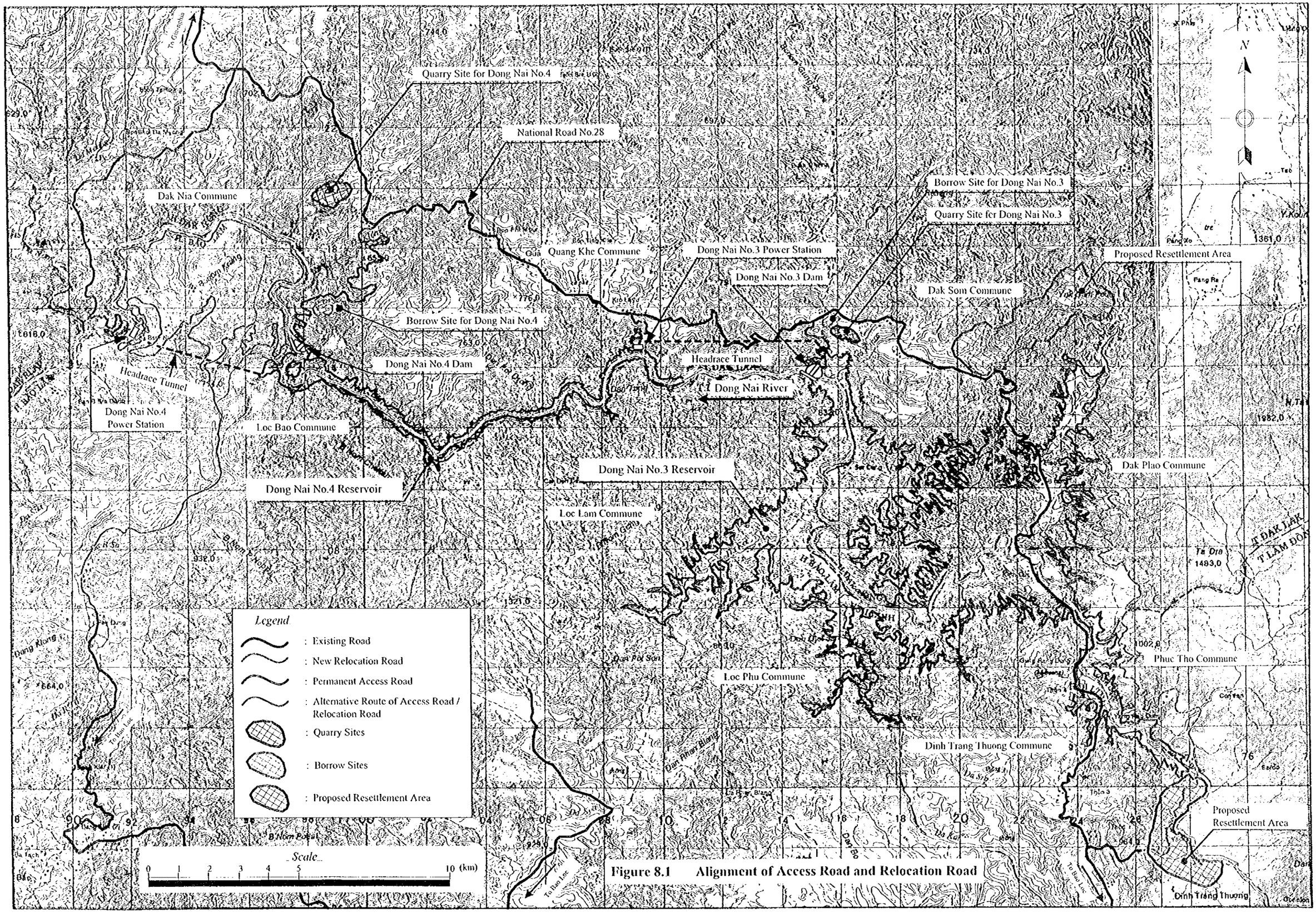
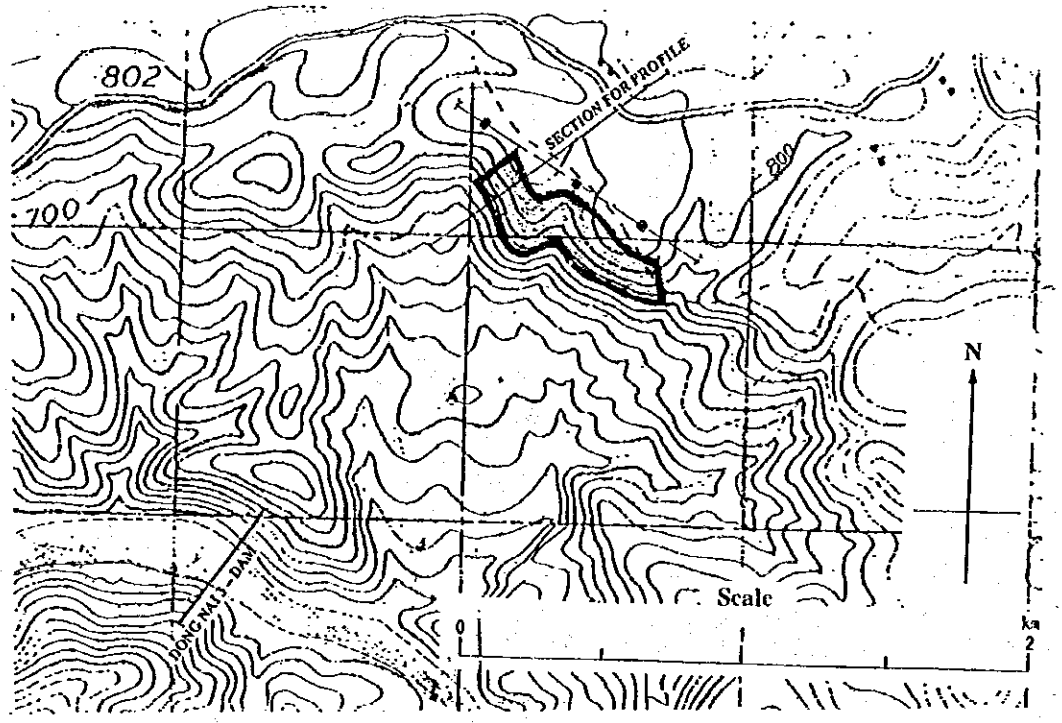


Figure 8.1 Alignment of Access Road and Relocation Road



QUARRY SITE FOR DONG NAI No.3

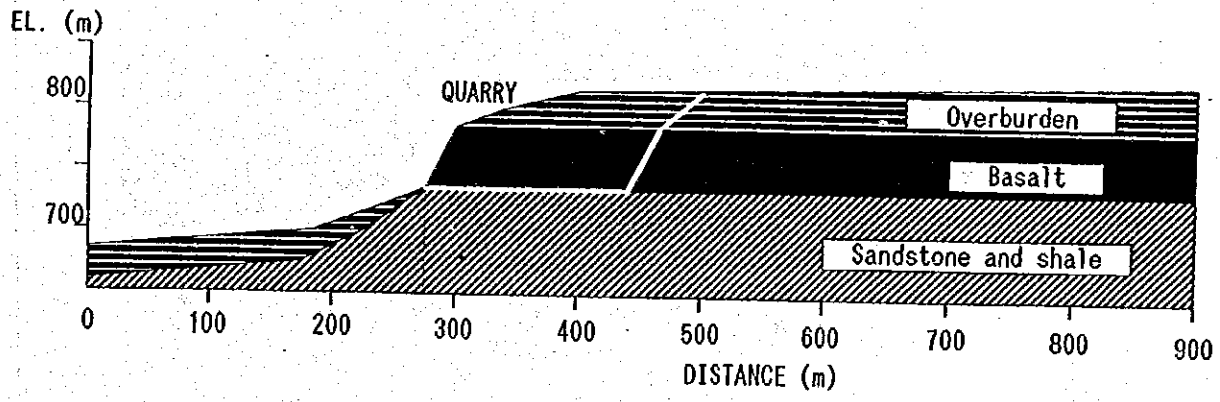
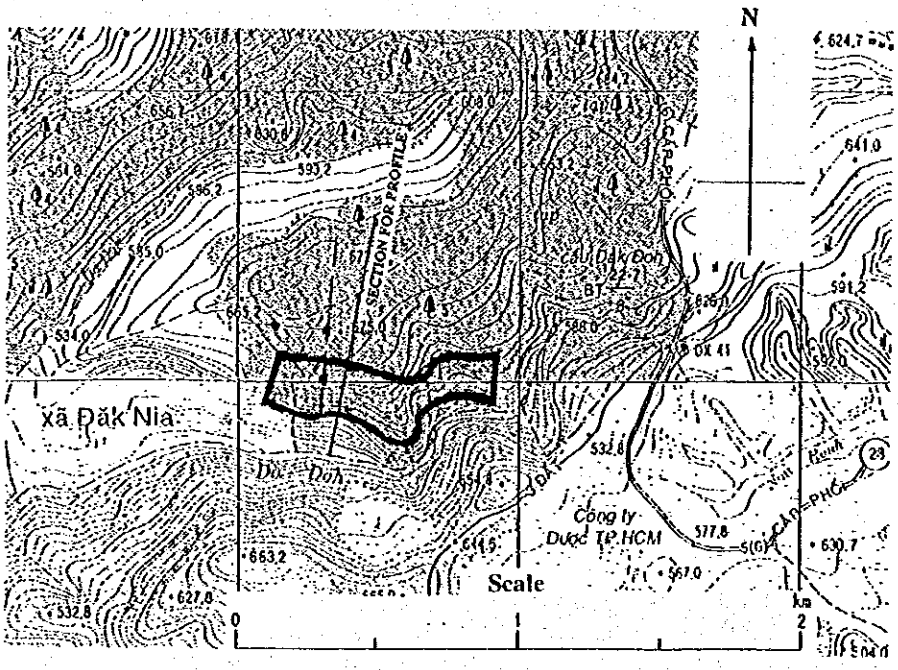


Figure 8.2 Quarry Site for Dong Nai No.3



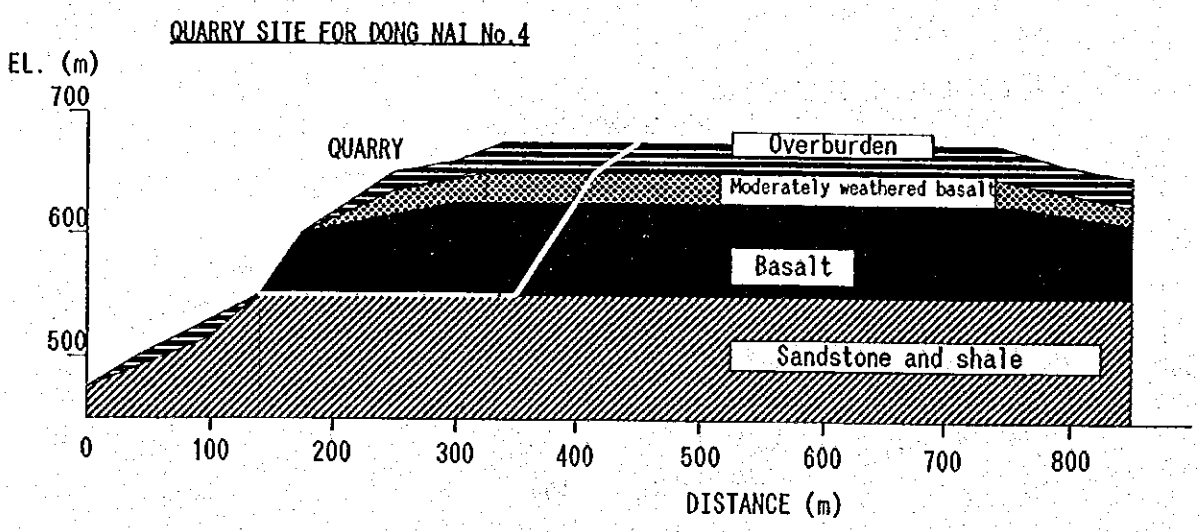
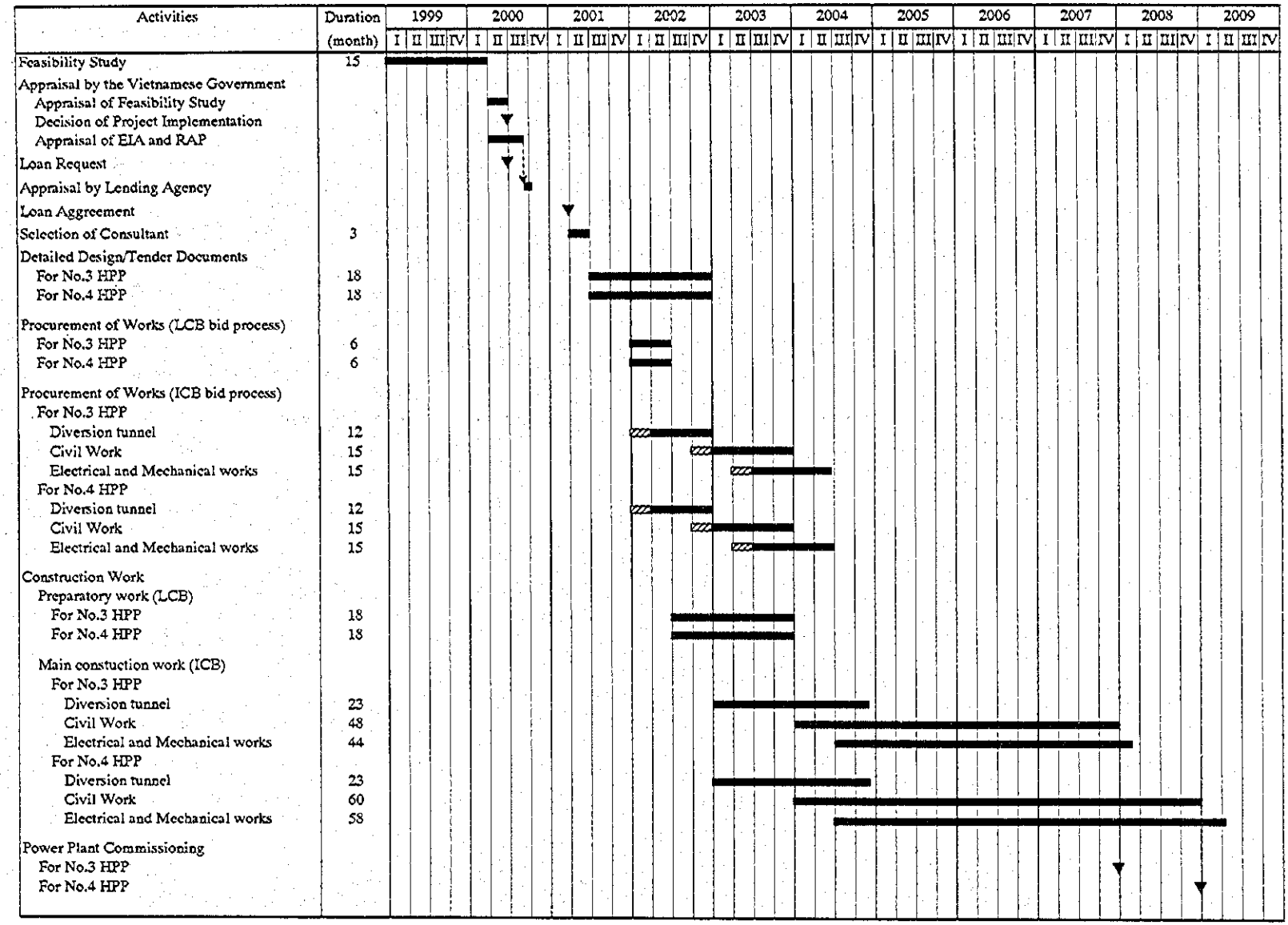


Figure 8.3 Quarry Site for Dong Nai No.4

Figure 8.4 Implementation Schedule of Dong Nai 3-4 HPP



Note: ICB : International Competitive Bid
LCB : Local Competitive Bid
zzz : Pre-qualification process

Figure 8.5 Construction Schedule for Dong Nai No. 3

Description	Qty	unit
1 Preparatory Works		
Access road	10	km
Base camp		
Construction power supply	30	km
2 Diversion tunnel		
Mobilization		
Excavation, portal		
Excavation, tunnel	880 x 2	m
Concrete, lining	880 x 2	m
Concrete, open		
Plug concrete		
3 Civil Works		
Mobilization		
Site installation		
River diversion work		
Primary cofferdam		
River closure/diversion		
Riservoir impounding		
Main dam (CFRD)		
Excavation, open	793,000	m^3
Embankment, cofferdam	380,000	m^3
Embankment, dam	4,720,000	m^3
Concrete, plinth	2,600	m^3
Concrete, face slab	47,500	m^3
Grouting, blanket	7,700	m
Grouting, curtain	52,600	m
Spillway		
Excavation, open	1,300,000	m^3
Concrete, open	134,500	m^3
Power intake		
Excavation, open	543,000	m^3
Excavation, shaft	63	m
Concrete, open	2,000	m^3
Concrete, shaft	5,500	m^3
Headrace tunnel		
Excavation, portal		
Adit construction	1,200	m
Excavation, tunnel (9.8 m diam.)	6,960	m
Concrete, lining (8.4 m diam.)	6,960	m
Grouting, consolidation		
Concrete, plug in adits		
Surge tank		
Excavation, open	84,000	m^3
Excavation, shaft (22.7 m diam.)	85	m
Concrete, lining (20.7 m diam.)	85	m
Penstock		
Excavation, tunnel, upper holizontal	70	m
Excavation, inclined shaft	135	m
Exavation, tunnel, lower holizontal	130	m
Concrete, backfill	6,300	m^3
Powerhouse and swichyard	63	m
Excavation, open	448,000	m^3
Concrete, substructure	35,000	m^3
Superstructure		
Power outlet		
Excavation, open	10,200	m^3
Concrete, open	4,200	m^3
4 Hydromechanical Works		
Spillway gates	3	set
Intake gates and trashrack	1	set
Steel penstock	340	m
Draft tube gates	2	set
5 Hydroelectical Works		
Draft tube	2	set
O/H traveling crane	2	set
Turbines	2	set
Generators	2	set
Switchyard equipment		
Test and commissioning, No. 1 unit		
Test and commissioning, No. 2 unit		
6 500 kV Transmission Line	13	km

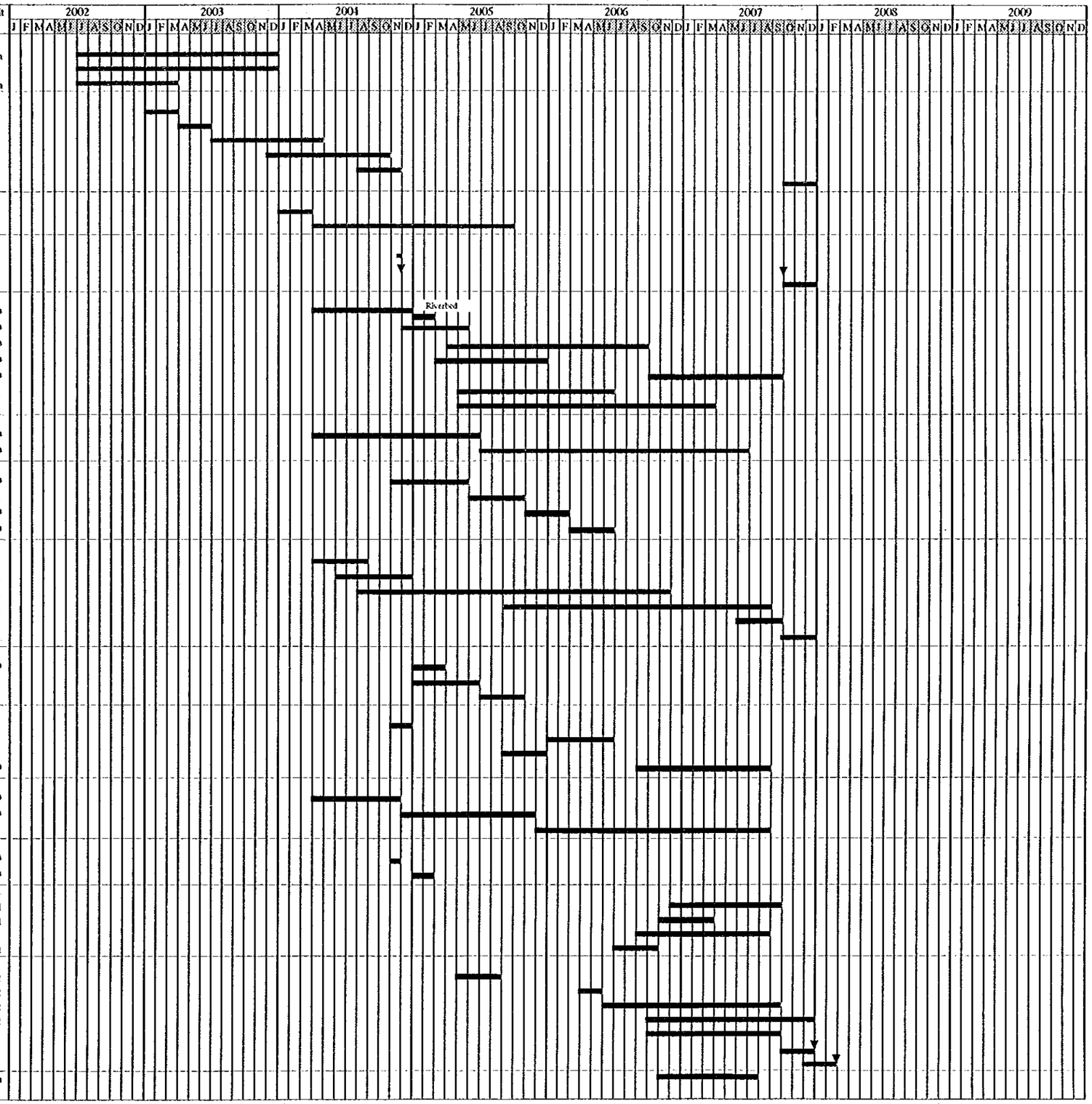
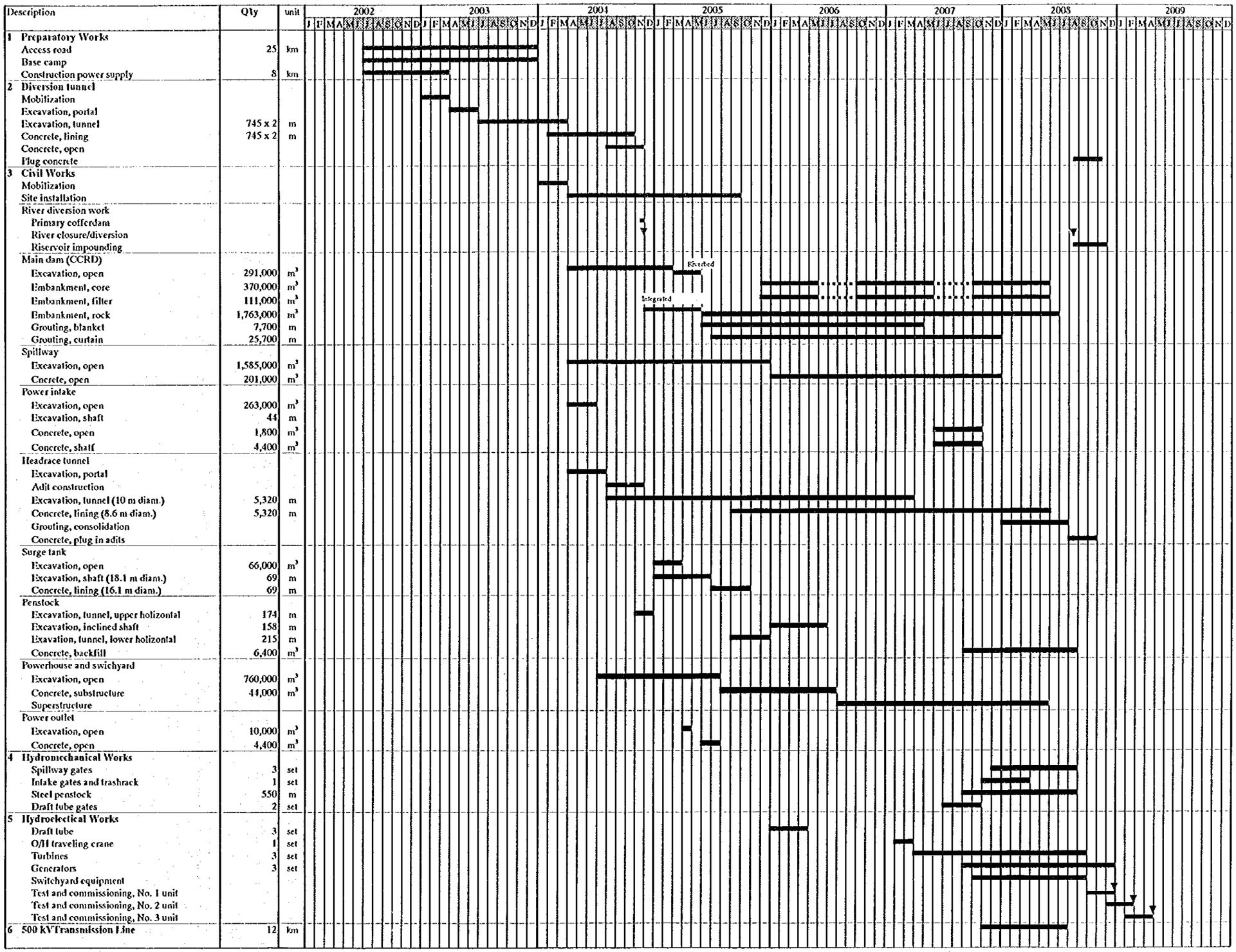


Figure 8.6 Construction Schedule for Dong Nai No. 4

Description	Qty	unit
1 Preparatory Works		
Access road	25	km
Base camp		
Construction power supply	8	km
2 Diversion tunnel		
Mobilization		
Excavation, portal		
Excavation, tunnel	745 x 2	m
Concrete, lining	745 x 2	m
Concrete, open		
Plug concrete		
3 Civil Works		
Mobilization		
Site installation		
River diversion work		
Primary cofferdam		
River closure/diversion		
Riservoir impounding		
Main dam (CCRD)		
Excavation, open	291,000	m^3
Embankment, core	370,000	m^3
Embankment, filter	111,000	m^3
Embankment, rock	1,763,000	m^3
Grouting, blanket	7,700	m
Grouting, curtain	25,700	m
Spillway		
Excavation, open	1,585,000	m^3
Concrete, open	201,000	m^3
Power intake		
Excavation, open	263,000	m^3
Excavation, shaft	44	m
Concrete, open	1,800	m^3
Concrete, shaft	4,400	m^3
Headrace tunnel		
Excavation, portal		
Adit construction		
Excavation, tunnel (10 m diam.)	5,320	m
Concrete, lining (8.6 m diam.)	5,320	m
Grouting, consolidation		
Concrete, plug in adits		
Surge tank		
Excavation, open	66,000	m^3
Excavation, shaft (18.1 m diam.)	69	m
Concrete, lining (16.1 m diam.)	69	m
Penstock		
Excavation, tunnel, upper holizontal	174	m
Excavation, inclined shaft	158	m
Exavation, tunnel, lower holizontal	215	m
Concrete, backfill	6,400	m^3
Powerhouse and swichyard		
Excavation, open	760,000	m^3
Concrete, substructure	44,000	m^3
Superstructure		
Power outlet		
Excavation, open	10,000	m^3
Concrete, open	4,400	m^3
4 Hydromechanical Works		
Spillway gates	3	set
Intake gates and trashrack	1	set
Steel penstock	550	m
Draft tube gates	2	set
5 Hydroelectical Works		
Draft tube	3	set
O/H traveling crane	1	set
Turbines	3	set
Generators	3	set
Switchyard equipment		
Test and commissioning, No. 1 unit		
Test and commissioning, No. 2 unit		
Test and commissioning, No. 3 unit		
6 500 kV Transmission Line	12	km



CHAPTER 9 PROJECT EVALUATION

9.1 Introduction

9.1.1 General

This chapter is devoted to ascertain the viability of the Project in both the economic and financial aspects through computation of economic internal rate of return (EIRR) and financial internal rate of return (FIRR), and through the examination of repayability of Project loans.

The economic evaluation is conducted from the point of view of the entire society as a whole. The Project cost is converted to economic cost to reflect real cost to the society as a whole either through eliminating transfer payment or through shadow pricing. The EIRR thus obtained is compared with a cut-off rate, i.e., opportunity cost of capital.

While, the financial analysis is conducted from the point of view of the executing agency of the Project in its implementation stage; EVN is assumed as such in this Study. The Project cost estimated based on the market price is compared with the actual revenue accrued from the sales of the electricity to be generated by the Project. The repayability of loans is examined by assuming various conditions of loans and power rates.

9.1.2 Conditions

The following conditions and assumptions were adopted in this Study:

a) The cost was estimated based on the market price in March 1999.

b) The monetary value was in principle indicated in US Dollar. An official exchange rate of VND 13,870 per US dollar (the rate as of March 1st, 1999) was applied as needed. No shadow pricing was made for exchange rate, because the official exchange rate can be recognized to represent the real value of Vietnamese Dong under the strict foreign exchange control of the Government.

c) The price escalation in financial analysis was incorporated assuming inflation rates of 1% for both foreign and local currency portions as stated already in Chapter 8. The adoption of US Dollar in estimating the local currency portion was made expecting to avoid the influence of the possible future fluctuation in the foreign exchange rate of Vietnamese Dong.

d) The shadow pricing of the wage rate for unskilled labor was incorporated in such a way that 10% of the local currency portion in average was assumed as unskilled labor wage. This portion was discounted by 50% for shadow pricing of the unskilled labor. Under the current labor market situation with more than 6% of the unemployment ratio, this shadow pricing was deemed necessary.

e) The economic value of the land to be committed to the Project including those to be submerged by constructing the reservoirs is to be shadow-priced by estimating the value of the production foregone. In case of the two reservoirs of Dong Nai No.3 and No.4, however, the prevailing farming is a slash-and-burn agriculture with primitive production level. Therefore, it was deemed appropriate to consider the value of production foregone negligible. Thus the economic value of land was

considered nil in this evaluation.

f) As for the compensation cost, a half of its total cost estimated based on the market price was considered as economic cost by assuming that all the structures including buildings, roads etc. are depreciated half of their economic values in average.

g) The operation and maintenance costs of the facilities built by the Project were estimated at 0.5% of construction cost for civil works and 2.5% for metal works.

h) The economic life was assumed as 50 years for civil works and 20 years for mechanical and electric works. The replacement of metal works was considered every 20 years and the residual value of civil works was counted as a negative cost in the 50th year.

i) The evaluation period of 50 years starting from the commissioning was adopted for two IRR computations. In examining the repayability of loans, however, repayment was assured throughout 30 years of its repayment period.

j) The opportunity cost of capital was assumed at 10% in this Study following recent practices of similar studies in Vietnam.

Further conditions and assumptions applied to the financial analysis are stated in section 9.3 in this report.

9.2 Economic Evaluation

9.2.1 Derivation of Economic Cost

The capital cost of the Project estimated based on the market price is summarized in Table 9.1 with its year-by-year disbursement schedule. The total capital cost (at 1999 constant prices) was estimated at US$ 737.1 million with the breakdown of foreign currency portion of US$ 423.4 million and the local currency portion of US$ 313.7 million (VND 4,349.6 billion equivalent).

The financial cost was adjusted to economic cost based on the conditions and assumptions stated in the preceding Subsection 9.1.2. The conversion of financial cost to economic cost is summarized in Table 9.2. In deriving economic cost, tax portion was deducted and price escalation was also deducted from the financial cost. The consequent yearly distribution of the economic cost is as shown in Table 9.3, which was transferred to Table 9.6 for the computation of EIRR.

9.2.2 Estimate of Economic Benefit

The economic benefit was estimated in this Study through two criteria: one is the conventional alternative-thermal (Case A) and the other is the long-run marginal cost (LRMC) (Case B).

(1) Case A: Alternative Thermal Power Plant Criterion

The Case A assumes that a least-cost alternative thermal power plant will substitute for the present Project in case the present Project is not implemented. The cost to be saved, i.e., the cost of the alternative thermal is considered as the benefit of the present Project.

The procedures for computation of capacity (kW) cost and energy (kWh) cost of alternative thermal power plants are presented in Table 9.4. Three types of thermal power plants including oil fired and coal fired thermal power plants and combined cycle gas turbine were selected as typical power plants following the historical and planned power development practices in Vietnam. A combined cycle gas turbine is not yet built in Vietnam but is prioritized in the Long-term Power Development Master Plan Phase V prepared by the Institute of Energy (IOE) of EVN (hereinafter referred to as "EVN's power master plan"). The cost data were primarily obtained from the IOE. The fuel cost was adopted from the historical and projected data in the "Commodity Price Outlook" prepared by World Bank after adjusted to 1999 constant price level. The lack of Vietnamese data on combined cycle gas turbine was supplemented by those in Japan. The computed value of the cost per kW and the cost per kWh were adjusted by coefficients to equalize the different conditions for losses between hydropower and each thermal power plant.

The total cost of each alternative thermal was computed based on each kW cost and kWh cost by multiplying the installed capacity and energy output of the Dong Nai Project and is shown in the column (4) in Table 9.4. As the result shows, the combined cycle gas turbine was identified as the least cost alternative among these three.

However, the combined cycle gas turbine was not adopted in this Study as a sole alternative thermal of the Dong Nai Project but a hypothetical combination of combined cycle gas turbine and coal fired thermal was assumed as the alternative thermal based on

the following reasons.

a) The Government of Vietnam is promoting an energy sector policy to develop hydropower resources with a higher priority than other resources. This aims at not only developing the untapped natural endowment of the nation but also preventing environmental aggravation like air and water pollution caused by thermal power plants. The least-cost alternative principle should be reviewed and amended from the point of view of promoting and pushing forward this policy. Because hydropower's disadvantage comparing to other resources like oil, coal and natural gas is inevitable when the least cost principle is strictly applied following the conventional way of power Project evaluation.

b) According to the conventional alternative thermal criterion, the social cost including the cost of environmental prevention and conservation that is to be borne by thermal power plants is not incorporated into the analysis. This makes thermal power plant unfairly advantageous to hydropower. In order to avoid this problem, a hypothetical combination of major power plants – combined cycle gas turbine and coal fired thermal – was proposed herein.

c) This proposal is related to rural development as well. Since hydro-potentials are in many cases located in rural areas, hydropower plant may give impact to these areas. This is the intangible benefit of hydropower that is not incorporated into the project analysis. The proposed hypothetical method prepares a justification not only in economic but also in social aspects.

d) All the electric power sources are connected to a national grid throughout the nation. Therefore, the demand in the South needs not necessarily be met by the supply in the South. Thus, it may not be reasonable to assume that a new power plant should be a coal fired thermal in the North and a combined cycle gas turbine in the South. The hypothetical combination concept leads to LRMC criterion in which all the conceivable power development projects including combined cycle gas turbine, coal fired thermal and other power plants are considered without asking its type and location. Justification of the LRMC as the economic benefit of power generation would lead to adoption of alternative-mix of thermal power plants like the proposed hypothetical method in stead of sole alternative thermal power plant.

e) Power supply characteristics of the Dong Nai No.3 and No.4 Combined Hydropower Project will be justifiably reflected to the hypothetical combination of combined cycle gas turbine and coal fired thermal; the former supplies for peak power demand and the latter for base load and/or intermediate portion of power demand.

In deriving the cost per kW and cost per kWh of the hypothetical composite thermal, the share of combined cycle gas turbine and coal fired thermal was computed based on the EVN's power master plan up to the year 2020. The installed capacity of combined cycle gas turbine is planned as 5,000 MW and that of coal fired thermal as 8,405 MW respectively in the said master plan. The unit cost of the hypothetical composite thermal alternative was derived at 182.3 US$/kW for capacity value and 1.916 US¢/kWh for energy value.

(2) Case B: LRMC Criterion

1) Definition and Marginal Cost Pricing

The long-run marginal cost (LRMC) is broadly defined as the incremental cost of all adjustments in the system expansion plan and system operations attributable to an incremental increase in demand that is sustained into the future.[1]

As imagined from this definition, the LRMC is in many cases calculated when a long-term power development plan is newly established. This time in Vietnam, it was computed in the EVN's power master plan. The LRMC is widely recognized as the most reasonable base of electricity pricing. In Case B, the economic benefit of power generated by the Project is evaluated by the LRMC. This means, in other words, that the economic benefit is evaluated by a unit power price determined based on the LRMC. Before proceeding to the explanation of LRMC, the marginal cost pricing is to be explained briefly.

The rationale for setting electricity price equal to marginal cost is clarified with a simple supply-demand diagram shown in Figure 9.1. The demand curve of $EFGD_0$ determines the kilowatt-hours of electricity demanded in a given year at any given average price level. *AGS* is the supply curve that is represented by the marginal cost (MC) of supplying additional units of output.

At price p and demand Q_0, the total benefit of consumption is represented by the consumer's willingness to pay (WTP), that is, the area under the demand curve *OEFJ*. The cost of supplying the output is the area under supply curve *OAIJ*. And the net benefit, or total benefit minus supply cost, is given by the area *AEFI*. The maximum net benefit *AEG* is achieved when price is set equal to marginal cost at the optimal market clearing point G (p_0, Q_0). At this point of G, the consumer's willingness to pay is represented by $OEGQ_0$ which is composed of the consumer's tariff payment $OBGQ_0$ and the consumer's surplus, that is, the triangle area *BEG*.

Meanwhile, the change of electricity price according to the demand increase in a short term with fixed capacity is shown in Figure 9.2. Suppose that in year zero, the maximum supply capacity is Q_1, while the optimal price and output combination (p_0, Q_0) prevails, corresponding to the demand curve D_0 and the short-run marginal cost curve *SRMC*. The *SRMC* is based on fuel, operating and maintenance costs, that is, supply costs with fixed capacity.

As demand grows from D_0 to D_1 over time, the price must be increased to p_1 to clear the market in the short run, because capacity is fixed and the supply curve is extremely steep at Q_1. When the demand curve has shifted to D_2 and the price is p_2, plant is added to increase the capacity to Q_1. As soon as the capacity increment is completed and becomes a sunk cost, however, *SRMC* falls to its old trend line. Therefore, p_3 is the optimal price corresponding to demand D_3 and the *SRMC* curve. Generally, such large price fluctuations during this process may not be practical. This problem can be avoided

[1] "Electricity Pricing", A World Bank Publication, 1982

by adopting a LRMC approach.

SRMC is defined in economic terms as the cost of meeting additional electricity consumption with fixed capacity. LRMC is the cost of meeting an increase in consumption sustained into the future when needed capacity adjustments are possible. If there is an increase in consumption in the short run, both the system operating costs and the outage costs (especially during the peak period) will also rise at the margin. Similarly, in the long run, an increase in demand will result in a corresponding increase in the operating costs as well as in the capacity costs. Thus in both the short and long run an equivalent increase in operating costs will occur. And when the system is optimally planned and operated – that is, capacity and reliability are optimal – SRMC and LRMC coincide.

2) LRMC Calculation Procedures

The LRMC adopted in this Study is that computed in the EVN's power master plan. Its derivation procedures are summarized in Table 9.5 that is a direct translation from the Vietnamese edition originally prepared by IOE.

In computing the LRMC, the following procedures in which an example of the current EVN's calculation is assumed are generally required:

a) A long-term power demand forecast covering the period of 2000-2020 is established firstly based on a variety of macro socio-economic forecasts including population trend, GDP increase, especially industrial development, power demand elasticity to income/production and so on.

b) In order to meet this future demand, all the possible power supply sources are investigated to formulate a long-term power generation expansion plan. This includes not only hydro energy but also coal fired thermal, combined cycle gas turbine as well as nuclear possibility. All these candidate power development sources are lined up in sequence according to the maturity of the project. The least-cost development program is obtained through applying such dynamic computer programs as WASP and/or EGEAS.

c) The similar optimal long-term development program is established for transmission and distribution networks accompanied by the generation expansion program.

d) All the incremental costs including those of generation, transmission and distribution as well as consumer related costs are estimated based on the market price in 1999. These costs are broken down into capacity cost that is mainly composed of capital cost and O&M cost, and energy cost that is mainly composed of fuel cost. The capacity cost is born by peak-time consumers as recognized widely as reasonable. While, energy costs are born by both the peak and off-peak consumers. Unit costs per kWh of capacity cost and energy cost are integrated to obtain the LRMC taking into account of the peak and off-peak allocation.

e) Finally, the LRMCs thus obtained for generation and for each level of voltage are averaged with the weight of the consumption of each voltage level from high to low voltages to derive at an averaged LRMC.

All the above description of the computation procedures of LRMC was not informed by IOE but only an essential portion of the above was derived from IOE. Theoretically, however, the above procedures must have been followed to obtain the LRMC.

3) Application of LRMC as Economic Benefit

The following is to be taken into consideration in applying the LRMC.

a) The LRMC criterion evaluates the economic benefit of the Project based on an electricity price valued at LRMC. This inevitably neglects the consumer's surplus portion (BEG in Figure 9.1) in the consumer's willingness-to-pay (OEGQ0 in the same figure). The economic benefit is calculated less than the total consumer's willingness-to-pay and the estimated benefit is considered as the proximity of the economic benefit.

b) One of the merits of adopting LRMC as the economic benefit lies in that projects can be evaluated under the same category of economic benefit by using common value of unit benefit. The economic benefit applied in alternative-thermal criterion will vary according to the price change of fuel like coal, oil and gas. The LRMC criterion can avoid this price fluctuation.

c) In calculating the LRMC, new investment costs planned in a long-term plan are considered as an incremental (marginal) cost in the long run. Therefore, the fixed capacity costs are treated as the variable costs together with fuel costs to be integrated into a LRMC value in kWh.

d) The estimated LRMC has such a nature that, if it were applied strictly for all the consumers according to the diversified tariff rates varied by, for example, peak and off-peak times, the future incremental costs to meet the increased demand will be financed by the tariff revenue.

e) Two LRMCs are computed in Table 9.5; one is the LRMC calculated based on the long term power development plan up to the year 2010 and another up to the year 2020. In this Study, the former estimated based on the plan up to 2010 was adopted avoiding such unknown factors as nuclear power plant or power import from Laos that are included in the latter plan to adopt the LRMC of US¢ 7.426 /kWh. The annual economic benefit was computed by this LRMC multiplied by the annual generation of the Project.

(3) Augmentation of Downstream River Flow

The two reservoirs of Dong Nai No.3 and No.4 will increase the downstream river flow in the dry season, which will enable the Tri An hydropower plant to generate additional power. This incremental generation can be attributable to the Dong Nai Project. Based on the hydrological analysis and reservoir operation study stated in Chapter 6 in this report, the downstream enhancement effect is computed at US$ 1.9 million per year and counted in the Project's economic benefit.

(4) Other Benefits

The other benefits than those stated above were not considered in this Study. Under the

present development plan, the water created in the dry season will be wasted after passing through the turbine flowing into the sea without being utilized effectively. The water created by the Dong Nai No.3 and No.4 reservoirs during the dry season, however, can be utilized more effectively, for example, by irrigation water, municipal water supply, prevention of salt water intrusion and recreation opportunities near around the artificially created lakes in the future. If these possible benefits were incorporated, the viability of the Project would be enhanced very much.

9.2.3 Computation of EIRR

The reservoir operation study shown in Chapter 6 in this report has worked out the installed capacity and the annual generation of the No.3 and No.4 Dong Nai power plants as referred in Table 9.7. In this table, the capacity value was calculated based on 90% firm peak power in stead of the installed capacity. The time of commissioning was scheduled at the end of 2007 for the No.3 and the end of 2008 for the No.4 Dong Nai power plants respectively. It was assumed in this Study that the power generation benefit of No.3 will accrue 92% in 2008 and 100% after 2009 and that of No.4 will accrue 83% in 2009 and 100% after 2010 following the commissioning schedule. The calculation of the economic benefit is explained in Table 9.7 covering three years of the initial commissioning.

The EIRR of the Project was computed in Table 9.6. The EIRR value of 13.0% was derived for the Case A and 13.5% for the Case B. Since the opportunity cost of capital is assumed at 10% in this Study, the Project is judged to be economically justified.

It is sometimes argued that the project with a higher internal rate of return should be prioritized than that with a lower internal rate of return. In this regard, a World Bank reference book on project analysis[2] is to be referred to. The internal rate of return can be explained as the maximum rate of interest that a project could pay if all resources were borrowed; it thus can be explained as a measure of the return on the resources engaged in the project. It is often recognized as a measure of ranking projects but it is better not to do this. Because it can lead to an erroneous investment decision. Choice among projects that meet the formal criteria of acceptance is related not to the rank of the projects by a discounted measure of worth but on other, non-economic grounds- including the capability to implement the projects.

The above may be interpreted that the role of economic analysis lies in examining whether the project can be justified or not according to the derived EIRR exceeding or not-exceeding the cut-off rate. Ranking projects is to be done by other criteria than EIRR computation. The power shortage in Vietnam is widely recognized and is proven in Chapter 5 in this Report as well. In order to improve the situation, a power master plan through the year of 2020 is already established by EVN. And this Dong Nai hydropower project is one of the candidate projects selected for preparation of its implementation. With this background, an EIRR exceeding the cut-off rate of 10% that is assumed as the opportunity cost of capital in Vietnam was derived. This may constitute a strong support for the Project to be promoted to the next step.

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[2] "Economic Analysis of Agricultural Projects" J. Price Gittinger, Johns Hopkins University Press

9.2.4 Sensitivity Test of EIRR

The sensitivity test of EIRR was carried out for the Case A. The change of EIRR value was examined by varying the determinant of benefit and cost of the Project in two ways. One is to examine the EIRR by varying the Project's construction cost and the fuel cost of alternative thermal that not only determines the Project's benefit but also fluctuates according to the world market's demand and supply. The fuel cost of both the gas and coal fired thermal was considered. Another is to examine the EIRR by varying the Project's construction cost and the Project's total benefit.

(1) Case of varying construction cost and fuel cost of alternative thermal

The EIRR changes as shown below according to the increase and decrease by 20% of the construction cost and the fuel cost of alternative thermal.

	Fuel cost +20%	Normal	Fuel cost –20%
Constr. Cost–20%	16.3%	15.8%	14.9%
Normal	13.5%	13.1%	12.3%
Constr. Cost+20%	11.8%	11.5%	10.8%

As shown above, the change of fuel cost affects EIRR value less than the change of construction cost. The EIRR reduces if the construction cost increases and if the fuel cost decreases. But even in the worst case of the construction cost with 20% up and the fuel cost with 20% down, the EIRR exceeds more than 10% that is assumed to be the cut-off rate of this Study.

(2) Case of varying construction cost and total benefit

This is the conventional way for sensitivity test of EIRR. In this case, the total benefit was taken up in stead of fuel cost and 10% change was assumed in stead of 20%. The result is tabulated below.

Case	Benefit +10%	Normal	Benefit –10%
Constr. Cost –10%	15.6%	14.5%	13.2%
Normal	14.3%	13.1%	11.9%
Constr. Cost +10%	13.4%	12.3%	11.2%

As shown above, even in the worst case of the construction cost with 10% up and the benefit decrease with 10% down, the EIRR exceeds 10% that is assumed to be the cut-off rate of this Study. The economic soundness of the Project is thus ensured.

9.3 Financial Analysis

9.3.1 Financial Cost and Benefit

The cost and benefit adopted in the financial analysis are all the cost and benefit to be accrued to the Project's executing agency i.e. EVN. The Project cost adopted for the financial analysis was derived by excluding the transmission line cost from the Project cost shown in Table 9.1, because the transfer-point of electricity was set in this financial analysis at the switchyard of the power plant. The total capital cost (at 1999 constant prices) applied for the financial analysis was US$ 727.2 million with the breakdown of foreign currency portion of US$ 417.5 million and the local currency portion of US$ 309.7 million (VND 4,295.5 billion equivalent).

Therefore, power rates assumed are not those at consumer's end but those valued at the said switchyard. The revenue based on the power rate is considered as EVN's sole income from the Project.

9.3.2 Computation of FIRR

The financial internal rate of return (FIRR) was computed as shown in Table 9.8.

There are three (3) kinds of FIRR varying by the point of view to the financial analysis.

a) Financial rate of return to all resources engaged: calculated from the incremental net benefit before financing

b) Financial rate of return to equity before income tax: calculated from the incremental net benefit after financing

c) Financial rate of return to equity after taxes: calculated from the incremental net benefit after financing and taxes

The point of view of a) mentioned above is that of the enterprise, b) is that of the private investors and c) is that of the equity owners. Since EVN belongs to enterprises criteria in nature, the FIRR shown in a) above was adopted in this Study. As indirect taxes like resources tax and VAT are considered as costs for EVN, they were included in the cost side at the computation. As for the corporate tax, it was not included in the cost side, because it is paid from net income when the enterprise can earn it and is considered as a part of the net income. This way of FIRR computation follows the usual practice of the World Bank.[3]

In Table 9.8, the cost escalation is considered during the construction period. And after the Project starts its operation, then it is assumed that both the cost and benefit will be equally affected by inflation resulting to set off its influence to the project analysis. Since the estimate of an inflation rate up to 50 years ahead may be unreliable, the said assumption is deemed reasonable.

Two (2) FIRRs were calculated in Table 9.8 varying by the assumed power rate: one is US¢4.5/ kWh (Cases 1) and another US¢5.0 /kWh (Cases 2). As the result, the FIRR of 6.5% was obtained for Cases 1 and the FIRR of 7.4% for Cases 2.

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[3] Same reference book as the foot note-2.

9.3.3 Sensitivity Test of FIRR

The sensitivity test of FIRR was carried out through examining the change of FIRR value by varying the benefit and cost of the Project. The benefit and cost were assumed to change by 10% respectively and the resulted FIRR change is as shown below.

Sensitivity test of FIRR for Cases 1: (Cases with tariff rate of US¢4.5/ kWh)

Case	Benefit +10%	Normal	Benefit –10%
Cost –10%	8.2%	7.4%	6.5%
Normal	7.3%	6.5%	5.7%
Cost +10%	6.5%	5.8%	5.0%

Sensitivity test of FIRR for Cases 2: (Cases with tariff rate of US¢5.0/ kWh)

Case	Benefit +10%	Normal	Benefit –10%
Cost –10%	9.1%	8.3%	7.4%
Normal	8.2%	7.4%	6.5%
Cost +10%	7.4%	6.6%	5.8%

As shown above, the lowest FIRR value in Cases 1 is 5.0% for the case with 10% increase in cost and 10% decrease in benefit.

As being observed for Cases 1 in the above table, the cost reduction in 10% with normal benefit would improve the FIRR value from 6.5% to 7.4% that is identical to the normal FIRR value for Cases 2. In other words, the cost reduction in 10% has the same financial effect as the raising of power tariff from US¢4.5/ kWh to US¢5.0/ kWh. In this context, it may be worthwhile to make an effort to find possible measures for reducing the Project cost in the next stage of the Project.

9.3.4 Examination of Loan Repayability

Taking into consideration the importance of financial conditions that will affect the financial viability of the Project, twelve (12) alternative cases were studied as shown below.

	FC:I.C = 85:15			FC:I.C=70:30		
FC interest rate:(% p.a.)	3.5%	5.0%	8.5%	3.5%	5.0%	8.5%
Power rate=4.5 c/kWh	Case 1-1	Case 1-2	Case 1-3	Case 2-1	Case 2-2	Case 2-3
Power rate=5.0 c/kWh	Case 3-1	Case 3-2	Case 3-3	Case 4-1	Case 4-2	Case 4-3

Major determinants of the financial viability include 1) the share of financing sources i.e. percentage of the foreign and local currency loans toward total loan requirement, 2) interest rate of the foreign currency loan that may vary depending on foreign financial agencies, and 3) power rate by which EVN will sell the electricity to Power Company. For the sake of simplicity, the explanation in the following two (2) paragraphs refers to only the case with the power rate of US¢4.5/ kWh.

Foreign loans were assumed to finance 85% of the total Project cost in the Cases 1, and

70% of the total Project cost in the Cases 2. The remaining loan requirement was assumed to be financed by domestic loans.

Three (3) alternative interest rates of foreign loans comprising 3.5% per annum, 5.0% per annum, and 8.5% per annum were set for both Cases 1 and Cases 2. This interest rate is considered as the sum of the interest rate of foreign financial agencies and the surcharge of the Vietnamese National Bank. Foreign loans with interest rates lower than 3.5% per annum including the surcharge might be available at the Project's implementation stage. Therefore, it can be said that the interest rate of 3.5% per annum being assumed in the present analysis may lead to a severer financial analysis than other cases with lower interest rates. The interest rate for domestic loans was assumed at 13% per annum. It was assumed that the interest will be capitalized without payment during the construction period and will be repaid together with the principal repayment after the commission of the Project.

In addition to the power rate of US¢4.5/ kWh, an alternative power rate of US¢5.0/ kWh was assumed for each case mentioned above. Therefore, the number of the alternative cases to be examined amounts to twelve (12) cases in total.

The repayability of Project loans was examined through preparation of sources-and-uses-of-funds statements as shown in Table 9.9. The sources of funds are composed of the revenue from power sales and loans of both the foreign loans and the domestic bank loans. The repayment of the loan principal is scheduled to be made for 30 years for the foreign loan and 10 years for the domestic loan. The outstanding loan principal will reach its peak in the year of the end of construction period and will reduce year by year thereafter to become zero at the end of the year 2039. The resources tax (2%) and VAT (10%) were computed toward the gross revenue and the corporate income tax (25%) was incorporated based on the current surplus after financing. The corporate tax, however, is exempted when the net income is deficit. The surplus after tax of each year is accumulated in the right most column of the table.

To analyze the result of examination of the twelve (12) alternative cases, two (2) tables were prepared as shown below.

i) Number of years with cumulative deficit:

	FC:LC=85:15			FC:LC=70:30		
FC interest rate:	3.5% p.a.	5.0% p.a.	8.5% p.a.	3.5% p.a.	5.0% p.a.	8.5% p.a.
Power rate = 4.5c/kWh	0	0	28	7	12	27
Power rate = 5.0c/kWh	0	0	17	0	6	18

There are two (2) kinds of revenue amount determined by two (2) kinds of power rate. Each of the two (2) revenues is common to six (6) cases. Therefore, the difference in "surplus after tax" among six (6) cases is mainly brought by the difference in each financing expenditure including interest payment and principal repayment of loans. The financial result of each year is presented in the column of "surplus after tax" that may become deficit depending on the magnitude of the financing expenditures. If the year with deficit after tax continues, then it will be accumulated as shown in the right most column in Table 9.9. The table shown above indicates the number of years with

cumulative deficit.

In the cases with tariff rate of US¢4.5/ kWh, two (2) cases show no deficit years throughout the evaluation period. In cases where the cumulative deficit are recorded, some measures such as issuing bond and/or borrowing money is required to make up the deficit for operation, which may cause additional cost for the Project. And long years of cumulative deficit may affect the payment of interest and principal of loans. In this context, Case 1-1 and Case 1-2 are desirable having no deficit years at all. While, some difficulties in repayment may be anticipated in Case 1-3 and Case 2-3 of which interest rate of foreign loan is the highest among all cases.

In the cases with tariff rate of US¢5.0/ kWh, betterment is naturally observed and the number of cases with zero year of cumulative deficit increase to three (3) cases including Case 3-1, Case 3-2 and Case 4-1.

ii) Debt Service Coverage Ratio (DSCR: in times)

		FC:LC=85:15			FC:LC=70:30		
FC interest rate:		3.5% p.a.	5.0% p.a.	8.5% p.a.	3.5% p.a.	5.0% p.a.	8.5% p.a.
Power rate=4.5 c/kWh	2015	0.9	0.8	0.6	0.7	0.6	0.5
	2025	1.7	1.6	1.3	2.2	2.0	1.6
	2035	2.2	2.1	1.9	2.8	2.7	2.4
Power rate=5.0 c/kWh	2015	1.0	0.9	0.7	0.8	0.7	0.6
	2025	1.9	1.7	1.4	2.4	2.1	1.7
	2035	2.4	2.3	2.1	3.1	2.9	2.7

The debt service coverage ratio (DSCR) is defined as the sum of income after tax, depreciation and interest paid divided by the sum of interest paid and loan repayment. The DSCR was calculated and shown in the table above for each case for the three (3) years of 2015, 2025 and 2035 based on Table 9.9. Taking an example of Case 1-1, DSCR of 2.2 in 2035 means that the net income plus depreciation plus interest paid can drop by nearly half for EVN still to meet its debt obligation. In general public investment, this ratio is usually considered appropriate when it falls in 1.5 times and higher. DSCR in 2015 is rather low of 0.9, which is caused by the heavier loan repayment than other years with the repayment of both the foreign and domestic loans. The DSCR is improved in the years of 2025 and 2035 when the repayment of domestic loans is already finished with the foreign loans' repayment only remaining. Excluding the ten-year period after the commissioning when the burden of financing expenditure of both the foreign and domestic loans exists, the DSCR may be considered to assure the repayability of loans with the exception of the cases with high interest rate of 8.5% per annum. In this context, domestic loans with a longer repayment period than ten (10) years assumed in this Study should desirably be arranged in the next stage.

Judging from the above-mentioned two (2) indices comprising the number of cumulative deficit years and the DSCR, the following can be concluded for the loan repayability:

a) Case 1-1 is most desirable and

b) the four (4) cases with zero cumulative deficit year are recommendable following the Case 1-1.

As for the other cases than these five (5), some financial arrangements will have to be made to sustain the Project during the years with cumulative deficit.

Table 9.1 Project Cost Summary and Disbursement Schedule

	F.C.	L.C.	Total	Foreign currency portion (US$ mil.)										Local currency portion (US$ mil.)									
	(US$ mil.)	(US$ mil.)	(US$ mil.)	2001	2002	2003	2004	2005	2006	2007	2008	2009	Total	2001	2002	2003	2004	2005	2006	2007	2008	2009	Total
(1) Base Cost																							
(1) Preparatory works		14.0	14.0												5.7	8.3							14.0
(2) Diversion tunnel	22.0	20.2	42.2			11.0	11.0						22.0			10.1	10.1							20.2
(3) Main civil works	154.9	162.2	317.1				19.9	43.2	46.5	38.7	6.6		154.9				20.7	45.0	48.7	40.6	7.3		162.2
(4) Hydromechanical works	35.9	6.4	42.3					3.6	14.4	14.4	3.6		35.9						1.6	3.2	1.6		6.4
(5) Hydroelectric works	114.7	12.8	127.5					10.4	41.7	46.9	12.5	3.1	114.7						3.0	6.3	3.2	0.4	12.8
(6) Transmission line	5.9	3.9	9.8						2.5	2.0	1.4		5.9						0.6	2.4	1.0		3.9
(7) Engineering service	31.1	10.4	41.5	4.7	4.7	3.1	3.1	5.5	5.5	3.1	1.5		31.1	1.6	1.6	1.0	1.0	1.8	1.8	1.0	0.5		10.4
(8) Administration		3.9	3.9											0.6	0.6	0.4	0.4	0.7	0.7	0.4	0.2		3.9
(9) Land compensation and resettlement	3.9	6.7	10.6		1.2	1.2	0.8	0.4	0.4				3.9		2.0	2.0	1.3	0.7	0.7				6.7
(10) Tax		29.8	29.8											0.3	0.6	1.7	3.3	5.5	8.3	7.9	2.0	0.2	29.7
Sub-total	368.4	270.3	638.7	4.7	5.8	15.3	34.8	63.1	110.9	105.1	25.6	3.1	368.4	2.5	10.5	23.5	36.8	53.7	65.4	61.7	15.6	0.5	270.2
(2) Contingency																							
(1) Price contingency	26.0	17.9	43.8	0.1	0.2	0.6	1.8	3.9	8.0	8.7	2.4	0.3	26.0	0.0	0.3	1.0	1.9	3.3	4.7	5.1	1.5	0.1	17.9
(2) Physical contingency	29.0	25.4	54.4	0.5	0.6	1.5	3.5	5.6	8.2	7.3	1.7	0.2	29.0	0.2	1.0	2.3	3.6	5.3	6.2	5.5	1.2	0.0	25.4
Sub-total	55.0	43.3	98.3	0.6	0.8	2.1	5.3	9.5	16.2	16.1	4.1	0.5	55.0	0.3	1.4	3.3	5.5	8.6	10.9	10.6	2.7	0.1	43.3
(3) Total Project cost	423.4	313.7	737.1	5.2	6.6	17.4	40.1	72.6	127.1	121.2	29.6	3.6	423.4	2.7	11.8	26.8	42.4	62.3	76.3	72.3	18.3	0.6	313.6

Note: Estimated based on 1999 constant prices.

Table 9.2 Adjustment of Financial Cost to Economic Cost

(Unit:US$ million)

	Financial cost			Economic cost		
	F.C.	L.C.	Total	F.C.	L.C.	Total
(1) Base cost						
1) Preparatory works		14.0	14.0		13.3	13.3
2) Diversion tunnel	22.0	20.2	42.2	22.0	19.2	41.2
3) Main civil works	154.9	162.2	317.1	154.9	154.1	309.0
4) Hydromechanical works	35.9	6.4	42.3	35.9	6.1	42.0
5) Hydroclectric works	114.7	12.8	127.5	114.7	12.2	126.9
6) Transmission line	5.9	3.9	9.8	5.9	3.7	9.6
7) Engineering service	31.1	10.4	41.5	31.1	9.9	41.0
8) Administration		3.9	3.9		3.7	3.7
9) Land compensation and resettlemen	3.9	6.7	10.6	3.9	3.1	7.0
10) Tax		29.8	29.8			
Sub-total	368.4	270.3	638.7	368.4	225.2	593.6
(2) Contingency						
1) Price contingency	26.0	17.9	43.9			
2) Physical contingency	29.0	25.4	54.4	29.0	24.1	53.1
Sub-total	55.0	43.3	98.3	29.0	24.1	53.1
(3) Total Project Cost	423.4	313.7	737.1	397.4	249.4	646.8

Note: F.C.: Foreign currency portion
L.C.: Local currency portion

Table 9.3 Yearly Distribution of Economic Cost

	F.C.	L.C.	Total	Foreign currency portion (US$ mil.)										Local currency portion (US$ mil.)									
	(US$ mil.)	(US$ mil.)	(US$ mil.)	2001	2002	2003	2004	2005	2006	2007	2008	2009	Total	2001	2002	2003	2004	2005	2006	2007	2008	2009	Total
(1) Base Cost																							
(1) Preparatory works		13.3	13.3												5.4	7.9							13.3
(2) Diversion tunnel	22.0	19.2	41.2			11.0	11.0						22.0			9.6	9.6							19.2
(3) Main civil works	154.9	154.1	309.0				19.9	43.2	46.5	38.7	6.6		154.9				19.6	42.8	46.2	38.5	6.9		154.1
(4) Hydromechanical works	35.9	6.1	42.0					3.6	14.4	14.4	3.6		35.9						1.5	3.0	1.5		6.1
(5) Hydroelectric works	114.7	12.2	126.9					10.4	41.7	46.9	12.5	3.1	114.7						2.9	6.0	3.0	0.3	12.2
(6) Transmission line	5.9	3.7	9.6						2.5	2.0	1.4		5.9						0.6	2.2	0.9		3.7
(7) Engineering service	31.1	9.9	41.0	4.7	4.7	3.1	3.1	5.5	5.5	3.1	1.5		31.1	1.5	1.5	1.0	1.0	1.7	1.7	1.0	0.5		9.9
(8) Administration		3.7	3.7											0.6	0.6	0.4	0.4	0.7	0.7	0.4	0.2		3.7
(9) Land compensation and resettlement	3.9	3.1	7.0		1.2	1.2	0.8	0.4	0.4				3.9		0.8	1.0	0.7	0.3	0.3				3.1
(10) Tax																							
Sub-total	368.4	225.2	593.6	4.7	5.8	15.3	34.8	63.1	110.9	105.1	25.6	3.1	368.4	2.0	8.3	19.8	31.3	45.5	53.9	51.1	13.0	0.3	225.2
(2) Contingency																							
(1) Price contingency																							
(2) Physical contingency	29.0	24.1	53.1	0.5	0.6	1.5	3.5	5.6	8.2	7.3	1.7	0.2	29.0	0.2	1.0	2.2	3.5	5.0	5.8	5.2	1.2	0.0	24.2
Sub-total	29.0	24.1	53.1	0.5	0.6	1.5	3.5	5.6	8.2	7.3	1.7	0.2	29.0	0.2	1.0	2.2	3.5	5.0	5.8	5.2	1.2	0.0	24.2
(3) Total Project cost	397.4	249.4	646.8	5.1	6.4	16.8	38.3	68.7	119.1	112.5	27.3	3.3	397.4	2.5	9.2	22.0	34.7	50.5	59.8	56.3	14.2	0.4	249.4

Table 9.4 Computation of kW and kWh Values of Alternative Thermal Power Plants

(1) Cost Data of Alternative Thermals

Items		Oil Thermal	Coal Thermal	C-Cycle	Remarks
1. Construction cost	:$/kW	701	973	619	
2. Economic life	:year	20	30	20	
3. Capital recovery factor	for 10%	0.117460	0.106079	0.117460	
4. Fuel cost		22.09	40.18	2.98	
		($/barrel)	($/t)	($/mcf)	
5. Calorific value		1.534E+06	5,500	2.520E+05	
		(kcal/barrel)	(kcal/kg)	(kcal/mcf)	
6. Thermal efficiency	:%	38%	38%	45%	
7. Fixed O&M ratio	:%	3%	5%	3%	: % to construction cost per kW

Source: "Commodity Price Outlook" WB in November 1998 for fuel cost and other data from IOE.

(2) Computation of cost per kW

Items		Oil Thermal	Coal Thermal	C-Cycle
1) Annualized construction cost:	($/kW)	101.3	127.0	89.4
2) Fixed O&M (annual cost):	($/kW)	21.0	48.7	18.6
3) Cost per kW (annual cost)	($/kW)	122.3	175.6	108.0
4) Adjustment factor		1.141	1.262	1.077
5) Cost per kW (after adjusted)	($/kW)	139.6	221.6	116.3

Note for annualized construction cost:
Assumed construction period : 3 years Assumed disbursement: 35%, 45%, 20%

(3) Computation of cost per kWh

Items		Oil Thermal	Coal Thermal	C-Cycle
1) Fuel cost per kWh	($/kWh)	0.033	0.017	0.023
2) Adjustment factor		1.032	1.043	0.990
3) Cost per kWh (after adjusted)	(C/kWh)	3.364	1.725	2.238

(4) Total cost comparison of three alternatives

Items		Oil Thermal	Coal Thermal	C-Cycle
1) kW cost	(US$ mil.)	66.2	105.0	55.1
2) kWh cost	(US$ mil.)	53.1	27.2	35.3
3) Total cost	(US$ mil.)	119.2	132.2	90.4

Note : Capacity and output of Dong Nai Project:
Installed capacity(MW) 474 Annual generation (GWh) 1,577

(5) Computation of Adjustment Coefficients for Losses:

		Oil Thermal	Coal Thermal	C-Cycle	Hydropower
(1) Loss ratios					
1) Transmission and distribution		1.4%	1.4%	1.4%	4.0%
2) Overhaul and maintenance		10.0%	17.7%	8.5%	2.5%
3) Station consumption		6.0%	7.0%	2.0%	0.3%
4) Forced outage		2.5%	2.5%	2.5%	0.5%
(2) Overall operation efficiency (%	kW cost:	81.3%	73.6%	86.2%	92.8%
	kWh cost:	92.7%	91.7%	96.6%	95.7%
(3) Adjustment coefficients for	kW cost:	1.141	1.262	1.077	
	kWh cost:	1.032	1.043	0.990	

Table 9.5 Long-run Marginal Cost (LRMC) for Generation, Transmission and Distribution
(Base Case computation in the Power Development Master Plan Phase V)

	Current cost as of 2010					Current cost as of 2020				
Voltage level	Total real cost	Capital recovery	Total	Capital recovery + operating cost	Total	Total real cost	Capital recovery	Total	Capital recovery + operating cost	Total
1) Generation up to bus bar	6,927	2,962	2,962	5,166	5,166	12,598	6,024	6,024	10,007	10,007
2) To main bar of 500 kV	1,155	214	3,176	263	5,429	3,403	550	6,574	674	10,681
3) To main bar of 220 kV	2,175	514	3,690	631	6,060	5,678	1,104	7,678	1,355	12,036
4) To main bar of 110 kV	2,110	557	4,247	684	6,744	5,561	1,146	8,824	1,406	13,442
5) To medium voltage	3,048	722	4,969	886	7,630	7,777	1,539	10,363	1,888	15,330
6) To low voltage	656	157	5,126	192	7,822	1,738	336	10,699	412	15,742
Total	16,071	5,126		7,822		36,755	10,699		15,742	

	Marginal cost as of 2010						Marginal cost as of 2020					
LRMC by voltage	Capacity MW	Generation GWh	Losses GWh	Energy Sales GWh	Marginal cost C/kWh	Average basic cost	Capacity MW	Generation GWh	Losses GWh	Energy Sales GWh	Marginal cost C/kWh	Average basic cost
1) Generation up to bus bar	18,978	119,879	4,051	0	4.460	272.2	40,746	256,539	9,085	0	4.044	245.6
2) To main bar of 500,200 k	18,978	115,828	1,003	0	5.274	319.1	40,746	247,455	1,885	0	4.900	295.3
3) To main bar of 110 kV	18,814	114,825	669	12,640	5.900	358.0	40,436	245,570	1,257	27,327	5.499	332.2
4) To medium voltage	16,633	101,518	2,340	59,511	6.932	413.3	35,729	216,986	4,399	128,664	6.500	386.8
5) To low voltage	6,498	39,665	6,487	33,179	8.873	453.0	13,818	83,924	12,191	71,733	8.189	425.1
Total		491,715	14,550	105,330	7.426	419		1,050,474	28,817	227,724	6.913	392

Source: Institute of Energy, EVN
Note: With discount rate of 10%.

Table 9.6 Computation of Economic Internal Rate of Return (EIRR)

(Unit: US$ million)

No.	Year	Capital costs F.C.	Capital costs L.C.	Capital costs Total	O & M costs	Total costs	Economic benefits Case A Dong Nai	Case A Tri An	Case B Dong Nai	Case B Tri An	Total benefits Case A: Alt.Therm.	Total benefits Case B: LRMC	B - C Case A: Alt.Therm.	B - C Case B: LRMC
1	2001	5.1	2.3	7.4		7.4					0.0	0.0	(7.4)	(7.4)
2	2002	6.4	9.2	15.6		15.6					0.0	0.0	(15.6)	(15.6)
3	2003	16.8	22.0	38.8		38.8					0.0	0.0	(38.8)	(38.8)
4	2004	38.3	34.7	73.0		73.0					0.0	0.0	(73.0)	(73.0)
5	2005	68.7	50.5	119.2		119.2					0.0	0.0	(119.2)	(119.2)
6	2006	119.1	59.8	178.9		178.9					0.0	0.0	(178.9)	(178.9)
7	2007	112.5	56.3	168.8		168.8					0.0	0.0	(168.8)	(168.8)
8	2008	27.3	14.2	41.5	2.6	44.1	49.5	1.9	50.3	5.9	51.4	56.2	7.3	12.1
9	2009	3.3	0.4	3.7	5.6	9.3	106.0	1.9	106.5	5.9	107.9	112.4	98.6	103.1
10	2010				6.2	6.2	116.6	1.9	117.1	5.9	118.5	123.0	112.3	116.8
11	2011				6.2	6.2	116.6	1.9	117.1	5.9	118.5	123.0	112.3	116.8
12	2012				6.2	6.2	116.6	1.9	117.1	5.9	118.5	123.0	112.3	116.8
13	2013				6.2	6.2	116.6	1.9	117.1	5.9	118.5	123.0	112.3	116.8
14	2014				6.2	6.2	116.6	1.9	117.1	5.9	118.5	123.0	112.3	116.8
15	2015				6.2	6.2	116.6	1.9	117.1	5.9	118.5	123.0	112.3	116.8
16	2016				6.2	6.2	116.6	1.9	117.1	5.9	118.5	123.0	112.3	116.8
17	2017				6.2	6.2	116.6	1.9	117.1	5.9	118.5	123.0	112.3	116.8
18	2018				6.2	6.2	116.6	1.9	117.1	5.9	118.5	123.0	112.3	116.8
19	2019				6.2	6.2	116.6	1.9	117.1	5.9	118.5	123.0	112.3	116.8
20	2020				6.2	6.2	116.6	1.9	117.1	5.9	118.5	123.0	112.3	116.8
21	2021				6.2	6.2	116.6	1.9	117.1	5.9	118.5	123.0	112.3	116.8
22	2022				6.2	6.2	116.6	1.9	117.1	5.9	118.5	123.0	112.3	116.8
23	2023				6.2	6.2	116.6	1.9	117.1	5.9	118.5	123.0	112.3	116.8
24	2024				6.2	6.2	116.6	1.9	117.1	5.9	118.5	123.0	112.3	116.8
25	2025				6.2	6.2	116.6	1.9	117.1	5.9	118.5	123.0	112.3	116.8
26	2026				6.2	6.2	116.6	1.9	117.1	5.9	118.5	123.0	112.3	116.8
27	2027				6.2	6.2	116.6	1.9	117.1	5.9	118.5	123.0	112.3	116.8
28	2028				6.2	6.2	116.6	1.9	117.1	5.9	118.5	123.0	112.3	116.8
29	2029			178.5	6.2	184.7	116.6	1.9	117.1	5.9	118.5	123.0	(66.2)	(61.7)
30	2030				6.2	6.2	116.6	1.9	117.1	5.9	118.5	123.0	112.3	116.8
31	2031				6.2	6.2	116.6	1.9	117.1	5.9	118.5	123.0	112.3	116.8
32	2032				6.2	6.2	116.6	1.9	117.1	5.9	118.5	123.0	112.3	116.8
33	2033				6.2	6.2	116.6	1.9	117.1	5.9	118.5	123.0	112.3	116.8
34	2034				6.2	6.2	116.6	1.9	117.1	5.9	118.5	123.0	112.3	116.8
35	2035				6.2	6.2	116.6	1.9	117.1	5.9	118.5	123.0	112.3	116.8
36	2036				6.2	6.2	116.6	1.9	117.1	5.9	118.5	123.0	112.3	116.8
37	2037				6.2	6.2	116.6	1.9	117.1	5.9	118.5	123.0	112.3	116.8
38	2038				6.2	6.2	116.6	1.9	117.1	5.9	118.5	123.0	112.3	116.8
39	2039				6.2	6.2	116.6	1.9	117.1	5.9	118.5	123.0	112.3	116.8
40	2040				6.2	6.2	116.6	1.9	117.1	5.9	118.5	123.0	112.3	116.8
41	2041				6.2	6.2	116.6	1.9	117.1	5.9	118.5	123.0	112.3	116.8
42	2042				6.2	6.2	116.6	1.9	117.1	5.9	118.5	123.0	112.3	116.8
43	2043				6.2	6.2	116.6	1.9	117.1	5.9	118.5	123.0	112.3	116.8
44	2044				6.2	6.2	116.6	1.9	117.1	5.9	118.5	123.0	112.3	116.8
45	2045				6.2	6.2	116.6	1.9	117.1	5.9	118.5	123.0	112.3	116.8
46	2046				6.2	6.2	116.6	1.9	117.1	5.9	118.5	123.0	112.3	116.8
47	2047				6.2	6.2	116.6	1.9	117.1	5.9	118.5	123.0	112.3	116.8
48	2048			178.5	6.2	184.7	116.6	1.9	117.1	5.9	118.5	123.0	(66.2)	(61.7)
49	2049				6.2	6.2	116.6	1.9	117.1	5.9	118.5	123.0	112.3	116.8
50	2050				6.2	6.2	116.6	1.9	117.1	5.9	118.5	123.0	112.3	116.8
51	2051				6.2	6.2	116.6	1.9	117.1	5.9	118.5	123.0	112.3	116.8
52	2052				6.2	6.2	116.6	1.9	117.1	5.9	118.5	123.0	112.3	116.8
53	2053				6.2	6.2	116.6	1.9	117.1	5.9	118.5	123.0	112.3	116.8
54	2054				6.2	6.2	116.6	1.9	117.1	5.9	118.5	123.0	112.3	116.8
55	2055				6.2	6.2	116.6	1.9	117.1	5.9	118.5	123.0	112.3	116.8
56	2056				6.2	6.2	116.6	1.9	117.1	5.9	118.5	123.0	112.3	116.8
57	2057				6.2	6.2	116.6	1.9	117.1	5.9	118.5	123.0	112.3	116.8
58	2058			(124.3)	6.2	(118.1)	116.6	1.9	117.1	5.9	118.5	123.0	236.6	241.1
												EIRR =	13.1%	13.5%

Note: 1) Abbreviations:
F.C.: Foreign currency portion
L.C.: Local currency portion
O & M: Operation and maintenance costs
Alt.Therm.: Alternative thermal

Table 9.7 Calculation of Economic Benefits

Power station	Dong Nai No.3	Dong Nai No.4	Dong Nai Total	Tri An	Dong Nai + Tri An
(1) Case A (Alternative thermal)					
1) Capacity and annual generation					
90% peak power (MW)	218	256	474	2	476
Total energy					
2008 (GWh/year)	677	0	677	80	757
2009 (GWh/year)	736	698	1434	80	1514
2010 (GWh/year)	736	841	1577	80	1657
2) Unit value of alternative thermal					
Capacity value (US$/kW)	182.3	182.3	182.3	182.3	
Energy value (Usc/kWh)	1.916	1.916	1.916	1.916	
3) Assumption on commissioning					
2008 (%)	92		-	100	
2009 (%)	100	83	-	100	
2010 (%)	100	100	-	100	
4) Annual economic benefit (US$ million)					
2008 Capacity value	36.6		36.6	0.4	36.9
Total energy	13.0		13.0	1.5	14.5
Total benefit	**49.5**		**49.5**	**1.9**	**51.4**
2009 Capacity value	39.7	38.7	78.5	0.4	78.8
Total energy	14.1	13.4	27.5	1.5	29.0
Total benefit	**53.8**	**52.1**	106.0	**1.9**	**107.9**
2010 Capacity value	39.7	46.7	86.4	0.4	86.8
Total energy	14.1	16.1	30.2	1.5	31.8
Total benefit	**53.8**	**62.8**	**116.6**	**1.9**	**118.5**
(2) Case B (LRMC)					
1) LRMC (USc/kWh)	7.426	7.426	7.426	7.426	
2) Annual economic benefit (US$ million)					
2008 Total benefit	50.3		**50.3**	**5.9**	**56.2**
2009 Total benefit	54.7	51.8	106.5	**5.9**	**112.4**
2010 Total benefit	54.7	62.5	**117.1**	**5.9**	**123.0**

Note:
1) Commissioning was assumed as shown 3) above.

Table 9.8 Computation of FIRR (1/2)

(Case of USc 4.5 /kWh)

(Unit: US$ million)

No.	Year	Capital costs F.C.	Capital costs L.C.	Capital costs Total	O&M costs	Total costs	Saleable energy (GWh)	Power rate (USc/kWh)	Financial revenue	Resources tax & VAT	Current surplus	B - C
1	2001	5.2	2.7	7.9		7.9						(7.9)
2	2002	6.6	11.8	18.4		18.4						(18.4)
3	2003	17.4	26.8	44.2		44.2						(44.2)
4	2004	40.1	42.4	82.5		82.5						(82.5)
5	2005	72.6	62.3	134.9		134.9						(134.9)
6	2006	124.6	75.7	200.3		200.3						(200.3)
7	2007	119.2	70.0	189.2		189.2						(189.2)
8	2008	28.2	17.4	45.6	2.5	48.1	757	4.5	34.1	4.1	30.0	(18.2)
9	2009	3.6	0.6	4.2	5.4	9.6	1,514	4.5	68.1	8.2	60.0	50.3
10	2010				6.0	6.0	1,657	4.5	74.6	8.9	65.6	59.6
11	2011				6.0	6.0	1,657	4.5	74.6	8.9	65.6	59.6
12	2012				6.0	6.0	1,657	4.5	74.6	8.9	65.6	59.6
13	2013				6.0	6.0	1,657	4.5	74.6	8.9	65.6	59.6
14	2014				6.0	6.0	1,657	4.5	74.6	8.9	65.6	59.6
15	2015				6.0	6.0	1,657	4.5	74.6	8.9	65.6	59.6
16	2016				6.0	6.0	1,657	4.5	74.6	8.9	65.6	59.6
17	2017				6.0	6.0	1,657	4.5	74.6	8.9	65.6	59.6
18	2018				6.0	6.0	1,657	4.5	74.6	8.9	65.6	59.6
19	2019				6.0	6.0	1,657	4.5	74.6	8.9	65.6	59.6
20	2020				6.0	6.0	1,657	4.5	74.6	8.9	65.6	59.6
21	2021				6.0	6.0	1,657	4.5	74.6	8.9	65.6	59.6
22	2022				6.0	6.0	1,657	4.5	74.6	8.9	65.6	59.6
23	2023				6.0	6.0	1,657	4.5	74.6	8.9	65.6	59.6
24	2024				6.0	6.0	1,657	4.5	74.6	8.9	65.6	59.6
25	2025				6.0	6.0	1,657	4.5	74.6	8.9	65.6	59.6
26	2026				6.0	6.0	1,657	4.5	74.6	8.9	65.6	59.6
27	2027				6.0	6.0	1,657	4.5	74.6	8.9	65.6	59.6
28	2028				6.0	6.0	1,657	4.5	74.6	8.9	65.6	59.6
29	2029			169.8	6.0	175.8	1,657	4.5	74.6	8.9	65.6	(110.2)
30	2030				6.0	6.0	1,657	4.5	74.6	8.9	65.6	59.6
31	2031				6.0	6.0	1,657	4.5	74.6	8.9	65.6	59.6
32	2032				6.0	6.0	1,657	4.5	74.6	8.9	65.6	59.6
33	2033				6.0	6.0	1,657	4.5	74.6	8.9	65.6	59.6
34	2034				6.0	6.0	1,657	4.5	74.6	8.9	65.6	59.6
35	2035				6.0	6.0	1,657	4.5	74.6	8.9	65.6	59.6
36	2036				6.0	6.0	1,657	4.5	74.6	8.9	65.6	59.6
37	2037				6.0	6.0	1,657	4.5	74.6	8.9	65.6	59.6
38	2038				6.0	6.0	1,657	4.5	74.6	8.9	65.6	59.6
39	2039				6.0	6.0	1,657	4.5	74.6	8.9	65.6	59.6
40	2040				6.0	6.0	1,657	4.5	74.6	8.9	65.6	59.6
41	2041				6.0	6.0	1,657	4.5	74.6	8.9	65.6	59.6
42	2042				6.0	6.0	1,657	4.5	74.6	8.9	65.6	59.6
43	2043				6.0	6.0	1,657	4.5	74.6	8.9	65.6	59.6
44	2044				6.0	6.0	1,657	4.5	74.6	8.9	65.6	59.6
45	2045				6.0	6.0	1,657	4.5	74.6	8.9	65.6	59.6
46	2046				6.0	6.0	1,657	4.5	74.6	8.9	65.6	59.6
47	2047				6.0	6.0	1,657	4.5	74.6	8.9	65.6	59.6
48	2048			169.8	6.0	175.8	1,657	4.5	74.6	8.9	65.6	(110.2)
49	2049				6.0	6.0	1,657	4.5	74.6	8.9	65.6	59.6
50	2050				6.0	6.0	1,657	4.5	74.6	8.9	65.6	59.6
51	2051				6.0	6.0	1,657	4.5	74.6	8.9	65.6	59.6
52	2052				6.0	6.0	1,657	4.5	74.6	8.9	65.6	59.6
53	2053				6.0	6.0	1,657	4.5	74.6	8.9	65.6	59.6
54	2054				6.0	6.0	1,657	4.5	74.6	8.9	65.6	59.6
55	2055				6.0	6.0	1,657	4.5	74.6	8.9	65.6	59.6
56	2056				6.0	6.0	1,657	4.5	74.6	8.9	65.6	59.6
57	2057				6.0	6.0	1,657	4.5	74.6	8.9	65.6	59.6
58	2058			(120.8)	6.0	(114.8)	1,657	4.5	74.6	8.9	65.6	180.4
									FIRR=			6.5%

Note: 1) Abbreviations:

F.C.: Foreign currency portion

L.C.: Local currency portion

2) Project construction cost excluding Transmission Line cost:

	F.C.	L.C.	Total
Civil	176.9	182.4	359.3
Metal	150.6	19.2	169.8
Others	90.0	108.1	198.1
Total	417.5	309.7	727.2

Table 9.8 Computation of FIRR (2/2)

(Case of USc 5.0 /kWh)

(Unit: US$ million)

No.	Year	Capital costs F.C.	Capital costs L.C.	Capital costs Total	O&M costs	Total costs	Saleable energy (GWh)	Power rate (USc/kWh)	Financial revenue	Resources tax & VAT	Current surplus	B - C
1	2001	5.2	2.7	7.9		7.9						(7.9)
2	2002	6.6	11.8	18.4		18.4						(18.4)
3	2003	17.4	26.8	44.2		44.2						(44.2)
4	2004	40.1	42.4	82.5		82.5						(82.5)
5	2005	72.6	62.3	134.9		134.9						(134.9)
6	2006	124.6	75.7	200.3		200.3						(200.3)
7	2007	119.2	70.0	189.2		189.2						(189.2)
8	2008	28.2	17.4	45.6	2.5	48.1	757	5.0	37.9	4.5	33.3	(14.8)
9	2009	3.6	0.6	4.2	5.4	9.6	1,514	5.0	75.7	9.1	66.6	57.0
10	2010				6.0	6.0	1,657	5.0	82.9	9.9	72.9	66.9
11	2011				6.0	6.0	1,657	5.0	82.9	9.9	72.9	66.9
12	2012				6.0	6.0	1,657	5.0	82.9	9.9	72.9	66.9
13	2013				6.0	6.0	1,657	5.0	82.9	9.9	72.9	66.9
14	2014				6.0	6.0	1,657	5.0	82.9	9.9	72.9	66.9
15	2015				6.0	6.0	1,657	5.0	82.9	9.9	72.9	66.9
16	2016				6.0	6.0	1,657	5.0	82.9	9.9	72.9	66.9
17	2017				6.0	6.0	1,657	5.0	82.9	9.9	72.9	66.9
18	2018				6.0	6.0	1,657	5.0	82.9	9.9	72.9	66.9
19	2019				6.0	6.0	1,657	5.0	82.9	9.9	72.9	66.9
20	2020				6.0	6.0	1,657	5.0	82.9	9.9	72.9	66.9
21	2021				6.0	6.0	1,657	5.0	82.9	9.9	72.9	66.9
22	2022				6.0	6.0	1,657	5.0	82.9	9.9	72.9	66.9
23	2023				6.0	6.0	1,657	5.0	82.9	9.9	72.9	66.9
24	2024				6.0	6.0	1,657	5.0	82.9	9.9	72.9	66.9
25	2025				6.0	6.0	1,657	5.0	82.9	9.9	72.9	66.9
26	2026				6.0	6.0	1,657	5.0	82.9	9.9	72.9	66.9
27	2027				6.0	6.0	1,657	5.0	82.9	9.9	72.9	66.9
28	2028				6.0	6.0	1,657	5.0	82.9	9.9	72.9	66.9
29	2029			169.8	6.0	175.8	1,657	5.0	82.9	9.9	72.9	(102.9)
30	2030				6.0	6.0	1,657	5.0	82.9	9.9	72.9	66.9
31	2031				6.0	6.0	1,657	5.0	82.9	9.9	72.9	66.9
32	2032				6.0	6.0	1,657	5.0	82.9	9.9	72.9	66.9
33	2033				6.0	6.0	1,657	5.0	82.9	9.9	72.9	66.9
34	2034				6.0	6.0	1,657	5.0	82.9	9.9	72.9	66.9
35	2035				6.0	6.0	1,657	5.0	82.9	9.9	72.9	66.9
36	2036				6.0	6.0	1,657	5.0	82.9	9.9	72.9	66.9
37	2037				6.0	6.0	1,657	5.0	82.9	9.9	72.9	66.9
38	2038				6.0	6.0	1,657	5.0	82.9	9.9	72.9	66.9
39	2039				6.0	6.0	1,657	5.0	82.9	9.9	72.9	66.9
40	2040				6.0	6.0	1,657	5.0	82.9	9.9	72.9	66.9
41	2041				6.0	6.0	1,657	5.0	82.9	9.9	72.9	66.9
42	2042				6.0	6.0	1,657	5.0	82.9	9.9	72.9	66.9
43	2043				6.0	6.0	1,657	5.0	82.9	9.9	72.9	66.9
44	2044				6.0	6.0	1,657	5.0	82.9	9.9	72.9	66.9
45	2045				6.0	6.0	1,657	5.0	82.9	9.9	72.9	66.9
46	2046				6.0	6.0	1,657	5.0	82.9	9.9	72.9	66.9
47	2047				6.0	6.0	1,657	5.0	82.9	9.9	72.9	66.9
48	2048			169.8	6.0	175.8	1,657	5.0	82.9	9.9	72.9	(102.9)
49	2049				6.0	6.0	1,657	5.0	82.9	9.9	72.9	66.9
50	2050				6.0	6.0	1,657	5.0	82.9	9.9	72.9	66.9
51	2051				6.0	6.0	1,657	5.0	82.9	9.9	72.9	66.9
52	2052				6.0	6.0	1,657	5.0	82.9	9.9	72.9	66.9
53	2053				6.0	6.0	1,657	5.0	82.9	9.9	72.9	66.9
54	2054				6.0	6.0	1,657	5.0	82.9	9.9	72.9	66.9
55	2055				6.0	6.0	1,657	5.0	82.9	9.9	72.9	66.9
56	2056				6.0	6.0	1,657	5.0	82.9	9.9	72.9	66.9
57	2057				6.0	6.0	1,657	5.0	82.9	9.9	72.9	66.9
58	2058			(120.8)	6.0	(114.8)	1,657	5.0	82.9	9.9	72.9	187.7
									FIRR=			7.4%

Note: 1) Abbreviations:
F.C.: Foreign currency portion
L.C.: Local currency portion
2) Project construction cost excluding Transmission Line cost:

	F.C.	L.C.	Total
Civil	176.9	182.4	359.3
Metal	150.6	19.2	169.8
Others	90.0	108.1	198.1
Total	417.5	309.7	727.2

Table 9.9 Examination of Repayability of Project Loans (Case 1-1)

Tariff rate=USc4.5/kWh;FC:LC=85%:15%; FC=3.5% p.a. (US$ million)

No.	Year	Power sales revenue	Loans received: Foreign (85%)	Loans received: Domestic (15%)	Total sources	Capital costs: F.C.	Capital costs: L.C.	Capital costs: Total	O & M costs	Outstanding loan principal	Repayment of principal	Interest payment: Foreign (3.5%)	Interest payment: Domestic (13.0%)	Resources tax & VAT	Total uses	Current surplus	Corporate tax payment	Surplus after tax	Cumulative surplus	Year
1	2001		6.7	1.2	7.9	5.2	2.7	7.9		7.9				0.0	7.9	0.0	0.0	0.0	0.0	2001
2	2002		15.6	2.8	18.4	6.6	11.8	18.4		26.3				0.0	18.4	0.0	0.0	0.0	0.0	2002
3	2003		37.6	6.6	44.2	17.4	26.8	44.2		70.5				0.0	44.2	0.0	0.0	0.0	0.0	2003
4	2004		70.1	12.4	82.5	40.1	42.4	82.5		153.0				0.0	82.5	0.0	0.0	0.0	0.0	2004
5	2005		114.7	20.2	134.9	72.6	62.3	134.9		287.9				0.0	134.9	0.0	0.0	0.0	0.0	2005
6	2006		170.3	30.0	200.3	124.6	75.7	200.3		488.2				0.0	200.3	0.0	0.0	0.0	0.0	2006
7	2007		160.8	28.4	189.2	119.2	70.0	189.2		677.4				0.0	189.2	0.0	0.0	0.0	0.0	2007
8	2008	34.1	38.8	6.8	79.7	28.2	17.4	45.6	2.5	723.0				4.1	52.2	27.4	6.9	20.6	20.6	2008
9	2009	68.1	3.6	0.6	72.3	3.6	0.6	4.2	5.4	727.2				8.2	17.8	54.5	13.6	40.9	61.5	2009
10	2010	74.6			74.6				6.0	695.7	31.5	21.7	14.9	8.9	83.1	(8.5)	0.0	(8.5)	53.0	2010
11	2011	74.6			74.6				6.0	664.2	31.5	20.2	11.3	8.9	78.0	(3.5)	0.0	(3.5)	49.5	2011
12	2012	74.6			74.6				6.0	632.7	31.5	19.5	9.9	8.9	75.9	(1.3)	0.0	(1.3)	48.1	2012
13	2013	74.6			74.6				6.0	601.2	31.5	18.7	8.5	8.9	73.8	0.8	0.2	0.6	48.7	2013
14	2014	74.6			74.6				6.0	569.6	31.5	18.0	7.1	8.9	71.6	2.9	0.7	2.2	51.0	2014
15	2015	74.6			74.6				6.0	538.1	31.5	17.3	5.7	8.9	69.5	5.1	1.3	3.8	54.8	2015
16	2016	74.6			74.6				6.0	506.6	31.5	16.6	4.3	8.9	67.3	7.2	1.8	5.4	60.2	2016
17	2017	74.6			74.6				6.0	475.1	31.5	15.9	2.8	8.9	65.2	9.4	2.3	7.0	67.2	2017
18	2018	74.6			74.6				6.0	443.6	31.5	15.1	1.4	8.9	63.1	11.5	2.9	8.6	75.8	2018
19	2019	74.6			74.6				6.0	412.1	31.5	14.4	0.0	8.9	60.9	13.6	3.4	10.2	86.1	2019
20	2020	74.6			74.6				6.0	391.5	20.6	13.7	0.0	8.9	49.3	25.3	6.3	19.0	105.0	2020
21	2021	74.6			74.6				6.0	370.9	20.6	13.0	0.0	8.9	48.6	26.0	6.5	19.5	124.5	2021
22	2022	74.6			74.6				6.0	350.3	20.6	12.3	0.0	8.9	47.9	26.7	6.7	20.0	144.5	2022
23	2023	74.6			74.6				6.0	329.7	20.6	11.5	0.0	8.9	47.1	27.4	6.9	20.6	165.1	2023
24	2024	74.6			74.6				6.0	309.1	20.6	10.8	0.0	8.9	46.4	28.2	7.0	21.1	186.2	2024
25	2025	74.6			74.6				6.0	288.5	20.6	10.1	0.0	8.9	45.7	28.9	7.2	21.7	207.9	2025
26	2026	74.6			74.6				6.0	267.9	20.6	9.4	0.0	8.9	45.0	29.6	7.4	22.2	230.1	2026
27	2027	74.6			74.6				6.0	247.2	20.6	8.7	0.0	8.9	44.2	30.3	7.6	22.7	252.8	2027
28	2028	74.6			74.6				6.0	226.6	20.6	7.9	0.0	8.9	43.5	31.0	7.8	23.3	276.1	2028
29	2029	74.6			74.6			169.8	6.0	206.0	20.6	7.2	0.0	8.9	212.6	(138.0)	0.0	(138.0)	138.1	2029
30	2030	74.6			74.6				6.0	185.4	20.6	6.5	0.0	8.9	42.1	32.5	8.1	24.4	162.4	2030
31	2031	74.6			74.6				6.0	164.8	20.6	5.8	0.0	8.9	41.4	33.2	8.3	24.9	187.3	2031
32	2032	74.6			74.6				6.0	144.2	20.6	5.0	0.0	8.9	40.6	33.9	8.5	25.4	212.8	2032
33	2033	74.6			74.6				6.0	123.6	20.6	4.3	0.0	8.9	39.9	34.6	8.7	26.0	238.8	2033
34	2034	74.6			74.6				6.0	103.0	20.6	3.6	0.0	8.9	39.2	35.4	8.8	26.5	265.3	2034
35	2035	74.6			74.6				6.0	82.4	20.6	2.9	0.0	8.9	38.5	36.1	9.0	27.1	292.4	2035
36	2036	74.6			74.6				6.0	61.8	20.6	2.2	0.0	8.9	37.8	36.8	9.2	27.6	320.0	2036
37	2037	74.6			74.6				6.0	41.2	20.6	1.4	0.0	8.9	37.0	37.5	9.4	28.1	348.1	2037
38	2038	74.6			74.6				6.0	20.6	20.6	0.7	0.0	8.9	36.3	38.3	9.6	28.7	376.8	2038
39	2039	74.6			74.6				6.0	0.0	20.6	0.0	0.0	8.9	35.6	39.0	9.7	29.2	406.0	2039
40	2040	74.6			74.6				6.0	0.0	0.0	0.0	0.0	8.9	15.0	59.6	14.9	44.7	450.7	2040

Note: 1) Abbreviations:
F.C.: Foreign currency portion
L.C.: Local currency portion
2) Project construction cost:

	F.C.	L.C.	Total
Civil	176.9	182.4	359.3
Metal	150.6	19.2	169.8
Others	90.0	108.1	198.1
Total	417.5	309.7	727.2

Table 9.9 Examination of Repayability of Project Loans (Case 1-2)

Tariff rate=USc4.5/kWh;FC:LC=85%:15%; FC=3.5% p.a. (US$ million)

No.	Year	Power sales revenue	Loans received: Foreign (85%)	Loans received: Domestic (15%)	Total sources	Capital costs: F.C.	Capital costs: L.C.	Capital costs: Total	O & M costs	Outstanding loan principal	Repayment of principal	Interest payment: Foreign (5.0%)	Interest payment: Domestic (13.0%)	Resources tax & VAT	Total uses	Current surplus	Corporate tax payment	Surplus after tax	Cumulative surplus	Year
1	2001		6.7	1.2	7.9	5.2	2.7	7.9		7.9				0.0	7.9	0.0	0.0	0.0	0.0	2001
2	2002		15.6	2.8	18.4	6.6	11.8	18.4		26.3				0.0	18.4	0.0	0.0	0.0	0.0	2002
3	2003		37.6	6.6	44.2	17.4	26.8	44.2		70.5				0.0	44.2	0.0	0.0	0.0	0.0	2003
4	2004		70.1	12.4	82.5	40.1	42.4	82.5		153.0				0.0	82.5	0.0	0.0	0.0	0.0	2004
5	2005		114.7	20.2	134.9	72.6	62.3	134.9		287.9				0.0	134.9	0.0	0.0	0.0	0.0	2005
6	2006		170.3	30.0	200.3	124.6	75.7	200.3		488.2				0.0	200.3	0.0	0.0	0.0	0.0	2006
7	2007		160.8	28.4	189.2	119.2	70.0	189.2		677.4				0.0	189.2	0.0	0.0	0.0	0.0	2007
8	2008	34.1	38.8	6.8	79.7	28.2	17.4	45.6	2.5	723.0				4.1	52.2	27.4	6.9	20.6	20.6	2008
9	2009	68.1	3.6	0.6	72.3	3.6	0.6	4.2	5.4	727.2				8.2	17.8	54.5	13.6	40.9	61.5	2009
10	2010	74.6			74.6				6.0	695.7	31.5	31.5	14.9	8.9	92.9	(18.3)	0.0	(18.3)	43.1	2010
11	2011	74.6			74.6				6.0	664.2	31.5	28.8	11.3	8.9	86.7	(12.1)	0.0	(12.1)	31.0	2011
12	2012	74.6			74.6				6.0	632.7	31.5	27.8	9.9	8.9	84.2	(9.7)	0.0	(9.7)	21.3	2012
13	2013	74.6			74.6				6.0	601.2	31.5	26.8	8.5	8.9	81.8	(7.2)	0.0	(7.2)	14.1	2013
14	2014	74.6			74.6				6.0	569.6	31.5	25.8	7.1	8.9	79.3	(4.8)	0.0	(4.8)	9.3	2014
15	2015	74.6			74.6				6.0	538.1	31.5	24.7	5.7	8.9	76.9	(2.3)	0.0	(2.3)	7.0	2015
16	2016	74.6			74.6				6.0	506.6	31.5	23.7	4.3	8.9	74.5	0.1	0.0	0.1	7.1	2016
17	2017	74.6			74.6				6.0	475.1	31.5	22.7	2.8	8.9	72.0	2.6	0.6	1.9	9.0	2017
18	2018	74.6			74.6				6.0	443.6	31.5	21.6	1.4	8.9	69.6	5.0	1.3	3.8	12.8	2018
19	2019	74.6			74.6				6.0	412.1	31.5	20.6	0.0	8.9	67.1	7.5	1.9	5.6	18.4	2019
20	2020	74.6			74.6				6.0	391.5	20.6	19.6	0.0	8.9	55.2	19.4	4.8	14.5	32.9	2020
21	2021	74.6			74.6				6.0	370.9	20.6	18.5	0.0	8.9	54.1	20.4	5.1	15.3	48.2	2021
22	2022	74.6			74.6				6.0	350.3	20.6	17.5	0.0	8.9	53.1	21.5	5.4	16.1	64.3	2022
23	2023	74.6			74.6				6.0	329.7	20.6	16.5	0.0	8.9	52.1	22.5	5.6	16.9	81.2	2023
24	2024	74.6			74.6				6.0	309.1	20.6	15.5	0.0	8.9	51.0	23.5	5.9	17.6	98.8	2024
25	2025	74.6			74.6				6.0	288.5	20.6	14.4	0.0	8.9	50.0	24.5	6.1	18.4	117.2	2025
26	2026	74.6			74.6				6.0	267.9	20.6	13.4	0.0	8.9	49.0	25.6	6.4	19.2	136.4	2026
27	2027	74.6			74.6				6.0	247.2	20.6	12.4	0.0	8.9	48.0	26.6	6.7	20.0	156.4	2027
28	2028	74.6			74.6				6.0	226.6	20.6	11.3	0.0	8.9	46.9	27.6	6.9	20.7	177.1	2028
29	2029	74.6			74.6			169.8	6.0	206.0	20.6	10.3	0.0	8.9	215.7	(141.1)	0.0	(141.1)	36.0	2029
30	2030	74.6			74.6				6.0	185.4	20.6	9.3	0.0	8.9	44.9	29.7	7.4	22.3	58.3	2030
31	2031	74.6			74.6				6.0	164.8	20.6	8.2	0.0	8.9	43.8	30.7	7.7	23.0	81.3	2031
32	2032	74.6			74.6				6.0	144.2	20.6	7.2	0.0	8.9	42.8	31.8	7.9	23.8	105.1	2032
33	2033	74.6			74.6				6.0	123.6	20.6	6.2	0.0	8.9	41.8	32.8	8.2	24.6	129.7	2033
34	2034	74.6			74.6				6.0	103.0	20.6	5.2	0.0	8.9	40.7	33.8	8.5	25.4	155.1	2034
35	2035	74.6			74.6				6.0	82.4	20.6	4.1	0.0	8.9	39.7	34.9	8.7	26.1	181.2	2035
36	2036	74.6			74.6				6.0	61.8	20.6	3.1	0.0	8.9	38.7	35.9	9.0	26.9	208.1	2036
37	2037	74.6			74.6				6.0	41.2	20.6	2.1	0.0	8.9	37.7	36.9	9.2	27.7	235.8	2037
38	2038	74.6			74.6				6.0	20.6	20.6	1.0	0.0	8.9	36.6	37.9	9.5	28.5	264.3	2038
39	2039	74.6			74.6				6.0	0.0	20.6	0.0	0.0	8.9	35.6	39.0	9.7	29.2	293.5	2039
40	2040	74.6			74.6				6.0	0.0	0.0	0.0	0.0	8.9	15.0	59.6	14.9	44.7	338.2	2040

Note: 1) Abbreviations:
F.C.: Foreign currency portion
L.C.: Local currency portion
2) Project construction cost:

	F.C.	L.C.	Total
Civil	176.9	182.4	359.3
Metal	150.6	19.2	169.8
Others	90.0	108.1	198.1
Total	417.5	309.7	727.2

Table 9.9 Examination of Repayability of Project Loans (Case 1-3)

Tariff rate=USc4.5/kWh:FC:LC=85%:15%; FC=3.5% p.a. (US$ million)

No.	Year	Power sales revenue	Loans received: Foreign (85%)	Loans received: Domestic (15%)	Total sources	Capital costs: F.C.	Capital costs: L.C.	Capital costs: Total	O & M costs	Outstanding loan principal	Repayment of principal	Interest payment: Foreign (8.5%)	Interest payment: Domestic (13%)	Resources tax & VAT	Total uses	Current surplus	Corporate tax payment	Surplus after tax	Cumulative surplus	Year
1	2001		6.7	1.2	7.9	5.2	2.7	7.9		7.9				0.0	7.9	0.0	0.0	0.0	0.0	2001
2	2002		15.6	2.8	18.4	6.6	11.8	18.4		26.3				0.0	18.4	0.0	0.0	0.0	0.0	2002
3	2003		37.6	6.6	44.2	17.4	26.8	44.2		70.5				0.0	44.2	0.0	0.0	0.0	0.0	2003
4	2004		70.1	12.4	82.5	40.1	42.4	82.5		153.0				0.0	82.5	0.0	0.0	0.0	0.0	2004
5	2005		114.7	20.2	134.9	72.6	62.3	134.9		287.9				0.0	134.9	0.0	0.0	0.0	0.0	2005
6	2006		170.3	30.0	200.3	124.6	75.7	200.3		488.2				0.0	200.3	0.0	0.0	0.0	0.0	2006
7	2007		160.8	28.4	189.2	119.2	70.0	189.2		677.4				0.0	189.2	0.0	0.0	0.0	0.0	2007
8	2008	34.1	38.8	6.8	79.7	28.2	17.4	45.6	2.5	723.0				4.1	52.2	27.4	6.9	20.6	20.6	2008
9	2009	68.1	3.6	0.6	72.3	3.6	0.6	4.2	5.4	727.2				8.2	17.8	54.5	13.6	40.9	61.5	2009
10	2010	74.6			74.6				6.0	695.7	31.5	55.7	14.9	8.9	117.0	(42.5)	0.0	(42.5)	19.0	2010
11	2011	74.6			74.6				6.0	664.2	31.5	49.0	11.3	8.9	106.9	(32.3)	0.0	(32.3)	(13.3)	2011
12	2012	74.6			74.6				6.0	632.7	31.5	47.3	9.9	8.9	103.7	(29.1)	0.0	(29.1)	(42.5)	2012
13	2013	74.6			74.6				6.0	601.2	31.5	45.5	8.5	8.9	100.5	(26.0)	0.0	(26.0)	(68.5)	2013
14	2014	74.6			74.6				6.0	569.6	31.5	43.8	7.1	8.9	97.4	(22.8)	0.0	(22.8)	(91.3)	2014
15	2015	74.6			74.6				6.0	538.1	31.5	42.0	5.7	8.9	94.2	(19.6)	0.0	(19.6)	(110.9)	2015
16	2016	74.6			74.6				6.0	506.6	31.5	40.3	4.3	8.9	91.0	(16.5)	0.0	(16.5)	(127.4)	2016
17	2017	74.6			74.6				6.0	475.1	31.5	38.5	2.8	8.9	87.9	(13.3)	0.0	(13.3)	(140.7)	2017
18	2018	74.6			74.6				6.0	443.6	31.5	36.8	1.4	8.9	84.7	(10.1)	0.0	(10.1)	(150.8)	2018
19	2019	74.6			74.6				6.0	412.1	31.5	35.0	0.0	8.9	81.5	(7.0)	0.0	(7.0)	(157.8)	2019
20	2020	74.6			74.6				6.0	391.5	20.6	33.3	0.0	8.9	68.9	5.7	1.4	4.3	(153.5)	2020
21	2021	74.6			74.6				6.0	370.9	20.6	31.5	0.0	8.9	67.1	7.4	1.9	5.6	(147.9)	2021
22	2022	74.6			74.6				6.0	350.3	20.6	29.8	0.0	8.9	65.4	9.2	2.3	6.9	(141.0)	2022
23	2023	74.6			74.6				6.0	329.7	20.6	28.0	0.0	8.9	63.6	11.0	2.7	8.2	(132.8)	2023
24	2024	74.6			74.6				6.0	309.1	20.6	26.3	0.0	8.9	61.9	12.7	3.2	9.5	(123.3)	2024
25	2025	74.6			74.6				6.0	288.5	20.6	24.5	0.0	8.9	60.1	14.5	3.6	10.8	(112.4)	2025
26	2026	74.6			74.6				6.0	267.9	20.6	22.8	0.0	8.9	58.4	16.2	4.1	12.2	(100.3)	2026
27	2027	74.6			74.6				6.0	247.2	20.6	21.0	0.0	8.9	56.6	18.0	4.5	13.5	(86.8)	2027
28	2028	74.6			74.6				6.0	226.6	20.6	19.3	0.0	8.9	54.9	19.7	4.9	14.8	(72.0)	2028
29	2029	74.6			74.6			169.8	6.0	206.0	20.6	17.5	0.0	8.9	222.9	(148.3)	0.0	(148.3)	(220.4)	2029
30	2030	74.6			74.6				6.0	185.4	20.6	15.8	0.0	8.9	51.4	23.2	5.8	17.4	(203.0)	2030
31	2031	74.6			74.6				6.0	164.8	20.6	14.0	0.0	8.9	49.6	25.0	6.2	18.7	(184.3)	2031
32	2032	74.6			74.6				6.0	144.2	20.6	12.3	0.0	8.9	47.9	26.7	6.7	20.0	(164.2)	2032
33	2033	74.6			74.6				6.0	123.6	20.6	10.5	0.0	8.9	46.1	28.5	7.1	21.3	(142.9)	2033
34	2034	74.6			74.6				6.0	103.0	20.6	8.8	0.0	8.9	44.4	30.2	7.6	22.7	(120.2)	2034
35	2035	74.6			74.6				6.0	82.4	20.6	7.0	0.0	8.9	42.6	32.0	8.0	24.0	(96.2)	2035
36	2036	74.6			74.6				6.0	61.8	20.6	5.3	0.0	8.9	40.8	33.7	8.4	25.3	(71.0)	2036
37	2037	74.6			74.6				6.0	41.2	20.6	3.5	0.0	8.9	39.1	35.5	8.9	26.6	(44.4)	2037
38	2038	74.6			74.6				6.0	20.6	20.6	1.8	0.0	8.9	37.3	37.2	9.3	27.9	(16.4)	2038
39	2039	74.6			74.6				6.0	0.0	20.6	0.0	0.0	8.9	35.6	39.0	9.7	29.2	12.8	2039
40	2040	74.6			74.6				6.0	0.0	0.0	0.0	0.0	8.9	15.0	59.6	14.9	44.7	57.5	2040

Note: 1) Abbreviations:
F.C.: Foreign currency portion
L.C.: Local currency portion
2) Project construction cost:

	F.C.	L.C.	Total
Civil	176.9	182.4	359.3
Metal	150.6	19.2	169.8
Others	90.0	108.1	198.1
Total	417.5	309.7	727.2

Table 9.9 Examination of Repayability of Project Loans (Case 2-1)

Tariff rate=USc4.5/kWh;FC:LC=70%:30%; FC=3.5% p.a. (US$ million)

No.	Year	Power sales revenue	Loans received: Foreign (70%)	Loans received: Domestic (30%)	Total sources	Capital costs: F.C.	Capital costs: L.C.	Capital costs: Total	O & M costs	Outstanding loan principal	Repayment of principal	Interest payment: Foreign (3.5%)	Interest payment: Domestic (13.0%)	Resources tax & VAT	Total uses	Current surplus	Corporate tax payment	Surplus after tax	Cumulative surplus	Year
1	2001		5.5	2.4	7.9	5.2	2.7	7.9		7.9				0.0	7.9	0.0	0.0	0.0	0.0	2001
2	2002		12.9	5.5	18.4	6.6	11.8	18.4		26.3				0.0	18.4	0.0	0.0	0.0	0.0	2002
3	2003		30.9	13.3	44.2	17.4	26.8	44.2		70.5				0.0	44.2	0.0	0.0	0.0	0.0	2003
4	2004		57.8	24.8	82.5	40.1	42.4	82.5		153.0				0.0	82.5	0.0	0.0	0.0	0.0	2004
5	2005		94.4	40.5	134.9	72.6	62.3	134.9		287.9				0.0	134.9	0.0	0.0	0.0	0.0	2005
6	2006		140.2	60.1	200.3	124.6	75.7	200.3		488.2				0.0	200.3	0.0	0.0	0.0	0.0	2006
7	2007		132.4	56.8	189.2	119.2	70.0	189.2		677.4				0.0	189.2	0.0	0.0	0.0	0.0	2007
8	2008	34.1	31.9	13.7	79.7	28.2	17.4	45.6	2.5	723.0				4.1	52.2	27.4	6.9	20.6	20.6	2008
9	2009	68.1	2.9	1.3	72.3	3.6	0.6	4.2	5.4	727.2				8.2	17.8	54.5	13.6	40.9	61.5	2009
10	2010	74.6			74.6				6.0	688.4	38.8	17.9	29.8	8.9	101.4	(26.8)	0.0	(26.8)	34.6	2010
11	2011	74.6			74.6				6.0	649.6	38.8	16.6	22.7	8.9	93.1	(18.5)	0.0	(18.5)	16.1	2011
12	2012	74.6			74.6				6.0	610.8	38.8	16.0	19.9	8.9	89.7	(15.1)	0.0	(15.1)	1.0	2012
13	2013	74.6			74.6				6.0	572.1	38.8	15.4	17.0	8.9	86.2	(11.7)	0.0	(11.7)	(10.7)	2013
14	2014	74.6			74.6				6.0	533.3	38.8	14.8	14.2	8.9	82.8	(8.2)	0.0	(8.2)	(18.9)	2014
15	2015	74.6			74.6				6.0	494.5	38.8	14.3	11.3	8.9	79.4	(4.8)	0.0	(4.8)	(23.7)	2015
16	2016	74.6			74.6				6.0	455.7	38.8	13.7	8.5	8.9	75.9	(1.4)	0.0	(1.4)	(25.1)	2016
17	2017	74.6			74.6				6.0	416.9	38.8	13.1	5.7	8.9	72.5	2.1	0.5	1.5	(23.5)	2017
18	2018	74.6			74.6				6.0	378.1	38.8	12.5	2.8	8.9	69.1	5.5	1.4	4.1	(19.4)	2018
19	2019	74.6			74.6				6.0	339.4	38.8	11.9	0.0	8.9	65.7	8.9	2.2	6.7	(12.7)	2019
20	2020	74.6			74.6				6.0	322.4	17.0	11.3	0.0	8.9	43.2	31.3	7.8	23.5	10.8	2020
21	2021	74.6			74.6				6.0	305.4	17.0	10.7	0.0	8.9	42.6	31.9	8.0	23.9	34.7	2021
22	2022	74.6			74.6				6.0	288.5	17.0	10.1	0.0	8.9	42.1	32.5	8.1	24.4	59.1	2022
23	2023	74.6			74.6				6.0	271.5	17.0	9.5	0.0	8.9	41.5	33.1	8.3	24.8	83.9	2023
24	2024	74.6			74.6				6.0	254.5	17.0	8.9	0.0	8.9	40.9	33.7	8.4	25.3	109.2	2024
25	2025	74.6			74.6				6.0	237.6	17.0	8.3	0.0	8.9	40.3	34.3	8.6	25.7	134.9	2025
26	2026	74.6			74.6				6.0	220.6	17.0	7.7	0.0	8.9	39.7	34.9	8.7	26.2	161.1	2026
27	2027	74.6			74.6				6.0	203.6	17.0	7.1	0.0	8.9	39.1	35.5	8.9	26.6	187.7	2027
28	2028	74.6			74.6				6.0	186.6	17.0	6.5	0.0	8.9	38.5	36.1	9.0	27.1	214.7	2028
29	2029	74.6			74.6			169.8	6.0	169.7	17.0	5.9	0.0	8.9	207.7	(133.1)	0.0	(133.1)	81.6	2029
30	2030	74.6			74.6				6.0	152.7	17.0	5.3	0.0	8.9	37.3	37.3	9.3	27.9	109.6	2030
31	2031	74.6			74.6				6.0	135.7	17.0	4.8	0.0	8.9	36.7	37.9	9.5	28.4	137.9	2031
32	2032	74.6			74.6				6.0	118.8	17.0	4.2	0.0	8.9	36.1	38.5	9.6	28.8	166.8	2032
33	2033	74.6			74.6				6.0	101.8	17.0	3.6	0.0	8.9	35.5	39.0	9.8	29.3	196.1	2033
34	2034	74.6			74.6				6.0	84.8	17.0	3.0	0.0	8.9	34.9	39.6	9.9	29.7	225.8	2034
35	2035	74.6			74.6				6.0	67.9	17.0	2.4	0.0	8.9	34.3	40.2	10.1	30.2	256.0	2035
36	2036	74.6			74.6				6.0	50.9	17.0	1.8	0.0	8.9	33.7	40.8	10.2	30.6	286.6	2036
37	2037	74.6			74.6				6.0	33.9	17.0	1.2	0.0	8.9	33.1	41.4	10.4	31.1	317.7	2037
38	2038	74.6			74.6				6.0	17.0	17.0	0.6	0.0	8.9	32.6	42.0	10.5	31.5	349.2	2038
39	2039	74.6			74.6				6.0	0.0	17.0	0.0	0.0	8.9	32.0	42.6	10.7	32.0	381.1	2039
40	2040	74.6			74.6				6.0	0.0	0.0	0.0	0.0	8.9	15.0	59.6	14.9	44.7	425.8	2040

Note: 1) Abbreviations:
F.C.: Foreign currency portion
L.C.: Local currency portion
2) Project construction cost:

	F.C.	L.C.	Total
Civil	176.9	182.4	359.3
Metal	150.6	19.2	169.8
Others	90.0	108.1	198.1
Total	417.5	309.7	727.2

Table 9.9 Examination of Repayability of Project Loans (Case 2-2)

Tariff rate=USc4.5/kWh;FC:LC=70%:30%; FC=5.0% p.a. (US$ million)

No.	Year	Power sales revenue	Loans received: Foreign (70%)	Loans received: Domestic (30%)	Total sources	Capital costs: F.C.	Capital costs: L.C.	Capital costs: Total	O & M costs	Outstanding loan principal	Repayment of principal	Interest payment: Foreign (5.0%)	Interest payment: Domestic (13.0%)	Resources tax & VAT	Total uses	Current surplus	Corporate tax payment	Surplus after tax	Cumulative surplus	Year
1	2001		5.5	2.4	7.9	5.2	2.7	7.9		7.9				0.0	7.9	0.0	0.0	0.0	0.0	2001
2	2002		12.9	5.5	18.4	6.6	11.8	18.4		26.3				0.0	18.4	0.0	0.0	0.0	0.0	2002
3	2003		30.9	13.3	44.2	17.4	26.8	44.2		70.5				0.0	44.2	0.0	0.0	0.0	0.0	2003
4	2004		57.8	24.8	82.5	40.1	42.4	82.5		153.0				0.0	82.5	0.0	0.0	0.0	0.0	2004
5	2005		94.4	40.5	134.9	72.6	62.3	134.9		287.9				0.0	134.9	0.0	0.0	0.0	0.0	2005
6	2006		140.2	60.1	200.3	124.6	75.7	200.3		488.2				0.0	200.3	0.0	0.0	0.0	0.0	2006
7	2007		132.4	56.8	189.2	119.2	70.0	189.2		677.4				0.0	189.2	0.0	0.0	0.0	0.0	2007
8	2008	34.1	31.9	13.7	79.7	28.2	17.4	45.6	2.5	723.0				4.1	52.2	27.4	6.9	20.6	20.6	2008
9	2009	68.1	2.9	1.3	72.3	3.6	0.6	4.2	5.4	727.2				8.2	17.8	54.5	13.6	40.9	61.5	2009
10	2010	74.6			74.6				6.0	688.4	38.8	25.9	29.8	8.9	109.5	(34.9)	0.0	(34.9)	26.6	2010
11	2011	74.6			74.6				6.0	649.6	38.8	23.8	22.7	8.9	100.2	(25.7)	0.0	(25.7)	0.9	2011
12	2012	74.6			74.6				6.0	610.8	38.8	22.9	19.9	8.9	96.5	(22.0)	0.0	(22.0)	(21.1)	2012
13	2013	74.6			74.6				6.0	572.1	38.8	22.1	17.0	8.9	92.8	(18.3)	0.0	(18.3)	(39.3)	2013
14	2014	74.6			74.6				6.0	533.3	38.8	21.2	14.2	8.9	89.2	(14.6)	0.0	(14.6)	(53.9)	2014
15	2015	74.6			74.6				6.0	494.5	38.8	20.4	11.3	8.9	85.5	(10.9)	0.0	(10.9)	(64.9)	2015
16	2016	74.6			74.6				6.0	455.7	38.8	19.5	8.5	8.9	81.8	(7.2)	0.0	(7.2)	(72.1)	2016
17	2017	74.6			74.6				6.0	416.9	38.8	18.7	5.7	8.9	78.1	(3.5)	0.0	(3.5)	(75.6)	2017
18	2018	74.6			74.6				6.0	378.1	38.8	17.8	2.8	8.9	74.4	0.1	0.0	0.1	(75.5)	2018
19	2019	74.6			74.6				6.0	339.4	38.8	17.0	0.0	8.9	70.7	3.8	1.0	2.9	(72.7)	2019
20	2020	74.6			74.6				6.0	322.4	17.0	16.1	0.0	8.9	48.1	26.5	6.6	19.9	(52.8)	2020
21	2021	74.6			74.6				6.0	305.4	17.0	15.3	0.0	8.9	47.2	27.3	6.8	20.5	(32.3)	2021
22	2022	74.6			74.6				6.0	288.5	17.0	14.4	0.0	8.9	46.4	28.2	7.0	21.1	(11.2)	2022
23	2023	74.6			74.6				6.0	271.5	17.0	13.6	0.0	8.9	45.5	29.0	7.3	21.8	10.6	2023
24	2024	74.6			74.6				6.0	254.5	17.0	12.7	0.0	8.9	44.7	29.9	7.5	22.4	33.0	2024
25	2025	74.6			74.6				6.0	237.6	17.0	11.9	0.0	8.9	43.8	30.7	7.7	23.0	56.1	2025
26	2026	74.6			74.6				6.0	220.6	17.0	11.0	0.0	8.9	43.0	31.6	7.9	23.7	79.8	2026
27	2027	74.6			74.6				6.0	203.6	17.0	10.2	0.0	8.9	42.1	32.4	8.1	24.3	104.1	2027
28	2028	74.6			74.6				6.0	186.6	17.0	9.3	0.0	8.9	41.3	33.3	8.3	25.0	129.0	2028
29	2029	74.6			74.6			169.8	6.0	169.7	17.0	8.5	0.0	8.9	210.2	(135.7)	0.0	(135.7)	(6.6)	2029
30	2030	74.6			74.6				6.0	152.7	17.0	7.6	0.0	8.9	39.6	35.0	8.7	26.2	19.6	2030
31	2031	74.6			74.6				6.0	135.7	17.0	6.8	0.0	8.9	38.7	35.8	9.0	26.9	46.5	2031
32	2032	74.6			74.6				6.0	118.8	17.0	5.9	0.0	8.9	37.9	36.7	9.2	27.5	74.0	2032
33	2033	74.6			74.6				6.0	101.8	17.0	5.1	0.0	8.9	37.0	37.5	9.4	28.1	102.1	2033
34	2034	74.6			74.6				6.0	84.8	17.0	4.2	0.0	8.9	36.2	38.4	9.6	28.8	130.9	2034
35	2035	74.6			74.6				6.0	67.9	17.0	3.4	0.0	8.9	35.4	39.2	9.8	29.4	160.3	2035
36	2036	74.6			74.6				6.0	50.9	17.0	2.5	0.0	8.9	34.5	40.1	10.0	30.0	190.3	2036
37	2037	74.6			74.6				6.0	33.9	17.0	1.7	0.0	8.9	33.7	40.9	10.2	30.7	221.0	2037
38	2038	74.6			74.6				6.0	17.0	17.0	0.8	0.0	8.9	32.8	41.8	10.4	31.3	252.3	2038
39	2039	74.6			74.6				6.0	0.0	17.0	0.0	0.0	8.9	32.0	42.6	10.7	32.0	284.3	2039
40	2040	74.6			74.6				6.0	0.0	0.0	0.0	0.0	8.9	15.0	59.6	14.9	44.7	329.0	2040

Note: 1) Abbreviations:
F.C.: Foreign currency portion
L.C.: Local currency portion
2) Project construction cost:

	F.C.	L.C.	Total
Civil	176.9	182.4	359.3
Metal	150.6	19.2	169.8
Others	90.0	108.1	198.1
Total	417.5	309.7	727.2

Table 9.9 Examination of Repayability of Project Loans (Case 2-3)

Tariff rate=USc4.5/kWh;FC:LC=70%:30%; FC=8.5% p.a. (US$ million)

No.	Year	Power sales revenue	Loans received: Foreign (70%)	Loans received: Domestic (30%)	Total sources	Capital costs: F.C.	Capital costs: L.C.	Capital costs: Total	O & M costs	Outstanding loan principal	Repayment of principal	Interest payment: Foreign (8.5%)	Interest payment: Domestic (13%)	Resources tax & VAT	Total uses	Current surplus	Corporate tax payment	Surplus after tax	Cumulative surplus	Year
1	2001		5.5	2.4	7.9	5.2	2.7	7.9		7.9				0.0	7.9	0.0	0.0	0.0	0.0	2001
2	2002		12.9	5.5	18.4	6.6	11.8	18.4		26.3				0.0	18.4	0.0	0.0	0.0	0.0	2002
3	2003		30.9	13.3	44.2	17.4	26.8	44.2		70.5				0.0	44.2	0.0	0.0	0.0	0.0	2003
4	2004		57.8	24.8	82.5	40.1	42.4	82.5		153.0				0.0	82.5	0.0	0.0	0.0	0.0	2004
5	2005		94.4	40.5	134.9	72.6	62.3	134.9		287.9				0.0	134.9	0.0	0.0	0.0	0.0	2005
6	2006		140.2	60.1	200.3	124.6	75.7	200.3		488.2				0.0	200.3	0.0	0.0	0.0	0.0	2006
7	2007		132.4	56.8	189.2	119.2	70.0	189.2		677.4				0.0	189.2	0.0	0.0	0.0	0.0	2007
8	2008	34.1	31.9	13.7	79.7	28.2	17.4	45.6	2.5	723.0				4.1	52.2	27.4	6.9	20.6	20.6	2008
9	2009	68.1	2.9	1.3	72.3	3.6	0.6	4.2	5.4	727.2				8.2	17.8	54.5	13.6	40.9	61.5	2009
10	2010	74.6			74.6				6.0	688.4	38.8	45.8	29.8	8.9	129.4	(54.8)	0.0	(54.8)	6.7	2010
11	2011	74.6			74.6				6.0	649.6	38.8	40.4	22.7	8.9	116.8	(42.3)	0.0	(42.3)	(35.6)	2011
12	2012	74.6			74.6				6.0	610.8	38.8	38.9	19.9	8.9	112.6	(38.0)	0.0	(38.0)	(73.6)	2012
13	2013	74.6			74.6				6.0	572.1	38.8	37.5	17.0	8.9	108.3	(33.7)	0.0	(33.7)	(107.3)	2013
14	2014	74.6			74.6				6.0	533.3	38.8	36.1	14.2	8.9	104.0	(29.4)	0.0	(29.4)	(136.8)	2014
15	2015	74.6			74.6				6.0	494.5	38.8	34.6	11.3	8.9	99.7	(25.2)	0.0	(25.2)	(162.0)	2015
16	2016	74.6			74.6				6.0	455.7	38.8	33.2	8.5	8.9	95.5	(20.9)	0.0	(20.9)	(182.8)	2016
17	2017	74.6			74.6				6.0	416.9	38.8	31.7	5.7	8.9	91.2	(16.6)	0.0	(16.6)	(199.5)	2017
18	2018	74.6			74.6				6.0	378.1	38.8	30.3	2.8	8.9	86.9	(12.3)	0.0	(12.3)	(211.8)	2018
19	2019	74.6			74.6				6.0	339.4	38.8	28.8	0.0	8.9	82.6	(8.1)	0.0	(8.1)	(219.8)	2019
20	2020	74.6			74.6				6.0	322.4	17.0	27.4	0.0	8.9	59.4	15.2	3.8	11.4	(208.4)	2020
21	2021	74.6			74.6				6.0	305.4	17.0	26.0	0.0	8.9	57.9	16.6	4.2	12.5	(196.0)	2021
22	2022	74.6			74.6				6.0	288.5	17.0	24.5	0.0	8.9	56.5	18.1	4.5	13.6	(182.4)	2022
23	2023	74.6			74.6				6.0	271.5	17.0	23.1	0.0	8.9	55.0	19.5	4.9	14.6	(167.7)	2023
24	2024	74.6			74.6				6.0	254.5	17.0	21.6	0.0	8.9	53.6	21.0	5.2	15.7	(152.0)	2024
25	2025	74.6			74.6				6.0	237.6	17.0	20.2	0.0	8.9	52.1	22.4	5.6	16.8	(135.2)	2025
26	2026	74.6			74.6				6.0	220.6	17.0	18.7	0.0	8.9	50.7	23.9	6.0	17.9	(117.3)	2026
27	2027	74.6			74.6				6.0	203.6	17.0	17.3	0.0	8.9	49.3	25.3	6.3	19.0	(98.3)	2027
28	2028	74.6			74.6				6.0	186.6	17.0	15.9	0.0	8.9	47.8	26.7	6.7	20.1	(78.3)	2028
29	2029	74.6			74.6			169.8	6.0	169.7	17.0	14.4	0.0	8.9	216.2	(141.6)	0.0	(141.6)	(219.9)	2029
30	2030	74.6			74.6				6.0	152.7	17.0	13.0	0.0	8.9	44.9	29.6	7.4	22.2	(197.7)	2030
31	2031	74.6			74.6				6.0	135.7	17.0	11.5	0.0	8.9	43.5	31.1	7.8	23.3	(174.4)	2031
32	2032	74.6			74.6				6.0	118.8	17.0	10.1	0.0	8.9	42.1	32.5	8.1	24.4	(150.0)	2032
33	2033	74.6			74.6				6.0	101.8	17.0	8.7	0.0	8.9	40.6	34.0	8.5	25.5	(124.5)	2033
34	2034	74.6			74.6				6.0	84.8	17.0	7.2	0.0	8.9	39.2	35.4	8.8	26.5	(98.0)	2034
35	2035	74.6			74.6				6.0	67.9	17.0	5.8	0.0	8.9	37.7	36.8	9.2	27.6	(70.3)	2035
36	2036	74.6			74.6				6.0	50.9	17.0	4.3	0.0	8.9	36.3	38.3	9.6	28.7	(41.6)	2036
37	2037	74.6			74.6				6.0	33.9	17.0	2.9	0.0	8.9	34.8	39.7	9.9	29.8	(11.8)	2037
38	2038	74.6			74.6				6.0	17.0	17.0	1.4	0.0	8.9	33.4	41.2	10.3	30.9	19.0	2038
39	2039	74.6			74.6				6.0	0.0	17.0	0.0	0.0	8.9	32.0	42.6	10.7	32.0	51.0	2039
40	2040	74.6			74.6				6.0	0.0	0.0	0.0	0.0	8.9	15.0	59.6	14.9	44.7	95.7	2040

Note: 1) Abbreviations:
F.C.: Foreign currency portion
L.C.: Local currency portion
2) Project construction cost:

	F.C.	L.C.	Total
Civil	176.9	182.4	359.3
Metal	150.6	19.2	169.8
Others	90.0	108.1	198.1
Total	417.5	309.7	727.2

Table 9.9 Examination of Repayability of Project Loans (Case3-1)

Tariff rate=USc5.0/kWh; FC:LC=85%:15%; FC=3.5% p.a. (US$ million)

No.	Year	Power sales revenue	Loans received: Foreign (85%)	Loans received: Domestic (15%)	Total sources	Capital costs: F.C.	Capital costs: L.C.	Capital costs: Total	O & M costs	Outstanding loan principal	Repayment of principal	Interest payment: Foreign (3.5%)	Interest payment: Domestic (13.0%)	Resources tax & VAT	Total uses	Current surplus	Corporate tax payment	Surplus after tax	Cumulative surplus	Year
1	2001		6.7	1.2	7.9	5.2	2.7	7.9		7.9				0.0	7.9	0.0	0.0	0.0	0.0	2001
2	2002		15.6	2.8	18.4	6.6	11.8	18.4		26.3				0.0	18.4	0.0	0.0	0.0	0.0	2002
3	2003		37.6	6.6	44.2	17.4	26.8	44.2		70.5				0.0	44.2	0.0	0.0	0.0	0.0	2003
4	2004		70.1	12.4	82.5	40.1	42.4	82.5		153.0				0.0	82.5	0.0	0.0	0.0	0.0	2004
5	2005		114.7	20.2	134.9	72.6	62.3	134.9		287.9				0.0	134.9	0.0	0.0	0.0	0.0	2005
6	2006		170.3	30.0	200.3	124.6	75.7	200.3		488.2				0.0	200.3	0.0	0.0	0.0	0.0	2006
7	2007		160.8	28.4	189.2	119.2	70.0	189.2		677.4				0.0	189.2	0.0	0.0	0.0	0.0	2007
8	2008	37.9	38.8	6.8	83.5	28.2	17.4	45.6	2.5	723.0				4.5	52.7	30.8	7.7	23.1	23.1	2008
9	2009	75.7	3.6	0.6	79.9	3.6	0.6	4.2	5.4	727.2				9.1	18.7	61.2	15.3	45.9	69.0	2009
10	2010	82.9			82.9				6.0	695.7	31.5	21.7	14.9	9.9	84.1	(1.2)	0.0	(1.2)	67.7	2010
11	2011	82.9			82.9				6.0	664.2	31.5	20.2	11.3	9.9	79.0	3.8	1.0	2.9	70.6	2011
12	2012	82.9			82.9				6.0	632.7	31.5	19.5	9.9	9.9	76.9	6.0	1.5	4.5	75.1	2012
13	2013	82.9			82.9				6.0	601.2	31.5	18.7	8.5	9.9	74.8	8.1	2.0	6.1	81.1	2013
14	2014	82.9			82.9				6.0	569.6	31.5	18.0	7.1	9.9	72.6	10.2	2.6	7.7	88.8	2014
15	2015	82.9			82.9				6.0	538.1	31.5	17.3	5.7	9.9	70.5	12.4	3.1	9.3	98.1	2015
16	2016	82.9			82.9				6.0	506.6	31.5	16.6	4.3	9.9	68.3	14.5	3.6	10.9	109.0	2016
17	2017	82.9			82.9				6.0	475.1	31.5	15.9	2.8	9.9	66.2	16.7	4.2	12.5	121.5	2017
18	2018	82.9			82.9				6.0	443.6	31.5	15.1	1.4	9.9	64.1	18.8	4.7	14.1	135.6	2018
19	2019	82.9			82.9				6.0	412.1	31.5	14.4	0.0	9.9	61.9	20.9	5.2	15.7	151.3	2019
20	2020	82.9			82.9				6.0	391.5	20.6	13.7	0.0	9.9	50.3	32.6	8.1	24.4	175.7	2020
21	2021	82.9			82.9				6.0	370.9	20.6	13.0	0.0	9.9	49.6	33.3	8.3	25.0	200.6	2021
22	2022	82.9			82.9				6.0	350.3	20.6	12.3	0.0	9.9	48.8	34.0	8.5	25.5	226.2	2022
23	2023	82.9			82.9				6.0	329.7	20.6	11.5	0.0	9.9	48.1	34.7	8.7	26.0	252.2	2023
24	2024	82.9			82.9				6.0	309.1	20.6	10.8	0.0	9.9	47.4	35.4	8.9	26.6	278.8	2024
25	2025	82.9			82.9				6.0	288.5	20.6	10.1	0.0	9.9	46.7	36.2	9.0	27.1	305.9	2025
26	2026	82.9			82.9				6.0	267.9	20.6	9.4	0.0	9.9	46.0	36.9	9.2	27.7	333.6	2026
27	2027	82.9			82.9				6.0	247.2	20.6	8.7	0.0	9.9	45.2	37.6	9.4	28.2	361.8	2027
28	2028	82.9			82.9				6.0	226.6	20.6	7.9	0.0	9.9	44.5	38.3	9.6	28.7	390.5	2028
29	2029	82.9			82.9			169.8	6.0	206.0	20.6	7.2	0.0	9.9	213.6	(130.7)	0.0	(130.7)	259.8	2029
30	2030	82.9			82.9				6.0	185.4	20.6	6.5	0.0	9.9	43.1	39.8	9.9	29.8	289.6	2030
31	2031	82.9			82.9				6.0	164.8	20.6	5.8	0.0	9.9	42.4	40.5	10.1	30.4	320.0	2031
32	2032	82.9			82.9				6.0	144.2	20.6	5.0	0.0	9.9	41.6	41.2	10.3	30.9	350.9	2032
33	2033	82.9			82.9				6.0	123.6	20.6	4.3	0.0	9.9	40.9	41.9	10.5	31.5	382.3	2033
34	2034	82.9			82.9				6.0	103.0	20.6	3.6	0.0	9.9	40.2	42.7	10.7	32.0	414.2	2034
35	2035	82.9			82.9				6.0	82.4	20.6	2.9	0.0	9.9	39.5	43.4	10.8	32.5	446.9	2035
36	2036	82.9			82.9				6.0	61.8	20.6	2.2	0.0	9.9	38.8	44.1	11.0	33.1	479.9	2036
37	2037	82.9			82.9				6.0	41.2	20.6	1.4	0.0	9.9	38.0	44.8	11.2	33.6	513.6	2037
38	2038	82.9			82.9				6.0	20.6	20.6	0.7	0.0	9.9	37.3	45.5	11.4	34.2	547.7	2038
39	2039	82.9			82.9				6.0	0.0	20.6	0.0	0.0	9.9	36.6	46.3	11.6	34.7	582.4	2039
40	2040	82.9			82.9				6.0	0.0	0.0	0.0	0.0	9.9	16.0	66.9	16.7	50.1	632.6	2040

Note: 1) Abbreviations:
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L.C.: Local currency portion
2) Project construction cost:

	F.C.	L.C.	Total
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Others	90.0	108.1	198.1
Total	417.5	309.7	727.2