Part IV FINANCIAL ANALYSIS AND SOCIO-ECONOMIC EVALUATION OF THE PROJECT

Chapter 1 Introduction

This Part IV describes the results of financial analysis and socio-economic evaluation made of this project. Outline of the project analyzed and evaluated is briefly described below.

(1) Production scale	:	275 TPD of prilled urea (bagged)
(2) Commencement of commercial production	:	Beginning in July, 1991
(3) Project economic life span	:	15 years after the commencement of commercial production

Components of this part are as follows. Chapter 2 explains the total financing requirement and financing plan for the project, and Chapter 3 describes the assessment of commercial prices and economic cost for electric power which are used for the financial analysis and economic assessment of the project. Chapter 4 relates to operating cost estimates, and financial projections and analysis of the project, and Chapter 5 relates to the economic assessment of the project. Chapter 6 discusses on overall evaluation of the project made on the basis of the financial analysis presented in Chapter 4 and the economic assessment presented in Chapter 5.

Chapter 2 Project Cost Estimate and Financing Plan

2-1 Project cost

2-1-1 Total financing required

The total financing requirement for completion of the project, including contingencies (physical contingency and price contingency), pre-operation expenses, initial working capital and interest during construction, is estimated as US$144.79 million composed of US$119.87 million for the foreign exchange portion and US$24.92 million for the local currency portion. The project cost summary is presented in Table 4-1, and breakdown of the estimated cost is given in Annex IV-1. The total financing requirement, as given in Annex IV-1, is based on base cost estimated in terms of 1984 prices.

2-1-2 Major assumptions for the estimate

(1) Pre-operation expenses

The pre-operation expenses have been estimated by taking into account cash requirements for administrative expenses which the project sponsor may expend during the implementation of the project, training of permanent staff, manpower and materials required for start-up operation, and other necessary expenses such as normally borne by the project sponsor at the pre-operation stage.

(2) Physical contingency

The physical contingency reflects expected increases in the estimated capital cost, due to changes in quantities and methods of implementation judged necessary to take into account, as being caused by uncertainties related to site conditions and other design bases, as well as degree of precision with which quantity of materials, equipment, laborers and services were estimated. In this estimate physical contingency allowances are assumed to be 5% of the base cost estimate.

(3) Price contingency

The price contingency reflects expected increases in the base cost estimate due to changes in unit prices for the various project components beyond the date of the base cost estimate. The current price trend for chemical plant equipment in Europe, the United States and Japan, indicates price increases of 3 to 4% per annum (Annex IV-2). It is predicted that this trend would continue in the future unless there are substantial changes in world economic conditions. In this context an escalation factor of 3.5% per annum is applied to the estimate of price contingency for foreign exchange component.

When the past trend of consumer prices in the Kingdom of Nepal is analyzed in terms of U.S. Dollars, using prevalent foreign exchange rates, it indicates that in Nepal consumer prices in U.S. dollar terms tended to increase closely with the trend of world-wide inflation (Annex IV-2). The World Bank forecasts the rate of world price rise in future as being 6% per annum. Assuming that the local market prices in U.S. dollar terms would henceforth increase in a similar trend, the estimate of price contingency for local currency portion (in U.S. dollar terms) use an escalation factor of 6% per annum.

(4) Initial working capital

Initial working capital is estimated by taking into account cash requirements for product inventory, accounts receivable, accounts payable and material inventory. The breakdown of the estimated initial working capital is indicated in Annex IV-3.

(5) Interest during construction

Interest during construction is estimated on the basis of the total of the base cost estimates, contingencies, pre-operation expenses and the initial working capital, and also assuming the financing plan as well as the terms of loans as described in Section 2-2.

2-2 Financing plan

2-2-1 Basic assumptions

The financing plan for the project is formulated on the basis of total financing requirements presented in the previous section. At the present stage there is no definite indication about possible finance sources as well as the form of the executing entity for the project. Thus the financing plan presented here is based on the following assumptions.

(1) Fundamental structure for the financing

30% of the total financing requirement is financed with the equity capital of the project executing entity, and the remaining 70% is financed with loans borrowed by the executing entity. The equity capital is primarily to be allocated for expenditure of the local currency component. However, if there is a surplus of funds available from the equity capital after expenditure of the local currency component, the surplus will be allocated for expenditure of foreign exchange component particularly payment of interest on foreign loans.

(2) Terms of the loans

As the finance sources for the loan requirements are not definite yet, the terms of loans for the project are unknown at present. For the purpose of this study the terms of these loans are hypothetically assumed as follows:

A. Foreign loans

i) Interest rate	:	5% p.a.
ii) Grace period	:	Construction period
iii) Disbursement of loans	:	Equal annual installments of the loan principal for 15 years with the repayment starting at the end of the initial year of commercial operation

B. Local loans (limited to short term borrowings)

i) Interst rate	:	15% p.a.
ii) Disbursement of the loan	:	Within one year after the borrowing

2-2-2 Finacing plan

The financing plan for the project which was projected on the basis of the above-mentioned assumptions is as follows:

(US$ million)

	Foreign exchange component	Local currency component	Total
Equity capital	18.52	24.92	43.44
Loans (Foreign)	101.35	-	101.35
Total Financing	119.87	24.92	144.79

Chapter 3 Tariff Rates and Economic Cost for Electric Power

3-1 Tariff rates, present and past

3-1-1 Present tariff rates

Table 4-2 shows the NEC's electricity tariffs effective in January, 1984. The tariff structure consists of different rates set for several categories of consumers. The rate for industrial consumers is set at three different levels according to consumer's demand scale, as summarized below.

Tariff Rates for Industrial Uses

(January, 1984)

Classification of consumers	A Zone		B Zone	
	Demand charge	Unit rate	Demand charge	Unit rate
Small (up to 50 kW)	Rs. 16 per kW (installed cap.) per month	56 Paisa	Rs. 18 per kW (installed cap.) per month	56 Paisa
Medium (up to 500 kW)	Rs. 45 per kW (max. demand) per month	52 Paisa	Rs. 40 per kW (max. demand) per month	52 Paisa
Large (above 500 kW)	Rs. 50 per kW (max. demand) per month	50 Paisa	Rs. 50 per kW (max. demand) per month	50 Paisa

(Notes) A Zone: Bagmati, Narayani, Gandaki, Lumbini Zone
B Zone: Other than the above

As has been discussed in Chapter 2 of Part III, electricity supply/demand conditions have significant changes between dry season and wet season, and hourly load also fluctuates to a substantial extent, but the present electric power tariff sets a flat rate applied throughout the year without month-of-year or time-of-day rates.

The following is the electricity price for the urea fertilizer plant which was calculated using the present tariffs as given above.

a) Demand charge*1	Rs. 0.07/kWh
b) Unit rate	Rs. 0.50/kWh
Total	Rs. 0.57/kWh
	(US¢3.56/kWh)*2

(Note) *1. $\frac{\text{Rs. 50/kW/month} \times \text{83,000kW}}{\text{1,992,600kWh/day} \times \text{30 days}} = \text{Rs. 0.07}$

*2. Foreign exchange rate: Rs. 16/US$

3-1-2 Past tariff and price levels

NEC's electricity tariffs are under the control of HMG/N. Before 1981/82 HMG/N had the policy of controlling electricity tariffs at a lower price level. The electricity price index in real terms (1972/73 = 100) was 102 in 1974/75, 136 in 1979/80, and 132 in 1981/82. The price level in 1981/82 was lower than that in 1979/80. The price rise from 1972/73 to 1981/82, in real terms, averaged only 3% per annum. Table 4-3 compares effective tariffs in 1981 with the tariffs associated with the long run marginal costs (LRMC) calculated by Water and Energy Commission, HMG/N. This shows that the tariffs were as low as 20 to 30% of values on the LRMC. In fact, the tariffs were on average 50% lower than the level required to obtain a 6% rate of return on assets employed, and this placed NEC in a very difficult financial position. The World Bank's appraisal mission for the Marsyangdi hydropower project recommended a 130% increase in tariffs to realize a 6% rate of return on assets employed. HMG/N, paying attention to this recommendation, revised electricity tariffs upward by 58% in May, 1983. These tariffs have remained effective through the present, although the tariffs for some categories of consumers were re-revised downward in August, 1983. The present tariffs increased by about 53% for small-demand industrial consumers and by about 68% for medium- and large-demand industrial consumers, as compared to the previous tariffs.

Comparison of Tariffs for Industrial Consumers

	Previous Tariffs (A)	Present Tairffs (B)	B/A (%)
- Small-demand consumers	Rs. 0.38/kWh*1	Rs. 0.58/kWh*3	+53
- Medium- and Large-demand consumers	Rs. 0.31/kWh*2	Rs. 0.57/kWh*4	+68

(Note)

*1. Demand charge	:	(Rs. 12/kW × 50kW)/(50kW × 740 hrs.)	= Rs. 0.02
Unit rate	:		Rs. 0.36
Total	:		Rs. 0.38
*2. Demand charge	:	(Rs. 30/kW × 600kW)/(600kW × 740 hrs.)	= Rs. 0.01
Unit rate	:		Rs. 0.30
Total	:		Rs. 0.31
*3. Demand charge	:	(Rs. 16/kW × 50kW)/(50kW × 740 hrs.)	= Rs. 0.02
Unit rate	:		Rs. 0.56
Total	:		Rs. 0.58
*4. Demand charge	:	(Rs. 50/kW × 600kW)/(600kW × 740 hrs.)	= Rs. 0.07
Unit rate	:		Rs. 0.50
Total	:		Rs. 0.57

3-2 Economic cost for electricity and outlook of electricity price for the future

3-2-1 Economic cost for electricity

All of the hydropower plants developed to date are small-scale ones, and most of those plants are of the run-of-river type. Hence the cost for electricity generated is fairly high. The hydropower plants which are presently being constructed are similar. Since the Sapta Gandaki hydropower project and subsequent projects which HMG/N plans to complete in the 1990's are medium-scale plants having installed capacity greater than 200 MW, however, the electricity marginal cost for the future would be lower than the present cost. The long run marginal cost for electricity (LRMC) estimated for the 1990's by using the estimated capital cost for the Sapta Gandaki project, in 1984 constant price terms, is as follows:

(U.S.¢/kWh)

	6% Discount Rate	12% Discount Rate
- Firm energy	6.82	9.79
- Secondary energy	1.17	1.70
- Weighted average	3.87	5.56

(The basis for this calculation is presented in Annex IV-7.)

When compared with the LRMC estimated at a 6% discount rate, the present electricity tariff for industrial uses is at about 50% of the LRMC for firm energy, but it is as high as three times the LRMC for secondary energy because of the present tariff having no special rate for such energy. In Nepal almost all of the existing industrial consumers consume electricity only during the day time and without changes in consumption between peak time and off-peak time, so that their consumption concentrates on firm energy. This demand pattern would discourage adoption of month-of-year or time-of-day tariffs. Nevertheless the present tariff structure is unfavorable for secondary energy consumers like the urea fertilizer plant. If special rates for secondary energy consumers are adopted by taking the LRMC for that energy into account, it would encourage the demand for secondary energy.

3-2-2 HMG/N's pricing policy for the future

The electricity tariffs in Nepal, as stated earlier, were revised upward in May, 1983. Nevertheless the present tariffs are still fairly lower than the LRMC as far as electricity is based on firm energy. If the tariffs should be rated at the level recommended by World Bank, it may be required to raise the present tariffs by 40%. HMG/N, however, is cautious of immediately revising the present tariffs upward to the level recommended by World Bank, because the consumers' willing-to-pay level is low.

Since there are no existing consumers requiring a large quantity of electricity such as would be consumed by this project, the present tariff structure has been formulated without paying high attention to such large-demand industrial consumers, so that the tariffs have no provision for applying concessional rates for electricity to be used at the urea fertilizer plant. Nevertheless HMG/N may consider to set up a special rate for this project after reviewing (a) impacts on feasibility of the project which electricity price would cause, and (b) any effects on the electricity sector which the project would produce.

3-3 Electricity cost in the project

3-3-1 Electricity price assumed for the financial projections and analysis

As stated in the previous section, HMG/N so far has no definite pricing policy for electricity used by the project. Hence the financial projections and analysis should be based on an assumption

The 1984 price of electricity to be used at the urea fertilizer plant is estimated as 57 Paisa (or US¢ 3.56) per kWh (Refer to Section 3-1-1). Based on this price level and assuming an annual escalation at 6%, the 1991 price is estimated as US¢ 5.35 per kWh. If the electricity tariffs are revised to raise as per the World Bank's recommendation, the 1991 price should be US¢ 7.49 per kWh which is as high as 40% as compared to the above price. Nevertheless there is so far no indication that the price would rise to such a level in the immediate future, since it is uncertain yet as to whether HMG/N will adopt such a pricing policy. Hence the base estimate uses the 1991 price of US¢ 5.35/kWh which has been calculated on the basis of present price and with 6% annual escalation, and also assumes that the 1991 price will be escalated at 6% every year. At the same time, assuming a possibility that a concessional rate is set for the project, sensitivity analysis is made by changing the price level in order to identify an electricity price level which forms the basis for this project as being financially viable. This analysis can serve to provide HMG/N with the basis for determining the electricity price for the project.

3-3-2 Economic electricity cost assumed for the economic assessment

Economic electricity cost can be assessed in terms of long run marginal cost for electricity (LRMC). The Nepal's LRMC in 1990's, in 1984 constant price terms, is estimated at a 6% discount rate, as follows.

Firm energy	US¢ 6.82/kWh
Secondary energy	US¢ 1.17/kWh

(Refer to 3-2-1 and Annex IV-7)

The quantity of electricity which a 275 TPD urea fertilizer plant, as proposed in this study, requires for 24 hours continuous operation, is as follows.

	Hourly consumption (kWh)	Daily consumption (kWh)	(%)
- Hydrogen unit	62,322	1,495,728	(81.54)
- Other units, including ammonia /urea units	14,105	338,520	(18.46)
Total:	76,427	1,834,248	(100.00)

As is evident from the above figures, about 82% of the electricity consumption at the urea fertilizer plant is for the hydrogen unit. The project assumes the following operation so as to meet the electric power supply conditions prevalent in Nepal.

a) The plant operation will be shut down for two and a half months (from January to the middle of March) in the dry season when the electric power supply is tight.

b) For each one month before and after the aforesaid shut-down period (December; and from the latter half of March to the early half of April), the ammonia and urea units will be operated at 50 to 60 percent load in the day-time and at full load in the night-time so that the units can run with 75 percent capacity utilization through the month, as in those months the availability of electric power shows a surplus to some extent. In the meanwhile, the hydrogen unit will be operated only in off-peak time so as to relieve the burden on the power supply in peak time. The operation of the hydrogen unit in off-peak time will produce an excess quantity of hydrogen by using surplus electricity, and the thus produced excess hydrogen will be stored for use for operating the ammonia unit in peak time.

c) During the remaining seven and a half months (from the latter half of April to the end of November), the entire plant will be operated at full load, since sufficient quantity of electricity is available.

Under the foregoing operation, the annual capacity utilization will not exceed 83% of the nameplate capacity set on the basis of 330 on-stream days per annum. By this control, however, the urea fertilizer plant will not cause any increment of peak load, because an overwhelming majority of the requirements can be met by unutilized secondary energy. Thus the project designs to maximize efficient utilization of secondary energy, so the consumption of firm energy and secondary energy by the project can be assumed as follows.

a) For the operation for seven and a half months when the plant runs at full load, all of the electricity requirements will be met by secondary energy.

b) The operation for two months when the plant runs at 75 percent capacity utilization, as described above, consists of full load operation for nine hours in the night-time and 60 percent load operation for the remaining 15 hours. In this operation, firm energy will be used only for operating ammonia and urea units at 60 percent load for three hours of the highest peak time (3 hours), so that the electricity requirements for other uses can be entirely met by secondary energy. As the hydrogen unit is operated only in off-peak time during these months, the electricity requirements for this unit can be fully met by secondary energy.

On the above assumptions, the annual consumption of firm energy and secondary energy is estimated as follows.

(1) Consumption of secondary energy

- For seven and a half months when the plant runs at full load
  (1,834.25 MWh/day × 228 days) ..... 418.21 GWh

- For two months when the plant runs at 75 percent capacity utilization (December; and Mid-March to Mid-April)

  - For operating the hydrogen unit at 75 percent capacity utilization
    (1,495.73 MWh/day × 0.75 × 62 days)..... 69.55 GWh

  - For operating other units at 60 percent load for 9 hours of off-peak in the day time, operating at full load for 9 hours in the night-time, as well as for miscellaneous uses
    [(14.105 MWh/hr. × 0.6 × 9 hrs.)
    + (14.105 MWh/hr. × 9 hrs.) +
    (32.74 MWh/day × 62 days)] ..... 14.62 GWh

Total consumption of secondary energy 502.38 GWh

(2) Consumption of firm energy
For operating the ammonia and urea units at 60 percent load for 3 hours of the highest peak time every day, during the two months when the plant runs at 75 percent capacity utilization
(10.00 MWh/hr. × 0.6 × 3 hrs. × 62 days)..... 1.12 GWh

The above estimate indicates that the annual consumption of secondary energy accounts for 99.78% of the total and the consumption of firm energy accounts only for 0.22%. On this basis the economic electricity cost for the project, in 1984 constant price terms, is assessed as US¢1.182/kWh which is calculated in the following formula:

(US¢1.17/kWh × 0.9978) + (US¢6.82/kWh × 0.0022) = US¢1.182/kWh

Thus the economic assessment of the project uses the given economic electricity cost.

Chapter 4 Operating Cost Estimate and Financial Analysis of the Project

4-1 Assumptions used in the operating cost estimates and financial projections (Base Estimates)

The following basic assumptions are applied for the operating cost estimate, and the base financial projections (Base Estimates) and analysis of the project.

The financial projections are developed in terms of current U.S. Dollars and the financial rate of return (Internal Rate of Return) is estimated on the basis of discounted cash-flow computed in terms of 1986 constant U.S. Dollars.

(1) Project schedule and economic life span

As described in Chapter 1 of this Part IV.

(2) Price escalation

It is predicted, as stated in 2-1-2(3), that the international inflation rate will be 6% per annum, and the future trend of price increases in Nepal, in terms of U.S. Dollar equivalents adjusted with prevailing foreign exchange rates, will conform to the international inflation. Hence an annual escalation at 6% is assumed for all the cost components, except for personnel cost for which the annual escalation is assumed at 5%.

(3) Financing plan and debt service

The financial projections and analysis are based on the financing conditions as mentioned in Section 2-2.

(4) Revenue

The project revenue has been calculated on the basis of the production schedule, sales plan and selling price of the product, prilled urea (in 50 kg bags), as stated below.

A. Production and sales plans

It is assumed that the project will start commercial operation at the beginning of July, 1991. Table 4-4 gives the projected annual production and sales for 15 years (economic life span) starting July, 1991. This projection is formulated in the following manner:

- The annual sales volume, which is the quantity of urea fertilizer to be taken off by AIC, has been projected on the basis of the projected demand (marketable volume at retail outlets) for urea fertilizer as presented in Part II, and by adding the quantity of inventory in markets which is assumed to be 20% of the projected demand.

- The annual production is projected as those being the sales volume plus inventory at the plant which is equal to the quantity of 20 days production. As has been discussed in Chapter 2, it is not realistic to assume the annual production resulting in the annual capacity utilization over 83% of the annual nameplate capacity, due to limited electricity supply. Since the projected production represents that the capacity utilization will be about 60% of the annual nameplate capacity in the initial year of commercial operation and will gradually rise to 80% in the 15th year (2005/06), the projected production is within the maximum availability of electricity.

B. Selling price of the urea fertilizer

Table 4-5 gives the ex-factory selling price of urea fertilizer (bagged in 50 kgs bags). This price has been projected on the basis of forecasted international price for urea fertilizer in CIF Calcutta terms (Table 2-27, Part II), and adding inland transport costs and handling costs incurred for delivering urea fertilizer from Calcutta to retail outlets in Nepal, while subtracting such costs required to move the fertilizer from the urea fertilizer plant to the retail outlets.

(5) Operating costs

A. Variable cost components

Table 4-6 tabulates the requirements for each item of variable cost components (e.g., electricity, coal, catalysts and chemicals, and bags) which are used for the estimate of variable cost for the project. The assumptions of prices or costs for these components are described below.

1) Electricity

The Base Estimate uses the electricity price of US¢ 5.35/kWh in 1991 which is escalated at 6% per annum for subsequent years. That 1991 price has been calculated on the basis of the 1984 price estimated as US¢ 3.56/kWh and escalated at 6% per annum (Refer to Chapter 2 of this Part IV). Sensitivity analysis is made by changing the electricity price used for the Base Estimate.

2) Coal

Coal will be imported from India. In 1984 the border price of imported coal was NRs.600/ton. By adding the costs for transportation from the border to the site, the delivered cost is estimated as NRs.650/ton (US$10.63/ton) in 1984, which is escalated to US$61.09/ton for the 1991 cost by using the escalation rate of 6% per annum. The Base Estimates use the thus estimated 1991 cost and the 6% annual escalation for subsequent years.

3) Catalysts and chemicals

The urea fertilizer production requires the consumption of catalysts and chemicals which will have to be imported. Assuming that those products will be purchased in international markets and will be imported via Calcutta, the delivered cost in 1984 is estimated as US$2.72 for 1 ton of the produced urea fertilizer, which is equivalent to US$4.09 in 1991. The Base Estimates are based on the estimated 1991 cost which is subject to the annual escalation of 6% for subsequent years.

4) Bags

It is planned to use 50 kgs jute bags with polyethylene film inner bag for bagging the urea fertilizer. Assuming that those bags will be purchased from local bag manufacturers, the cost for the bags, as of 1984, is estimated as NRs.6 (or US¢37.5) per bag including polyethylene inner bag. The 1991 cost is estimated as US¢56.4 per bag by using the 6% annual escalation. The annual bagging cost is calculated on the basis of the 1991 cost and by applying the same escalation rate.

B. Fixed cost components

1) Personnel cost

The total personnel cost for the urea fertilizer plant is estimated as NRs.3.64 million per annum, averaged at NRs.11,660 per person per annum. This estimate was made on the basis of the salary and fringe benefit scale adopted by Himal Cement Co. and Hetauda Cement Industries Co., and 312 persons of total personnel, excluding the board members, which has been projected for the project (see Part III). Breakdown of the personnel cost estimate is shown in Table 4-7. The estimated personnel cost is equivalent to US$227,333 per annum (averaged at US$729 per person). Assuming the 5% annual escalation, the 1991 personnel cost is estimated as US$319,880 per annum. The Nepal Factory Act sets forth the compulsory obligation for factories to have accident insurance for their employees, the premium for which is estimated at 3.5% of annual salaries. In addition to the compulsory insurance, most of the factories buy additional insurance, the cost for which is estimated at 0.4%. Thus the cost for the personnel insurance which should be incurred for the project is estimated at 3.9% of the estimated salaries. The salary portion accounts for 52.63% of the estimated annual personnel cost. Hence the cost for the personnel insurance is equivalent to 2% of the annual personnel cost (i.e., 3.9% of the 52.63%). By adding 2% of the annual personnel cost, the 1991 personnel cost including the cost for the personnel insurance is estimated as US$326,228 per annum. The annual personnel cost for the project is estimated on this basis and subject to the 5% annual escalation.

2) Fixed assets tax and insurance

In accordance with the tax law in the Kingdom of Nepal, no tax on fixed assets of the urea fertilizer plant is assumed. The insurance coverage is estimated at 1.175% of the annual fixed asset value after depreciation, pursuant to the insurance tariffs set by the National Insurance Company (Rastriya Beema Sansthan). The basis for the insurance coverage is as follows.

a)	Basic rate:	NRs. 4.15/1000
b)	Additional rates:	
	- Earthquake:	NRs. 2.60/1000
	- Flood:	NRs. 2.00/1000
	- Riot:	NRs. 1.50/1000
	- Explosion:	NRs. 1.50/1000
c)	Total:	NRs. 11.75/1000

3) Maintenance

The annual maintenance cost for ammonia and urea plants is estimated at 2.5% of the erected plant cost. Nevertheless, since this project requires additional maintenance cost for electrodes used in the hydrogen unit, the annual maintenance cost for the project in 1991 is estimated at 3% of the erected plant cost and is escalated with the 6% annual escalation for subsequent years.

4) Depreciation and amortization

According to the tax law in the Kingdom of Nepal, all the assets, excluding land, are subject to straight line depreciation or amortization without any salvage value which are allowed for the following years:

- All types of buildings, drainage, sewerage, water distribution system ..... 20 years
- All types of machinery, equipment and tools ..... 10 years
- Transportation vehicles, furniture and fixtures, office equipment ..... 5 years
- Any other fixed assets not categorized above ..... 10 years

- Capitalized pre-investment and pre-operational expenses ..... 10 years

The depreciation and amortization allowances for the project are calculated in accordance with the above method. The assessed value of the assets for depreciation is given in Table 4-8.

C. General administrative expenses

By referring to the records of general administrative expenses incurred in Himal Cement Co. and Hetauda Cement Industries Co., the general administrative expenses for the project are estimated at 70% of the annual personnel expenses.

D. Corporate income tax

The corporate income tax is calculated pursuant to the Industrial Enterprises Act and the tax law in the Kingdom of Nepal which set forth the tax holiday provisions and corporate tax rates summarized below.

1) Tax holidays

The Industrial Enterprises Act provides for the tax holidays granted according to the classified types of enterprises. This project is classified as "Large Manufacturing Industry" to which the following tax holidays are granted.

i) For five years if the value added is between 20% and 50%

ii) Additional one year's exemption for every 10% increase in the value added above 50%

(Note) "Value added" means the ratio of net domestic operating costs and expenses (left after deducting all foreign costs such as imported raw materials, auxiliary raw materials, chemicals, wages, remuneration, consultancy fee, royalty, depreciation of the imported assets) to the total annual operating costs and expenses.

2) Corporate income tax

The tax law applied a progressive taxation system for the corporate income tax. The tax rates for 1983/84 are as follows:

	Taxable Profit	Tax Rate
First	NRs. 5,000	5%
Thereafter	NRs. 5,000	10%
"	NRs. 10,000	15%
"	NRs. 15,000	20%
"	NRs. 25,000	25%
"	NRs. 40,000	30%
"	NRs. 55,000	40%
"	NRs. 85,000	50%
Over	NRs. 285,000	55%

E. Other taxes

1) Import duty

Equipment, construction materials, spare parts and chemicals imported for the construction and operation of the project are subject to import duty at 1% of CIF border value.

2) Sales tax

Sales tax is exempted for the sales of the urea fertilizer produced.

F. Accounts receivable and accounts payable

A 15-days usance period is assumed for the calculation of accounts receivable and accounts payable.

G. Dividends

The financial projections assume no dividends, so that the projections are made on the basis that net benefits gained after tax shall be accounted as retained earnings.

4-2 Revenue and operating cost

4-2-1 Revenue

The revenue for the project is confined to that related to the sales of urea fertilizer produced at the urea fertilizer plant. It is calculated in accordance with the projected selling price as given in Table 4-4 and the projected sales as given in Table 4-5. The projected revenue, as shown in Table 4-9, is expected to increase annually due to increases in the sales volume and rise in the selling price, so that the revenue amount can be estimated to be US$25.0 million in the initial year (1991/92), and increase to US$40.8 million in the fifth year (1995/96), US$60.7 million in the tenth year (2001/02), and US$86.4 million in the 15th year (2005/06).

4-2-2 Operating costs

Operating costs for the project are calculated in current U.S. dollars during the 15 years economic life. Table 4-10 shows the estimated production cost per ton of the urea fertilizer produced, which includes variable costs (costs for electricity, coal, catalysts, chemicals, and bags), fixed costs (costs for personnel, maintenance, and insurance), depreciation and amortization allowances, general administrative expenses, and interest on loans.

The variable cost per ton of the product is likely to increase every year due to increases in the unit price of each component. On the other hand, the annual fixed costs are likely to decrease every year, because the decreases in insurance cost, depreciation/amortization, and interest on loans would be more than offsetting increases in other cost components such as personnel costs, maintenance cost, and general administrative expenses which reflect annual price rises. Further, as the capacity utilization also rises every year, the fixed cost per ton of the product is likely to decrease every year.

In view of the future trends of the variable cost and the fixed cost as discussed above, the future trend of the production cost of urea fertilizer in the project will be largely dependent on the prices for each variable cost component. In particular electricity cost is the element having the greatest affects to the production cost of urea fertilizer. As has been stated earlier, this project would consume a large quantity of electricity. Hence the production cost of the urea fertilizer would be substantially affected by the future price for the supplied electricity. Table 4-10 tabulates the Base Estimate of the urea fertilizer production cost and also the production cost estimated by lowering the electricity price, as well as pricing it as zero value, which can indicate the affect of electricity price on the urea fertilizer production cost. The Base Estimate uses the electricity price, in current terms, calculated on the basis of the present tariff (pricing at US¢ 3.56/kWh in 1984) and by applying 6% annual escalation. The sensitivity test of the production cost is made by lowering the electricity price used for the Base Estimate by 20%, 40%, 60%, 80% and 100% respectively. The electricity price based on the present tariff is estimated as US¢ 5.35/kWh in 1991 which is as high as 50% of the estimated 1984 price. The 1991 electricity cost for one ton of urea fertilizer is estimated as US$355.3/ton (US¢ 5.35/kWh × 6,642 kWh/ton) on the basis of the electricity price estimated for the year of 1991. If the electricity price should rise at 6% per annum, the production cost of urea fertilizer in current price terms, as given below, will increase to a substantial extent every year.

Year	Electricity price	Electricity cost per ton of urea (A)	Production cost per ton of urea (B)	A/B
	(US¢/kWh)	(US$/ton)	(US$/ton)	(%)
1991/92	5.35	355.3	836.0	42.5
1995/96	6.76	443.0	854.3	51.9
2000/01	9.01	600.4	948.9	63.3
2005/06	12.10	803.7	1,025.6	78.4

The production cost level, as shown above, far exceeds the import price forecasted for the respective year. It is essential to lower the electricity price, as well as adopting an electrolysis technology requiring possible minimum electricity consumption, in order to make the urea fertilizer production cost comparable to the price for imports.

In this study, several types of commercially proven electrolysis technologies have been studied, and as a result the production cost has been estimated by assuming the adoption of an electrolysis technology which has demonstrated the most efficient performance. Hence the only possible measure to reduce the production cost should be to lower the electricity price. Table 4-11 shows breakdown of the production cost in 1997/98 which provides the basis for cost estimates, as well as the structure of the production cost representing that in the mid-year of the economic life.

4-3 Financial projections and analysis

The financial projections of the project have been prepared in the form of pro-forma financial statements which include profit and loss statements, fund-flow statements and balance-sheets during the 15 years economic life, and the financial analysis has been made according to the projected financial statements. In light of the significance that electricity prices would affect the financial structure of the project, the financial projections have been made on the Base Estimate using the electricity price based on the present tariff, but also on five alternative cases where the electricity price is lowered by 20%, 40%, 60%, 80%, and 100% respectively. A summary of the financial projection for these cases is given in Tables 4-12 to 4-17, and the financial statements are attached as Annex IV-5. An overview of the financial projections is summarized below.

(1) Annual income

While the annual revenue, as described in 4-2-1, will increase year after year, the cost expenditures will also increase. As the electricity cost accounts for a large portion of the production cost, changes in the electricity price would greatly affect the project income. The net income after tax will always be in losses over the whole period of economic life, if the calculation uses the electricity price based on the present tariff and 6% annual escalation. Even if the electricity price is set as 20% lower than the base estimate, the project income will be in losses for the initial 10 years and will gain operating profit only in the 11th year and thereafter. If the electricity price is lowered by 40%, the period during which the operating income is in losses will

be the initial six years, but the accumulated losses will reach US$44.5 million which can be written off in the 13th year. By lowering the electricity price by 60%, the financial position can be fairly improved so that the project income can gain the operating profit during the whole life except the initial three years incurring the operating losses. Even in this case, however, the accumulated losses cannot be written off before the eighth year. The financial position will be substantially improved by lowering the electricity price by 80%. In this case, the project will continue to gain the operating profit except the initial two years, and the accumulated losses incurred during the initial two years will be written off in the third year. In the third year net profit after tax is expected to the extent of US$1.9 million, which is to increase to US$15.5 million in the tenth year and further to US$35.2 million in the 15th year.

(2) Cash-flow

If the operating income results in losses, the project entity should have to borrow short term loans to cover the cash deficits, which incur the payment of additional interest and adversely affect the operating income structure and cash-flow. The projected operating income, as presented above, has taken into account the taking out of short term loans in the years when there are cash deficits due to operating losses. In actuality, however, there may be difficulties in borrowing the short term loans, if the operating losses continue for a few years. Capital intensive projects requiring a large amount of capital investment like this project, are usually unable to gain operating profit during the initial two to three years. If operating losses continue longer than that period, such a project would encounter difficulties in sustaining sound financial liquidity. Hence, in order for the project to sustain a sound cash-flow, it is essential that electricity be supplied at a price lower than 40% of the present tariff level. If this condition is satisfied, the project could be operated with stable cash-flow.

(3) Debt service capacity

The financial projections, as stated in 4-1, have been calculated on the basis of an equity/debt ratio of 30:70, and the coverage of debt by long term loans of 5% p.a. interest and 15 years disbursement starting the initial year of commercial operation. In view of the debt service capacity which is assessed in terms of the debt service coverage ratio calculated on the basis of the above conditions (Tables 4-12 to 4-17), it is expected that the project will be well capable of maintaining a satisfactory position for the debt service from the second year of commercial operation, if the electricity price is lowered to the level equal to 40% of the present tariff level. If the price is lower than that level, the project will have the satisfactory capacity for the debt service from the initial year.

The above analyses indicate that the project could sustain a sound financial structure only by means of lowering the electricity price to a level lower than 40% of the present tariff.

4-1 Profitability of the project

In order to provide the parameters for assessing financial profitability of the project, internal rates of return on investment (financial return rates) are analyzed on the basis of the projected financial statements and by applying the discounted cash-flow method. The thus analyzed internal rates of return (IRR) are summarized below.

		IRR in current prices (%)		IRR in constant prices (%)	
	Electricity price	Before tax	After tax	Before tax	After tax
(a)	80% of the base estimate	3.70	3.06	*	*
(b)	60% of the base estimate	8.17	6.16	2.23	0.37
(c)	40% of the base estimate	11.78	9.38	5.59	3.36
(d)	20% of the base estimate	14.87	12.24	8.48	6.02
(e)	No value	17.61	14.84	11.03	8.44

(Note) *: negative returns

When the electricity price used is the present tariff (i.e., US¢ 3.56/kWh in 1984, escalated at 6% per annum), the project would not be financially viable, because the operating income, as stated earlier, would have losses every year during the whole period of economic life. If the price is lowered to 80% of the base estimate, the project will generate small returns in current price terms, but no returns will be expected in constant price terms, because the latter takes into account decreases in relative value of assets which may accrue owing to future inflation. If the price is lowered to a level lower than 40% of the base estimate, the project will generate returns, in constant price terms, to some extent. Nevertheless financial profitability of the project is inherently low. Even if the electricity price is lowered to 20% of the base estimate, the IRR after tax is 6.02% in constant price terms. This return rate is considerably low as compared to the interest rates of commercial loans, and it implies that the project will not have sufficient profitability so as to attract investment from the private sector, as well as commercial financing. Most of the urea fertilizer plants currently in place throughout the world are large-scale plants having the capacity larger than 1,000 TPD for ammonia and 1,700 TPD for urea. Natural gas is the most economical feedstock for manufacturing ammonia which is an intermediate for urea fertilizer. Further, natural gas has another economic advantage for manufacturing urea fertilizer, because ammonia manufacturing based on natural gas can byproduce carbon dioxide which is another intermediate material required for the manufacturing of urea. In light of these situations in the world's urea fertilizer industry, it is obvious that this project would have inherent difficulties in generating high profitability, due to cost handicaps attributing to high capital-related costs caused by small plant scale, as well as high raw material costs caused by adoption of the electrolysis process for hydrogen generation and also by the costly process adopted for recovering carbon dioxide from cement plant flue gas.

Hence this project could be materialized only by means of HMG/N's public investment, as well as financing with concessional loans, and economic benefits rather than financial profitability for the project could be more important criteria for HMG/N's decision making on investment. In this context economic benefits of the project are analyzed in the subsequent chapter.

It must be noted, however, that even if the implementation of the project should have been decided by HMG/N from the national point of view, the project must meet the minimum financial conditions required for sustaining financial liquidity and sound financial structure which is capable for debt service. The premise for satisfying these conditions, as discussed in the previous section, should be the HMG/N's decision on setting a special rate of electricity for the project so that the project can be supplied with electricity priced at a level lower than 40% of the present tariff level.

Chapter 5 Economic Analysis of the Project

5-1 Introduction

This chapter describes the results of economic analysis made on the project. The objectives of the economic analysis are to assess the economic benefits and other economic effects which the project could produce or derive, and thereby evaluate economic feasibility of the project. Quantitative assessment of the economic benefits or effects is made on the basis of the following four criteria:

(1) Economic Internal Rate of Return (Economic Return) — ERR
(2) Economic Net Present Value — ENPV
(3) Net Value Added Ratio
(4) Net Foreign Exchange Savings

In addition to the above, qualitative assessment is also made especially on benefits which are inappropriate for quantitative assessment. In these assessments, however, attention is primarily given to the ERR and ENPV, since these factors would serve to indicate the most important parameters to assess the economic feasibility of the project.

The primary objective of this project, from the national economy point of view, is to contribute to economic development by producing urea fertilizer, to substitute for the imports of this fertilizer which the country requires for agriculture development. In the light of this objective, ERR and ENPV for the project are computed in terms of benefits assessed as the economic value of the product (urea fertilizer) produced by the project and the opportunity costs or economic costs of capital, electricity, and other factors required for the production.

The net value added ratio of the project is estimated pursuant to the method defined in the Industrial Enterprises Act. The net foreign exchange savings are estimated as the net of the foreign exchange savings which may accrue by substitution for the imports of urea fertilizer, remaining after deducting the outlays of foreign exchange which may be incurred for the production of urea fertilizer.

5-2 ERR and ENPV of the project

5-2-1 General

The ERR of the project is assessed as the internal rate of return of net benefits which the project could generate from the nation's capital resources initially invested for the project (economic project cost), and the ENPV of the project is assessed at the net present value of economic benefits after deducting the present value of economic cost of the project. Thus the assessment is made in the following four steps:

A. Assessment of economic project cost

B. Assessment of economic annual cost

C. Assessment of economic benefits which can be quantified as the basis for computing the ERR and the ENPV

D. Computation of the ERR and the ENPV based on the results of (A) to (C) above

5-2-2 Economic project cost

The economic project cost for this project has been obtained from the financial project cost presented in Chapter 2 of this Part IV by deducting import duties on imported equipment and materials, and other local tax components. Thus the economic project cost for the project is estimated as US$128.55 million in current price terms and US$95.16 million in 1984 constant price terms. The breakdown of the estimates, as well as the basis for the estimates, are given in Table 4-18.

5-2-3 Economic annual cost

(1) Economic electricity cost

The economic electricity cost is assessed in terms of long run marginal cost for electricity (LRMC). The Nepal's LRMC in 1990's, in 1984 constant price terms, is estimated as follows:

- Firm energy US¢ 6.82/kWh
- Secondary energy US¢ 1.17/kWh

(Refer to Chapter 2 of this Part IV)

Of the quantity of electricity consumed by this project, 99.8% is surplus power generated from secondary energy, and only 0.2% is the power generated from firm energy. By taking these conditions into account, the economic cost of electricity consumed by the project is estimated as US¢ 1.182/kWh (Refer to Chapter 2 of this Part IV). Thus the estimate of economic annual cost uses this economic electricity cost.

(2) Other cost elements

The economic costs for other elements are calculated by subtracting tax components from the costs used for the financial projections. The basis for this calculation is given in Table 4-19.

5-2-4 Assessment of economic benefits

Economic benefits of an industrial project in general consist of two categories of benefits, namely, direct benefits and indirect benefits. The primary objective of this project, as stated earlier, is to produce urea fertilizer in order to substitute for the imports of this fertilizer. Hence the direct benefits of this project can be assessed as the economic value of the product (urea fertilizer) produced by the project.

Indirect economic benefits can be categorized as those which this project could indirectly contribute to the national economy. These benefits would be as follows:

(1) Increases in employment opportunities which could be effected through the employment of construction laborers by contractors as well as the employment of plant personnel by the project executing entity

(2) External effects to relevant industries, such as the domestic machinery, engineering and construction industries, relevant manufacturing industries which produce the supplies for the urea fertilizer plant, transportation sector and so on

(3) External effects to regional communities which may be effected by indirect creation of additional job opportunities or additional income sources if any for regional inhabitants

These indirect benefits, however, encompass various elements which make it difficult to quantify in accurate monetary terms the effects by this project. Hence if those benefits should be included in the benefit which are used as the basis for computing the ERR, it may lead to over-estimate the benefits. In the case of a revenue-earning project like this project, the primary importance should be the direct benefit which can be gained from the product produced by the project. In this context the assessment of the ERR for this project is based on the direct benefit as stated above. The indirect benefits are subject to qualitative assessment.

The direct benefits from this project are assessed as the gross economic value which could annually be gained by the production of the product, urea fertilizer, for local sales. The economic value per ton of the urea fertilizer is assessed as the same value as used for the financial projections. Hence the economic value of the product is primarily estimated by using the projected selling price as shown in Table 4-5. In addition to this benefit, the following benefit is added. If the requirements for urea fertilizer should be met by imports because this project is not implemented, then the funds required for importing the urea fertilizer will be sunk for about four months. If the domestic production starts, those funds will not be required. In Nepal, opportunity costs for capital is assessed as 8% per annum. The opportunity costs for the import funds (calculated by annual demand $\times$ 4/12 $\times$ 0.08) can be deemed as another direct benefit, so this amount is accounted into the direct benefit value.

5-2-5 ERR and ENPV

The ERR and ENPV, in 1981 constant price terms, estimated on the above-stated assumptions are:

ERR: 8.2%
ENPV: US$1.08 million (at 8% discount factor)

The basis for the calculation of these figures is presented in Table 4-20. These figures reveal that although the project's economic return seems to be very marginal to justify the investment, it could generate the return slightly higher than the opportunity cost for capital resources prevalent in the Kingdom of Nepal, namely 8% per annum.

5-3 Net added value ratio, and net foreign exchange savings

Table 4-21 gives the net value added ratio estimated for the project, and Table 4-22 gives the net foreign exchange savings estimated. The net value added ratio has been estimated as the ratio of local operating costs against the total operating costs pursuant to the provision of the Industrial Enterprises Act, and assuming that the electricity price for the project be 40% of the present tariff rate. The net foreign exchange savings have been estimated as the net of the foreign exchange savings which may accrue by substitution for the imports of urea fertilizer, remaining after deducting the outlays of foreign exchange which may be incurred for the production of urea fertilizer. The thus estimated net value added ratio and net foreign exchange savings, in current price terms, are:

- Net value added ratio : 51% of production cost (in average of 15 years)

- Net foreign exchange savings : US$560.75 million for 15 years (averaged at US$37.38 million per annum)

Assuming that the electricity price for the project be 40% of the present tariff rate, as shown in Table 4-23, the production cost will be higher than the import price during the initial three years, but after the 4th year it will be lower than the import price so as to be about 70% and 46% in the 10th year and the 15th year respectively. On the other hand, as given in the above table, the foreign exchange cost will be about 78% of the import price in the first year, 34% in the 10th year, and 13% in the 15th year.

These figures indicate that the project could contribute to foreign exchange savings.

5-4 Indirect benefits

Since the requirements for urea fertilizer are met by imports, the supply of this fertilizer has been often short due to difficulties in timely procurement of the required volume, and this shortage has caused an impediment for agricultural production. This project could contribute to the country's agricultural development, since the domestic production could ensure the timely supply of urea fertilizer as required, thereby contributing to increases in agricultural production.

In addition to the contribution to the country's agriculture, this project would provide local engineering and machinery industries with great opportunities not only to expand operations but also to build up valuable experience and know-how through participating in the construction of the urea fertilizer plant. Another contribution may be expected for other relevant industries which could manufacture the supplies for the plant operation.

This project also creates jobs, by direct employment of above 300 persons and indirect employment of another 100 persons who would be directly or indirectly engaged in the plant operation. In addition the construction of the urea fertilizer plant would provide job opportunities for 1,000 persons at the peak.

Another benefit which can be anticipated for the project is the contribution to regional communities of the area in which the urea fertilizer plant is located. A large number of people engaged in the construction and operation will transfer to the area. They will indirectly contribute to creating additional income sources for the communities. Those indirect benefits have not been accounted in estimating the ERR and the ENPV. If such factors are taken into account, the economic returns should be larger than the estimates.

Ammonia and urea industries are basic chemical industries. This project could contribute to built-up of experiences which can apply to the development of various chemical industries in the country. Further, urea is used not only for fertilizer but also for manufacturing a variety of urea derivatives as summarized in Table 4-24. Hence the establishment of a urea fertilizer plant may gear possibilities to develop those derivative projects in future.

Chapter 6 Overall Evaluation of the Project

6-1 Introduction

This chapter describes the overall evaluation of the project made on the basis of the financial analysis as presented in Chapter 4 and the economic analysis as presented in Chapter 5. As has been discussed in Chapter 4, in order that the project be financially viable, it is essential that electricity shall be supplied at a rate lower than 40% of the present tariff level (namely, US¢3.56/kWh in 1981 and escalated at 6% per annum). Hence it is recommended that, as the premise for implementing the project, HMG/N adopt concessional rate pricing for the electricity supplied to the urea fertilizer plant so that the plant can use electricity at the price level as mentioned above. The overall evaluation of the project presented in this chapter has been made on this premise.

In the course of the overall evaluation, sensitivity analysis is made on the factors other than the electricity price, in a view to analyzing any risks involved in the project, and then the conclusion of the study is derived by taking the analyzed risk areas into consideration. Further, this chapter also describes the basic elements which should be taken into consideration in deciding on the concessional rate of electricity for the project.

6-2 Economic feasibility of the project

As stated earlier, this project would have limited attractiveness to private sector investors and for commercial financing, since its financial profitability seems to be very low even with a concessional electricity price. Therefore in order to promote this project, HMG/N would have to decide on implementing the project on the basis of public sector investment and financing with concessional loans. For this end it would be important to evaluate the economic effects of the project from the national economic point of view.

The primary objective of this project, from the economic viewpoint, is to produce urea fertilizer, one of the essential agricultural inputs, by efficient utilization of the scarce capital and electric power resources, as well as human resources, and thereby effecting import substitution for and securing stable supply of the fertilizer. In this context economic feasibility of the project should be evaluated from the standpoint of whether this project can gain reasonable economic returns at the costs of the capital, electric power and human resources to attain the objective of the project.

This project, as stated in Part III, is based on efficient utilization of surplus electric power generated from secondary energy. In Nepal the electricity demand would continue to increase in future and, regardless of this urea fertilizer project, continuous efforts at hydropower development would be taken to meet the increasing electricity demand. Following the Marsyangdi project, HMG/N plans to develop the Sapta Gandaki project, to be completed in the early 1990's, and then proceed with the development of subsequent hydropower projects. In order to secure long term stable supply of electricity, assurance on the timely development of the Sapta Gandaki project and subsequent hydropower projects would be premises for the feasibility of this project.

When those projects have been developed, they will have a substantial quantity of surplus energy for supply during daily off-peak time, as well as wet season. This project conceives to maximize efficient utilization of unutilized secondary energy, by means of operating the plant under a full utilization of surplus energy and shutting down or operating at low load the plant during daily peak time as well as during a few months in the dry season when electricity supply is tight. Hence this operation will not cause any increment of peak load.

By taking these factors into account, the economic cost of electricity used at the urea fertilizer plant is estimated at US¢1.182/kWh in 1984 constant price terms. As far as this economic electricity cost is used as a basis for assessing the economic return of the project, it would not cause any economic victim to the electric power sector, since the assessment is made on the basis of reasonably valued economic cost of the energy resource.

Based on the thus estimated economic electricity cost, it is assessed that this project could gain a 8.2% ERR, and ENPV of US$1.08 million in 1984 constant price terms. These figures would reveal that, although the project's economic return seems to be very marginal to justify the investment, without cost penalty for other resources, it could generate a return slightly higher than the opportunity cost for capital resources prevalent in the Kingdom of Nepal, namely 8% per annum. If its contribution to foreign exchange savings and other indirect benefits as discussed in Section 5-4 are taken into account it may be assessed that, as far as the foregoing conditions are satisfied, this project could have economic benefits to the national economy to a minimum extent that can justify the investment.

Nevertheless the economic returns of this project would be substantially affected by changes in (a) the project cost and (b) the economic value of the urea fertilizer produced by the project. Sensitivity analysis of the ERR and ENPV for the project affected by the variance of the above two factors has been made. The results of this analysis are summarized below.

	ERR (%)	ENPV (US$ million)
A. Base Case:	8.20	1.08
B. Changes in Project Cost:		
10% decrease	9.51	7.71
5% decrease	8.83	4.39
5% increase	7.60	−2.24
10% increase	7.05	−5.56
C. Changes in Economic Value of Urea Fertilizer:		
10% increase	10.26	12.99
5% increase	9.25	7.03
5% decrease	7.08	−4.88
10% decrease	5.90	(*)

(Note) (*) unaccountable

The basis for the above analysis is presented in Annex IV-8. Figure 4-1 illustrates the above-listed figures with a graph. The above figures indicate that, if the project cost increases by 5%, the ERR would be less than 8% and the ENPV would also shift to a negative position accordingly. Also, if the economic value (international prices) of the urea fertilizer decreases by 5%, the ERR and ENPV would be in a similar position to the above. The analysis manifests that the project is situated in a very marginal position on feasibility.

However, there may be little possibility that the project cost would increase, since the base project cost has been estimated by taking foreseeable factors into account and also has included physical contingency which can cover cost increases which may accrue due to some uncertain areas. Similarly, there may be little probability that the urea fertilizer price would turn to a lower level in the long term range, even though there is a short term fluctuation. In the above context the assumptions used for the base estimate can be assessed as reasonable. Hence it is judged that the project stands within an economically feasible range although its position is very marginal.

6-3 Financial structure of the project

As stated earlier, financial profitability of the project is very low. However, as this project has reasonable ground for promoting investments from the national economic point of view, if HMG/N promotes it as a public sector project, the financial profitability would not necessarily be an important criterion. Greater attention should be given to the financial liquidity of the project for satisfying cash-flow and debt service capacity. As has been discussed in connection with the financial analysis, if the project is supplied with electricity priced at a level lower than 40% of the present tariff price, the project could satisfy the above conditions. Hence financial viability of the project is dependent on whether such decision is made by HMG/N.

Assuming that electricity is supplied at such a price level, other factors affecting the financial structure would be any changes in the total financing requirement and the selling price of the product. In order to demonstrate the effects of these factors, sensitivity analysis of the IRR (in 1986 constant price terms) affected by changes in the above has been made, the results of which are summarized below:

	IRR (%) at the electricity price as low as 40% of the base estimate		IRR (%) at the electricity price as low as 20% of the base estimate	
	Before tax	After tax	Before tax	After tax
A. Base Case:	5.59	3.36	8.42	6.02
B. Changes in Total Financing Requirement :				
10% decrease	7.09	4.72	10.06	7.51
5% decrease	6.32	4.02	9.24	6.74
5% increase	4.91	2.74	7.76	5.35
10% increase	4.27	2.16	7.08	4.73

C. Changes in Selling price :				
10% increase	7.67	5.27	10.30	7.74
5% increase	6.66	4.33	9.41	6.90
5% decrease	4.46	2.34	7.50	5.11
10% decrease	3.26	1.26	6.47	4.17

The basis for the above analysis is presented in Annex IV-6. Figure 4-2 illustrates the above figures with a graph. The figures imply that the financial structure of the project would be adversely affected by increases in the investment cost, as well as decreases in the selling price. As has been discussed in the previous section, the bases used for the investment cost estimates, as well as the projection of the selling price, would be reasonably sound to judge that there may be little probability for such problems. Since the electricity price has greater influences to the financial structure, it is recommended that the electricity price for the project be lowered as much as possible, so that the project can sustain sound structure to cope with any unforeseeable problems.

The base analysis has been made on the basis of an equity/debt ratio of 30:70 and assuming a 5% p.a. interest rate for long term loans. Here, an analysis is made for the case where the equity/debt ratio of 20:80 is adopted and also for the case where higher interest rates are assumed. The financial statements projected with this structure is attached as Annex IV-6. The result of this analysis is summarized below.

(1) Assuming the interest of long term loans at 5% per annum, the interest during construction will increase by US$1.44 million as compared to that for the base analysis, but it has no effect to the profitability (IRR).

(2) During the initial two years, cash-flow appears to be tight, so that the debt service capacity gets weak during that period.

As the result, it is recommended that if the equity/debt ratio of 20:80 is adopted, the electricity price for the project be lowered to a level lower than 30% of the present tariff price. If the loan interest should be higher than 5% per annum, the interest during construction will increase to a further extent and the debt service capacity will be adversely affected. Hence it is recommended that the project be financed with soft term loans the interest of which should not be higher than 5% per annum.

6-4 Impacts derived from the lower electricity price

As has been discussed earlier, setting lower electricity price for this project is the premise for it to be financially viable. However, since the project could consume surplus electricity generated from secondary energy, even if the electricity price for the project is lowered to a level as low as 35% of the present tariff price, it would be slightly higher than the economic cost for electricity. As the supply of electricity to the project requires no increment of the installed capacity, the supply at a lower electricity price would not cause financial burden for NEC. The consumption of electricity by the project, regardless of the price, could rather contribute to increases in NEC's net income. It is recommended that the HMG/N's decision on setting a concessional rate of electricity for the project be made from the national point of view by taking due consideration of those effects.

Table 4-1 ESCALATED CAPITAL COST ESTIMATE

NEPAL UREA PROJECT (275 TPD)

(Unit: US$MIL.)

	BASE PROJECT COST		PHYSICAL CONTINGENCY		PRICE CONTINGENCY		TOTAL PROJECT COST (AS COMPLETED)		
	FOREIGN	LOCAL	FOREIGN	LOCAL	FOREIGN	LOCAL	FOREIGN	LOCAL	TOTAL
A. LAND ACQUISITION	0.0	0.59	0.0	0.03	0.0	0.10	0.0	0.72	0.72
B. SITE PREPARATION	1.35	0.15	0.07	0.01	0.18	0.04	1.60	0.20	1.80
C. PLANT DIRECT COST									
C-1 PROCESS UNITS	38.41	1.81	1.92	0.09	7.86	0.67	48.19	2.57	50.76
C-2 UTILITY FACILITIES	10.17	0.53	0.51	0.03	2.04	0.19	12.72	0.75	13.47
C-3 AUXILIARY FACILITIES	1.94	0.82	0.10	0.04	0.38	0.29	2.42	1.15	3.57
C-4 OFFSITE FACILITIES	1.70	2.31	0.09	0.12	0.32	0.79	2.11	3.22	5.33
D. SPAREPARTS, CATL. & CHEM.	2.33	0.0	0.12	0.0	0.59	0.0	3.04	0.0	3.04
E. CONST. & ERECTION LABOR	9.87	3.44	0.49	0.17	2.23	1.42	12.59	5.03	17.62
F. CONST. EQUIPMENT	7.82	0.0	0.39	0.0	1.38	0.0	9.59	0.0	9.59
G. TRANSPORT, INSURANCE & DUTY	2.00	2.59	0.10	0.13	0.40	0.94	2.50	3.66	6.16
H. INDIRECT FIELD EXPENCES	0.33	0.49	0.02	0.02	0.07	0.20	0.42	0.71	1.13
I. ENGINEERING SERVICES	9.31	0.85	0.47	0.04	1.80	0.30	11.58	1.19	12.77
J. PROJECT MANAGEMENT SERVICES	2.45	0.37	0.12	0.02	0.48	0.13	3.05	0.52	3.57
K. PRE-OPERATION EXPENSES	0.29	1.90	0.01	0.10	0.08	0.92	0.38	2.92	3.30
L. BASE PROJECT COST	87.97	15.85	4.41	0.80	17.81	5.99	110.19	22.64	132.83
M. INITIAL WORKING CAPITAL	0.0	0.0	0.0	0.0	0.0	0.0	0.40	2.28	2.68
N. INTEREST DURING CONSTRUCTION	0.0	0.0	0.0	0.0	0.0	0.0	9.28	0.0	9.28
O. TOTAL FINANCING REQUIRED	87.97	15.85	4.41	0.80	17.81	5.99	119.87	24.92	144.79

Table 4-2 NEPAL ELECTRICITY CORPORATION

REVISED ELECTRICITY RATES

The revised rates are effective from meter-reading and billing KHM of 1st Bhadra 2040 and applicable in all are of the Corporation.

Category

		Unit Rate
1.	Domestic	
a)	0 - 25 Units	44 Paisa
b)	25 - 100 Units	66 Paisa
c)	101 - 300 Units	80 Paisa
d)	Above - 300 Units	90 Paisa

Minimum Charges

a) 2.5 amps to 15 amps meter - Rs. 11/- per month and 25 units free
b) 16 amps to 30 amps meter - Rs. 27/50 per month and 50 units free
c) 31 amps to 60 amps meter - Rs. 60/50 per month and 100 units free
d) 61 amps to 100 amps meter - Rs. 100/50 per month and 150 units free
e) Above 100 amps meter - Rs. 220/50 per month and 300 units free

		Unit Rate
2.	Commercial	
a)	Hotel Rs. 50/- per KW maximum demand per month	70 Paisa
b)	Others Rs. 40/- per KW installed capacity per month	65 Paisa
3.	Non-commercial service Rs. 41/- per month 50 units minimum allowance	85 Paisa
4.	Industries (for Bagmati, Narayani, Gandaki, Lumbini Zone only)	

Demand Charge

a)	Small (up to 50 KW) Rs. 16/- per KW installed capacity per month	56 Paisa
b)	Medium (up to 500 KW) Rs. 45/- per KW maximum demand per month	52 Paisa
c)	Large (above 500 KW) Rs. 50/- per KW maximum demand per month	50 Paisa

Table 4-2 NEPAL ELECTRICITY CORPORATION (Continued)

4.	Industries (For areas other than the above)		
	Demand Charge		Unit Rate
	a) Small (up to 50 KW)	Rs. 18/- per KW installed capacity per month	56 Paisa
	b) Medium (up to 50 KW)	Rs. 40/- per KW maximum demand per month	52 Paisa
	c) Large (above 500 KW)	Rs. 50/- per KW maximum demand per month	50 Paisa
5.	Street Lighting		
	a) Metered	per unit	83 Paisa
	b) Unmetered	per watt per month	33 Paisa
6.	Drinking Water	Rs. 40/- per KW maximum demand per month	45 Paisa
7.	Transport	Rs. 40/- per KW maximum demand per month	40 Paisa
8.	Irrigation		
	a) 400 Volt	Rs. 35/- per KW maximum demand per month	42 Paisa
	b) 11 K.V.	Rs. 35/- per KW maximum demand per month	35 Paisa
9.	Supply to India		14 Paisa I.C.
10.	Temporary Supply		
	a) Metered	per unit	1.60
	b) Unmetered	per watt per month	72 Paisa

Table 4-3 AVERAGE COST PER KWH

(Unit: Rs./kWh)

	Present Tariffs	Tariff Based on LRMC (Average Wet & Dry Seasons)	Ratio of Dry to Wet Season LRMC Tariffs
Domestic			
25 kWh/month	0.25	2.9	1.9
100 kWh/month	0.36	2.3	2.2
300 kWh/month	0.49	2.0	2.5
Commercial			
400 V	0.55	1.99	2.6
11 kV	0.52	1.50	3.3
Industrial			
400 V	0.42	1.6	3.2
11 kV	0.42	1.26	4.4
Large Industrial			
On-peak	0.39	1.37	3.5
Off-peak	0.39	0.91	6.3
Irrigation			
On-peak	0.32	1.89	1.2
Off-peak	0.32	0.39	2.5

Source: Preliminary Analysis of Marginal Costs of Providing Electricity in Nepal, Water and Energy Commission, 1981. (UNDP/World Bank Energy Sector Assessment Program Report No. 4474-NEP, Aug., 1983.)

Table 4-4 PROJECTED PRODUCTION AND SALES
(Bagged Urea: 275 TPD)

YEAR	Capacity 1/ Utilization Rate (%)	(A) Production	(B) Increases in Inventory at Plant 2/	(C) Sale to AIC 3/	(D) Increases in Inventory at Stock Points 4/	(E) Retail Sale 5/
					(9,300)	(46,700)
1991/92	60.05	54,500	3,000	51,500	800	50,700
1992/93	60.98	55,340	46	55,294	794	54,500
1993/94	65.36	59,320	219	59,101	801	58,300
1994/95	68.85	62,480	174	62,306	606	61,700
1995/96	71.19	64,610	117	64,493	493	64,000
1996/97	72.35	65,660	58	65,603	303	65,300
1997/98	73.56	66,760	61	66,700	200	66,500
1998/99	74.77	67,860	61	67,800	200	67,600
1999/2000	75.88	68,860	55	68,805	205	68,600
2000/01	76.86	69,750	49	69,701	201	69,500
2001/02	77.73	70,540	43	70,497	197	70,300
2002/03	78.38	71,130	32	71,097	97	71,000
2003/04	79.04	71,730	33	71,697	97	71,600
2004/05	79.59	72,230	28	72,202	102	72,100
2005/06	80.02	72,620	21	72,598	98	72,500

Notes:
1/ Production divided by annual nameplate capacity (275 t/d x 330 on-stream days)
2/ 5.5% of annual production (i.e., production for 20 days) less inventory at plant carried over from preceding years.
3/ Production less inventory at plant
4/ 20% of retail sale less inventory at stock points carried over from preceding years
5/ Sale to AIC less inventory at stock points (corresponding to the figures shown in Table 2-24, Part II)

Table 4-5 PROJECTED EX-FACTORY UREA SELLING PRICE

(US$/ton: Bagged Urea)

Year	Projected Ex-factory Selling Price (1984 Constant Price) 1/	Projected Ex-factory Selling Price (Current Price) 2/
1991/92	323	486
1992/93	326	520
1993/94	328	554
1994/95	331	593
1995/96	333	632
1996/97	335	674
1997/98	337	719
1998/99	339	766
1999/2000	341	817
2000/01	343	871
2001/02	344	926
2002/03	346	988
2003/04	347	1,050
2004/05	349	1,119
2005/06	350	1,190

Notes: 1/ Mean of the prices projected for the respective calendar year and subsequent year (see Table 2-28, Part II)

2/ Escalated at 6% p.a. from 1984/85.

Table 4-6 CONSUPMTION OF UTILITIES, CATALYSTS, CHEMICALS, AND SUPPLIES FOR UREA FERTILIZER PRODUCTION

Item	Unit	Consumption Per Ton of Urea
Electric Power	kWh	6,642.0
Coal	Tons	0.256
Chemicals ad Catalysts	US$ (1984 price)	2.72
Bags	Pieces	21.0

Table 4-7 PERSONNEL COST FOR PROJECT
(1984 Prices)

(Unit: N. Rupees)

Class	Personnel Cost per Person				Number of Persons 1/	Total Personnel Cost per Year
	Basic Salary (Monthly)	Fringe Benefits & Allowances 2/	Total Cost (Monthly)	Total Cost (Annual)		
I. (General Manager)	1,500	1,350	2,850	34,200	1	34,200
II. (Assistant General Manager)	1,100	990	2,090	25,080	1	25,080
III. (Manager)	900	810	1,710	20,520	18	369,360
IV. (Senior Engineer, and Senior Officer)	700	630	1,330	15,960	33	526,680
V. (Supervisor, Foreman, Officer)	600	540	1,140	13,680	75	1,026,000
VI. (Operator, Worker, Secretary)	470	420	890	10,680	92	982,560
VII. (- ditto -)	320	290	610	7,320	92	673,440
Total					312	3,637,320
(Average per Person)						(11,658)

Notes: 1/ Excluding Managing Director and Directors, the personnel cost for whom are included in the company's administration cost
2/ 90% of basic salary

Table 4-8 BREAKDOWN OF FIXED ASSETS FOR DEPRECIATIONS

(Buildings and Plant Facilities)

(Unit: US$ Million)

	Buildings			Plant & Facilities			Total Cost		
	Foreign Exchange Portion	Local Currency Portion	Total	Foreign Exchange Portion	Local Currency Portion	Total	Foreign Exchange Portion	Local Currency Portion	Total
- Process Units	-	-	-	48.19	2.57	50.76	48.19	2.57	50.76
- Utility Facilities	0.97	0.09	1.06	11.75	0.66	12.41	12.72	0.75	13.47
- Auxiliary Facilities	1.77	0.75	2.52	0.65	0.40	1.05	2.42	1.15	3.57
- Offsite Facilities	2.11	3.22	5.33	-	-	-	2.11	3.22	5.33
- Sparoparts, Catalysts & Chemicals	-	-	-	3.04	-	3.04	3.04	-	3.04
- Construction Equipment	-	-	-	9.59	-	9.59	9.59	-	9.59
- Transport, Insurance, Duty Engineering Services & Management Services	2.75	0.94	3.69	27.01	9.43	36.44	29.76	10.37	40.13
TOTAL	7.60	5.00	12.60	100.23	13.06	113.29	107.83	18.06	125.89

Table 4-9 PRODUCTION AND SALES PLAN
- (UREA : 275TPD) - BASE CASE

(Unit: USD 1,000)

YEAR	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
RATED CAPACITY (UREA)	90750	90750	90750	90750	90750	90750	90750	90750	90750	90750	90750	90750	90750	90750	90750
CAPACITY UTILIZATION	0.601	0.610	0.654	0.688	0.712	0.724	0.736	0.748	0.759	0.769	0.777	0.784	0.790	0.796	0.800
PRODUCTION	54500	55340	59320	62480	64610	65660	66760	67860	68860	69750	70540	71130	71730	72230	72620
INCREASE IN INVENTORY	3000	46	219	174	117	58	61	61	55	49	43	32	33	28	21
SALES VOLUME	51500	55294	59101	62306	64493	65603	66700	67800	68805	69701	70497	71097	71697	72202	72598
UNIT SALES PRICE	0.4860	0.5200	0.5540	0.5930	0.6320	0.6740	0.7190	0.7660	0.8170	0.8710	0.9260	0.9880	1.0500	1.1190	1.1900
SALES REVENUE	25029	28753	32742	36947	40760	44216	47957	51934	56214	60710	65280	70244	75282	80794	86392
TOTAL SALES REVENUE	25029	28753	32742	36947	40760	44216	47957	51934	56214	60710	65280	70244	75282	80794	86392

Table 4-10 PROJECTED UREA PRODUCTION COST BY CHANGES IN ELECTRICITY PRICE
(Capacity 275 TPD: Bagged Urea)

(Unit: US$/ton)

Year	Base Estimate		20% Reduction		40% Reduction		60% Reduction		80% Reduction		100% Reduction	
	Current Price	1984 Const. Price	Current Price	1984 Const. Price	Current Price	1984 Const. Price	Current Price	1984 Const. Price	Current Price	1984 Const. Price	Current Price	1984 Const. Price
1991/92	836.0	556.0	764.9	508.7	693.9	461.5	622.8	414.2	551.7	366.9	480.7	319.7
1992/93	848.2	532.2	772.8	484.9	697.5	437.6	622.2	390.4	546.8	343.1	471.5	295.8
1993/94	839.7	497.0	759.8	449.7	680.0	402.5	600.0	355.1	520.3	308.0	440.4	260.7
1994/95	842.1	470.2	757.4	422.9	672.8	375.7	588.1	328.4	503.5	281.2	418.8	233.9
1995/96	854.3	450.0	764.6	402.8	674.8	355.5	585.1	308.2	495.4	261.0	405.7	213.7
1996/97	871.8	433.3	776.7	386.0	681.6	338.7	586.5	291.5	491.4	244.2	396.3	196.9
1997/98	894.5	419.4	794.1	372.3	693.2	325.0	592.4	277.7	491.6	230.5	390.8	183.2
1998/99	920.4	407.1	813.5	359.8	706.6	312.5	599.8	265.3	492.9	218.0	386.1	170.8
1999/2000	948.9	395.9	835.6	348.7	722.3	301.4	609.0	254.1	495.8	206.9	382.5	159.6
2000/01	980.5	386.0	860.4	338.7	740.3	291.4	620.3	244.2	500.2	196.9	380.2	149.7
2001/02	638.9	311.5	711.7	264.3	584.4	217.0	457.1	169.8	329.8	122.5	202.6	75.2
2002/03	881.0	308.7	746.1	261.4	611.2	214.1	476.2	166.8	341.3	119.6	206.4	72.3
2003/04	925.9	306.0	782.9	258.8	639.8	211.5	496.8	164.2	353.8	116.9	210.8	69.7
2004/05	974.0	303.7	822.4	256.4	670.8	209.2	519.2	161.9	367.6	114.6	216.1	67.4
2005/06	1,025.6	301.7	864.9	254.4	704.2	207.1	543.5	159.9	382.8	112.6	222.2	65.4
Average (1991/92 - 2005/06)	898.8	405.3	788.5	358.0	678.2	310.7	567.9	263.4	457.7	216.2	347.4	168.9

Notes: 1/ Excluding interest for short-term loan which will be borrowed for recovering cash deficit incurred due to financial losses
2/ Using deflater of 6% p.a. for calculating the production cost in 1984 constant prices

Table 4-11 PROJECTED UREA PRODUCTION COST
(1997/98: Current Price)

Annual Production: 66,760 tons
Capacity Utilization: 73.6%

Items	Particulars	Annual Costs (US$ '000)	Cost per Ton (US$/ton)	% to Total cost
1. Variable Cost				
1.1 Electric Power	@US¢5.35/kWh[1] x1.06[6] x6,642kWh/t	33,652	504.07	56.35
1.2 Coal	@US$61.09/ton[2] x1.06[6] x0.256t/t	1,481	22.18	2.48
1.3 Catalysts and Chemicals	@US$4.09/ton[3] x1.06[6]	387	5.80	0.65
1.4 Bags	@US¢56.4/bag[4] x1.06[6] x21bags/t	1,121	16.80	1.88
Sub-total		36,641	548.85	61.36
2. Direct Fixed Cost				
2.1 Personnel Cost	US$319,880[5] x1.05[6]	429	6.43	0.72
2.2 Maintenance Cost	(US$129,900x10[3])[6] x0.03x1.06[6]	5,528	82.80	9.26
2.3 Insurance	[(US$141,700x10[3])[7] - (US$93,240x10[3])[8]]x0.01175	569	8.52	0.95
Sub-total		6,526	97.75	10.93
3. Depreciation and Amortization 9/				
3.1 Plants and Facilities	(US$113,290x10[3])x1/10	11,329	169.70	18.97
3.2 Buildings	(US$12,590x10[3])x1/20	630	9.44	1.06
3.3 Preoperation Expenses	(US$3,300x10[3])x1/10	330	4.94	0.55
3.4 Interest during Construction	(US$9,280x10[3])x1/10	928	13.90	1.55
Sub-total		13,217	197.98	22.13
4. General Administrative Expenses	Personnel Cost (US$428,669)x0.7	300	4.49	0.50
5. Interest on Long-Term Loan	[(US$101,068x10[3])[10] - (US$40,428x10[3])[11]] x 0.05	3,032	45.42	5.08
Total Cost		59,716	894.49	100.00

Note: Excluding interest for short term loans

EXPLANATORY NOTES TO Table 4-11

1/ 1984 : US¢3.56/kWh
1991 : US¢5.35/kWh (3.56×1.06^7)

2/ 1984 : US$40.63/ton
1991: US$61.09/ton ($40.63 \times 1.06^7$)

3/ 1984 : US$2.72/ton of urea
1991 : US$4.09/ton of urea ($2.72 \times 1.06^7$)

4/ 1984 : US¢37.5/bag
1991 : US¢56.4/bag (37.5×1.06^7)

5/ 1984 : US$227,333/year (See Table 4-7)
1991 : US$319,880/year ($227,333 \times 1.05^7$)

6/ 1991 : Base Project Cost (US$132.83 million)
less : Land Acquisition Cost (US$0.72 million)
Site Preparation Cost (US$1.80 million), and
Part of Indirect Field Exp. (US$0.41 million)

7/ Depreciable Assets (US$141.70 million)

8/ Accumulated Depreciation (US$93.24 million)

9/ Amortization excluding for indirect field expenses because of those expenses amortized out within the initial five years

10/ US$144.79 million x 0.7

11/ US$6,738,000/year x 6 years

Table 4-12 SUMMARY OF FINANCIAL PROJECTIONS AND ANALYSIS
(Electric Power Price : Base Estimate)

Plant Capacity: 275 TPD-Bagged Urea

(In million of current US dollars)

Fiscal Year Ending June 30	1991/92	1992/93	1993/94	1994/95	1996/97	1998/99	2000/01	2002/03	2004/05
Capacity Utilization (%)	60.1	61.0	65.4	68.8	72.4	74.8	76.9	78.4	79.6
Urea Sales (1,000 t.p.a.)	51.5	55.3	59.1	62.3	65.6	67.8	69.7	71.1	72.2
Sales Revenue	25.0	28.8	32.7	36.9	44.2	51.9	60.7	70.2	80.8
Cost of Sales (bef. Admn. Exp. & Interest)	38.1	41.9	45.0	48.1	53.4	59.3	65.8	60.7	69.0
General admn. expenses	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.4	0.4
Interest on long-term loans	5.1	4.7	4.4	4.1	3.4	2.7	2.0	1.4	0.7
Net profit after tax	-18.3	-20.2	-21.1	-21.9	-24.2	-27.3	-31.1	-23.8	-30.6
Current assets	5.8	6.2	6.9	7.5	8.7	9.9	11.2	12.1	13.8
Net fixed assets	128.7	115.2	101.8	88.3	61.7	35.2	8.8	7.6	6.3
Current liabilities	21.5	35.4	50.4	66.3	101.5	142.7	191.3	250.0	321.6
Long term debt	87.8	81.1	74.3	67.6	54.1	40.5	27.0	13.5	-
Retained earnings (Accumulated)	-18.3	-38.5	-59.5	-81.4	-128.6	-181.5	-241.7	-287.3	-344.9
Shareholders equity	25.1	4.9	-16.1	-38.0	-85.2	-138.1	-198.3	-243.9	-301.5
Ratio									
Net profit after tax/sales (%)	-73.2	-70.2	-64.3	-59.2	-54.7	-52.6	-51.2	-33.9	-37.8
Net profit after tax/shareholders equity (%)	-72.9	-407.2	130.7	57.6	28.4	19.8	15.7	9.8	10.1
Net profit after tax/share capital (%)	-42.2	-46.4	-48.5	-50.4	-55.6	-62.8	-71.6	-54.8	-70.4
Current ratio	0.27	0.18	0.14	0.11	0.09	0.07	0.06	0.05	0.04
Quick ratio	0.15	0.10	0.08	0.07	0.05	0.04	0.04	0.03	0.03
Debt service coverage ratio	0.02	-0.17	-0.29	-0.41	-0.75	-1.20	-1.81	-2.69	-3.94
Long term debt/shareholders equity	78/22	94/6	*	*	*	*	*	*	*

Table 4-13 SUMMARY OF FINANCIAL PROJECTIONS AND ANALYSIS
(Electric Power Price : 20% lower)

Plant Capacity: 275 TPD-Bagged Urea

(In million of current US dollars)

Fiscal Year Ending June 30	1991/92	1992/93	1993/94	1994/95	1996/97	1998/99	2000/01	2002/03	2004/05
Capacity Utilization (%)	60.1	61.0	65.4	68.8	72.4	74.8	76.9	78.4	79.6
Urea Sales (1,000 t.p.a.)	51.5	55.3	59.1	62.3	65.6	67.8	69.7	71.1	72.2
Sales Revenue	25.0	28.8	32.7	36.9	44.2	51.9	60.7	70.2	80.8
Cost of Sales (bef. Admn. Exp. & Interest)	34.4	37.7	40.3	42.9	47.2	52.0	57.5	51.2	58.1
General admn. expenses	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.4	0.4
Interest on long-term loans	5.1	4.7	4.4	4.1	3.4	2.7	2.0	1.4	0.7
Net profit after tax	-14.7	-15.4	-15.0	-14.4	-13.2	-11.7	-9.3	3.7	5.8
Current assets	5.3	5.7	6.2	6.8	7.8	8.9	10.1	10.7	12.2
Net fixed assets	128.7	115.2	101.8	88.3	61.7	35.2	8.8	7.6	6.3
Current liabilities	17.3	26.4	35.3	43.6	58.6	70.9	79.1	85.9	89.3
Long term debt	87.8	81.1	74.3	67.6	54.1	40.5	27.0	13.5	-
Retained earnings (Accumulated)	-14.7	-30.1	-45.1	-59.5	-86.8	-110.8	-130.7	-124.6	-114.2
Shareholders equity	28.8	13.4	-1.7	-16.0	-43.1	-67.4	-87.2	-81.2	-70.7
Ratio									
Net profit after tax/sales (%)	-58.6	-53.6	-45.9	-38.9	-29.9	-22.5	-15.3	5.3	7.2
Net profit after tax/shareholders equity (%)	-50.9	-115.3	907.0	89.7	30.6	17.4	10.6	-4.6	-8.2
Net profit after tax/share capital (%)	-33.7	-35.5	-34.6	-33.1	-30.4	-26.9	-21.3	8.6	13.3
Current ratio	0.30	0.21	0.18	0.16	0.13	0.12	0.13	0.12	0.14
Quick ratio	0.17	0.12	0.10	0.09	0.08	0.08	0.08	0.08	0.09
Debt service coverage ratio	0.33	0.24	0.25	0.29	0.33	0.45	0.68	0.70	0.96
Long term debt/shareholders equity	75/25	86/14	*	*	*	*	*	*	*

Table 4-14 SUMMARY OF FINANCIAL PROJECTIONS AND ANALYSIS
(Electric Power Price : 40% lower)

Plant Capacity: 275 TPD-Bagged Urea

(In million of current US dollars)

Fiscal Year Ending June 30	1991/92	1992/93	1993/94	1994/95	1996/97	1998/99	2000/01	2002/03	2004/05
Capacity Utilization (%)	60.1	61.0	65.4	68.8	72.4	74.8	76.9	78.4	79.6
Urea Sales (1,000 t.p.a.)	51.5	55.3	59.1	62.3	65.6	67.8	69.7	71.1	72.2
Sales Revenue	25.0	28.8	32.7	36.9	44.2	51.9	60.7	70.2	80.8
Cost of Sales (bef. Admn. Exp. & Interest)	30.7	33.6	35.6	37.6	41.0	44.8	49.1	41.6	47.2
General admn. expenses	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.4	0.4
Interest on long-term loans	5.1	4.7	4.4	4.1	3.4	2.7	2.0	1.4	0.7
Net profit after tax	-11.0	-10.7	-9.0	-6.9	-2.2	2.3	5.5	16.1	19.5
Current assets	4.7	5.1	5.6	6.1	6.9	7.9	8.9	9.4	10.7
Net fixed assets	128.7	115.2	101.8	88.3	61.7	35.2	8.8	7.6	6.3
Current liabilities	13.1	17.4	20.2	20.9	15.6	7.8	8.0	8.1	8.3
Long term debt	87.8	81.1	74.3	67.6	54.1	40.5	27.0	13.5	-
Retained earnings (Accumulated)	-11.0	-21.7	-30.6	-37.5	-44.5	-41.9	-32.4	-2.2	35.1
Shareholders equity	32.4	21.8	12.8	5.9	-1.1	1.6	11.0	41.3	78.5
Ratio									
Net profit after tax/sales (%)	-43.9	-37.1	-27.5	-18.7	-5.1	4.5	9.1	23.0	24.1
Net profit after tax/shareholders equity (%)	-33.9	-48.9	-70.3	-117.0	204.3	147.7	50.0	39.1	24.8
Net profit after tax/share capital (%)	-25.3	-24.5	-20.7	-15.9	-5.1	5.3	12.7	37.2	44.9
Current ratio	0.36	0.29	0.28	0.29	0.44	1.01	1.12	1.16	1.29
Quick ratio	0.20	0.17	0.16	0.17	0.27	0.62	0.70	0.78	0.87
Debt service coverage ratio	0.64	0.65	0.79	0.98	1.42	1.93	2.36	2.24	2.80
Long term debt/shareholders equity	73/27	79/21	85/15	92/8	*	96/4	71/29	25/75	0/100

Table 4-15 SUMMARY OF FINANCIAL PROJECTIONS AND ANALYSIS
(Electric Power Price : 60% lower)

Plant Capacity: 275 TPD-Bagged Urea

(In million of current US dollars)

Fiscal Year Ending June 30	1991/92	1992/93	1993/94	1994/95	1996/97	1998/99	2000/01	2002/03	2004/05
Capacity Utilization (%)	60.1	61.0	65.4	68.8	72.4	74.8	76.9	78.4	79.6
Urea Sales (1,000 t.p.a.)	51.5	55.3	59.1	62.3	65.6	67.8	69.7	71.1	72.2
Sales Revenue	25.0	28.8	32.7	36.9	44.2	51.9	60.7	70.2	80.8
Cost of Sales (bef. Admn. Exp. & Interest)	27.1	29.4	30.9	32.4	34.8	37.6	40.8	32.0	36.3
General admn. expenses	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.4	0.4
Interest on long-term loans	5.1	4.7	4.4	4.1	3.4	2.7	2.0	1.4	0.7
Net profit after tax	-7.3	-5.9	-3.0	0.3	3.5	6.8	10.5	21.9	26.0
Current assets	4.2	4.5	4.9	5.3	6.1	6.9	7.8	8.1	9.2
Net fixed assets	128.7	115.2	101.8	88.3	61.7	35.2	8.8	7.6	6.3
Current liabilities	8.9	8.4	7.2	7.3	7.4	7.5	7.6	7.7	7.9
Long term debt	87.8	81.1	74.3	67.6	54.1	40.5	27.0	13.5	-
Retained earnings (Accumulated)	-7.3	-13.2	-16.2	-15.9	-9.4	2.5	21.6	62.9	112.8
Shareholders equity	36.1	30.2	27.2	27.5	34.0	45.9	65.0	106.4	156.3
Ratio									
Net profit after tax/sales (%)	-29.3	-20.5	-9.1	0.8	7.8	13.1	17.3	31.2	32.2
Net profit after tax/shareholders equity (%)	-20.3	-19.5	-10.9	1.0	10.2	14.8	16.2	20.6	16.7
Net profit after tax/share capital (%)	-16.9	-13.6	-6.8	0.6	8.0	15.6	24.2	50.4	60.0
Current ratio	0.47	0.53	0.68	0.73	0.82	0.91	1.02	1.04	1.17
Quick ratio	0.26	0.30	0.39	0.43	0.49	0.56	0.64	0.72	0.81
Debt service coverage ratio	0.95	1.07	1.33	1.64	1.98	2.40	2.93	2.94	3.68
Long term debt/shareholders equity	71/29	73/27	73/27	71/29	61/39	47/53	29/71	11/89	0/100

Table 4-16 SUMMARY OF FINANCIAL PROJECTIONS AND ANALYSIS
(Electric Power Price : 80% lower)

Plant Capacity: 275 TPD-Bagged Urea

(In million of current US dollars)

Fiscal Year Ending June 30	1991/92	1992/93	1993/94	1994/95	1996/97	1998/99	2000/01	2002/03	2004/05
Capacity Utilization (%)	60.1	61.0	65.4	68.8	72.4	74.8	76.9	78.4	79.6
Urea Sales (1,000 t.p.a.)	51.5	55.3	59.1	62.3	65.6	67.8	69.7	71.1	72.2
Sales Revenue	25.0	28.8	32.7	36.9	44.2	51.9	60.7	70.2	80.8
Cost of Sales (bef. Admn. Exp. & Interest)	23.4	25.3	26.2	27.1	28.6	30.4	32.5	22.5	25.4
General admn. expenses	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.4	0.4
Interest on long-term loans	5.1	4.7	4.4	4.1	3.4	2.7	2.0	1.4	0.7
Net profit after tax	-3.7	-1.5	1.9	5.5	7.2	11.1	15.5	27.6	32.6
Current assets	3.7	3.9	4.3	4.6	5.2	5.9	6.6	6.8	7.7
Net fixed assets	128.7	115.2	101.8	88.3	61.7	35.2	8.8	7.6	6.3
Current liabilities	7.0	7.0	7.0	7.1	7.1	7.2	7.3	7.3	7.4
Long term debt	87.8	81.1	74.3	67.6	54.1	40.5	27.0	13.5	-
Retained earnings (Accumulated)	-3.7	-5.2	-3.2	2.3	18.3	38.5	67.3	119.8	182.4
Shareholders equity	39.8	38.3	40.2	45.8	61.7	82.0	110.8	163.2	225.8
Ratio									
Net profit after tax/sales (%)	-14.7	-5.1	5.9	15.0	16.3	21.4	25.6	39.3	40.3
Net profit after tax/shareholders equity (%)	-9.2	-3.9	4.8	12.1	11.6	13.6	14.0	16.9	14.4
Net profit after tax/share capital (%)	-8.5	-3.4	4.4	12.8	16.6	25.6	35.7	63.6	75.0
Current ratio	0.52	0.56	0.61	0.65	0.73	0.81	0.91	0.92	1.04
Quick ratio	0.28	0.31	0.34	0.38	0.44	0.50	0.57	0.65	0.73
Debt service coverage ratio	1.25	1.45	1.77	2.13	2.35	2.86	3.50	3.65	4.56
Long term debt/shareholders equity	69/31	68/32	65/35	60/40	47/53	33/67	20/80	8/92	0/100

Table 4-17 SUMMARY OF FINANCIAL PROJECTIONS AND ANALYSIS
(Electric Power Price : 100% Lower)

Plant Capacity: 275 TPD-Bagged Urea

(In million of current US dollars)

Fiscal Year Ending June 30	1991/92	1992/93	1993/94	1994/95	1996/97	1998/99	2000/01	2002/03	2004/05
Capacity Utilization (%)	60.1	61.0	65.4	68.8	72.4	74.8	76.9	78.4	79.6
Urea Sales (1,000 t.p.a.)	51.5	55.3	59.1	62.3	65.6	67.8	69.7	71.1	72.2
Sales Revenue	25.0	28.8	32.7	36.9	44.2	51.9	60.7	70.2	80.8
Cost of Sales (bef. Admn. Exp. & Interest)	19.8	21.1	21.5	21.8	22.3	23.2	24.1	12.9	14.5
General admn. expenses	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.4	0.4
Interest on long-term loans	5.1	4.7	4.4	4.1	3.4	2.7	2.0	1.4	0.7
Net profit after tax	-0.0	2.7	6.6	10.8	10.9	15.5	20.5	33.4	39.1
Current assets	3.1	3.4	3.6	3.9	4.3	4.8	5.4	5.4	6.2
Net fixed assets	128.7	115.2	101.8	88.3	61.7	35.2	8.8	7.6	6.3
Current liabilities	6.8	6.8	6.8	6.9	6.9	6.9	6.9	6.9	7.0
Long term debt	87.8	81.1	74.3	67.6	54.1	40.5	27.0	13.5	-
Retained earnings (Accumulated)	-0.0	2.7	9.3	20.1	45.6	74.2	112.6	176.2	251.5
Shareholders equity	43.4	46.1	52.7	63.5	89.0	117.6	156.1	219.6	294.9
Ratio									
Net profit after tax/sales (%)	-0.1	9.3	20.3	29.2	24.7	29.8	33.8	47.5	48.4
Net profit after tax/shareholders equity (%)	-0.0	5.8	12.6	17.0	12.3	13.1	13.2	15.2	13.3
Net profit after tax/share capital (%)	-0.0	6.2	15.3	24.9	25.1	35.6	47.3	76.8	90.1
Current ratio	0.46	0.49	0.53	0.56	0.63	0.70	0.79	0.78	0.89
Quick ratio	0.24	0.27	0.30	0.33	0.38	0.43	0.50	0.57	0.65
Debt service coverage ratio	1.56	1.81	2.19	2.62	2.72	3.32	4.07	4.36	5.44
Long term debt/shareholders equity	67/33	64/36	58/42	52/48	38/62	26/74	15/85	6/94	0/100

Table 4-18(1) ECONOMIC CAPITAL COST
(Current Prices)

(Unit: US$ Million)

Items	Foreign Exchange Portion	Local Currency Portion	Total
A. Land Acquisition	-	-	-
B. Site Preparation	1.44	0.18	1.62
C. Plant Direct Cost	65.44	7.69	73.13
C-1 Process Units	(48.19)	(2.57)	(50.76)
C-2 Utility Facilities	(12.72)	(0.75)	(13.47)
C-3 Auxiliary Facilities	(2.42)	(1.15)	(3.57)
C-4 Offsite Facilities	(2.11)	(3.22)	(5.33)
D. Spareparts, Catalysts, and Chemicals	3.04	-	3.04
E. Construction and Erection Labor	11.96	4.78	16.74
F. Construction Equipment	9.59	-	9.59
G. Transport, Insurance & Duty	1.82	2.66	4.48
H. Indirect Field Expenses	0.42	0.71	1.13
I. Engineering Services	11.00	1.13	12.13
J. Project Management Services	2.90	0.49	3.39
K. Pre-operation Expenses	0.38	2.92	3.30
Economic Project Cost (A - K)	107.99	20.56	128.55

Table 4-18(2) ECONOMIC CAPITAL COST
(1984 Constant Prices)

(Unit: US$ Million)

Items	Foreign Exchange Portion	Local Currency Portion	Total
A. Land Acquisition	-	-	-
B. Site Preparation	1.17	0.15	1.32
C. Plant Direct Cost	48.51	5.75	54.26
C-1 Process Units	(35.66)	(1.90)	(37.56)
C-2 Utility Facilities	(9.46)	(0.56)	(10.02)
C-3 Auxiliary Facilities	(1.80)	(0.86)	(2.66)
C-4 Offsite Facilities	(1.59)	(2.43)	(4.02)
D. Spareparts, Catalysts, and Chemicals	2.11	-	2.11
E. Construction and Erection Labor	8.60	3.44	12.04
F. Construction Equipment	7.38	-	7.38
G. Transport, Insurance & Duty	1.35	1.98	3.33
H. Indirect Field Expenses	0.30	0.51	0.81
I. Engineering Services	8.26	0.85	9.11
J. Project Management Services	2.17	0.37	2.54
K. Pre-operation Expenses	0.26	2.00	2.26
Economic Project Cost	80.11	15.05	95.16

[EXPLANATORY NOTES TO TABLES 4-18(1) & 4-18(2)]

CORRECTION FACTORS USED FOR ESTIMATING ECONOMIC CAPITAL COST

Items	Correction Factors	Remarks
A. Land Acquisition	0	Land cost is evaluated with no value, assuming that land belongs to the nation.
B. Site Preparation	0.9025	Assuming the site preparation work will be commissioned to local contractor, the following tax components are subtracted from the estimated cost: a. 5% of the cost - Contractor Tax, plus b. 5% of the remainder after subtracting (a) - Corporate Tax at 50% of taxable income assumed as 10% of the remaining gross amount (1 - 0.05) x 0.1 x 0.5 = 0.0475
C. Plant Direct Cost	1.0	
D. Spareparts, Catalysts, and Chemicals	1.0	
E. Construction and Erection Labor	0.95	Subtracting 5% (Contractor Tax) from the estimated cost
F. Construction Equip.	1.0	

G. Transport, Insurance, and Duty	0.7266	Subtracting the following components: a. Ocean Transport and Insurance, accounting for 43.6% of the total cost ... no subtraction b. Custom Clearance, Import Duty and Tax, accounting for 24.2% ... full subtraction c. Unloading, Inland Transport and Insurance, accounting for 32.2% ... 5% Contract Tax, plus Corporate Tax at 50% of taxable income assumed as 10% of gross amount remaining after subtracting Contractor Tax portion (1 - 0.05) x 0.5 x 0.1 = 0.0475 Total subtracting factors based on the foregoing assumptions are as follows: a. Nil b. 0.242 c. 0.322 x (0.05 + 0.0475) = 0.0314 Total: 1 - (0.242 + 0.0314) = 0.7266
H. Indirect Field Expenses	1.0	
I. Engineering Services	0.95	Subtracting 5% (Contractor Tax) from the estimated cost
J. Project Management Services	0.95	Subtracting 5% (Contractor Tax) from the estimated cost
K. Pre-operation Expenses	1.0	
M. Initial Working Capital	1.0	
N. Interest during Construction	0	Non-accountable due to transferrable cost

Table 4-19 ECONOMIC COSTS FOR OPERATING COST COMPONENTS

Items	Financial Cost (1984 Price)	Economic Cost (1984 Price)	Remarks
1. Electric Power	US¢3.56/kwh	US¢1.97/kwh	Refer to Chapter 3, Part IV
2. Coal	US$40.63/ton	US$39.35/ton	Subtracting the following components from the financial cost: a. Import duty at 3% from border price (US$37.50/ton) b. Corporate tax at 50% from taxable income assumed as 10% of freight (US$3.125/ton)
3. Catalysts and Chemicals	US$2.72/ton-urea	US$2.68/ton-urea	Subtracting import duty and clearance charge at 1.5% from the financial cost
4. Bags	US¢37.5/bag	US¢34.56/bag	Subtracting the following components from the financial cost: a. Sales tax at 3% b. Corporate tax at 50% of taxable income assumed as 5% of the financial cost remaining after subtracting sales tax

5. Labor Cost	US$213x10^3/yr (US$320x10^3; 1991 price)	US$213x10^3/yr	
6. Maintenance cost	US$2,600x10^3 /yr (US$3,909x10^3; 1991 price)	US$2,553x10^3 /yr	Subtracting the following components: a. Import duty and clearance charge at 1.5% from the foreign portion, accounting for 80% b. Sales tax at 3% from the local portion, accounting for 20%
7. Insurance	(See ATTACHMENT)	(See ATTACHMENT)	
8. General Administration Expenses	US$149x10^3 (US$224x10^3; 1991 price)	US$149x10^3	

(ATTACHMENT TO Table 4-19)

ECONOMIC COST FOR INSURANCE

(Unit: US$'000/yr)

Year	Financial Cost		Economic Cost
	Current Price	1984 Constant Price 1/	(1984 Constant Price) 2/
1991	1,512	1,006	956
1992	1,354	850	808
1993	1,196	708	673
1994	1,038	580	551
1995	880	464	441
1996	725	360	342
1997	569	267	254
1998	414	183	174
1999	259	108	103
2000	104	41	39
2001	96	36	34
2002	89	31	29
2003	81	27	26
2004	74	23	22
2005	67	20	19

Notes: 1/ Using deflater of 6% per annum

2/ Using correction factor of 0.95, by subtracting Corporate Tax at 50% of taxable income assumed as 10% of the financial cost

Table 4-20 ECONOMIC RATE OF RETURN

NEPAL UREA PROJECT (275 TPD)

(UNIT: US$ '000)

YEAR	COSTS	GROSS BENEFIT	ANNUAL COSTS	NET BENEFIT	DISCOUNT FACTOR	(COST/BENEFIT) PRESENT VALUE		DISCOUNT FACTOR	(COST/BENEFIT) PRESENT VALUE	
						COSTS	BENEFIT	(8 %)	COSTS	BENEFIT
1984	0.00	0.00	0.00	0.00	1.0000	0.00	0.00	1.0000	0.00	0.00
1985	0.00	0.00	0.00	0.00	0.9242	0.00	0.00	0.9259	0.00	0.00
1986	0.00	0.00	0.00	0.00	0.8542	0.00	0.00	0.8573	0.00	0.00
1987	2910.00	0.00	0.00	0.00	0.7895	2297.45	0.00	0.7938	2310.05	0.00
1988	37826.00	0.00	0.00	0.00	0.7297	27601.20	0.00	0.7350	27803.30	0.00
1989	44615.00	0.00	0.00	0.00	0.6744	30088.70	0.00	0.6806	30364.20	0.00
1990	9809.00	0.00	0.00	0.00	0.6233	6114.09	0.00	0.6302	6181.34	0.00
1991	0.00	17079.00	8732.00	8347.00	0.5761	0.00	4808.64	0.5835	0.00	4870.40
1992	0.00	18507.00	9166.00	9341.00	0.5324	0.00	4973.59	0.5403	0.00	5046.66
1993	0.00	19903.00	9396.00	10507.00	0.4921	0.00	5170.58	0.5003	0.00	5256.12
1994	0.00	21174.00	9594.00	11580.00	0.4548	0.00	5266.89	0.4632	0.00	5363.79
1995	0.00	22049.00	9702.00	12347.00	0.4204	0.00	5190.29	0.4289	0.00	5295.43
1996	0.00	22564.00	9717.00	12847.00	0.3885	0.00	4991.33	0.3971	0.00	5101.73
1997	0.00	23078.00	9738.00	13340.00	0.3591	0.00	4790.21	0.3677	0.00	4905.10
1998	0.00	23598.00	9766.00	13832.00	0.3319	0.00	4590.59	0.3405	0.00	4709.27
1999	0.00	24089.00	9794.00	14295.00	0.3067	0.00	4384.83	0.3152	0.00	4506.39
2000	0.00	24545.00	9818.00	14727.00	0.2835	0.00	4175.10	0.2919	0.00	4298.68
2001	0.00	24899.00	9892.00	15007.00	0.2620	0.00	3932.16	0.2703	0.00	4055.94
2002	0.00	25257.00	9949.00	15308.00	0.2422	0.00	3707.15	0.2503	0.00	3830.82
2003	0.00	25543.00	10005.00	15538.00	0.2238	0.00	3477.78	0.2317	0.00	3600.35
2004	0.00	25871.00	10051.00	15820.00	0.2069	0.00	3272.63	0.2145	0.00	3394.16
2005	-1624.00	26087.00	10086.00	16001.00	0.1912	-310.50	3059.30	0.1987	-322.62	3178.70
TOTAL	93536.00	********	********	********		65791.00	65791.00		66336.30	67413.50

** ERR = 8.20%

** NPV = 1077.26

[Attachment (1) to Table 4-20]

<DIRECT BENEFIT>

YEAR	QUANTITY (TONS)	UNIT VALUE (US$)	GROSS BENEFIT (US$ '000)	FINANCING COST (US$ '000)	TOTAL BENEFIT (US$ '000)
1991	51500	323	16635	444	17079
1992	55294	326	18026	481	18507
1993	59101	328	19385	518	19903
1994	62306	331	20623	551	21174
1995	64493	333	21476	573	22049
1996	65603	335	21977	587	22564
1997	66700	337	22478	600	23078
1998	67800	339	22984	614	23598
1999	68805	341	23463	626	24089
2000	69701	343	23907	638	24545
2001	70497	344	24251	648	24899
2002	71097	346	24600	657	25257
2003	71697	347	24879	664	25543
2004	72202	349	25198	673	25871
2005	72598	350	25409	678	26087

[Attachment (2) to Table 4-20]

<ECONOMIC PRODUCTION COST (Unit: US$1,000)

YEAR	QUANTITY (TONS)	VARIABLE COST					FIXED COST							TOTAL COST
		ELECT. POWER	COAL	CAT. & CHEM.	BAGS	TOTAL	LABOR COST	MAINT COST	INSUR-ANCE	GEN. EXP.	TOTAL	SUPPLY / PROD	ADJUST COST	
1991	51300	4043	519	138	374	5074	213	2553	956	149	3871	0.945	3658	8732
1992	55294	4341	557	148	401	5447	211	2553	808	147	3723	0.999	3719	9166
1993	59101	4640	595	158	429	5822	209	2553	673	146	3588	0.996	3574	9396
1994	62306	4892	627	167	452	6138	207	2553	551	145	3466	0.997	3456	9594
1995	64493	5063	649	173	468	6353	205	2553	441	143	3356	0.998	3349	9702
1996	65603	5150	661	176	476	6463	203	2553	342	142	3257	0.999	3254	9717
1997	66700	5237	672	179	484	6572	201	2553	254	141	3169	0.999	3166	9738
1998	67800	5323	683	182	492	6680	199	2553	174	139	3089	0.999	3086	9766
1999	68805	5402	693	184	500	6779	197	2553	103	138	3018	0.999	3015	9794
2000	69701	5472	702	187	506	6867	195	2553	39	137	2954	0.999	2951	9818
2001	70497	5535	710	189	512	6946	193	2553	34	136	2949	0.999	2946	9892
2002	71097	5582	716	191	516	7005	192	2553	29	134	2944	1.000	2944	9949
2003	71697	5629	722	192	521	7064	190	2553	26	133	2941	1.000	2941	10005
2004	72202	5669	727	194	524	7114	188	2553	22	132	2937	1.000	2937	10051
2005	72598	5699	731	195	527	7152	186	2553	19	131	2934	1.000	2934	10086

Table 4-21 PERCENTAGE OF NET VALUE ADDED

(Electric Power Price: 40% of Present Price Level)

(Unit: US$Million)

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
1. Total Production Cost	33.83	34.58	35.66	36.64	37.70	38.48	39.52	40.68	41.91	43.24	32.22	33.85	35.61	37.48	39.44
2. Foreign Exchange Outlay (for Plant Operation)															
2.1 Coal (92.3%)	0.79	0.84	0.96	1.07	1.18	1.27	1.37	1.47	1.58	1.70	1.82	1.95	2.08	2.22	2.37
2.2 Catalysts & Chemical (100.0%)	0.22	0.24	0.27	0.30	0.33	0.36	0.39	0.42	0.45	0.48	0.52	0.55	0.59	0.63	0.67
2.3 Maintenance Cost (80.0%)	3.11	3.30	3.50	3.71	3.94	4.17	4.42	4.69	4.97	5.27	5.58	5.92	6.27	6.65	7.05
TOTAL	4.12	4.38	4.73	5.08	5.45	5.80	6.18	6.58	7.00	7.45	7.92	8.42	8.94	9.50	10.09
3. Depreciation of Imported Equipment, Materials & Services															
3.1 Plants and Facilities (88.5%)	10.03	10.03	10.03	10.03	10.03	10.03	10.03	10.03	10.03	10.03	-	-	-	-	-
3.2 Buildings (60.7%)	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38
3.3 Indirect Field Expenses (37.2%)	0.05	0.05	0.05	0.05	0.05	-	-	-	-	-	-	-	-	-	-
3.4 Pre-operation Expenses (11.5%)	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	-	-	-	-	-
3.5 Interest during Construction (100.0%)	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	-	-	-	-	-
TOTAL	11.43	11.43	11.43	11.43	11.43	11.38	11.38	11.38	11.38	11.38	0.38	0.38	0.38	0.38	0.38
4. Interest on Long-Term Loan	5.05	4.72	4.38	4.04	3.71	3.37	3.03	2.70	2.36	2.02	1.68	1.35	1.01	0.67	0.34
5. Total Foreign Exchange Outlay for Urea Production (2-4)	20.60	20.53	20.54	20.55	20.59	20.55	20.59	20.66	20.74	20.85	9.98	10.15	10.33	10.55	10.81
6. Percentage of Net Value Added [(1)-(5)]/(1) (%)	39.10	40.63	42.40	43.91	46.38	46.60	47.90	49.21	50.51	51.78	69.03	70.01	69.48	71.85	72.59

(Average for 15 years: 54.03%)

Table 4-22 PROJECTED NET FOREIGN EXCHANGE SAVINGS

(Unit: US$Million)

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
1. Foreign Exchange Outlay (for Urea Import)	25.03	28.75	32.74	36.95	40.76	44.22	47.96	51.93	56.21	60.71	65.28	70.24	75.28	80.79	86.39
2. Foreign Exchange Outlay (for Plant Operation)	4.12	4.38	4.73	5.08	5.45	5.80	6.18	6.58	7.00	7.45	7.92	8.42	8.94	9.50	10.09
3. Adjustment for Cost of Sales	3.89	4.38	4.71	5.06	5.44	5.79	6.17	6.57	6.99	7.44	7.91	8.42	8.94	9.50	10.09
(Sales/Production)	(0.945)	(0.999)	(0.996)	(0.997)	(0.998)	(0.999)	(0.999)	(0.999)	(0.999)	(0.999)	(0.999)	(1.000)	(1.000)	(1.000)	(1.000)
4. Repayment of Foreign Loan	6.74	6.74	6.74	6.74	6.74	6.74	6.74	6.74	6.74	6.74	6.74	6.74	6.74	6.74	6.74
5. Interest on Long-Term Loan	5.05	4.72	4.38	4.04	3.71	3.37	3.03	2.70	2.36	2.02	1.68	1.35	1.01	0.67	0.34
6. Total Foreign Exchange Outlay from Project (2-5)	15.68	15.50	15.83	15.84	15.89	15.90	15.94	16.01	16.09	16.20	16.33	16.51	16.69	16.91	17.17
7. Net Foreign Exchange Savings [(1)-(6)]	9.35	13.25	16.91	21.11	24.87	28.32	32.02	35.92	40.12	44.51	48.95	53.73	58.59	63.88	69.22

Total for 15 years: 560.75 (Average: 37.38 per annum)

Table 4-23 PRODUCTION COST AND FOREIGN EXCHANGE COST OF UREA

(Unit: US$ Per Ton of Urea)

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
1. Total Production Cost	621	625	601	586	583	586	592	599	609	620	457	476	497	519	543
2. Foreign Exchange Cost*	378	371	346	329	319	313	308	304	301	299	141	143	144	146	149
3. Import Price	486	520	554	593	632	674	719	766	817	871	926	988	1,050	1,119	1,190
4. Total Production Cost/Import Price (%)	128	120	108	99	92	87	82	78	75	71	49	48	47	46	46
5. Foreign Exchange Cost/Import Price (%)	78	71	62	55	50	46	43	40	37	34	15	14	14	13	13

Note: Based on the figures shown in (5) of Table 4-21

Table 4-24 INDUSTRIAL USES OF UREA

Items	Type	End Uses
1) Industrial Uses		
- Urea Formaldehyde Resins	- Adhesives, (Liquid and Flakes)	Plywood, Laminate Beams, Particle Board, Wood Mould
	- UF Bulk Mould	Electric Appliances
	- UF Foam	Insulation
- Melamine	- Crystalline	Decolative Laminates, Surface Coating, Paper Treatment
2) Feed Supplement Uses (Ruminant Animals)		
- Feed Grade Urea	- Microprill	Cattle, Sheep, Goats
- Storage of Feed Straw and Feed Grain	- Prill	Cattle, Sheep, Goats
3) Miscellaneous Uses		
- De-icing Agent	- Prill	Highway, Airport
- Petroleum Dewaxing	- Crystalline	Wax Adduct
- MSG (Mono Sodium Glutamate)	- Prill	Fermentation
- DMEU (Dimethyethylene Urea)	- ---	Textile Treatment
- Urea Hydrogen Peroxide	- Solid	Cosmetics, Laundry Bleach

Note: It is estimated that the world urea consumption for industrial uses was approximately 4.3MM TPY while the world total urea production was 50MM TPY in 1982, respectively. The consumption of industrial urea uses are concentrated mostly in North America and West Europe (60%), Japan (15%), East Europe (20%) and the consumption in elsewhere is minimal.

Figure 4-1 ECONOMIC RATE OF RETURN
(Urea: 275 TPD)

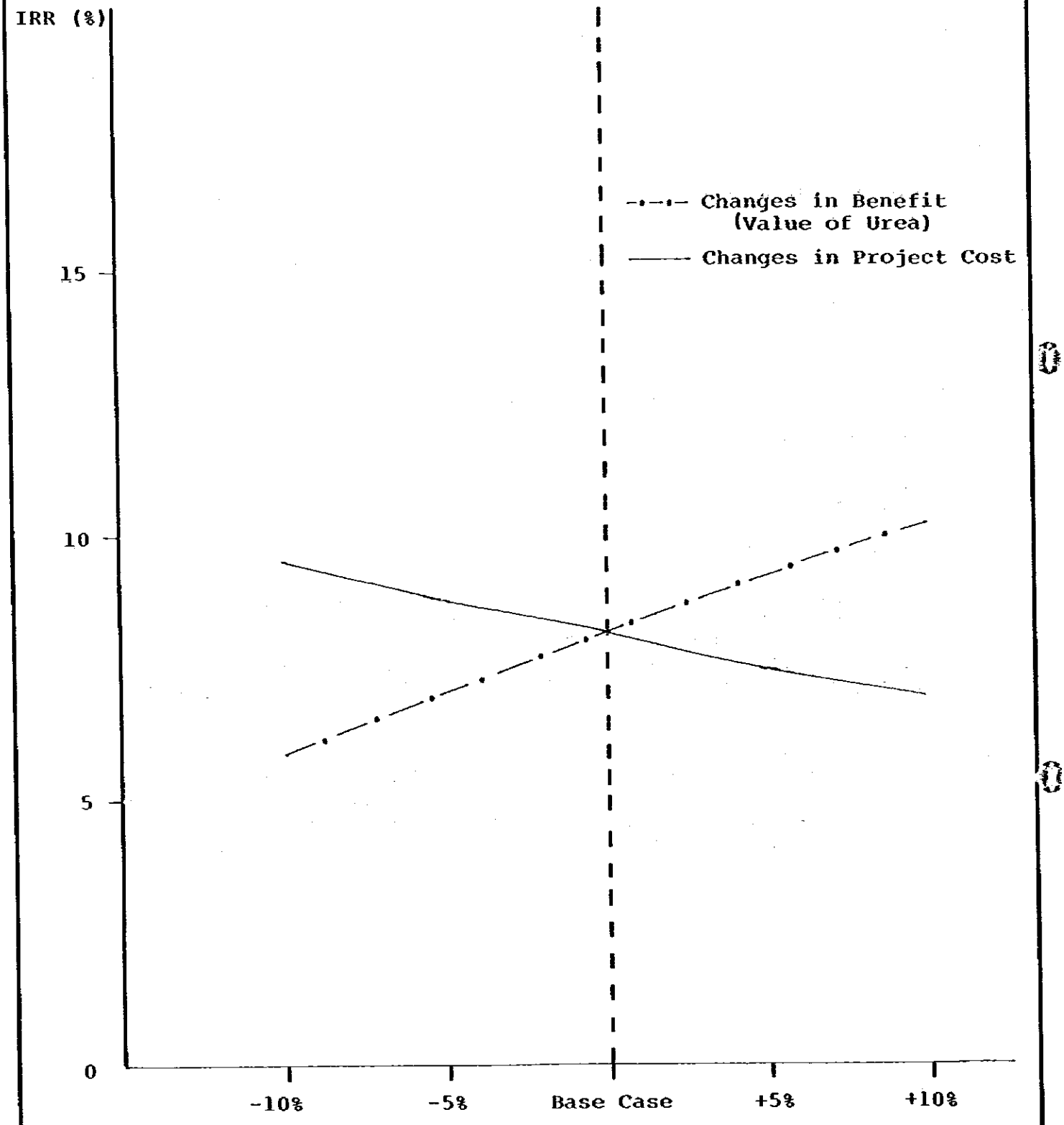
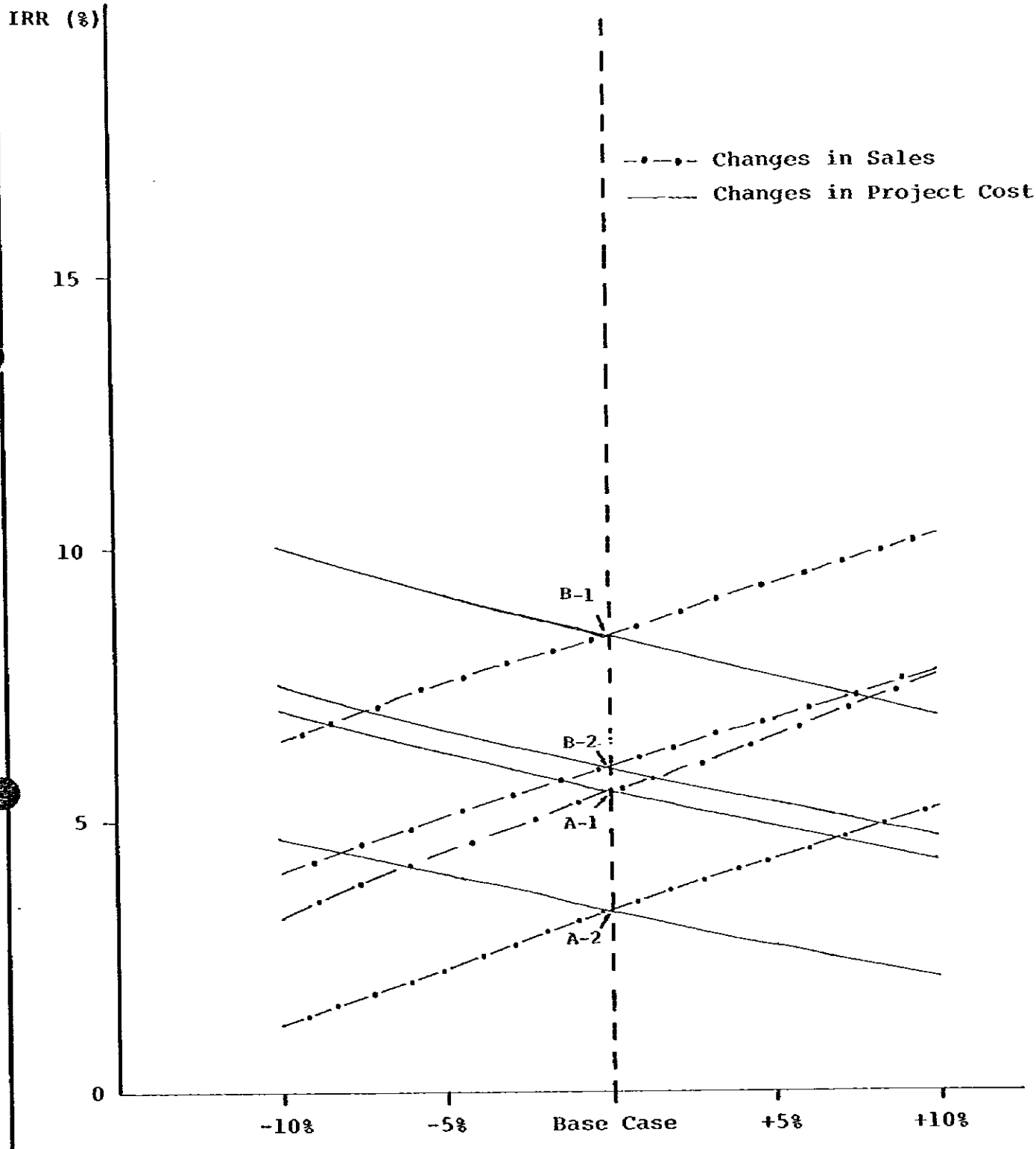


Figure 4-2 FINANCIAL RATE OF RETURN
(Urea: 275 TPD)



A: Electricity Price: 40% of Base Estimate
(A-1: Before Tax, A-2: After Tax)

B: Electricity Price: 20% of Base Estimate
(B-1: Before Tax, B-2: After Tax)