26,667	17,543	25,846	17,968	34,699	62,606	35,498	41,659	61,386	38,819	41,168	53,059	36,104
27,404	16,251	26,087	16,789	24,197	16,456	31,088	54,871	30,436	34,942	50,369	31,160	32,327	40,758	27,131
27,999	16,251	25,532	16,082	22,685	15,099	27,918	48,229	26,182	29,419	41,505	25,130	25,517	31,487	20,514
28,595	16,251	25,000	15,419	21,296	13,880	25,129	42,505	22,594	24,859	34,341	20,359	20,242	24,458	15,602
29,191	16,251	24,490	14,796	20,019	12,781	22,667	37,559	19,558	21,078	28,525	16,566	16,134	19,097	11,934
29,786	16,251	24,000	14,210	18,842	11,789	20,489	33,271	16,978	17,933	23,782	13,535	12,919	14,985	9,177
30,382	16,251	23,530	13,658	17,755	10,891	18,558	29,544	14,781	15,305	19,900	11,104	10,390	11,816	7,094
30,978	16,251	23,077	13,138	16,750	10,077	16,841	26,295	12,902	13,103	16,709	9,144	8,392	9,360	5,512

CASE : I-1

Economic

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
INVESTMENT COST	49,951	95,851	22,950	66,826	124,539	57,713	189,509	73,351	239,347	164,196	149,627	174,378	126,339	94,839	13,388
FUEL COST	126,066	146,185	166,305	163,831	190,943	218,054	218,646	292,988	327,683	327,683	328,275	347,327	382,242	401,294	398,444
OTHER VARIABLE COST	9,045	9,726	10,407	11,088	12,110	13,132	14,154	16,879	19,263	19,263	20,285	22,695	24,815	27,226	27,303
FIXED COST	6,192	7,160	8,127	7,240	8,435	9,631	9,813	13,172	14,779	14,779	14,961	18,133	21,004	24,176	26,023
TOTAL COST	191,253	258,923	207,790	248,985	336,028	298,531	432,122	396,390	601,072	525,921	513,148	562,532	554,401	547,535	465,158

PRESENT VALUE

@ Discount Rate of:

0.00%	191,253	258,923	207,790	248,985	336,028	298,531	432,122	396,390	601,072	525,921	513,148	562,532	554,401	547,535	465,158
2.50%	135,355	178,777	139,972	163,632	215,449	186,739	263,712	236,005	349,141	298,038	283,707	303,425	291,745	281,104	232,987
5.00%	96,596	124,546	95,191	108,632	139,626	118,139	162,862	142,281	205,476	171,225	159,111	166,117	155,920	146,656	118,559
7.50%	69,485	87,507	65,326	72,817	91,416	75,549	101,727	86,805	122,445	99,661	90,456	92,244	84,568	77,693	61,399
10.00%	50,363	61,984	45,221	49,260	60,438	48,812	64,232	53,564	73,639	58,734	52,098	51,919	46,517	41,765	32,256
12.50%	36,768	44,247	31,563	33,619	40,330	31,849	40,979	33,413	45,037	35,028	30,380	29,603	25,933	22,766	17,192
15.00%	27,030	31,820	22,205	23,137	27,153	20,976	26,403	21,060	27,770	21,129	17,926	17,088	14,645	12,577	9,291
17.50%	20,002	23,046	15,740	16,052	18,437	13,940	17,173	13,407	17,302	12,884	10,699	9,982	8,372	7,037	5,088
20.00%	14,896	16,805	11,239	11,223	12,622	9,344	11,271	8,616	10,888	7,939	6,455	5,897	4,843	3,986	2,822
22.50%	11,161	12,335	8,081	7,904	8,708	6,315	7,463	5,888	6,917	4,941	3,935	3,522	2,833	2,284	1,584
25.00%	8,411	9,110	5,849	5,607	6,053	4,302	4,982	3,656	4,435	3,104	2,423	2,125	1,676	1,324	900
27.50%	6,375	6,769	4,261	4,004	4,238	2,953	3,353	2,412	2,869	1,969	1,507	1,295	1,001	776	517
30.00%	4,857	5,058	3,123	2,878	2,988	2,042	2,274	1,604	1,871	1,260	945	797	604	459	300

CASE: I-1

	2025	TOTAL
INVESTMENT COST	0	2,262,049
FUEL COST	417,496	5,103,348
OTHER VARIABLE COST	29,713	342,289
FIXED COST	28,739	281,857
TOTAL COST	475,948	7,989,544

PRESENT VALUE

@ Discount Rate of:

0.00%	475,948	7,989,544
2.50%	232,577	4,902,461
5.00%	115,630	3,135,200
7.50%	58,441	2,090,443
10.00%	30,003	1,452,573
12.50%	15,636	1,050,424
15.00%	8,267	788,741
17.50%	4,431	613,141
20.00%	2,406	491,781
22.50%	1,323	405,539
25.00%	736	342,643
27.50%	415	295,672
30.00%	236	259,827

Table 9.4.3 BASE CASE II-1 (FINANCIAL)

CASE: II-1 Financial

TOTAL COST

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
INVESTMENT COST	26,024	17,748	27,234	18,574	28,504	19,442	49,764	97,706	23,937	53,311	104,681	25,065	54,552	104,681	25,065
FUEL COST	0	0	4,033	4,140	8,500	8,725	13,433	28,965	45,309	77,918	96,394	112,807	145,048	161,461	177,875
OTHER VARIABLE COST	0	0	1,621	1,654	3,377	3,446	5,275	6,301	7,365	8,469	9,615	10,803	12,034	13,311	14,634
FIXED COST	0	0	1,811	1,865	3,932	4,051	6,405	8,162	10,058	11,632	13,811	15,689	17,055	18,932	20,809
TOTAL COST	26,024	17,748	34,699	26,234	44,313	35,663	74,878	141,134	86,670	151,329	224,501	164,363	228,689	298,385	238,382

Financial

PRESENT VALUE

@ Discount Rate of:

0.00%
2.50%
5.00%
7.50%
10.00%
12.50%
15.00%
17.50%
20.00%
22.50%
25.00%
27.50%
30.00%

26,024	17,748	17,748	34,699	26,234	44,313	35,663	74,878	141,134	86,670	151,329	224,501	164,363	228,689	298,385	238,382
26,675	17,748	33,853	24,970	24,970	41,149	32,309	66,182	121,699	72,912	124,203	179,764	128,400	174,294	221,866	172,927
27,326	17,748	33,047	23,795	23,795	38,279	29,340	58,669	105,316	61,595	102,426	144,715	100,905	133,709	166,152	126,419
27,976	17,748	32,279	22,701	22,701	35,670	26,705	52,157	91,449	52,241	84,851	117,096	79,748	103,217	125,278	93,103
28,627	17,748	31,545	21,681	21,681	33,293	24,359	46,494	79,666	44,475	70,596	95,210	63,369	80,154	95,075	69,051
29,277	17,748	30,844	20,728	20,728	31,122	22,264	41,552	69,617	38,002	58,980	77,776	50,615	62,599	72,602	51,557
29,928	17,748	30,173	19,837	19,837	29,136	20,391	37,228	61,016	32,582	49,470	63,817	40,628	49,155	55,770	38,744
30,579	17,748	29,531	19,002	19,002	27,316	18,710	33,432	53,629	28,029	41,651	52,587	32,766	38,800	43,085	29,294
31,229	17,748	28,916	18,218	18,218	25,644	17,199	30,092	47,265	24,188	35,194	43,510	26,546	30,779	33,466	22,280
31,880	17,748	28,326	17,482	17,482	24,106	15,837	27,144	41,765	20,937	29,842	36,140	21,599	24,533	26,130	17,041
32,530	17,748	27,760	16,790	16,790	22,688	14,698	24,536	36,997	18,176	25,389	30,132	17,648	19,644	20,505	13,105
33,181	17,748	27,215	16,138	16,138	21,380	13,495	22,223	32,853	15,823	21,669	25,213	14,478	15,799	16,168	10,131
33,832	17,748	26,692	15,523	15,523	20,170	12,487	20,167	29,240	13,812	18,551	21,170	11,923	12,760	12,807	7,871

Base Case II-1

CASE: II-1

Financial

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
INVESTMENT COST	71,631	188,598	155,793	79,494	15,604	72,982	165,500	63,030	177,479	80,108	261,396	206,552	137,978	103,575	14,621
FUEL COST	210,115	226,528	242,942	275,182	296,542	317,901	354,117	406,747	402,293	474,725	470,271	542,703	549,692	571,052	538,786
OTHER VARIABLE COST	16,004	17,423	18,893	20,415	24,671	29,203	31,724	35,570	38,301	43,054	46,020	51,092	52,976	59,422	60,621
FIXED COST	22,156	24,033	25,911	27,257	30,842	37,653	48,526	60,339	41,218	43,858	47,632	52,913	53,628	61,009	62,466
TOTAL COST	319,905	456,584	443,539	402,348	367,658	457,739	599,867	565,686	659,291	641,745	825,319	853,061	794,274	795,059	676,495

PRESENT VALUE

@ Discount Rate of:

0.00%	319,905	456,584	443,539	402,348	367,658	457,739	599,867	565,686	659,291	641,745	825,319	853,061	794,274	795,059	676,495
2.50%	226,406	315,255	298,779	264,421	235,730	286,328	366,082	336,801	382,959	363,675	456,299	460,133	417,974	408,183	338,841
5.00%	161,574	219,624	203,190	175,543	152,770	181,143	226,084	203,049	225,379	208,934	255,905	251,911	223,382	212,955	172,570
7.50%	116,226	154,310	139,443	117,668	100,021	115,840	141,217	123,879	134,305	121,610	145,485	139,884	121,157	112,816	89,295
10.00%	84,241	109,302	96,527	79,602	66,127	74,844	89,166	76,441	80,991	71,669	83,791	78,734	66,644	60,645	46,910
12.50%	61,502	78,025	67,374	54,326	44,126	48,834	56,886	47,684	49,399	42,742	48,861	44,892	37,154	33,058	25,003
15.00%	45,212	56,112	47,399	37,389	29,709	32,163	36,652	30,055	30,460	25,782	28,832	25,914	20,981	18,262	13,512
17.50%	33,457	40,640	33,599	25,939	20,173	21,375	23,840	19,133	18,978	15,721	17,207	15,137	11,995	10,218	7,400
20.00%	24,916	29,635	23,990	18,135	13,810	14,328	15,647	12,296	11,942	9,687	10,382	8,942	6,938	5,788	4,104
22.50%	18,669	21,751	17,249	12,773	9,528	9,683	10,359	7,975	7,587	6,029	6,329	5,340	4,059	3,317	2,304
25.00%	14,070	16,065	12,485	9,060	6,623	6,597	6,916	5,218	4,865	3,788	3,897	3,223	2,401	1,922	1,309
27.50%	10,663	11,936	9,094	6,470	4,637	4,528	4,654	3,442	3,147	2,402	2,423	1,964	1,435	1,126	752
30.00%	8,125	8,920	6,666	4,651	3,269	3,131	3,156	2,290	2,053	1,537	1,520	1,209	866	667	436

CASE : II-1

	2025	TOTAL
INVESTMENT COST	0	2,470,430
FUEL COST	560,146	7,324,351
OTHER VARIABLE COST	67,762	711,056
FIXED COST	68,786	842,440
TOTAL COST	696,694	11,348,277

PRESENT VALUE

@ Discount Rate of:

0.00%	696,694	11,348,277
2.50%	340,447	6,937,266
5.00%	169,259	4,412,713
7.50%	85,545	2,920,919
10.00%	43,919	2,010,898
12.50%	22,889	1,438,038
15.00%	12,101	1,066,157
17.50%	6,486	817,454
20.00%	3,522	646,336
22.50%	1,937	525,401
25.00%	1,078	437,771
27.50%	607	372,796
30.00%	346	323,594

Table 9.4.4 BASE CASE II-1 (ECONOMIC)

TOTAL COST

Economic

CASE: II-1

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
INVESTMENT COST	23,994	16,364	25,110	17,126	26,281	17,926	45,882	90,085	22,070	49,152	96,516	23,109	50,297	96,516	23,109
FUEL COST	0	0	3,454	3,545	7,278	7,471	11,503	24,454	38,083	65,265	80,671	94,349	121,216	134,893	148,571
OTHER VARIABLE COST	0	0	826	843	1,720	1,755	2,686	3,384	4,107	4,859	5,639	6,448	7,287	8,158	9,060
FIXED COST	0	0	790	813	1,715	1,767	2,794	3,689	4,656	4,011	5,082	6,056	5,181	6,155	7,129
TOTAL COST	23,994	16,364	30,179	22,327	36,994	28,918	62,865	121,611	68,917	123,288	187,908	129,962	183,981	245,722	187,869

Economic

PRESENT VALUE

@ Discount Rate of:

0.00%	23,994	16,364	30,179	22,327	36,994	28,918	62,865	121,611	68,917	123,288	187,908	129,962	183,981	245,722	187,869
2.50%	24,594	16,364	29,443	21,251	34,352	26,198	55,564	104,865	57,977	101,188	150,463	101,526	140,220	182,708	136,284
5.00%	25,194	16,364	28,742	20,251	31,957	23,791	49,256	90,748	48,978	83,446	121,127	79,786	107,570	136,827	99,631
7.50%	25,794	16,364	28,074	19,320	29,778	21,654	43,789	78,799	41,540	69,128	98,010	63,057	83,038	103,167	73,374
10.00%	26,394	16,364	27,435	18,452	27,794	19,751	39,034	68,646	35,365	57,515	79,691	50,106	64,484	78,294	54,419
12.50%	26,994	16,364	26,826	17,641	25,982	18,053	34,886	59,987	30,217	48,051	65,099	40,021	50,361	59,788	40,632
15.00%	27,594	16,364	26,243	16,882	24,324	16,534	31,255	52,576	25,908	40,303	53,415	32,125	39,545	45,927	30,534
17.50%	28,193	16,364	25,684	16,172	22,804	15,171	28,069	46,211	22,287	33,933	44,015	25,908	31,214	35,480	23,087
20.00%	28,793	16,364	25,149	15,505	21,408	13,946	25,264	40,727	19,233	28,673	36,418	20,990	24,762	27,559	17,559
22.50%	29,393	16,364	24,636	14,878	20,124	12,842	22,789	35,988	16,648	24,313	30,250	17,079	19,737	21,518	13,430
25.00%	29,993	16,364	24,143	14,289	18,941	11,845	20,600	31,880	14,453	20,684	25,221	13,955	15,804	16,886	10,328
27.50%	30,593	16,364	23,670	13,734	17,848	10,943	18,658	28,308	12,582	17,654	21,103	11,448	12,710	13,314	7,984
30.00%	31,193	16,364	23,215	13,211	16,838	10,125	16,931	25,195	10,983	15,114	17,720	9,427	10,266	10,547	6,203

CASE: II-1

Economic

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
INVESTMENT COST	66,043	173,888	143,641	73,293	14,387	67,289	152,591	58,114	163,636	73,860	241,007	190,257	127,216	95,497	13,481
FUEL COST	175,438	189,116	202,794	229,661	248,713	267,765	297,945	341,803	338,091	398,451	394,740	455,100	460,810	479,861	454,112
OTHER VARIABLE COST	9,995	10,963	11,967	13,006	16,550	20,328	22,108	24,816	26,745	30,090	32,185	35,756	37,610	42,960	45,230
FIXED COST	6,235	7,209	8,183	7,290	8,841	11,788	16,747	22,251	13,444	14,648	16,036	18,444	18,600	21,794	23,654
TOTAL COST	257,712	381,176	366,586	323,251	288,491	367,170	489,390	446,984	541,916	517,049	683,968	699,557	644,235	640,112	536,477

PRESENT VALUE

@ Discount Rate of:

0.00%	257,712	381,176	366,586	323,251	288,491	367,170	489,390	446,984	541,916	517,049	683,968	699,557	644,235	640,112	536,477
2.50%	182,389	263,189	246,941	212,439	184,970	229,675	298,661	266,128	314,780	293,010	378,149	377,334	339,019	328,634	268,709
5.00%	130,162	183,352	167,937	141,033	119,874	145,302	184,446	160,441	185,254	168,336	212,076	206,581	181,185	171,453	136,852
7.50%	93,630	128,825	115,250	94,536	78,484	92,919	115,209	97,885	110,394	97,980	120,568	114,713	98,271	90,830	70,813
10.00%	67,864	91,251	79,780	63,953	51,888	60,035	72,745	60,401	66,572	57,743	69,440	64,566	54,055	48,826	37,201
12.50%	49,545	65,139	55,685	43,646	34,625	39,171	46,409	37,678	40,605	34,437	40,493	36,814	30,136	26,616	19,828
15.00%	36,422	46,844	39,175	30,038	23,312	25,799	29,902	23,749	25,037	20,772	23,894	21,251	17,018	14,703	10,715
17.50%	26,953	33,928	27,770	20,840	15,829	17,145	19,449	15,118	15,599	12,667	14,260	12,413	9,729	8,227	5,868
20.00%	20,072	24,740	19,828	14,570	10,836	11,493	12,765	9,716	9,816	7,805	8,604	7,333	5,628	4,660	3,294
22.50%	15,039	18,159	14,256	10,262	7,476	7,768	8,451	6,301	6,236	4,857	5,245	4,379	3,292	2,670	1,827
25.00%	11,334	13,411	10,318	7,279	5,197	5,291	5,642	4,123	3,999	3,052	3,230	2,643	1,947	1,548	1,038
27.50%	8,590	9,965	7,516	5,198	3,639	3,632	3,797	2,720	2,586	1,936	2,008	1,611	1,164	907	596
30.00%	6,545	7,447	5,509	3,737	2,565	2,512	2,575	1,809	1,687	1,238	1,260	991	702	537	346

CASE: II-1

	2025	TOTAL
INVESTMENT COST	0	2,277,737
FUEL COST	473,164	6,148,316
OTHER VARIABLE COST	51,196	488,278
FIXED COST	26,388	291,389
TOTAL COST	550,748	9,205,719

PRESENT VALUE

@ Discount Rate of:

0.00%	550,748	9,205,719
2.50%	269,129	5,636,154
5.00%	133,802	3,591,754
7.50%	67,625	2,382,816
10.00%	34,719	1,644,784
12.50%	18,094	1,179,820
15.00%	9,566	877,726
17.50%	5,127	675,514
20.00%	2,784	536,254
22.50%	1,531	437,741
25.00%	852	366,289
27.50%	480	313,259
30.00%	273	273,066

Table 9.4.5 BASE CASE III-1 (FINANCIAL)

TOTAL COST Financial

CASE: III-1

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
INVESTMENT COST	26,024	17,748	27,234	18,574	28,504	67,094	81,258	83,142	85,072	87,050	89,077	35,631	54,552	104,681	25,065
FUEL COST	0	0	4,033	4,140	8,500	8,725	13,433	21,713	30,423	39,578	49,196	57,767	66,337	90,481	114,625
OTHER VARIABLE COST	0	0	1,621	1,654	3,377	3,446	5,275	9,522	13,937	18,525	23,291	27,683	32,075	33,048	34,021
FIXED COST	0	0	1,811	1,865	3,932	4,051	6,406	10,464	14,860	19,544	24,671	29,313	33,932	35,809	37,687
TOTAL COST	26,024	17,748	34,699	26,234	44,313	83,315	106,373	124,842	144,291	164,696	186,234	150,393	186,896	264,020	211,398

PRESENT VALUE

@ Discount Rate of:

0.00%
2.50%
5.00%
7.50%
10.00%
12.50%
15.00%
17.50%
20.00%
22.50%
25.00%
27.50%
30.00%

Financial

26,024	17,748	34,699	26,234	44,313	83,315	106,373	124,842	144,291	164,696	186,234	150,393	186,896	264,020	211,398
26,675	17,748	33,853	24,970	41,149	75,480	94,018	107,651	121,387	135,174	149,123	117,487	142,442	196,313	153,352
27,326	17,748	33,047	23,795	38,279	68,544	83,346	93,159	102,545	111,473	120,048	92,328	109,274	147,016	112,109
27,976	17,748	32,279	22,701	35,670	62,387	74,095	80,893	86,972	92,345	97,137	72,970	84,354	110,850	82,564
28,627	17,748	31,545	21,681	33,293	56,906	65,049	70,470	74,044	76,832	78,982	57,983	65,506	84,125	61,234
29,277	17,748	30,844	20,728	31,122	52,013	59,029	61,581	63,266	64,189	64,519	46,313	51,159	64,240	45,721
29,928	17,748	30,173	19,837	29,136	47,636	52,886	53,972	54,244	53,839	52,939	37,175	40,172	49,347	34,358
30,579	17,748	29,531	19,002	27,316	43,709	47,494	47,439	46,663	45,329	43,623	29,981	31,709	38,123	25,978
31,229	17,748	28,916	18,218	25,644	40,179	42,749	41,809	40,269	38,303	36,093	24,289	25,154	29,612	19,758
31,880	17,748	28,326	17,482	24,106	36,998	38,561	36,944	34,857	32,478	29,980	19,764	20,049	23,121	15,112
32,530	17,748	27,760	16,790	22,688	34,126	34,856	32,726	30,260	27,631	24,996	16,148	16,054	18,143	11,622
33,181	17,748	27,215	16,138	21,380	31,527	31,570	29,060	26,343	23,583	20,916	13,247	12,912	14,306	8,984
33,832	17,748	26,692	15,523	20,170	29,171	28,649	25,864	22,995	20,190	17,562	10,909	10,429	11,332	6,980

Base Case III-1

Financial

CASE: III-1

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
INVESTMENT COST	54,552	104,681	25,065	72,982	136,012	63,030	206,967	80,108	261,396	179,322	163,411	190,441	137,978	103,575	14,621
FUEL COST	111,656	135,800	159,944	156,975	189,509	222,042	272,732	311,964	353,597	353,597	312,674	334,033	416,199	437,559	478,091
OTHER VARIABLE COST	34,994	35,967	36,941	37,914	39,373	40,833	42,293	46,185	49,591	49,591	47,645	50,469	55,764	58,587	60,476
FIXED COST	39,033	40,911	42,788	44,135	54,167	59,448	50,949	57,707	62,244	67,837	66,898	68,690	69,387	76,768	82,987
TOTAL COST	240,236	317,359	264,737	312,005	419,061	385,353	522,561	495,964	726,828	650,347	590,628	643,634	679,328	676,490	636,176

PRESENT VALUE

@ Discount Rate of:

0.00%	240,236	317,359	264,737	312,005	419,061	385,353	522,561	495,964	726,828	650,347	590,628	643,634	679,328	676,490	636,176
2.50%	170,021	219,126	178,334	205,048	268,688	241,049	318,904	295,290	422,189	368,550	326,544	347,170	357,486	347,310	318,646
5.00%	121,335	152,655	121,279	136,127	174,129	152,497	196,948	178,022	248,466	211,734	183,135	190,067	191,055	181,197	162,284
7.50%	87,281	107,257	83,230	91,247	114,005	97,521	123,018	108,611	148,063	123,240	104,114	105,542	103,624	95,991	83,973
10.00%	63,262	75,973	57,615	61,729	75,372	63,008	77,675	67,020	89,288	72,630	59,964	59,405	56,999	51,601	44,115
12.50%	46,185	54,233	40,214	42,128	50,296	41,111	49,555	41,807	54,460	43,315	34,967	33,871	31,777	28,128	23,513
15.00%	33,952	39,002	28,291	28,993	33,862	27,077	31,929	26,351	33,580	26,127	20,633	19,552	17,945	15,539	12,707
17.50%	25,125	28,248	20,054	20,115	22,993	17,994	20,767	16,775	20,922	15,932	12,314	11,421	10,259	8,694	6,959
20.00%	18,711	20,598	14,319	14,063	15,740	12,062	13,631	10,781	13,166	9,817	7,430	6,747	5,934	4,925	3,859
22.50%	14,020	15,119	10,295	9,905	10,860	8,152	9,024	6,992	8,364	6,110	4,529	4,029	3,472	2,822	2,167
25.00%	10,566	11,166	7,452	7,026	7,549	5,554	6,025	4,574	5,363	3,839	2,789	2,432	2,053	1,636	1,231
27.50%	8,007	8,297	5,428	5,018	5,286	3,812	4,054	3,018	3,469	2,435	1,734	1,482	1,227	958	707
30.00%	6,101	6,200	3,979	3,607	3,726	2,636	2,750	2,007	2,263	1,558	1,088	912	741	567	410

CASE: III-1

	2025	TOTAL
INVESTMENT COST	0	2,624,849
FUEL COST	499,451	5,204,793
OTHER VARIABLE COST	63,300	957,399
FIXED COST	89,307	1,197,200

TOTAL COST	652,057	9,984,242
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PRESENT VALUE

@ Discount Rate of:

0.00%	652,057	9,984,242
2.50%	318,635	6,139,811
5.00%	158,415	3,939,383
7.50%	80,065	2,637,722
10.00%	41,105	1,841,784
12.50%	21,422	1,338,732
15.00%	11,325	1,010,258
17.50%	6,070	788,867
20.00%	3,296	635,050
22.50%	1,813	525,080
25.00%	1,009	444,342
27.50%	568	383,610
30.00%	324	336,915

Table 9.4.6 BASE CASE III-1 (ECONOMIC)

TOTAL COST Economic

CASE: III-1

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
INVESTMENT COST	23,829	16,251	24,937	17,008	26,100	61,435	74,404	76,129	77,896	79,707	81,564	32,625	49,951	95,851	22,950
FUEL COST	0	0	3,454	3,545	7,278	7,471	11,503	18,593	26,051	33,890	42,126	49,465	56,805	76,925	97,044
OTHER VARIABLE COST	0	0	826	843	1,720	1,755	2,686	5,156	7,723	10,391	13,163	15,725	18,287	18,968	19,649
FIXED COST	0	0	784	808	1,703	1,754	2,775	4,532	6,436	8,305	10,521	12,532	14,359	15,326	16,293
TOTAL COST	23,829	16,251	30,001	22,203	36,801	72,415	91,368	104,410	118,106	132,294	147,374	110,348	139,401	207,070	155,937

Economic

PRESENT VALUE

@ Discount Rate of:

0.00%
2.50%
5.00%
7.50%
10.00%
12.50%
15.00%
17.50%
20.00%
22.50%
25.00%
27.50%
30.00%

23,829	16,251	30,001	22,203	36,801	72,415	91,368	104,410	118,106	132,294	147,374	110,348	139,401	207,070	155,937
24,425	16,251	29,269	21,133	34,173	65,604	80,756	90,032	99,358	108,580	118,007	86,203	106,244	153,968	113,120
25,021	16,251	28,572	20,139	31,790	59,576	71,589	77,912	83,936	89,542	94,999	67,744	81,505	115,304	82,697
25,616	16,251	27,908	19,213	29,623	54,224	63,643	67,654	71,189	74,178	76,868	53,540	62,918	86,939	60,903
26,212	16,251	27,273	18,350	27,649	49,460	56,732	58,937	60,607	61,716	62,501	42,544	48,859	65,979	45,170
26,808	16,251	26,667	17,543	25,846	45,208	50,703	51,502	51,785	51,561	51,056	33,981	38,158	50,383	33,726
27,404	16,251	26,088	16,789	24,197	41,403	45,426	45,139	44,400	43,247	41,893	27,276	29,963	38,703	25,344
27,999	16,251	25,532	16,082	22,685	37,991	40,795	39,675	38,195	36,411	34,521	21,998	23,651	29,899	19,163
28,595	16,251	25,001	15,419	21,297	34,922	36,719	34,967	32,961	30,767	28,562	17,822	18,762	23,224	14,575
29,191	16,251	24,490	14,796	20,019	32,158	33,122	30,898	28,531	26,089	23,724	14,501	14,954	18,134	11,148
29,786	16,251	24,001	14,210	18,842	29,661	29,939	27,370	24,769	22,195	19,780	11,848	11,974	14,230	8,573
30,382	16,251	23,530	13,658	17,755	27,402	27,117	24,304	21,563	18,943	16,551	9,720	9,631	11,220	6,627
30,978	16,251	23,077	13,138	16,751	25,354	24,608	21,631	18,822	16,218	13,897	8,004	7,778	8,888	5,149

CASE : III-1

Economic

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
INVESTMENT COST	49,951	95,851	22,950	66,826	124,539	57,713	189,509	73,351	239,347	164,196	149,627	174,378	126,339	94,839	13,388
FUEL COST	94,570	114,690	134,810	132,336	159,447	186,559	187,150	261,493	296,188	296,188	262,085	281,137	350,747	369,799	404,714
OTHER VARIABLE COST	20,330	21,012	21,593	22,374	23,396	24,418	25,439	28,164	30,548	30,548	29,186	31,597	36,101	38,511	40,632
FIXED COST	15,406	16,374	17,341	16,454	20,997	23,389	19,027	22,386	23,993	26,526	26,720	27,490	27,747	30,919	33,744
TOTAL COST	180,258	247,927	196,794	237,990	328,380	292,078	421,126	385,395	590,076	517,458	467,618	514,601	540,934	534,068	492,477

PRESENT VALUE

@ Discount Rate of:

0.00%	180,258	247,927	196,794	237,990	328,380	292,078	421,126	385,395	590,076	517,458	467,618	514,601	540,934	534,068	492,477
2.50%	127,573	171,185	132,565	156,406	210,546	182,703	257,001	229,459	342,754	293,242	258,534	277,571	284,658	274,190	246,671
5.00%	91,042	119,257	90,154	103,834	136,449	115,585	158,718	138,334	201,717	168,469	144,993	151,963	152,133	143,049	125,628
7.50%	65,490	83,791	61,870	69,601	89,336	73,916	99,139	84,397	120,205	98,057	82,430	84,384	82,513	75,782	65,005
10.00%	47,468	59,352	42,828	47,085	59,062	47,757	62,598	52,079	72,488	57,789	47,475	47,496	45,387	40,737	34,150
12.50%	34,654	42,368	29,893	32,134	39,412	31,160	39,936	32,486	44,213	34,464	27,684	27,081	25,303	22,206	18,202
15.00%	25,476	30,469	21,030	22,115	26,535	20,523	25,731	20,476	27,262	20,789	16,336	15,632	14,289	12,267	9,837
17.50%	18,852	22,068	14,908	15,343	18,018	13,639	16,736	13,035	16,985	12,677	9,749	9,131	8,169	6,864	5,387
20.00%	14,040	16,092	10,644	10,727	12,334	9,142	10,985	8,377	10,689	7,811	5,882	5,394	4,725	3,888	2,988
22.50%	10,519	11,811	7,653	7,555	8,510	6,179	7,273	5,433	6,791	4,861	3,586	3,222	2,764	2,228	1,677
25.00%	7,928	8,723	5,539	5,359	5,916	4,209	4,855	3,555	4,354	3,055	2,208	1,944	1,635	1,291	953
27.50%	6,008	6,481	4,035	3,827	4,142	2,889	3,267	2,345	2,816	1,937	1,373	1,185	977	757	547
30.00%	4,578	4,844	2,957	2,751	2,920	1,998	2,216	1,560	1,837	1,239	861	729	590	448	318

CASE : III-1

	2025	TOTAL
INVESTMENT COST	0	2,403,443
FUEL COST	423,766	4,389,829
OTHER VARIABLE COST	43,042	583,883
FIXED COST	36,460	481,100
TOTAL COST	503,268	7,858,255

PRESENT VALUE

@ Discount Rate of:

0.00%	503,268	7,858,255
2.50%	245,927	4,838,111
5.00%	122,267	3,110,170
7.50%	61,795	2,088,378
10.00%	31,726	1,463,716
12.50%	16,534	1,068,912
15.00%	8,741	811,032
17.50%	4,685	637,094
20.00%	2,544	516,105
22.50%	1,399	429,467
25.00%	779	365,733
27.50%	439	317,681
30.00%	250	280,641

Table 9.4.7 HIGH CASE I-2 (FINANCIAL)

CASE :	TOTAL COST																
	Financial																
Financial	DEVIATION																
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
	1995 (%)	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
INVESTMENT COST	0.0%	17,748	27,234	18,574	28,504	68,080	95,492	23,394	52,099	102,299	25,065	54,532	104,681	25,065	72,982	136,012	31,515
FUEL COST	0.0%	0	4,033	4,140	8,500	8,725	35,180	58,435	57,165	82,199	108,518	105,551	129,694	153,836	150,870	183,402	215,934
OTHER VARIABLE COST	0.0%	0	0	1,654	3,377	3,445	6,174	7,218	8,300	9,423	10,588	11,561	12,534	13,507	14,480	15,940	17,400
FIXED COST	0.0%	0	1,811	1,865	3,932	4,051	7,888	9,690	11,195	13,266	15,496	16,854	18,732	20,609	21,956	24,596	27,236
TOTAL COST	26,024	17,748	34,699	26,234	44,313	84,301	144,735	98,736	128,760	207,187	159,666	188,518	265,641	213,017	260,288	359,950	292,085
PRESENT VALUE	Financial	26,024	17,748	34,699	26,234	44,313	84,301	98,736	128,760	207,187	159,666	188,518	265,641	213,017	260,288	359,950	292,085
@ Discount Rate of:	0.00%	17,748	17,748	34,699	26,234	44,313	84,301	144,735	98,736	128,760	207,187	159,666	188,518	265,641	213,017	260,288	359,950
	2.50%	17,748	17,748	33,853	24,970	41,149	76,373	127,925	85,140	108,321	170,048	127,849	147,270	202,457	158,990	188,818	254,746
	5.00%	17,748	17,748	33,047	23,795	38,279	69,355	113,404	73,679	91,507	140,232	102,922	115,734	155,315	118,616	138,036	181,799
	7.50%	17,748	17,748	32,279	22,701	35,670	63,125	100,816	63,977	77,611	116,170	83,279	91,468	119,895	89,436	101,658	130,775
	10.00%	17,748	17,748	31,545	21,681	33,293	57,579	89,869	55,734	66,074	96,654	67,714	72,682	93,105	67,874	75,396	94,786
	12.50%	17,748	17,748	30,844	20,728	31,722	52,629	80,318	48,704	56,456	80,750	55,315	58,053	72,714	51,830	56,295	69,200
	15.00%	17,748	17,748	29,531	19,002	27,316	44,227	64,623	37,519	41,641	57,024	37,400	37,582	45,069	30,758	31,986	37,645
	17.50%	17,748	17,748	28,916	18,218	25,644	40,655	58,166	33,067	35,935	48,185	30,944	30,447	35,752	23,891	24,327	28,035
	20.00%	17,748	17,748	28,326	17,482	24,106	37,436	52,468	29,219	31,105	40,858	25,703	24,774	28,497	18,654	18,607	21,006
	22.50%	17,748	17,748	27,760	16,790	22,688	34,530	47,427	25,883	27,093	34,760	21,430	20,242	22,818	14,638	14,309	15,831
	25.00%	17,748	17,748	27,215	16,138	21,380	31,900	42,956	22,983	23,508	29,668	17,932	16,605	18,352	11,542	11,062	11,998
	27.50%	17,748	17,748	26,692	15,523	20,170	29,516	38,981	20,456	20,520	25,399	15,056	13,675	14,822	9,143	8,594	9,142
	30.00%	17,748	17,748	26,234	15,000	19,000	28,000	38,000	20,000	20,000	25,000	15,000	13,000	14,000	9,000	8,000	9,000

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Financial

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	TOTAL
	336,858	436,521	368,656	413,429	542,579	520,813	846,656	779,785	917,220	835,081	943,343	718,576	751,992	811,849	11,775,262
	72,982	136,012	31,515	72,982	165,500	80,108	261,396	210,837	340,890	253,471	315,457	105,603	44,109	0	3,000,183
	216,647	249,179	281,711	282,424	314,957	371,632	502,474	480,841	480,841	480,841	524,156	500,197	581,650	669,500	7,243,231
	18,859	20,319	21,779	23,239	24,698	27,131	34,430	38,617	38,617	38,617	38,656	38,560	42,395	51,057	594,198
	28,370	31,010	33,650	34,784	37,424	41,942	48,356	49,490	56,872	62,152	65,075	74,216	83,838	91,291	937,651

	336,858	436,521	368,656	413,429	542,579	520,813	846,656	779,785	917,220	835,081	943,343	718,576	751,992	811,849	11,775,262
	226,916	286,879	236,369	258,611	331,120	310,085	491,793	441,902	507,108	450,435	496,420	368,917	376,656	396,719	7,173,339
	154,319	190,452	153,184	163,608	204,492	186,942	289,429	253,876	284,400	246,602	265,307	192,469	191,828	197,236	4,555,436
	105,904	127,662	100,293	104,626	127,730	114,052	172,473	147,768	161,685	136,936	143,896	101,963	99,260	99,685	3,017,234
	73,310	86,363	66,306	67,599	80,651	70,378	104,008	87,085	93,121	77,075	79,152	54,811	52,146	51,178	2,083,468
	51,169	58,940	44,246	44,107	51,453	43,901	63,438	51,936	54,302	43,946	44,127	29,878	27,793	26,672	1,497,807
	35,998	40,564	29,789	29,050	33,152	27,671	39,116	31,327	32,042	25,368	24,919	16,306	15,020	14,101	1,118,395
	25,518	28,142	20,227	19,306	21,563	17,615	24,371	19,103	19,123	14,818	14,246	9,235	8,225	7,557	864,697
	18,220	19,675	13,847	12,941	14,153	11,321	15,336	11,771	11,538	8,754	8,241	5,231	4,562	4,104	689,810
	13,100	13,858	9,554	8,746	9,370	7,342	9,743	7,326	7,034	5,228	4,821	2,998	2,561	2,257	565,720
	9,482	9,830	6,641	5,958	6,256	4,804	6,247	4,603	4,331	3,155	2,851	1,737	1,455	1,256	475,270
	6,907	7,020	4,650	4,090	4,210	3,169	4,041	2,919	2,693	1,923	1,704	1,018	835	707	407,689
	5,062	5,046	3,278	2,828	2,855	2,108	2,636	1,868	1,690	1,183	1,028	603	485	403	356,049

Table 9.4.8 HIGH CASE I-2 (ECONOMIC)

CASE :	Economic																
	TOTAL COST																
DEVIATION (%)	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
	INVESTMENT COST	23,829	16,251	24,937	17,008	26,100	62,337	87,438	21,421	47,705	93,670	22,950	49,951	95,851	22,950	66,826	124,539
FUEL COST	0	0	3,454	3,545	7,278	7,471	29,626	49,012	47,963	68,833	90,774	88,301	108,420	128,540	126,067	153,177	180,288
OTHER VARIABLE COST	0	0	826	843	1,720	1,755	3,316	4,025	4,762	5,527	6,329	7,001	7,682	8,364	9,045	10,067	11,088
FIXED COST	0	0	784	808	1,703	1,754	3,538	4,450	3,847	4,858	5,949	5,104	6,071	7,038	6,151	7,347	8,543
TOTAL COST	23,829	16,251	30,001	22,203	36,801	73,318	123,917	78,909	104,277	172,887	125,993	150,357	218,025	166,892	208,089	295,130	228,775

PRESENT VALUE @ Discount Rate of:	Economic																	
	0.00%	2.50%	5.00%	7.50%	10.00%	12.50%	15.00%	17.50%	20.00%	22.50%	25.00%	27.50%	30.00%					
0.00%	23,829	16,251	30,001	22,203	36,801	73,318	123,917	78,909	104,277	172,887	125,993	150,357	218,025	166,892	208,089	295,130	228,775	
2.50%	24,425	16,251	29,269	21,133	34,173	66,422	109,524	68,043	87,724	141,897	100,886	117,459	166,167	124,093	150,952	208,872	157,961	
5.00%	25,021	16,251	28,572	20,139	31,790	60,319	97,092	58,883	74,108	117,017	81,216	92,306	127,475	92,932	110,354	149,061	110,045	
7.50%	25,616	16,251	27,908	19,213	29,623	54,990	86,315	51,130	62,853	96,938	65,716	72,952	98,404	70,070	81,272	107,225	77,318	
10.00%	26,212	16,251	27,273	18,350	27,649	50,077	76,943	44,542	53,511	80,653	53,433	57,969	76,417	53,177	60,276	77,717	54,767	
12.50%	26,808	16,251	26,667	17,543	25,846	45,772	68,765	38,923	45,721	67,382	43,649	46,302	59,680	40,607	45,006	56,739	39,095	
15.00%	27,404	16,251	26,088	16,789	24,197	41,920	61,609	34,115	39,202	56,517	35,815	37,166	46,863	31,193	33,820	41,710	28,115	
17.50%	27,999	16,251	25,532	16,082	22,685	38,464	55,327	29,985	33,723	47,584	29,513	29,974	36,991	24,098	25,572	30,866	20,363	
20.00%	28,595	16,251	25,001	15,419	21,297	35,358	49,799	26,426	29,102	40,208	24,418	24,284	29,344	18,718	19,449	22,987	14,849	
22.50%	29,191	16,251	24,490	14,796	20,019	32,558	44,921	23,351	25,190	34,094	20,283	19,759	23,389	14,615	14,876	17,223	10,899	
25.00%	29,786	16,251	24,001	14,210	18,842	30,031	40,605	20,686	21,868	29,006	16,911	16,144	18,728	11,469	11,440	12,980	8,049	
27.50%	30,382	16,251	23,530	13,658	17,755	27,744	36,777	18,368	19,038	24,756	14,150	13,244	15,062	9,043	8,843	9,837	5,981	
30.00%	30,978	16,251	23,077	13,138	16,751	25,671	33,374	16,348	16,618	21,194	11,881	10,907	12,166	7,163	6,870	7,496	4,469	

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Economic

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	TOTAL
66,826	124,539	28,857	66,826	151,540	73,351	239,347	193,033	312,136	232,091	288,848	96,695	40,388	0	2,747,117	
180,882	207,992	233,102	235,696	262,806	310,036	419,071	403,548	403,548	403,548	439,529	420,816	489,831	564,292	6,069,446	
12,110	13,132	14,154	15,176	16,197	17,900	23,010	26,809	26,809	26,809	27,200	27,566	31,049	37,547	397,807	
8,725	9,921	11,116	11,299	12,494	14,657	17,231	17,413	20,585	22,977	24,424	29,214	33,463	36,361	337,826	
268,543	355,584	289,229	328,996	443,038	415,944	698,658	640,823	763,078	685,424	780,001	574,291	594,732	638,200	9,552,197	

268,543	355,584	289,229	328,996	443,038	415,944	698,658	640,823	763,078	685,424	780,001	574,291	594,732	638,200	9,552,197
180,897	233,688	185,444	205,796	270,373	247,648	408,826	363,153	421,887	369,711	410,464	294,841	297,888	311,863	5,824,732
123,023	155,140	170,181	130,195	166,976	149,300	238,836	208,634	236,606	202,408	219,368	153,823	151,712	155,048	3,703,830
84,426	103,992	78,685	83,259	104,297	91,087	142,324	121,435	134,513	112,395	118,980	81,490	78,503	78,363	2,457,455
58,443	70,350	52,020	53,794	65,855	56,207	85,827	71,566	77,472	63,262	65,446	43,806	41,241	40,232	1,700,737
40,792	48,012	34,713	35,099	42,014	35,062	52,349	42,681	45,176	36,070	36,486	23,879	21,981	20,967	1,226,037
28,698	33,043	23,371	23,117	27,070	22,099	32,278	25,745	26,658	20,822	20,604	13,191	11,879	11,085	918,432
20,343	22,924	15,869	15,363	17,607	14,068	20,111	15,699	15,910	12,162	11,779	7,381	6,505	5,941	712,671
14,525	16,027	10,864	10,298	11,556	9,041	12,655	9,673	9,599	7,185	6,814	4,181	3,608	3,226	570,756
10,443	11,288	7,495	6,960	7,651	5,864	8,040	6,020	5,852	4,291	3,986	2,396	2,025	1,774	469,992
7,559	8,007	5,210	4,741	5,108	3,836	5,155	3,783	3,604	2,589	2,357	1,389	1,150	988	396,483
5,506	5,718	3,648	3,255	3,437	2,531	3,335	2,399	2,240	1,578	1,409	813	661	556	341,508
4,036	4,111	2,572	2,250	2,331	1,684	2,175	1,535	1,406	971	850	482	384	317	299,455

Table 9.4.9 HIGH CASE II-2 (FINANCIAL)

TOTAL COST

CASE: II-2

Financial

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
INVESTMENT COST	26,024	17,748	27,234	18,574	28,504	68,080	95,492	23,394	52,099	102,299	25,065	54,552	104,681	25,065	90,060	219,929	162,244
FUEL COST	0	0	4,033	4,140	8,500	8,725	35,181	58,436	57,165	82,200	108,520	105,551	129,695	153,839	150,870	183,403	215,937
OTHER VARIABLE COST	0	0	1,621	1,654	3,377	3,446	6,174	7,218	8,300	9,423	10,588	11,561	12,534	13,507	14,480	15,940	17,400
FIXED COST	0	0	1,811	1,865	3,932	4,051	7,886	9,690	11,195	13,266	15,496	16,854	18,732	20,609	21,956	24,596	27,236
TOTAL COST	26,024	17,748	34,699	26,234	44,313	84,301	144,736	98,738	128,760	207,188	159,668	188,518	265,642	213,020	277,366	443,868	422,816

PRESENT VALUE

@ Discount Rate of:

0.00%	26,024	17,748	34,699	26,234	44,313	84,301	144,736	98,738	128,760	207,188	159,668	188,518	265,642	213,020	277,366	443,868	422,816
2.50%	26,675	17,748	33,853	24,970	41,149	76,373	127,925	85,142	108,321	170,049	127,851	147,270	202,457	158,392	201,207	314,138	291,940
5.00%	27,326	17,748	33,047	23,795	38,279	69,355	113,404	73,680	91,507	140,233	102,924	115,734	155,315	118,617	147,093	224,184	203,382
7.50%	27,976	17,748	32,279	22,701	35,670	63,125	100,817	63,979	77,611	116,171	83,280	91,468	119,896	89,437	108,329	161,263	142,898
10.00%	28,627	17,748	31,545	21,681	33,293	57,579	89,870	55,735	66,074	96,655	67,715	72,682	93,106	67,875	80,343	116,884	101,219
12.50%	29,277	17,748	30,844	20,728	31,122	52,629	80,318	48,705	56,456	80,750	55,315	58,033	72,714	51,831	59,989	85,333	72,254
15.00%	29,928	17,748	30,173	19,837	29,136	48,200	71,959	42,687	48,406	67,730	45,388	46,599	57,098	39,815	45,080	62,731	51,962
17.50%	30,579	17,748	29,531	19,002	27,316	44,227	64,623	37,520	41,641	57,025	37,401	37,582	45,069	30,758	34,085	46,432	37,634
20.00%	31,229	17,748	28,916	18,218	25,644	40,655	58,166	33,067	35,935	48,185	30,945	30,447	35,752	23,892	25,924	34,571	27,443
22.50%	31,880	17,748	28,326	17,482	24,106	37,436	52,468	29,219	31,105	40,858	25,704	24,774	28,497	18,655	19,828	25,903	20,142
25.00%	32,530	17,748	27,760	16,790	22,688	34,530	47,427	25,884	27,003	34,760	21,430	20,242	22,818	14,639	15,248	19,522	14,877
27.50%	33,181	17,748	27,215	16,138	21,380	31,900	42,956	22,984	23,508	29,688	17,932	16,605	18,352	11,542	11,787	14,795	11,053
30.00%	33,832	17,748	26,692	15,523	20,170	29,516	38,982	20,456	20,520	25,399	15,057	13,675	14,822	9,143	9,158	11,273	8,260

HIGH CASE II-2

Financial

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	TOTAL
79,494	15,604	72,982	136,012	92,518	177,479	63,020	194,557	146,947	352,316	201,008	251,567	46,136	0	2,970,695	
216,647	238,007	259,366	291,900	324,433	349,287	414,355	415,063	480,132	480,842	565,082	541,833	623,289	645,359	7,151,792	
18,859	21,683	24,506	25,966	27,426	29,859	32,778	34,238	37,157	38,617	40,602	41,966	43,801	50,084	606,765	
28,370	35,752	42,496	45,136	47,776	50,788	56,088	57,202	62,482	63,616	68,478	72,339	91,006	99,561	1,020,247	
343,370	311,045	399,350	499,014	492,153	607,413	566,231	701,062	726,718	935,392	875,170	907,705	806,232	795,005	11,749,499	
343,370	311,045	399,350	499,014	492,153	607,413	566,231	701,062	726,718	935,392	875,170	907,705	806,232	795,005	11,749,499	
231,303	204,417	256,050	312,147	300,347	361,645	328,903	397,290	401,785	504,541	460,545	466,015	403,824	388,488	7,172,760	
157,302	135,708	165,938	197,477	185,487	218,026	193,566	228,246	225,352	276,224	246,133	243,127	205,665	193,143	4,566,997	
107,951	90,966	108,643	126,285	115,859	133,017	115,347	132,850	128,104	153,385	133,497	128,800	106,420	97,617	3,033,388	
74,727	61,539	71,827	81,593	73,155	82,080	69,559	78,293	73,781	86,333	73,432	69,238	55,907	50,117	2,100,209	
52,158	41,998	47,930	53,237	46,671	51,201	42,427	46,693	43,023	49,224	40,938	37,742	29,798	26,118	1,513,229	
36,694	28,904	32,270	35,063	30,071	32,272	26,160	28,165	25,387	28,415	23,118	20,850	16,104	13,808	1,131,758	
26,011	20,053	21,912	23,302	19,559	20,544	16,299	17,175	15,152	16,598	13,216	11,666	8,819	7,401	873,865	
18,572	14,020	15,000	15,620	12,837	13,703	10,257	10,582	9,141	9,805	7,645	6,608	4,891	4,019	698,937	
13,353	9,874	10,349	10,557	8,499	8,563	6,516	6,586	5,573	5,856	4,473	3,787	2,746	2,210	573,073	
9,665	7,004	7,194	7,192	5,674	5,602	4,178	4,138	3,432	3,534	2,645	2,195	1,559	1,280	481,138	
7,040	5,002	5,037	4,926	3,819	3,696	2,703	2,624	2,134	2,154	1,581	1,286	896	693	412,345	
5,160	3,596	3,551	3,413	2,590	2,459	1,763	1,679	1,339	1,326	954	761	520	394	359,731	

Table 9.4.10 HIGH CASE II-2 (ECONOMIC)

TOTAL COST

Economic

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
INVESTMENT COST	23,829	16,251	24,937	17,008	26,100	62,337	87,438	21,421	47,705	93,670	22,950	49,951	95,851	22,950	82,464	201,378	148,558
FUEL COST	0	0	3,454	3,545	7,278	7,471	29,626	49,014	47,963	68,834	90,776	88,301	108,421	128,541	126,067	153,178	180,290
OTHER VARIABLE COST	0	0	826	843	1,720	1,755	3,316	4,025	4,762	5,527	6,320	7,001	7,682	8,264	9,045	10,067	11,088
FIXED COST	0	0	784	808	1,703	1,754	3,538	4,450	3,847	4,858	5,949	5,104	6,071	7,038	6,151	7,347	8,543
TOTAL COST	23,829	16,251	30,001	22,203	36,801	73,318	123,918	78,911	104,277	172,888	125,995	150,357	218,026	166,894	223,727	371,970	348,479

INVESTMENT COST
FUEL COST
OTHER VARIABLE COST
FIXED COST

TOTAL COST

PRESENT VALUE

@ Discount Rate of:

Discount Rate	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
0.00%	23,829	16,251	30,001	22,203	36,801	73,318	123,918	78,911	104,277	172,888	125,995	150,357	218,026	166,894	223,727	371,970	348,479
2.50%	24,425	16,251	29,269	21,133	34,173	66,422	109,525	68,044	87,724	141,897	100,888	117,459	166,168	124,095	162,296	263,253	240,613
5.00%	25,021	16,251	28,572	20,139	31,790	60,319	97,093	58,884	74,108	117,017	81,218	92,306	127,475	92,933	118,647	187,870	167,625
7.50%	25,616	16,251	27,908	19,213	29,623	54,900	86,316	51,131	62,853	96,939	65,717	72,952	98,405	70,071	87,379	135,142	117,774
10.00%	26,212	16,251	27,273	18,350	27,649	50,077	76,943	44,943	53,511	80,654	53,434	57,969	76,417	53,177	64,806	97,951	83,423
12.50%	26,808	16,251	26,667	17,543	25,846	45,772	68,765	38,924	45,721	67,382	43,650	46,302	59,680	40,608	48,388	71,511	59,551
15.00%	27,404	16,251	26,088	16,789	24,197	41,920	61,609	34,115	39,202	56,517	35,816	37,166	46,863	31,194	36,362	52,570	42,826
17.50%	27,999	16,251	25,532	16,082	22,685	38,464	55,328	29,985	33,723	47,584	29,313	29,974	36,991	24,098	27,493	38,903	31,018
20.00%	28,595	16,251	25,001	15,419	21,297	35,358	49,800	26,427	29,102	40,208	24,419	24,284	29,344	18,718	20,910	28,971	22,618
22.50%	29,191	16,251	24,490	14,796	20,019	32,538	44,921	23,352	25,190	34,094	20,283	19,759	23,389	14,615	15,994	21,707	16,601
25.00%	29,786	16,251	24,001	14,210	18,842	30,031	40,605	20,686	21,868	29,006	16,911	16,144	18,728	11,469	12,300	16,359	12,261
27.50%	30,382	16,251	23,530	13,658	17,755	27,744	36,777	18,369	19,038	24,756	14,150	13,244	15,062	9,043	9,508	12,398	9,110
30.00%	30,978	16,251	23,077	13,138	16,751	25,671	33,375	16,348	16,618	21,194	11,881	10,907	12,166	7,163	7,387	9,447	6,808

HIGH CASE II-2

Economic

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	TOTAL
INVESTMENT COST	72,789	14,288	66,826	124,539	84,714	162,509	57,713	178,146	134,552	322,599	184,053	230,347	42,244	0	2,720,117
FUEL COST	180,882	199,934	218,987	246,098	273,210	293,921	348,144	348,736	402,959	403,550	473,636	455,515	524,534	544,178	6,007,044
OTHER VARIABLE COST	12,110	14,521	16,931	17,953	18,975	20,678	22,721	23,743	25,787	26,809	28,562	29,951	33,433	36,866	411,379
FIXED COST	8,725	11,897	14,795	15,991	17,187	18,336	20,728	20,910	23,301	23,484	25,848	28,247	36,479	39,754	373,627
TOTAL COST	274,505	240,640	317,539	404,582	394,085	495,444	449,306	571,535	586,599	776,441	712,099	744,060	636,690	620,798	9,512,168

PRESENT VALUE

@ Discount Rate of:

0.00%	274,505	240,640	317,539	404,582	394,085	495,444	449,306	571,535	586,599	776,441	712,099	744,060	636,690	620,798	9,512,168
2.50%	184,914	158,147	203,595	253,077	240,499	294,981	260,986	323,888	324,316	418,805	374,731	382,000	318,904	303,360	5,815,838
5.00%	125,754	104,990	131,944	160,107	148,526	177,836	153,595	186,076	181,885	229,285	200,271	199,295	162,416	150,821	3,710,069
7.50%	86,401	70,376	86,386	102,387	92,773	108,497	91,529	108,305	103,404	127,320	108,623	105,579	84,041	76,226	2,469,938
10.00%	59,740	47,609	57,112	66,152	58,578	66,950	55,195	63,828	59,555	71,662	59,749	56,755	44,150	39,135	1,714,812
12.50%	41,698	32,492	38,111	43,163	37,371	41,763	33,666	38,066	34,728	40,860	33,310	30,938	23,532	20,395	1,239,462
15.00%	29,335	22,362	25,659	28,428	24,079	26,323	20,758	22,961	20,492	23,586	18,810	17,091	12,717	10,782	930,272
17.50%	20,794	15,514	17,423	18,892	15,661	16,757	12,933	14,001	12,230	13,777	10,754	9,563	6,964	5,779	722,667
20.00%	14,847	10,846	11,927	12,664	10,279	10,769	8,139	8,527	7,379	8,139	6,221	5,416	3,862	3,138	578,976
22.50%	10,675	7,639	8,229	8,559	6,806	6,985	5,171	5,369	4,499	4,861	3,639	3,104	2,168	1,726	476,640
25.00%	7,727	5,419	5,720	5,831	4,543	4,570	3,315	3,374	2,770	2,933	2,152	1,799	1,232	961	401,804
27.50%	5,628	3,870	4,005	4,002	3,058	3,015	2,144	2,139	1,722	1,788	1,286	1,054	707	541	345,738
30.00%	4,125	2,782	2,824	2,767	2,074	2,005	1,399	1,369	1,081	1,100	776	624	411	308	302,805

Table 9.4.11 HIGH CASE III-2 (FINANCIAL)

TOTAL COST Financial

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
INVESTMENT COST	26,024	17,748	27,234	18,574	75,080	98,862	81,258	83,142	85,072	87,050	35,631	54,552	104,681	25,065	72,982	136,012	31,515
FUEL COST	0	0	4,033	4,140	8,500	8,725	21,153	29,638	38,557	47,927	57,767	66,337	90,481	114,625	111,656	144,190	176,723
OTHER VARIABLE COST	0	0	1,621	1,654	3,377	3,446	9,341	13,681	18,193	22,883	27,760	32,168	33,141	34,114	35,087	36,547	38,007
FIXED COST	0	0	1,811	1,865	3,932	4,051	10,056	14,205	18,687	23,524	28,737	33,346	35,224	37,101	38,447	41,088	43,728
TOTAL COST	26,024	17,748	34,699	26,234	90,889	115,084	121,808	140,665	160,510	181,386	149,895	186,403	263,527	210,905	258,173	357,836	289,973

PRESENT VALUE

@ Discount Rate of:

	0.00%	2.50%	5.00%	7.50%	10.00%	12.50%	15.00%	17.50%	20.00%	22.50%	25.00%	27.50%	30.00%				
Financial	26,024	17,748	34,699	26,234	90,889	115,084	121,808	140,665	160,510	181,386	149,895	186,403	263,527	210,905	258,173	357,836	289,973
Financial	26,675	17,748	33,833	24,970	84,399	104,260	107,661	121,295	135,031	148,872	120,025	145,618	200,846	156,819	187,284	253,250	200,216
Financial	27,326	17,748	33,047	23,795	78,513	94,680	95,440	104,967	114,071	122,769	95,623	114,435	154,079	117,440	136,915	180,732	139,482
Financial	27,976	17,748	32,279	22,701	73,162	86,175	84,846	91,146	96,748	101,703	78,183	90,442	118,941	88,549	100,832	130,007	98,001
Financial	28,627	17,748	31,545	21,681	68,286	78,604	75,633	79,402	82,367	84,618	63,570	71,867	92,365	67,201	74,783	94,229	69,417
Financial	29,277	17,748	30,844	20,728	63,834	71,846	67,595	69,386	70,377	70,694	51,979	57,402	72,135	51,316	55,838	68,794	49,553
Financial	29,928	17,748	30,173	19,837	59,761	65,799	60,560	60,814	60,342	59,295	42,609	46,076	56,643	39,420	41,960	50,573	35,636
Financial	30,579	17,748	29,531	19,002	56,027	60,376	54,386	53,452	51,908	49,923	35,111	37,160	44,710	30,453	31,726	37,424	25,810
Financial	31,229	17,748	28,916	18,218	52,598	55,499	48,952	47,109	44,795	42,185	29,051	30,105	35,468	23,654	24,130	27,871	18,821
Financial	31,880	17,748	28,326	17,482	49,443	51,106	44,157	41,627	38,775	35,770	24,730	24,496	28,270	18,469	18,456	20,882	13,814
Financial	32,530	17,748	27,760	16,790	46,535	47,138	39,914	36,875	33,661	30,432	20,119	20,015	22,637	14,493	14,193	15,738	10,203
Financial	33,181	17,748	27,215	16,138	43,851	43,548	36,151	32,744	29,304	25,973	16,834	16,419	18,206	11,428	10,972	11,927	7,581
Financial	33,832	17,748	26,692	15,523	41,370	40,294	32,806	29,143	25,580	22,236	14,135	13,521	14,704	9,052	8,524	9,088	5,665

Financial

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	TOTAL
INVESTMENT COST	72,982	136,012	31,515	72,982	185,500	80,108	261,396	179,322	236,393	326,453	169,493	115,555	85,376	0	2,993,769
FUEL COST	177,433	209,967	242,501	243,211	275,745	332,422	333,132	398,200	398,910	452,803	525,869	547,939	596,861	691,467	6,350,912
OTHER VARIABLE COST	39,466	40,926	42,386	43,845	45,305	47,738	49,198	52,117	53,577	57,860	61,209	65,492	67,868	75,124	1,051,132
FIXED COST	44,862	47,502	50,142	51,276	53,916	58,434	59,568	64,848	65,982	76,004	84,969	93,485	100,466	111,303	1,298,560
TOTAL COST	334,744	434,407	366,544	411,314	540,466	518,702	703,294	694,487	754,861	913,120	841,340	822,470	850,771	875,895	11,694,373

PRESENT VALUE

@ Discount Rate of:

0.00%	334,744	434,407	366,544	411,314	540,466	518,702	703,294	694,487	754,861	913,120	841,340	822,470	850,771	875,895	11,694,373
2.50%	225,492	285,490	235,015	257,289	329,830	308,828	408,518	393,564	417,344	492,528	442,848	422,256	426,132	428,016	7,141,974
5.00%	153,350	189,590	152,306	162,771	203,696	186,184	240,471	226,105	234,058	269,647	236,675	220,297	217,026	212,795	4,556,924
7.50%	105,239	127,044	99,718	104,091	127,233	113,590	143,268	131,604	133,065	149,733	128,367	116,706	112,299	107,549	3,038,944
10.00%	72,850	85,945	65,926	67,253	80,337	70,093	86,397	77,559	76,638	84,277	70,610	62,736	58,995	55,216	2,116,774
12.50%	50,848	58,655	43,993	43,881	51,253	43,724	52,696	46,255	44,690	48,052	39,365	34,198	31,444	28,776	1,537,127
15.00%	35,772	40,368	29,619	28,901	33,023	27,559	32,493	27,901	26,371	27,738	22,290	18,892	16,993	15,213	1,160,245
17.50%	25,357	28,006	20,111	19,207	21,479	17,544	20,244	17,013	15,738	16,202	12,708	10,571	9,306	8,154	906,968
20.00%	18,106	19,580	13,768	12,874	14,098	11,275	12,739	10,488	9,495	9,572	7,351	5,987	5,161	4,428	731,266
22.50%	13,018	13,791	9,499	8,701	9,334	7,312	8,094	6,524	5,789	5,716	4,301	3,431	2,897	2,435	605,672
25.00%	9,422	9,782	6,603	5,928	6,231	4,784	5,189	4,100	3,565	3,450	2,543	1,989	1,646	1,355	513,366
27.50%	6,864	6,986	4,623	4,069	4,193	3,156	3,357	2,600	2,216	2,103	1,520	1,165	945	763	443,781
30.00%	5,031	5,022	3,259	2,814	2,844	2,099	2,190	1,663	1,391	1,294	917	690	549	435	390,110

Table 9.4.12 HIGH CASE III-2 (ECONOMIC)

TOTAL COST Economic

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
INVESTMENT COST	23,829	16,251	24,937	17,008	68,747	90,523	74,404	76,129	77,896	79,707	32,625	49,951	95,851	22,950	66,826	124,539	28,857
FUEL COST	0	0	3,454	3,545	7,278	7,471	18,114	25,379	33,016	41,040	49,465	56,805	76,925	97,044	94,570	121,682	148,793
OTHER VARIABLE COST	0	0	826	843	1,720	1,755	5,058	7,582	10,206	12,934	15,770	18,341	19,022	19,703	20,385	21,406	22,428
FIXED COST	0	0	784	808	1,703	1,754	4,355	6,152	8,093	10,188	12,446	14,442	15,409	16,376	15,489	16,685	17,881
TOTAL COST	23,829	16,251	30,001	22,203	79,448	101,503	101,931	115,242	129,212	143,870	110,307	139,538	207,207	156,075	197,270	284,312	217,959

PRESENT VALUE Economic

@ Discount Rate of:	0.00%	2.50%	5.00%	7.50%	10.00%	12.50%	15.00%	17.50%	20.00%	22.50%	25.00%	27.50%	30.00%
Investment Cost	23,829	24,425	25,021	25,616	26,212	26,808	27,404	27,999	28,595	29,191	29,786	30,382	30,978
Fuel Cost	16,251	16,251	16,251	16,251	16,251	16,251	16,251	16,251	16,251	16,251	16,251	16,251	16,251
Other Variable Cost	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
Fixed Cost	784	784	784	784	784	784	784	784	784	784	784	784	784
Present Value	101,931	90,092	79,866	71,105	63,291	56,564	50,678	45,511	40,964	36,951	33,401	30,252	27,453

Economic

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	TOTAL
INVESTMENT COST	66,826	124,539	28,857	66,826	151,540	73,351	239,347	164,196	216,433	298,917	155,196	105,808	78,357	0	2,741,245
FUEL COST	149,385	176,496	203,608	204,199	231,311	278,542	279,134	333,356	333,948	380,112	442,138	461,782	503,688	583,779	5,346,059
OTHER VARIABLE COST	23,450	24,472	25,494	26,515	27,537	29,240	30,262	32,366	33,327	36,760	39,902	43,334	45,795	49,908	646,281
FIXED COST	18,063	19,259	20,454	20,637	21,832	23,995	24,178	26,569	26,752	31,119	35,186	38,541	41,594	46,472	537,218
TOTAL COST	257,724	344,766	278,412	318,178	432,220	405,129	572,921	556,427	610,480	746,987	672,422	649,464	669,434	680,160	9,270,803

PRESENT VALUE

@ Discount Rate of:

0.00%	257,724	344,766	278,412	318,178	432,220	405,129	572,921	556,427	610,480	746,987	672,422	649,464	669,434	680,160	9,270,803
2.50%	173,609	226,579	178,508	199,029	263,771	241,208	332,789	315,326	337,520	402,875	353,852	333,435	335,305	332,368	5,665,348
5.00%	118,066	150,420	115,686	125,914	162,899	145,418	195,853	181,157	189,290	220,564	189,112	173,958	170,768	165,242	3,619,417
7.50%	81,025	100,828	75,742	80,521	101,750	88,719	116,710	105,442	107,614	122,477	102,570	92,157	88,363	85,515	2,418,895
10.00%	56,088	68,210	50,075	52,025	64,247	54,745	70,381	62,141	61,979	68,937	56,420	49,540	46,421	42,877	1,690,076
12.50%	39,148	46,551	35,415	33,945	40,988	34,150	42,928	37,060	36,142	39,306	31,454	27,005	24,742	22,345	1,232,201
15.00%	27,542	32,038	22,497	22,357	26,409	21,525	26,469	22,354	21,327	22,689	17,762	14,918	13,371	11,813	934,568
17.50%	19,523	22,227	15,276	14,858	17,177	13,702	16,492	13,631	12,728	13,253	10,154	8,347	7,322	6,332	734,522
20.00%	13,940	15,540	10,457	9,959	11,274	8,806	10,378	8,399	7,679	7,830	5,874	4,728	4,061	3,438	595,669
22.50%	10,023	10,945	7,215	6,731	7,464	5,711	6,593	5,227	4,682	4,676	3,436	2,709	2,280	1,891	496,313
25.00%	7,254	7,763	5,015	4,585	4,983	3,737	4,227	3,285	2,883	2,822	2,032	1,570	1,295	1,052	423,182
27.50%	5,284	5,544	3,512	3,148	3,354	2,465	2,734	2,083	1,792	1,720	1,214	920	744	593	367,948
30.00%	3,873	3,986	2,476	2,176	2,274	1,640	1,784	1,333	1,125	1,058	733	545	432	337	325,251

Table 9.4.13 ANALYTICAL STUDY ON THE PRESENT VALUE OF TOTAL COST OF THE CASES

(1) COMPARISON OF CALCULATED PRESENT VALUE

Discount Rate :	0.00%	2.50%	5.00%	7.50%	10.00%	12.50%	15.00%	17.50%	20.00%	22.50%	25.00%	27.50%	30.00%
Base Case Financial													
I-1	9,914	6,073	3,876	2,578	1,787	1,288	963	746	596	489	411	353	309
II-1	11,348	6,937	4,413	2,921	2,011	1,438	1,066	817	646	525	438	373	324
III-1	9,984	6,140	3,939	2,658	1,842	1,339	1,010	789	635	525	444	384	337
Base Case Economic													
I-1	7,990	4,902	3,135	2,090	1,453	1,050	789	613	492	406	343	296	260
II-1	9,206	5,636	3,592	2,383	1,645	1,180	878	676	536	438	366	313	273
III-1	7,858	4,838	3,110	2,088	1,464	1,069	811	637	516	429	366	318	281
High Case Financial													
I-2	11,775	7,173	4,555	3,017	2,083	1,498	1,118	865	690	566	475	408	356
II-2	11,749	7,173	4,567	3,033	2,100	1,513	1,132	876	699	573	481	412	360
III-2	11,694	7,142	4,557	3,039	2,117	1,537	1,160	907	731	606	513	444	390
High Case Economic													
I-2	9,552	5,825	3,704	2,457	1,701	1,226	918	713	571	470	396	342	299
II-2	9,512	5,816	3,710	2,470	1,715	1,239	930	723	579	477	402	346	303
III-2	9,271	5,665	3,619	2,419	1,690	1,232	935	735	596	496	423	368	325

Table 9.4.14 RESULT OF SENSITIVITY ANALYSIS

I. BASE CASE

Discount Rate :	0.00%	2.50%	5.00%	7.50%	10.00%	12.50%	15.00%	17.50%	20.00%	22.50%	25.00%	27.50%	30.00%
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FINANCIAL Deviation	0 %	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1
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Investment Cost	-20 %	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1
	-10 %	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1
	+10 %	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1
	+20 %	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1

Fuel Cost	-20 %	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1
	-10 %	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1
	+10 %	III-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1
	+20 %	III-1	III-1	III-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1
	+30 %	III-1	III-1	III-1	III-1	III-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1
	+40 %	III-1	III-1	III-1	III-1	III-1	III-1	I-1	I-1	I-1	I-1	I-1	I-1
	+50 %	III-1	III-1	III-1	III-1	III-1	III-1	III-1	I-1	I-1	I-1	I-1	I-1
	+60 %	III-1	III-1	III-1	III-1	III-1	III-1	III-1	I-1	I-1	I-1	I-1	I-1
	+70 %	III-1	III-1	III-1	III-1	III-1	III-1	III-1	III-1	I-1	I-1	I-1	I-1
	+80 %	III-1	III-1	III-1	III-1	III-1	III-1	III-1	III-1	III-1	III-1	I-1	I-1
	+90 %	III-1	III-1	III-1	III-1	III-1	III-1	III-1	III-1	III-1	III-1	III-1	I-1
	+100 %	III-1	III-1	III-1	III-1	III-1	III-1	III-1	III-1	III-1	III-1	III-1	I-1

Other V-Cost + Fixed Cost	-20 %	III-1	III-1	III-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1
	-10 %	III-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1
	+10 %	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1
	+20 %	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1

ECONOMIC Deviation	0 %	III-1	III-1	III-1	III-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1
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Investment Cost	-20 %	III-1	III-1	III-1	III-1	III-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1
	-10 %	III-1	III-1	III-1	III-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1
	+10 %	III-1	III-1	III-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1
	+20 %	III-1	III-1	III-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1

Fuel Cost	-20 %	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1
	-10 %	III-1	III-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1
	+10 %	III-1	III-1	III-1	III-1	III-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1
	+20 %	III-1	III-1	III-1	III-1	III-1	III-1	I-1	I-1	I-1	I-1	I-1	I-1
	+30 %	III-1	III-1	III-1	III-1	III-1	III-1	III-1	I-1	I-1	I-1	I-1	I-1
	+40 %	III-1	III-1	III-1	III-1	III-1	III-1	III-1	III-1	I-1	I-1	I-1	I-1
	+50 %	III-1	III-1	III-1	III-1	III-1	III-1	III-1	III-1	III-1	I-1	I-1	I-1
	+60 %	III-1	III-1	III-1	III-1	III-1	III-1	III-1	III-1	III-1	III-1	I-1	I-1
	+70 %	III-1	III-1	III-1	III-1	III-1	III-1	III-1	III-1	III-1	III-1	I-1	I-1
	+80 %	III-1	III-1	III-1	III-1	III-1	III-1	III-1	III-1	III-1	III-1	III-1	I-1
	+90 %	III-1	III-1	III-1	III-1	III-1	III-1	III-1	III-1	III-1	III-1	III-1	I-1
	+100 %	III-1	III-1	III-1	III-1	III-1	III-1	III-1	III-1	III-1	III-1	III-1	III-1

Other V-Cost + Fixed Cost	-20 %	III-1	III-1	III-1	III-1	III-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1
	-10 %	III-1	III-1	III-1	III-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1
	+10 %	III-1	III-1	III-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1
	+20 %	III-1	III-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1	I-1

II. HIGH CASE

Discount Rate :	0.00%	2.50%	5.00%	7.50%	10.00%	12.50%	15.00%	17.50%	20.00%	22.50%	25.00%	27.50%	30.00%
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FINANCIAL

Deviation	0 %	III-2	III-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2
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Investment Cost

-20 %	III-2	III-2	III-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2
-10 %	III-2	III-2	III-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2
+10 %	III-2	III-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2
+20 %	III-2	III-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2

Fuel Cost

-20 %	II-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2
-10 %	II-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2
+10 %	III-2	III-2	III-2	III-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2
+20 %	III-2	III-2	III-2	III-2	III-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2
+30 %	III-2	III-2	III-2	III-2	III-2	III-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2
+40 %	III-2	III-2	III-2	III-2	III-2	III-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2
+50 %	III-2	III-2	III-2	III-2	III-2	III-2	III-2	I-2	I-2	I-2	I-2	I-2	I-2
+60 %	III-2	III-2	III-2	III-2	III-2	III-2	III-2	III-2	I-2	I-2	I-2	I-2	I-2
+70 %	III-2	III-2	III-2	III-2	III-2	III-2	III-2	III-2	III-2	III-2	I-2	I-2	I-2
+80 %	III-2	III-2	III-2	III-2	III-2	III-2	III-2	III-2	III-2	III-2	III-2	I-2	I-2
+90 %	III-2	III-2	III-2	III-2	III-2	III-2	III-2	III-2	III-2	III-2	III-2	III-2	I-2
+100 %	III-2	III-2	III-2	III-2	III-2	III-2	III-2	III-2	III-2	III-2	III-2	III-2	III-2

Other V-Cost + Fixed Cost

-20 %	III-2	III-2	III-2	III-2	III-2	III-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2
-10 %	III-2	III-2	III-2	III-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2
+10 %	II-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2
+20 %	II-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2

ECONOMIC

Deviation	0 %	III-2	III-2	III-2	III-2	III-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2
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Investment Cost

-20 %	III-2	III-2	III-2	III-2	III-2	III-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2
-10 %	III-2	III-2	III-2	III-2	III-2	III-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2
+10 %	III-2	III-2	III-2	III-2	III-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2
+20 %	III-2	III-2	III-2	III-2	III-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2

Fuel Cost

-20 %	III-2	III-2	III-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2
-10 %	III-2	III-2	III-2	III-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2
+10 %	III-2	III-2	III-2	III-2	III-2	III-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2
+20 %	III-2	III-2	III-2	III-2	III-2	III-2	III-2	I-2	I-2	I-2	I-2	I-2	I-2
+30 %	III-2	III-2	III-2	III-2	III-2	III-2	III-2	III-2	I-2	I-2	I-2	I-2	I-2
+40 %	III-2	III-2	III-2	III-2	III-2	III-2	III-2	III-2	III-2	I-2	I-2	I-2	I-2
+50 %	III-2	III-2	III-2	III-2	III-2	III-2	III-2	III-2	III-2	I-2	I-2	I-2	I-2
+60 %	III-2	III-2	III-2	III-2	III-2	III-2	III-2	III-2	III-2	III-2	I-2	I-2	I-2
+70 %	III-2	III-2	III-2	III-2	III-2	III-2	III-2	III-2	III-2	III-2	III-2	I-2	I-2
+80 %	III-2	III-2	III-2	III-2	III-2	III-2	III-2	III-2	III-2	III-2	III-2	III-2	I-2
+90 %	III-2	III-2	III-2	III-2	III-2	III-2	III-2	III-2	III-2	III-2	III-2	III-2	I-2
+100 %	III-2	III-2	III-2	III-2	III-2	III-2	III-2	III-2	III-2	III-2	III-2	III-2	III-2

Other V-Cost + Fixed Cost

-20 %	III-2	III-2	III-2	III-2	III-2	III-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2
-10 %	III-2	III-2	III-2	III-2	III-2	III-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2
+10 %	III-2	III-2	III-2	III-2	III-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2
+20 %	III-2	III-2	III-2	III-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2	I-2

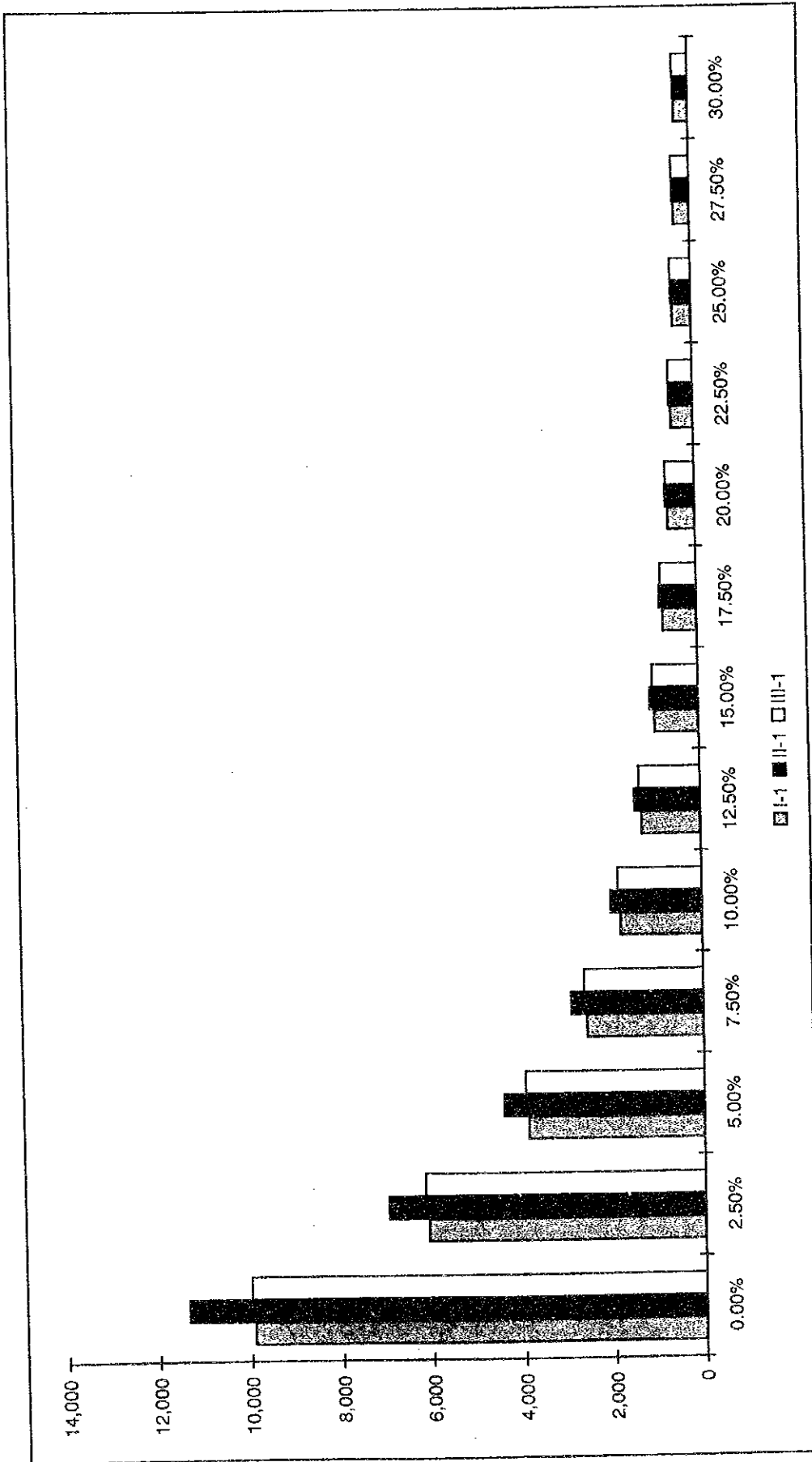


Figure 9.4.1 COMPARISON OF CALCULATED PRESENT VALUE - BASE CASE FINANCIAL

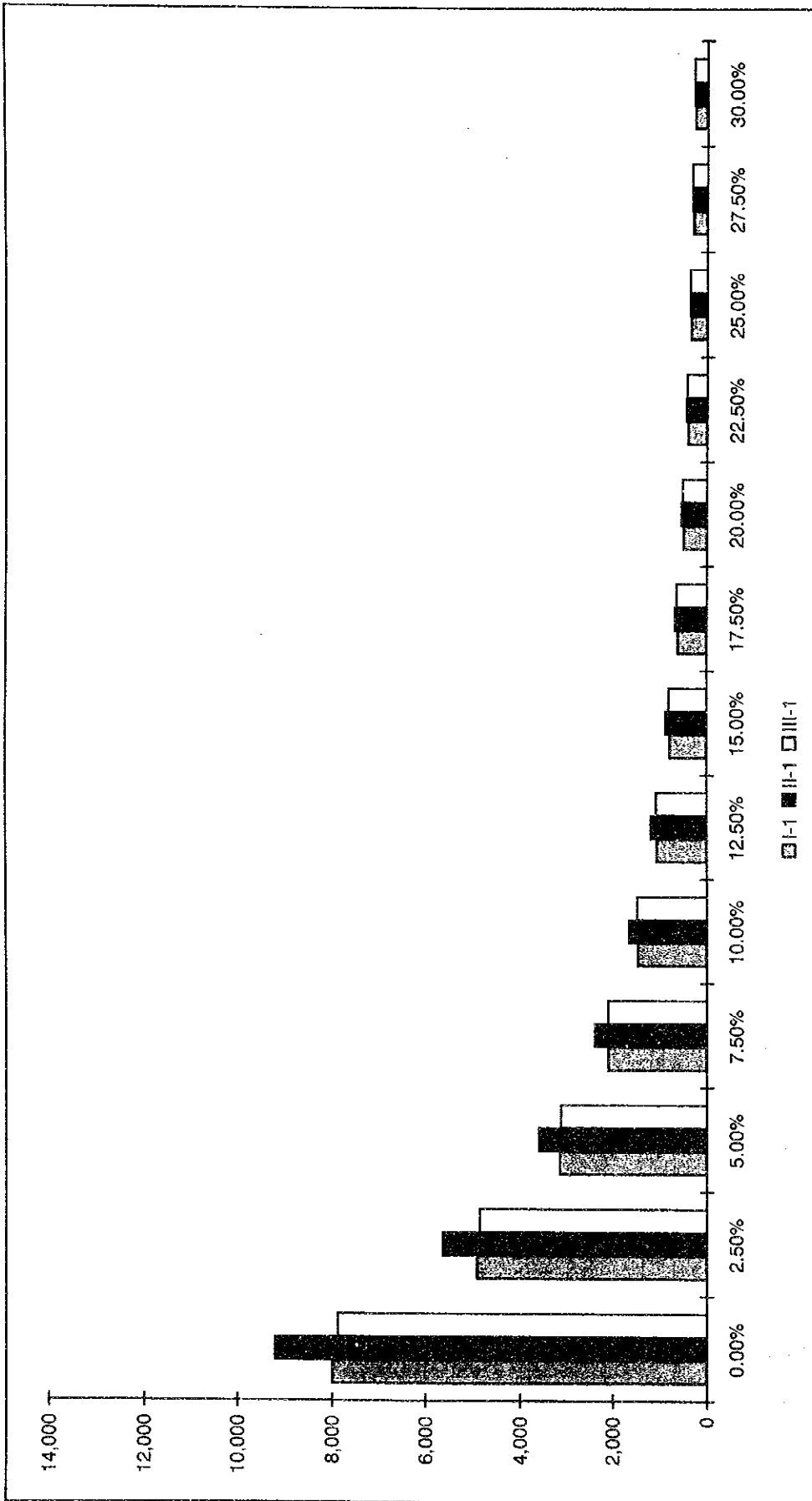


Figure 9.4.2 COMPARISON OF CALCULATED PRESENT VALUE - BASE CASE ECONOMIC

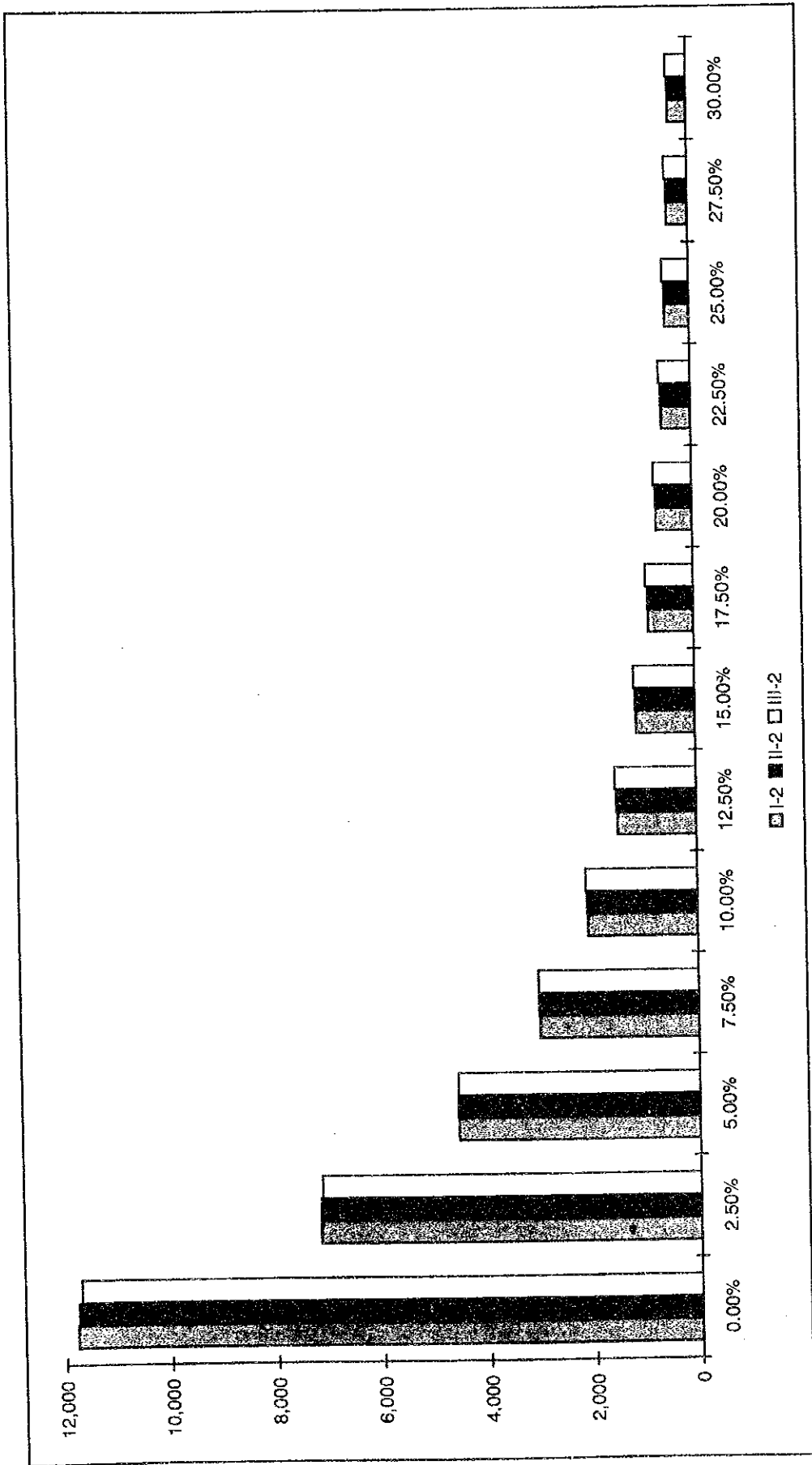


Figure 9.4.3 COMPARISON OF CALCULATED PRESENT VALUE - HIGH CASE FINANCIAL

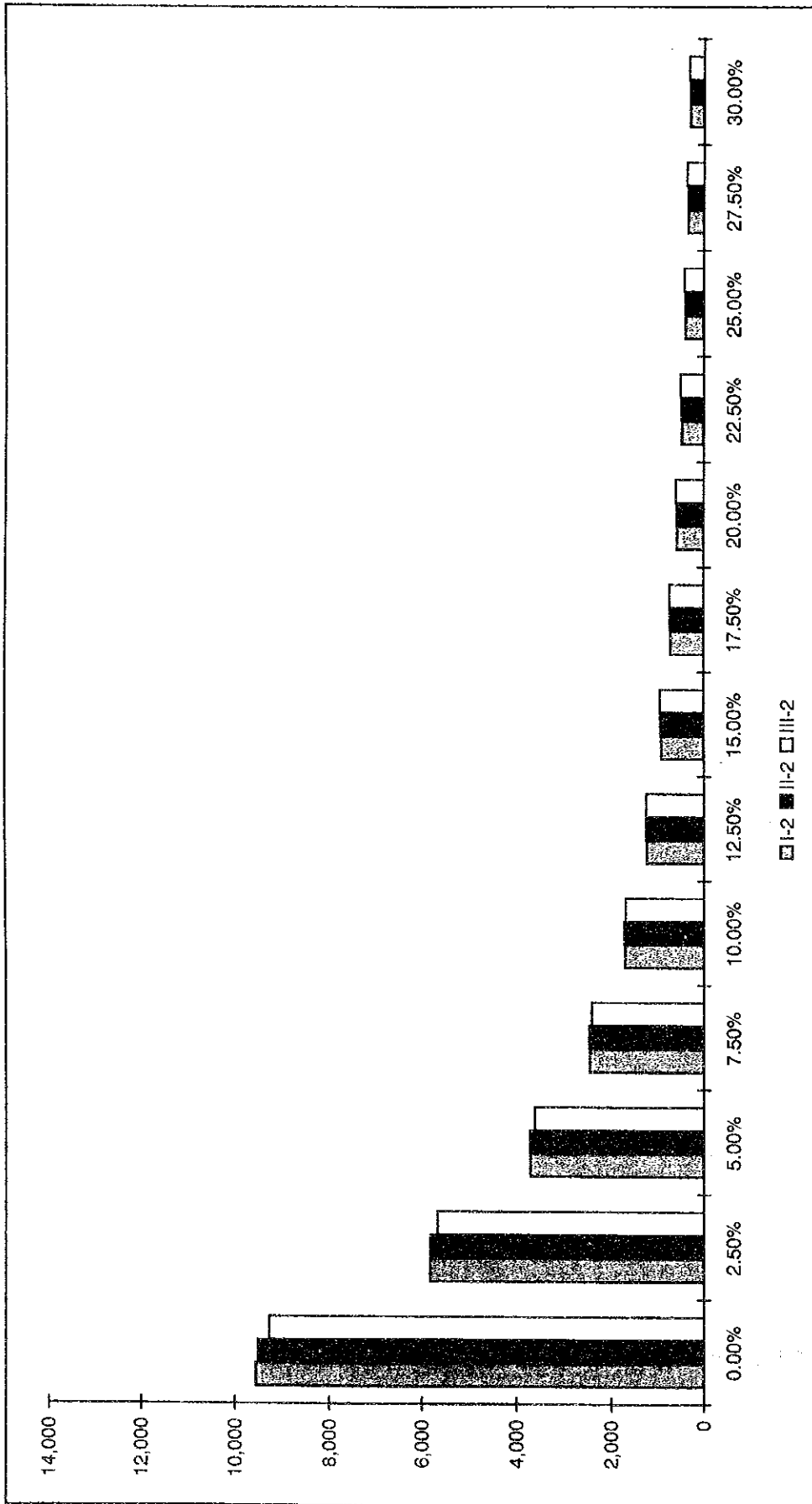


Figure 9.4.4 COMPARISON OF CALCULATED PRESENT VALUE - HIGH CASE ECONOMIC

9.5 Scenario of Optimum Energy Supply

It is the "Results of Energy Demand Forecast up to the Year 2025" in Chapter 7 of this report that was prepared taking into consideration the energy situations at home and abroad based on the scenario of future economic growth forecast. The 30 years from 1996 are divided into three decades, and three different economic growth rates are assumed for each of the three periods to forecast energy demand. In the forecast, the demand for each of different energy sources is also estimated. However, those estimates are based entirely on the present mix of energy sources: the concept of replacement or supplementation with new energy is not reflected in them. Namely, the energy forecast was made with grasping the future energy demand (side) as the main theme.

Formulating a scenario of optimum energy supply (best mix) is an attempt to work out an optimum scenario for Mauritius by evaluating the characteristics of individual sources of energy, from the viewpoint of technology (present level of technology and technical potential), economy (capital cost, operating cost, production cost), environment (impact on the environment), etc. based on the energy demand forecast. Fig. 9.5.1 shows the conceptual flow of the process. The work of evaluation is described in concrete in various parts of this report. In this chapter, the evaluation results are summarized and reviewed. Though the main object of economic evaluation is power generating technology, the ultimate objective of formulating the above scenario is to find ways to optimize the primary energy, including the energy input for power generation.

In studying the above energy optimization, the following three points were given the most careful consideration.

- a) Diversifying sources of energy
- b) Reducing dependence on imports for energy
- c) Paying due attention to environmental problems

With respect to item c) generally speaking, both the technical and environmental characteristics ultimately converge on the economic cost. Therefore, ultimately, the evaluated investment cost becomes the criterion for optimum scenario. Here, however,

consideration is given not to exclude any mix which is costly because short-term economic efficiency is pursued but which is desirable in terms of economic efficiency and environmental protection in the long run.

9.5.1 Evaluation of Characteristics of Energy Sources

(1) Transport and Domestic

With respect to gasoline and diesel oil as automotive fuels, no suitable substitutes are available for the moment. Therefore, there is no alternative but to promote the introduction of low-lead or unleaded gasoline or low-sulfur diesel oil. In terms of cost, they do not differ much from the high-octane leaded gasoline that is currently imported. Rather, new investment in facilities required to store them in the distribution process will push up the cost.

The same is true with heavy oil. It is possible to continue using high-sulfur heavy oil by introducing the flue-gas desulfurization process. However, in view of the extra cost involved, it is considered more advantageous to reduce the emissions of soot, dust, and NO_x by switching to low-sulfur heavy oil.

LPG and jet fuel have no difficult technical problems, hence their consumption is expected to continue increasing in the future. In this respect, new investment in additional distribution facilities will be required.

(2) Power Generation

Concerning the power generating technology that Mauritius will be able to introduce in the future, construction of new hydroelectric power plants has already become impossible because of its geographical and economic limitations. In the present study, therefore, power generating technology other than hydroelectric power generation was evaluated. Technical evaluation was carried out using three criteria: a) power generating efficiency, b) cost, and c) flexibility of construction period. In making the final judgment, consideration was given to the points in optimization already mentioned.

The costs of various power generating systems were compared in Section 8.1. From the evaluation results, it is for the moment recommended that CCGT be employed to cope with intermediate and base loads. The reasons are as follows.

- 1) At present, GT is most widely employed to cope with peak loads. Since GT can be used for CCGT (only the addition of a steam turbine is required), it helps increase the possibility of securing power sources.
- 2) With CCGT, the delivery time and construction period of devices can be curtailed.
- 3) CCGT is easier to maintain than the diesel engine generator.

Nevertheless, when it comes to diversifying energy sources and reducing dependence on imports for energy which are among the most important tasks of the energy sector of Mauritius, it is virtually impossible to implement medium- to long-term electric power development by CCGT alone. As the existing power plants, many of which employ GT, become obsolescent, new demand for electric power will appear on a constant basis. From this perspective, relatively large power generating equipment will be needed for some time. In this context, the Study Team recommends that coal-fired thermal power generation be introduced as a means to cope with the increase in power demand and the depreciation of the existing power generating equipment in the future. Using coal as a source of energy might be questionable from the viewpoint of environmental protection. However, this problem can be largely solved by employing the advanced technology of today. Rather, the prolongation of construction period due to environmental assessment, etc. will be a problem. Therefore, it will need a time for implementing a feasibility study.

Long-term scenarios (drafts) incorporating power generating equipment having those comparative advantages were subjected to an economic evaluation in the preceding section (9.4). From the evaluation results, it may be said that Scenario 1 (base case) in which power demand for the moment is to be met with GT and CCGT and coal-fired thermal power generation is to be introduced in 2021 is the most economical.

Best mix

The energy balances for 2000, 2010, and 2025 prepared from Scenario 1 (base case) are

shown in Tables 9.5.1 the own use of a bagasse at sugar mill is excluded from the table. The supply of new energy, including solar energy, is left out of consideration since it is difficult to predict its share, though such new energy could be put to practical use by the year 2025. Nevertheless, in view of the scenario of energy optimization in Mauritius, it is considered idealistic that 10% of the total power demand will be covered by new sources of energy by 2020 to 2025.

As a tendency in the future energy mix, it can be said that a kerosene and fuel wood will be gradually substituted by LPG. Meanwhile the yield of sugar cane will be going down, so that utilization of bagasse remain on the same level of the present. Other energy sources are also gradually increased at the almost same proportion.

However, after applied a coal-fired station in power generating system, a balance of energy sources will be substantially changed. That is, proportion in mauritius TPES depends on what a kind of energy sources convert into electricity

Table 9.5.1 ESTIMATED TOTAL PRIMARY ENERGY SUPPLY

Year	Coal	Gasoline	Diesel	Kerosene	Fuel Oil	LPG	Fuel Wood	Charcoal	Hydro	Bagasse	Total
2000	59,133 6.40%	115,210 12.47%	158,796 17.18%	38,743 4.19%	286,027 30.95%	53,395 5.78%	1,792 0.19%	421 0.05%	11,180 1.21%	61,384 6.64%	924,137 100%
2010	109,734 7.08%	197,233 12.73%	191,754 12.38%	32,938 2.13%	668,793 43.16%	90,911 5.87%	192 0.01%	313 0.02%	11,180 0.72%	78,137 5.04%	1,549,474 100%
2025	2,252,877 49.29%	352,393 7.71%	264,991 5.80%	32,265 0.71%	1,049,930 22.97%	227,410 4.98%	7 0.00%	300 0.01%	1,180 0.03%	162,440 3.55%	4,570,288 100%

Note: Excluding a jet fuel, own use portion of a bagasse and new energy.

Source: JICA Study Team

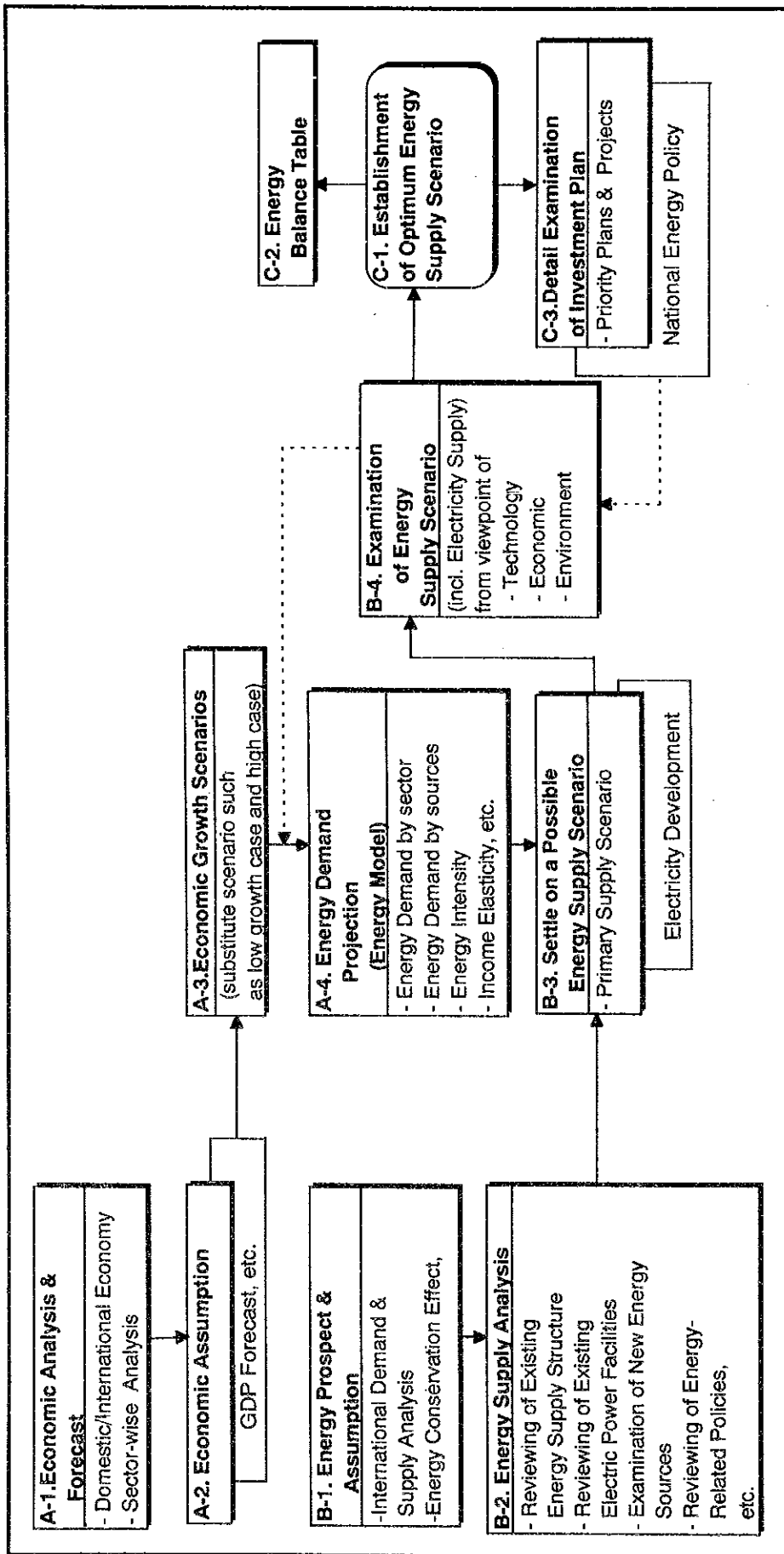


Figure 9.5.1 CONCEPTUAL WORK FLOW FOR MAKING AN OPTIMUM ENERGY SUPPLY SCENARIO



APPENDIX

◆ *Appendix 1 Incentives to BEDP Power Project* ◆

Appendix 1 Incentives to BEDP Power Project

The BEDP Projects classified into following three type.

- Firm suppliers ----- Those supplying power year round
- Continuous suppliers ----- Those supplying power in the crop season only
- Intermittent suppliers ----- Those supplying power as and when they can export

The government provides considerable tax incentives to the sugar mills especially for the firm supplier.

Tax Incentives to Sugar Mills

- | | |
|----------------------------------|---|
| a. import duty | Lower rate or zero tariff for new equipment and comparatively higher rate for spare parts.
This is common for import equipment. |
| b. income tax | 15%
This is common in any manufacturing. 35% is applied to sugar cane growing. Mills can offset unrelieved losses against the profits of holding companies generally sugar cane growing ones, but not allowed vice versa. There is no time limit for the carry forward of losses. |
| c. Capital expenditure allowance | 125%
This is common in any manufacturing as a bonus of depreciation. In the process of profit/loss calculation, they can deduct 125% of equipment expenditure from taxable sales. |
| d. Bagasse generation reduction | 60%
In a case of a full-year contract on bagasse power purchase between a sugar mill and CEB, the sugar mill can deduct 60% of power sales accruing from bagasse amount from their profits. This is a great privilege to sugar mills to expand their businesses to power generation. |

- e. Tax free debenture for bagasse generation finance When a sugar mill borrows investment loans from a local commercial bank for electricity generation under a full-year contract with CEB, the bank can deduct the interest revenue of that credit from the taxable sales. This means the commercial bank can enjoy non-taxable interest revenue from the sugar mills who want to invest for bagasse based power generation .

Cases a, b and c are the common rule for manufacturing industries; cases d and e are special advantages to encourage sugar mills to commence bagasse-based power generation. Case d can lighten the investment burden of CEB, and case e encourages commercial banks to offer loans at a lower interest rate to sugar mills for investment in bagasse-based generation.

All sugar mills possessing vast expanses of sugarcane fields have mechanized their operations for planting, irrigating and harvesting. Plantations remove rocks with tractors, and use sprinklers, cultivation machines, large transport vehicles and the like, in order to stabilize sugarcane production costs. It is becoming difficult for sugar mills to secure the workers needed to cultivate their sugarcane fields. The younger generation prefers to work in the service sector in urban areas where opportunities are good, rather than to live as farmers in villages. Sugarcane mills are striving hard to diversify their businesses and modernize their operations, in order to maintain viability.