Republic of Indonesia

Kotapanjang Hydroelectric Power and Associated Transmission Line Project (1) (2)

Third Party Ex-Post Evaluation Report

INTRODUCTION

In anticipating the increasing demand of regional electrification in West Sumatra and Riau Provinces of Indonesia, the Kotapanjang Hydro-Electric Power Plant (HEPP) of 114 MW and associated transmission lines were constructed in the central part of the Sumatra Island. It was decided to extend Japan's ODA loan to the project under the Indonesian commitment to pay sufficient attention to social and environmental impacts, because the Kotapanjang reservoir covering 12,400 ha was expected to have enormous influence on the area. The project commenced construction in 1992 and started operation in 1998. The power plant now covers approximately 20 % of the electricity supply in both provinces.

Three years have passed since the completion of the project, and time has come to carry out the ex-post evaluation of the project. An ex-post evaluation study was conducted in 2002 by third party evaluators, from Indonesia and Japan, based on the OECD-DAC evaluation criteria of relevance, efficiency, effectiveness, sustainability, and impact. In the case of this dam project, "impact" includes an analysis of issues stemming from the involuntary relocation of local residents, numbering 4,886 families, and other effects of the dam's construction. Figure 1 shows relocation of Project Affected Peoples' (PAFs) villages, from previous sites to new sites.

An objective evaluation was conducted by entrusting both Indonesian and Japanese academics (third-party evaluators) to examine the conditions on-site and assess both the positive and negative aspects of the project.

Third-party evaluators examined the following five areas:

(1) Relevance
- Assesses the extent to which the project was consistent with the needs of the target group (West Sumatra Province and Riau Province) and with the priorities and policies of the recipient government and country.
- Were the goals/objectives of the project still relevant at the time of evaluation?
- Were the specific scope and content of the project also relevant?

(2) Efficiency
- Reflects the degree to which project outputs were achieved efficiently, relative to the amount of investment. Were the most efficient methods used to complete the project?
- Did the project scope, implementation schedule, project cost and implementation scheme facilitate efficiency?

(3) Effectiveness
- Measure of the extent to which the project's objectives were attained, i.e. how to respond to rapidly increasing electricity demand in West Sumatra and Riau provinces, stable supply of electricity and the efficient operation of the power station.
- Increase/improvement in regional electricity supply, reduction in energy loss due to the construction of the transmission lines, confirmation that electricity supply within the Third District stabilized, etc.

(4) Sustainability
- Extent to which the project's objectives have been maintained.
- Degree to which the implementing organizations or beneficiary groups that were affected by the project can or will assume responsibility for achievement of the project's goals (presence or absence of ownership).
- Degree of environmental and/or economic sustainability.

(5) Impact
- How to accomplish the project's overall goals affected the local community (improvement in the welfare of local residents as a result of improvements in regional electrification in West Sumatra and Riau provinces, regional economic development, inflow of foreign currency due to oil export growth as a result of transition to hydroelectricity, etc.)
- Secondary effects on the regional economy due to secondary economic development such as flooding

prevention measures for downstream areas, development of irrigation, dam-based tourism, fish farming, if any.

- Indirect effects of the projects, including the following aspects: Technical, economic, social and cultural, organizational structure and environmental (including quality conditions of water of reservoir and its downstream, preservation of the Muara Takus Temple ruins, protection of wild animals, such as the Sumatra elephants), if any.
- Impact to PAF (Project Affected Families) (the level of residents' welfare, compensation for land; provision of infrastructure, such as rubber and palm plantations, water supply, electricity and roads; review of Indonesia's action plan).

Following five third party evaluators carried out the evaluation. Dr. Maksum and Dr. Nakayama respectively served as the leader and co-leader of the evaluators. While this report was developed by the evaluators as a whole, each chapter was elaborated by one evaluator or more as shown below.

Dr. Ryo Fujikura (Hosei University): Chapter 2 and 5

Dr. Syafruddin Karimi (Andalas University, Indonesia): Chapter 5

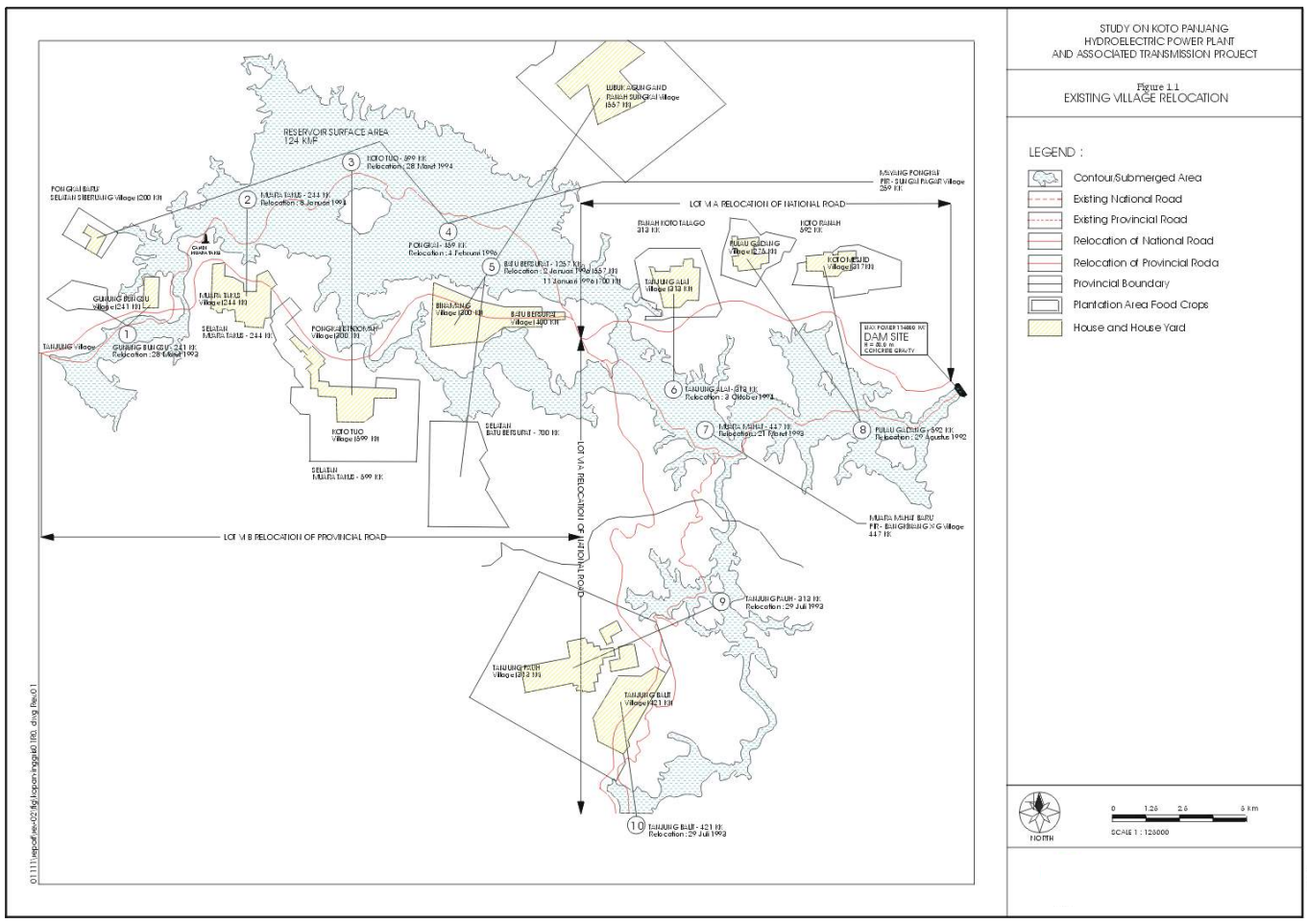
Dr. Ir Mochammad Maksum (University of Gadja Mada, Indonesia): Chapter 3 and 4

Dra Auda Murad (University of Riau, Indonesia): Chapter 5

Dr. Mikiyasu Nakayama (Tokyo University of Agriculture and Technology, Japan): Introduction and Chapter 1

The evaluators commenced their work between January 2002 and June 2003. This paper summarizes the findings obtained through the third party evaluation.

Figure 1: Relocation of Project Affected Peoples' villages



1. RELEVANCE

1.1 Relevance at the time of project appraisal (by OECF)

Regarding the national policy for energy, the Indonesian Government in its Fifth Five Year Plan (1988-1993 REPELITA V) emphasized diversifying domestic energy sources so that petrol may be reserved for export to secure income by hard currencies. The development of alternative energy sources was thus given a high priority. The same Five Year Plan also gave priorities to promoting rural electrification, increase in power generation in rural areas, improving reliability in provision of electric power, and improving efficiency in power production and transmission.

The power production capacity by the PLN in 1988-89 was as shown in Table 1-1. At that time, the domestic civilian energy consumption of Indonesia showed a rapid growth of 5.1% per year between 1983 (equivalent to petrol of 223.2 million barrels) and 1988 (equivalent to petrol of 285.7 million barrels). The share of petrol in the same period decreased from 74.9% to 64.5%. While Indonesia produced petrol, the reserves available for human use were estimated to be 5 billion barrel and reducing its domestic consumption was given a priority by the Indonesian Government. The share of petrol in total installed electricity production capacity was 51% in 1987, while it was aimed as a national policy to be reduced into 24% by 1993.

The potential for hydro power generation in Indonesia was estimated to be 75 TW, of which 32 TW was supposed to be commercially viable. As shown in Table 1-1, only 6% or so of the potential for hydro power generation had been developed by late 1980's and hydro power generation had a large potential for further development, in particular in other islands than the Java island. At that stage, about 92% of hydro power in the nation was generated only in the Java island. As of the year 1988, the installed capacity in the Region III of the Sumatra island, which is composed of Riau and West Sumatra Provinces, was 285.1 MW as in Table 1-1. West Sumatra Province depended its power source of 167.8 MW on hydro (46.9%), natural gas(25.7%) and diesel oil (27.4%), while Riau Province depended 117.3 MW of power source exclusively on diesel oil. Non-PLN power generation, mostly by privately owned diesel oil power generator amounted to 21 MW in West Sumatra Province and 134 MW in Riau Province. In the latter, the rate of electrification was as low as 12.3%, while the ration was 33.6% in West Sumatra Province and 24.9% in the Sumatra island as a whole.

A grid transmission line had been developed only in the Padang City, capital city of West Sumatra Province, and its vicinity. On the other hand, there existed no grid transmission line system in Riau Province, and electricity was supplied through small diesel power plants and its isolated distribution system.

Riau and West Sumatra Provinces did not have enough natural gas and geothermal resources to maintain additional power stations. The coalfield in the region was supposed to be able to supply coal marginally for the planned Ombilin power station (to become operational in 1994-1995) with 130 MW of capacity. Thereafter, there would be no coal reserve left for another power station. The only geothermal power station than planed was Kerinchi power station with 5 MW of capacity.

Table 1-1: Installed Capacity of the Sumatra Island in 1988/89 (Unit: MW)

	Hydro	Thermal	Diesel	Gas	Geothermal	Total
Region I	0.4	0.0	149.7	0.0	0.0	150.1
Region II	3.2	130.0	128.5	244.6	0.0	506.3
Region III	78.7	0.0	163.2	43.2	0.0	285.1
Region IV	2.4	155.0	296.2	64.5	0.0	518.1
Total of Sumatra	84.7	285.0	737.6	352.3	0.0	1,459.6
Outside Java	152.0	310.0	1,649.9	430.8	0.0	2,542.7
Java Island	1,817.5	3,107.0	119.2	802.8	140.0	5,986.5
Indonesia Total	1,969.5	3,417.0	1,769.1	1,233.6	140.0	8,529.2

Source: PLN

The growth in demand for power amounted to 20.2% per year between 1983 and 1988 in the Region III of the Sumatra island, due to very rapid economic growth of the region. It surpassed that of the Sumatra island

as a whole (14.1%) and equivalent to the same for the entire nation (20.2%). Table 1-2 shows the estimates made by PLN in 1989 for the duration of 1991-2000, in which the Kotapanjang hydropower station was assumed to become operational in 1996-1997.

Table 1-2: Demand – Supply Forecast of the Region III (Unit: MW)

	Actual	Forecast								
	90/91	91/92	92/93	93/94	94/95	95/96	96/97	97/98	98/99	99/00
Installed Capacity	285	313	309	318	458	461	567	562	741	748
Dependable Capacity	197	225	221	230	370	373	410	405	490	491
Largest Unit	17	17	17	17	65	65	65	65	65	65
Firm Capacity	180	208	204	213	305	308	345	340	425	426
Peak Load	157	177	198	222	246	273	291	321	353	387
Reserve Capacity[1]	23	31	6	-9	59	35	54	19	72	39
Reserved Capacity Ratio[2]	14.6%	17.5%	3.0%	-4.1%	24.0%	12.8%	18.6%	5.9%	20.4%	10.1%

Source: PLN

1.2 Relevance at present

The government of Indonesia has adopted a General Energy Policy (KUBE: Kebijaksanaan Umum Bidang Energi) covering five goals, which include “energy diversification” and “Intensification of exploration for Energy Sources”. The former implies utilization of a variety of energy, including the renewable, in order to achieve the most economic national energy supply and to reduce hydrocarbon resource recovery rate, and to obtain a maximum net national benefit which ensures sustainable development. Intensification of exploration for Energy Sources. The latter suggests survey and exploration to search for new hydrocarbon energy sources in areas which have never been surveyed, in order to upgrade their status to proven reserves. The importance of hydropower generation was emphasized as a major component of renewable energy sources.

Renewable energy policy is a part of Indonesia’s national energy policy particularly on energy diversification policy. The utilization of renewable energy are still small compared with national energy demand. Renewable energy sources should be developed to contribute significantly to the national energy supply mix. PLN appears prepared to include proven renewable energy technologies in its charter, provided that there is centralized power generation and a subsequent power distribution network. Hydro and mini-hydro, geothermal and mini-geothermal, large-scale grid-connected biomass and wind-based power generation may fall in its scope of interest.

Table 1-3 shows the unit generation cost of the Kotapanjang hydropower station, in comparison with other PLN’s power stations. The unit generation cost of the Kotapanjang hydropower station is higher than the averaged cost by other hydro power stations, while it is still substantially lower (i.e. less than half) than other energy sources. Before the project implementation, the Riau province completely depended their energy source on diesel power plant, of which generation cost was considerably higher than PLN’s average generation cost by 50% or so. The Kotapanjang hydropower station has contributed decrease of power production in the Riau providence as a whole.

Table 1-3: Comparison of Unit Generation Cost (Rupiah/kWh)

	Hydro	Steam	Diesel	Gas Turbine	Combined Cycle	PLN Average	Kotapanjang
1995	20.13	55.87	157.05	131.52	69.76	74.82	-
1996	17.19	56.8	156.11	179.94	69.49	68.37	-
1997	18.39	69.47	186.16	253.11	95.73	87.43	-
1998	20.03	106.93	211.5	247.91	233.02	152.2	-
1999	29.55	116.08	221.36	224.38	192.63	146.79	58.96
2000	32.61	109.79	231.92	324.29	204.51	148.33	62.64
2001	-	-	-	-	-	-	60.74

Source: PLN

[1] Reserve Capacity: Firm Capacity – Peak Load

[2] Reserve Capacity Ratio: Reserve Capacity/ Firm Capacity

2 EFFICIENCY

2.1 Project scope

As a part of a feasibility study conducted during 1982- 1984, an optimization study was made and the result is summarized in the Table2-1. It was concluded that economically optimum highest water level (HWL) of the dam was 100 m. However, this option would submerge a part of a village (Pangkalan Kotabaru) with population of 8,572 accompanied with a Buddhist temple remains (Muara Takus). Considering the minimization of resettlement and conservation of the remains, it was decided to lower the HWL to 85 m. In order to avoid land sliding due to reservoir water, reinforcement of the slope along the riverbank at the western part of the temple was considered. However, the riverbank was regarded very stable, and protection work was not carried out. At present, the riverbank slope is self-supported, there is no sign of landslide, and the remains remained intact.

This decision reduced both of the construction cost and the benefit/cost ratio as shown in Table2-1. Taking future forecast of energy demand into consideration, it is desirable to have larger power generation facility. However, this decision eventually reduced number of resettlers, and the amount of the reduction of social cost of the resettlement was not calculated. In addition to its intrinsic value as a heritage, the temple remains will possibly provide another economical benefit by attracting tourism in the future. Such a potential benefit was not included in this calculation either. Moreover, the final project scope was able to be amended from 111,000 kW to 114,000kW at HWL of 85 meters by conducting a Detail Design. As a result, latent ratio of the benefit/cost would be even greater than obtained at the feasibility study. It can be concluded that the decision was deemed adequate.

Table 2-1: Comparison of Dam Scales Studied at Feasibility Study

	HWL= 76 m	HWL= 85 m	HWL= 100 m
Maximum Output (kW)	90,000	111,000	160,000
Maximum Discharge (m^3/sec)	348	348	348
Effective Head (m)	30.7	38.1	54.4
Annual Generated Energy (kWh)	393 x 10^6	495 x 10^6	697 x 10^6
Construction Cost (10^3 US$)	155,447	190,194	268,796
Construction Cost per kW (US$)	1,727	1,713	1,680
Construction Cost per kWh (US$)	0.40	0.38	0.39
Benefit – Cost (B-C)	1.43	1.47	1.47
Benefit / Cost (B/C)	9,534	12,551	17,923

Source: Feasibility Study

Originally envisaged project scope at appraisal was actualized without major deviation. Following modification were made during the implementation of the project.

a) Modification of transmission line route
Transmission between Kotapanjang switchyard and Pekanbaru was 69.3km in original plan. However, as Pekanbaru substation was relocated toward Kotapanjang, the line length was reduced to 64.4 km.

b) Change in design of relocation road
Taking actual topography of the project site into consideration, alignment of national road at resettlement area was carried out with modification of gradient of slope and deck plats.

c) Cancellation of riverbank reinforcement at Muara Takus Temple during the feasibility study
At appraisal, reinforcement of the slope along the riverbank of the temple was envisaged. However, the protection work was not carried out because the riverbank was found to be very stable.

2.2 Project Implementation Period

The major construction/installation work were completed in September 1999, a delay of as many as 33 months. Comparison of the original schedule and actual period regarding major items is shown in Table 2-2. The consulting service for the project was completed in October 1999, a delay of about 23 months. The delay was brought about due to the following factors:

a) Completion delay of installation of generating equipment (24 months)
b) Completion delay of installation of the substation equipment (11 months)
c) Completion delay of procurement of transmission line materials (19 months)
d) Completion delay of relocation of national road (24 months)

The dam construction project was completed and it has already been provided electricity from 1998. However, some local people resettled by the project are still complaining against the situation of their new relocated villages. JBIC has conducted a supplementary survey in 2002 to address necessary countermeasures and an action plan. This implies that the whole project implementation has not yet perfectly completed despite of the small economical scale of the remaining additional measures. This problem could be avoided by more prudent project preparation. (Note : Refer to JBIC Comment 1.)

Table 2-2: Comparison of the Original Schedule and Actual Period

Item	Original Schedule (At the time of OECF appraisal)	Actual Period
<IP-358>		
Loan Agreement	Jan 1990	Dec 1990
Consulting services	Oct 1990 to Nov 1997	Mar 1991 to Oct 1999
Civil works	Dec 1990 to Oct 1996	Oct 1992 to Nov 1997
Land acquisition and resettlement	May 1990 to May 1996	Started in May 1990 but completion date was unknown (Note：Refer to JBIC Comment 2)
<IP-374>		
Loan Agreement	Oct 1991	Sep 1991
Consulting services	Jul 1991 to Nov 1996	Sep 1991 to Aug 1999
<HPP>		
Installment of communication system	Oct 1991 to Feb 1993	Oct 1997 to Sep 1999
Metal works	Jan 1992 to May 1996	Aug 1993 to Nov 1996
Installment of equipment	Oct 1991 to Nov 1996	Sep 1993 to Nov 1998
Relocation road and bridges	Oct 1991 to Nov 1995	Feb 1993 to Mar 1997
<Transmission Lines>		
Procurement of equipment of transmission line	Nov 1991 to Apr 1994	Apr 1994 to Jun 1997
Installation, civil works	Nov 1991 to Dec 1994	Apr 1994 to Nov 1997

Source: PLN

2.3 Project Cost

At the time of the project appraisal, total construction cost was estimated at 36,499 million yen equivalent. Actual expenditure was 29,898 million yen equivalent and 18% lower than the estimated figure as shown in Table 2-3, 2-4, and 2-5. This difference was resulted from the following reasons:

a) decrease of 29.6% in the contract tender price arising for the intense competition (Table2-6), and
b) appreciation of Japanese yen vis-à-vis Indonesian rupiah and US dollar.

Table 2-3: Original Estimate and Actual Expenditure of Phase I and II (Unit: Mil Yen)

	Originally Estimated Cost						Actual Expenditure					
	Foreign		Local		Total		Foreign		Local		Total	
1990	174	(174)	950	(N.A)	1,124	(N.A)	0	(0)	0	(0)	0	(0)
1991	2,142	(2,142)	2,188	(N.A)	4,330	(N.A)	103	(103)	180	(35)	283	(138)
1992	3,955	(3,955)	3,386	(N.A)	7,341	(N.A)	1,530	(1,530)	2,992	(791)	4,522	(2,321)
1993	4,858	(4,858)	2,891	(N.A)	7,749	(N.A)	2,202	(2,202)	3,006	(1,344)	5,208	(3,546)
1994	5,338	(5,338)	2,653	(N.A)	7,991	(N.A)	1,423	(1,423)	2,885	(1,904)	4,308	(3,327)
1995	3,501	(3,501)	1,795	(N.A)	5,296	(N.A)	1,597	(1,597)	1,706	(1,233)	3,303	(2,830)
1996	1,146	(1,146)	1,100	(N.A)	2,246	(N.A)	2,912	(2,912)	2,994	(2,397)	5,906	(5,309)
1997	347	(347)	75	(N.A)	422	(N.A)	1,124	(1,124)	1,239	(962)	2,363	(2,086)
1998	0	(0)	0		0		2,019	(2,019)	412	(145)	2,431	(2,164)
1999	0	(0)	0		0		933	(933)	641	(156)	1,574	(1,089)
Total	21,461	(21,461)	15,038	(8,564)	36,499	(30,025)	13,843	(13,843)	16,055	(8,967)	29,898	(22,810)

( ) out of which ODA Loan Portion Source: PLN

Table 2-4: Phase I Originally Estimated Cost (by Item) (Unit: Million Yen)

Breakdown of Cost Item	Originally Estimated Cost			Actual Expenditure		
	Foreign	Local	Total	Foreign	Local	Total
Civil works	5,207 (5,207)	5,055 (5,055)	10,262 (10,262)	4,916 (4,916)	3,799 (3,797)	8,715 (8,713)
Consulting service	1,532 (1,532)	295 (295)	1,827 (1,827)	1,567 (1,567)	381 (345)	1,948 (1,912)
Physical Contingency	209 (209)	202 (202)	411 (411)	0 (0)	0 (0)	0 (0)
Tax	0 (0)	1,068 (0)	1,068 (0)	0 (0)	1,066 (0)	1,066 (0)
Land acquisition	0 (0)	2,313 (0)	2,313 (0)	0 (0)	3,779 (0)	3,779 (0)
Total	6,948 (6,948)	8,933 (5,552)	15,881 (12,500)	6,483 (6,483)	9,025 (4,142)	15,508 (10,625)

( ) out of which ODA Loan Portion Source: PLN

Exchange Rate: Appraisal Rp 1= ¥ 0.08 (as of March, 1990)

Actual Rp 1= ¥ 0.069- 0.010 (monthly average exchange rate at SOP issued)

Table 2-5: Phase II Originally Estimated Cost (by Item)

Breakdown of Cost Item	Originally Estimated Cost			Actual Expenditure		
	Foreign	Local	Total	Foreign	Local	Total
Metal work	1,615 (1,615)	284 (n.a)	1,899 (n.a)	849 (849)	241 (241)	1,090 (1,090)
HPP equipment	5,920 (5,920)	376 (n.a)	6,296 (n.a)	3,509 (3,509)	588 (588)	4,097 (4,097)
Switchyard equipment	856 (856)	74 (n.a)	930 (n.a)	332 (930)	56 (56)	388 (388)
Communication equipment	22 (22)	1 (n.a)	23 (n.a)	135 (135)	41 (41)	176 (176)
Relocation road & bridges	1,527 (1,527)	1,236 (n.a)	2,763 (n.a)	0 (0)	3,750 (2,964)	3,750 (2,964)
Transmission materials	1,541 (1,541)	0 (n.a)	1,541 (n.a)	807 (807)	7 (7)	814 (814)
Substation equipment	1,287 (1,287)	0 (n.a)	1,287 (n.a)	564 (564)	4 (4)	568 (568)
Installment	0 (0)	515 (n.a)	515 (n.a)	0 (0)	654 (621)	654 (621)
Substation civil works	0 (0)	304 (n.a)	304 (n.a)	0 (0)	136 (129)	136 (129)
Consulting service	1,061 (1,061)	259 (n.a)	1,320 (n.a)	1,164 (1,164)	190 (173)	1,354 (1,337)
Physical contingency	684 (684)	327 (n.a)	1,011 (n.a)	0 (0)	0 (0)	0 (0)
Tax	0 (0)	1,556 (n.a)	1,556 (n.a)	0 (0)	1,303 (0)	1,303 (0)
Land acquisition	0 (0)	1,173 (n.a)	1,173 (n.a)	0 (0)	60 (0)	60 (0)
Total	14,513 (14,153)	6,105 (3,012)	20,618 (17,525)	7,360 (7,360)	7,030 (4,824)	14,390 (12,184)

( ) out of which ODA Loan Portion Source: PLN

Exchange Rate: Appraisal Rp 1= ¥ 0.068 as of April, 1991

Actual Rp 1= ¥ 0.069- 0.010 (monthly average exchange rate at SOP issued)

Table2-6: Cost Saving by Intense Competition at Competitive Bidding (Mil Yen)

	A: Original	B: Actual	Difference (B-A)	Ratio (B/A)
Lot I Civil Works	10,262	8,190	-2,072	79.81%
Lot II Metal Works	1,899	1,149	-750	60.51%
A & B Generation	6,296	4,330	-1,966	68.77%
Switchyard equipment	930	400	-530	43.01%
Relocation Road	2,763	2,063	-700	74.67%
Transmission Line Materials	1,541	843	-698	54.70%
Substation Equipments	1,287	607	-680	47.16%
Transmission Line Civil Works	515	419	-96	81.36%
Substations Civil Works	304	211	-93	69.41%
Total	25,797	18,212	-7,585	70.60%

Source: PLN

It should be noted that this cost does not include "hidden cost" regarding the adverse impact of the project. As for resettlement of local villages, some of the resettled villagers are still suffering hardships while some others are economically benefiting by aquaculture in their new resettled villages. Current situation of endangered wild species including elephants, which were relocated from the projected area to a natural reserve, is unknown. The adverse impact of the project on the wildlife is likely very significant. (Note : Refer to JBIC Comment 3) In general, such social and environmental costs accompanied with any development projects are overlooked, while it is almost impossible to quantitatively evaluate them in monetary term.

2.4 Project Performance

The dam and the reservoir were originally designed (and optimized) for HWL=85 m, and the annual power generation was estimated as 472 GWh at the appraisal stage. However, they have been in fact operated with HWL=83m. This decrease in HWL apparently makes the B/C ration worse. Despite of this fact, the actual performance of the power station itself appears better than it was designed. As Table 2-7 shows, the annual power generation in 2001 was 483.7 GWh. The runoff of this year was, 168.7 m3/sec (Table 2-8), and that this figure is between "dry year" of 192.2 m3/sec. and "very dry year" of 156.6 m3/sec. The runoff of nominal years is estimated to be 209.4 m3/sec. It implies that the power station in 2001 was able to generate more power than nominal years, despite the fact that the runoff in 2001 (i.e. 168.7 m3/sec.) was much lower than that of nominal years (i.e. 209.4 m3/sec.). It should be noted that the power station was designed for a conservative estimation of the annual average runoff of 173.5 m3./sec (averaged for 11 years of 1971-1981). Still, the runoff in 2001 is lower than this figure and the power station outperformed the design.

Table 2-7: Year-wise Gross Energy Production of the Kotapanjang HEPP (Unit: MWh)

		1998	1999	2000	2001	2002*
Original Target Level**		542,000.0	542,000.0	542,000.0	542,000.0	542,000.0
Revised Target Level***		308,540.0	392,260.0	412,346.0	472,872.0	542,000.0
Actual Operation	Unit 1	28,825.5	160,343.8	132,799.8	102,131.4	46,943.1
	Unit 2	135,048.2	120,264.0	138,994.5	161,088.4	46,185.0
	Unit 3	137,574.9	112,615.4	140,570.4	220,497.0	59,406.0
	Total	301,448.6	393,223.2	412,364.7	483,716.8	153,164.1

Source: PLN

* Actual figures in 2002 are from January 1st to March 31st only

** PLN

*** PLN

Table 2-8: Water Inflow to the Kotapanjag Dam (Unit:m^3/sec)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ave.
Actual													
1998									335.9	134.4	101.3	335.9	134.4
1999	427.0	324.3	225.9	97.4	136.1	93.0	113.2	131.6	218.8	355.7	270.6	318.9	225.8
2000	538.9	232.5	153.9	170.2	102.0	111.2	59.6	129.1	55.6	66.1	264.3	176.5	170.9
2001	305.6	294.1	156.2	250.7	164.7	106.1	80.0	89.0	101.2	113.0	164.0	200.1	168.7
2002	220.9	232.5											226.7
Estimate													
Very Wet	310.6	278.0	278.8	377.8	245.2	154.1	100.5	78.2	112.1	175.4	294.4	410.6	234.3
Normal	331.2	193.8	263.2	195.8	240.4	79.7	73.3	82.0	151.5	225.8	337.4	334.3	209.4
Very Dry	269.4	159.3	172.8	174.0	191.8	127.6	76.1	56.0	103.5	122.6	188.3	237.1	156.6

Source: PLN

2.5 Conclusion

The WHL was decided to 85 meters, lower than optimum HWL, in order to minimize the resettlement and to protect Buddhist temple remains. This decision reduced the cost of resettlement and conserved a possible tourist resource in the future. On the other hand, the dam is generating more electricity than it was estimated despite the fact that the dam and reservoir is actually operated at lower water level (83m) than the WHL. It can be concluded that the project is implemented in the most efficient way compared to alternatives.

However, some of the people resettled from submerged areas are still suffering hardships due to inadequate preparation of resettlement village, This could be avoided by more cautious project preparation. It is reported the delay of the project implementation of 23 months, but some more preparation period should have been allocated for the resettlement. (Note : Refer to JBIC Comment 4.)

3 EFFECTIVENESS

3.1 Introduction

Several years after that commencement, it is now the right time to objectively conduct this ex-post evaluation study based on the DAC evaluation criteria including project effectiveness. Effectiveness as one among several aspects in the context of this ex-post evaluation study aimed at measuring:

- the extent to which project's objectives were attained, i.e. how to respond to rapidly increasing electricity demand in West Sumatra and Riau provinces, stable supply of electricity and the efficient operation of the power station;
- the increase/improvement in regional electricity supply, reduction in energy loss due to the construction of new transmission lines, confirmation that electricity supply within the third district stabilized, etc.

In addition to the above-mentioned aims, it is also very urgent to evaluate project effectiveness in connection with socio-economic development that is presumably suspected as having very close relationship with the HEPP system in general.

As far as socio-economic aspect of development is concerned, it is not an easy task however, to isolate the discussion of this effectiveness from other evaluation criteria. To some extent, this discussion might be overlapping with project impact component knowing the fact that project effectiveness for this case is also measuring how effective it is in creating sustainable livelihood for the project affected families in general, and particularly families have been relocated for the sake of development.

Aside from those, considering the fact that the existence of the Kotapanjang HEPP has regionally designed in conjunction with the Sumbar-Riau system, it is also interesting to some extent, assessing this Kotapanjang HEPP within the context of regional effectiveness.

3.2 Operational Effectiveness

Knowing the fact that the powerhouse of Kotapanjang HEPP is built at the downstream end of the Kotapanjang dam on the left bank, project effectiveness is directly dictated by the attainable water level of the dam in meeting the turbine discharge and effective head per turbine rated 116 m^3/sec and 38.1 m, respectively. Attainable water level itself would be very much dependent upon rainfall condition in the region and effectiveness of upstream water holding capacity.

In addition to several measures of technical effectiveness of the Kotapanjang HEPP system, under the general context of integrated water resource management (IWRM) system, therefore, effectiveness in developing upstream community is very closely related in protecting the life expectancy of existing river basin system. It is highly believable that, in turns, it would directly influence the operational effectiveness of overall HEPP system.

3.3 Gross Energy Production

It has been mentioned that the attainable level of the HWL has been revised from its originally designed HWL of 100 m to HWL 85 m. Consequently, the target of gross energy production[1] of the Kotapanjang HEPP has been remarkably revised, from 697GWh to 542GWh. Revision of the target and its actual level of gross energy production since the commencement of the HEPP operation are presented by Table 3-1.

[1] The total amount of electric energy produced by the generating units at a generating station or stations, measured at the generator terminals

Table 3-1: Year-wise Gross Energy Production of the Kotapanjang HEPP (Unit: GWh)

	1998	1999	2000	2001	2002*
Original Target Level**	542.0	542.0	542.0	542.0	542.0
Revised Target Level***	308.5	392.2	412.3	472.8	542.0
Actual Operation	301.4	393.2	412.3	483.7	153.1

Source: PLN

* Actual figures in 2002 are from January 1st to March 31st only

** PLN

*** PLN

It is very interesting to notice that along its operation, the actual production level of the system is fully attainable during the years,. In the year 2001 the actual level of gross electricity production was about 10GWh higher than that has been targeted. The attainment of the target in 1999 and 2000 was also very excellent.

Effectiveness in meeting targeted level of production is very good although the system has experienced three major outages during the years, consisting of two planned outages[*2] occurred to the Unit 2 and 3 in 1998, and one forced outage[3] occurred in 2001, due to malfunction of a circuit board of governor controller of the Unit 1. It is good for the HEPP that all the troubles were settled by the original contractors as warranty.

Though all troubles were still under the repair warranty of the contractor, to some extent they disturb daily operation during the days of repair. To illustrate the outages, both the planned and the forced ones, they were (i) Replacement of Inferior Grade of Nuts for the Unit 2 and 3 (November 1998 – July 1999); (ii) Damage of Governor Controller of the Unit 1 (July 2001 – December 2001); and (iii) malfunction of a circuit board of governor controller of the Unit 1, July 2, 2001.

3.4 Daily Operation

The Kotapanjang HEPP electricity supply is integrated as a part of the whole electricity supply of PLN for the Sumatra Barat and Riau Provinces. Under this integrated operation of the Sumbar-Riau System[*4], operation of each sub-system including Kotaoanjang HEPP must be carried out in accordance with the allocation schedule prepared by the PLN UPB (Unit Pengatur Beban - Load Management Unit)[*5] Sumbar-Riau. Routinely, PLN UPB Sumbar- Riau received information about conditions of power stations and water level of reservoirs from respective power stations. Based on this routine information, the UPLB decides the schedules for daily allocation of each station typically presented in Figure 3-1.

[2] Removing equipment from service availability for inspection and/or general overhaul of major equipment. A planned outage does not usually result in power supply failure, although planned outages during critical peak demand periods may place stress upon a system.

[3] The removal from service availability of a generating unit for emergency reasons or a condition in which the equipment is unavailable due to unanticipated failure.

[4] The Kotapanjang HEPP connected to the Sumbar - Riau Transmission System, which stretches two provinces, namely West Sumatra and Riau.

[5] Load dispatching unit of the Sumbar- Riau system.

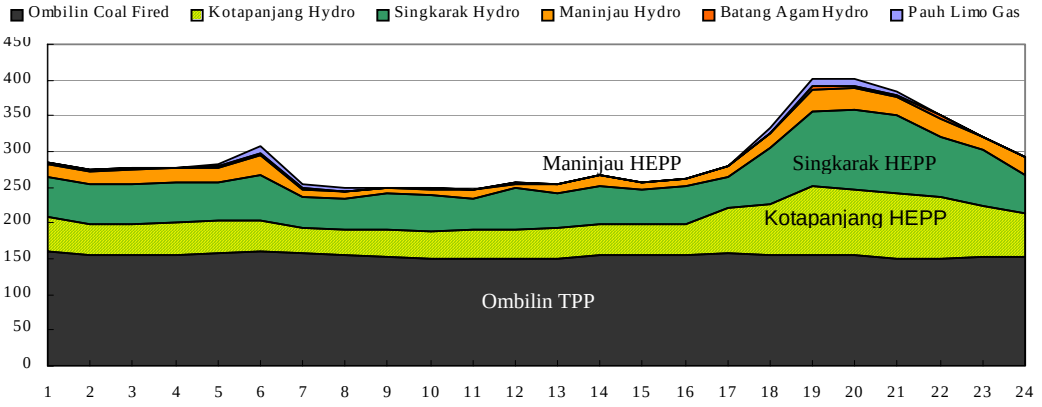


Figure 3-1: Typical Daily Load Curve of the Sumbar- Riau System

Source: PLN

In anticipating remarkable difference between the peak load and the off-peak load period, and for the purpose of managing water level of the system, Kotapanjang HEPP has been utilizing what so called the middle load facilities by operating the whole unit during peak load and operating 1-2 units only during off-peak load.

3.5 High Depreciation Cost

Detailed breakdown of electricity generation cost for the Kotapanjang HEPP can be summarized in Table 3-2. It could be clearly observed that while the quantity of energy production increased from 393.2 GWh in 1999 to 483.7 GWh in 2001, the generation cost was about the same. On the average, generation cost was about Rp 60.00/kWh.

Table 3-2: Generation Cost of Kotapanjang HEPP (Unit: 1,000 Rp.)

	1998	1999	2000	2001
Total Generation Cost	3,635,945.6	23,186,129.8	25,832,537.8	29,379,373.1
Depreciation	2,946,905.2 (81.05)	21,755,502.4 (93.82)	22,223,425.4 (86.03)	21,836,287.1 (74.32)
Non-Depreciation	689,040.4 (18.95)	1.430,627.4 (6.18)	3,608,112.4 (13.97)	7,543,086.0 (15.68)
Energy Production (MWh)	301,448.60	393,223.20	412,364.70	483,716.80
Generation Cost (Rp/kWh)	12.06	58.96	62.64	60.74

*) Figure in parenthesis is percentage

Source: PLN

One interesting finding shown by Table 3-2 is the extremely high portion of depreciation component in generation cost. The table finds out that although the absolute amount of depreciation tends to be stable from 1999 to 2001, there is a tendency of decreasing proportion of depreciation component in the power generation cost. The decrease in proportion of depreciation cost from 93.82% in 1999 to 74.32% in 2001 could be attributed to the fact that the non-depreciation component of the cost between 1999-2001 increased very significantly from Rp 1,430 million to Rp 7,543 million, respectively.

As far as electricity investment is concerned, it could be easily understood that this industry is characterized by significant portion of depreciation component because this industry could be classified into the capital intensive industry. Beyond this fact, it is more interesting however, to compare this high proportion for the Kotapanjang HEPP case to PLN average proportion.

Statistical data of PLN shows that, in 2001, proportion of depreciation component of the Kotanpajang HEPP (86.9%) was the highest compared to that of the PLN average (83.1%) and PLN hydro-power average (73.9). The first comparison could be attributed to the fact that hydro power investment which must be allocated for water reservoir development is normally much higher than that of the non-hydro power plant. Whereas, higher depreciation proportion of the Kontapanjang HEPP to the average hydro-power could be attributed to the fact that Kotapanjang HEPP reservoir is specially constructed for hydro power, not for some other purposes.

Considering the highest proportion of depreciation cost however, it is very advisable to search for the possibility of creating re-use of water discharge for other purposes to have variety of activities in shouldering depreciation cost more effectively. Among many choices, the possibility of reusing discharge water for irrigation, domestic, other purposes for nearby districts seems very rational to be studied. By relatively small amount of additional investment, extremely high depreciation cost should be proportionally shouldered by diversified uses of water, in case re-use of water discharge is feasible.

At any case of that re-use feasibility, at least we could simultaneously consider possible distribution of that depreciation cost for the purpose of flood mitigation of the downstream area. The internalization of flood mitigation benefit consideration, which should have been incorporated in the analysis, would be able to improve profitability performance of the HEPP through recalculation of the economic cost and benefit in the HEPP EIRR analysis.

In addition to those, internalization of the expected improvement of the PAFs standard of living and other socially intangible and indirect benefits in the future could also be estimated to enrich better economic benefits of overall project which would have increased overall project performance and profitability.

3.6 Water Availability

As a hydro-electric power plant, the operation of the Kotapanjang HEPP would be very much dependent upon the Kotapanjang dam with an active storage capacity[*6] of 1,040 million m^3, which is located approximately 10 km downstream of the confluence of the Kampar Kanan and Mahat Rivers. It is very fortunate that the dam is located in the tropical zone where monsoon winds, heavy rainfall and high humidity with little variation in temperature dominate the climate. There are distinct seasons, the wet season with the northeast monsoon from November to May and the dry season with Southwest monsoon from June to October.

Water availability is very potential to meet the discharge required for generating power. It was the reason why the originally designed HWL was at 100 m, instead of 85 m. Comparing this potential which is shown by both the estimated and the actual inflow and water outflow, it could be understood that during 1999 part of excessive water was discharged through spillway without contributing energy production. However, the amount of inflow during 2001 and 2002 was at the normal level and water has fully utilized for power generation alone due to low level of water inflow (Table 3-3). In 2001, monthly average water inflow was only 168.7 m3/sec as compared to that in 1999 amounted to 225.8 m3/sec (Table 3-4).

[6] The total amount of reservoir capacity normally available for release from a reservoir below the maximum storage level. It is total or reservoir capacity minus dead storage capacity. More specifically, it is the volume of water between the outlet works and the spillway crest.

Table 3-3: Water Outflow from the Reservoir, 1999 and 2001 (Unit: m^3/sec)

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1999	Turbine Discharge	123.61	147.82	137.27	138.	136.5	135.3	106.8	79.2	203.8	167.0	144.1	123.9
	Discarded Flow	247.3	185.6	51.4	0	0	0	0	0	0	222.6	142.3	136.7
	Total Out Flow	370.9	333.4	188.7	138.4	136.5	135.3	106.8	79.2	203.8	389.6	286.4	260.6
2000	Turbine Discharge	162.7	226.8	134.0	169.5	156.8	138.8	92.4	132.7	113.2	98.7	127.9	170.8
	Discarded Flow	353.9	86.6	0	0	0	0	0	0	0	0	0	0
	Total Out Flow	516.6	313.4	134.0	169.4	156.8	138.8	92.4	132.7	113.2	98.7	127.9	170.8
2001	Turbine Discharge	182	264.8	207.5	156.7	245.3	178.3	126.1	137.3	106.4	88.1	134.6	207.5
	Discarded Flow	0	0	0	0	0	0	0	0	0	0	0	0
	Total Out Flow	182	264.8	207.5	156.7	245.3	178.3	126.1	137.3	106.4	88.1	134.6	207.5

Source: PLN

Table 3-4: Water Inflow to the Kotapanjang Dam (Unit: m^3/sec)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ave.
1998	-	-	-	-	-	-	-	-	335.9	134.4	101.3	335.9	134.4
1999	427.0	324.3	225.9	97.4	136.1	93.0	113.2	131.6	218.8	355.7	270.6	318.9	225.8
2000	538.9	232.5	153.9	170.2	102.0	111.2	59.6	129.1	55.6	66.1	264.3	176.5	170.9
2001	305.6	294.1	156.2	250.7	164.7	106.1	80.0	89.0	101.2	113.0	164.0	200.1	168.7
2002	220.9	232.5	-	-	-	-	-	-	-	-	-	-	226.7

Source: PLN

Figure 3-2 illustrates Rule Curve[*7] and actual water level of the reservoir. Water discharge from the reservoir is decided by the PLN UPB Sumbar- Riau (Load Dispatch Center), based on the electricity demand and the rule curve. Operation of spillway gate and water intake for the power station is carried out by the power station staffs as per Standard Operation Procedures (SOP), which are written in "Reservoir Operation Manual" and "Spillway Gate Operation Manual" prepared by the consultant.

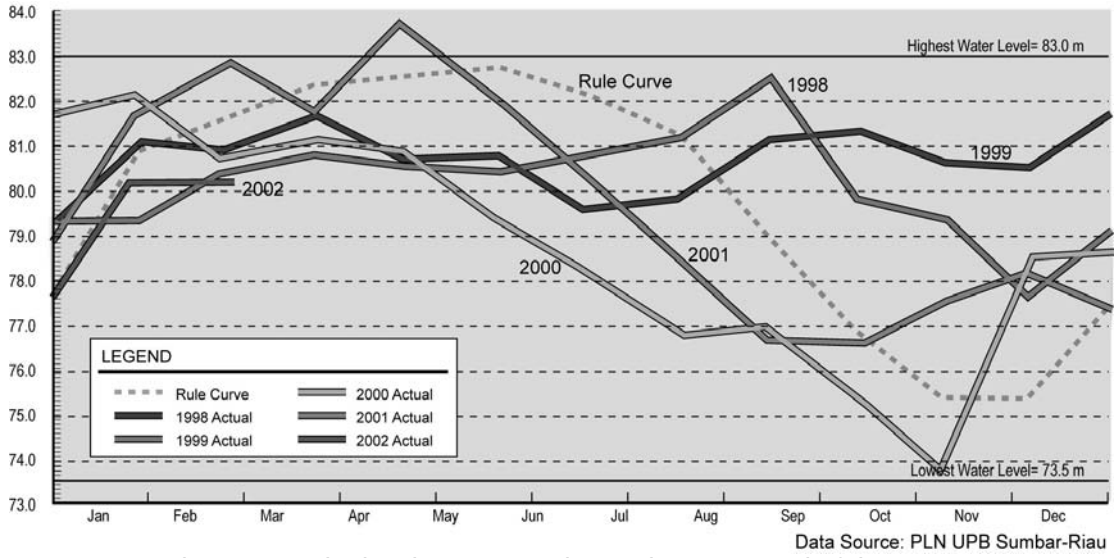


Figure 3-2: Ideal Rule Curve and Actual Water Level of the Dam

When water inflow is extremely high the Kotapanjang HEPP has to accommodate the request of people at the upstream area or of the institution concerned for the opening of spillway in anticipating possible flood, though HWL is not maximized yet. This means that an excessive amount of water must be discharged

[7] Water levels, represented graphically as curves, that guide reservoir operations. A curve indicating how a reservoir is to be operated under specific conditions to obtain best or predetermined results.

without any contribution to electricity production (Table 3-5).

Table 3-5: Lost of electricity due to Flood Threatening

Period	Water Level (m)	Inflow (m^3/s)	Discarded Discharge (m^3/s)	Request from
14^{th} - 20^{th} January 1999	+81.200 m	1,009.40	3,147.60	Representative of Residents
7^{th} - 13^{th} February 1999	+81.200 m	674.00	3,818,85	Public Works
8^{th} - 14^{th} January 2000	+82.760 m	795.80	3,728.10	Representative of Residents
1^{st} - 7^{th} February 2000	+82.140 m	574.19	2,137.08	Representative of Residents
Total			12,831.63	

Source: PLN

Water discharge without any electricity contribution indicates three possibilities: (i) extremely high rainfall beyond water holding capacity of upstream area; (ii) limited water holding capacity of upstream area; and (ii) both, extremely high rainfall and poor holding capacity.

Considering the fact that operational performance of the Kotapanjang HEPP is highly dependent upon water availability, it is very advisable therefore to manage water balance in an integrated way following the standard basin water resource management (BWRM) approach. Under this BWRM concept, Kotapanjang basin have to be managed based on one basin, one water resource and one integrated plan covering multidimensional development aspects. Among many aspect to be considered is the importance of socio-economic development for the sake of the life expectancy (technical life) of the dam.

The target of gross energy production of the Kotapanjang Hydro-Electric Power Plant (HEPP) is 542 GWh. The actual level of annual gross energy production since the commencement of the HEPP operation has been 393.2 GWh in 1999, 412.4 GWh in 2000, and 483.7 GWh in 2001. The annual averaged inflow to the reservoir in these years were 225.8 m3/sec, 170.9 m3/sec, and 168.7 m3/sec, respectively. It should be noted that, as in Table 3-4, some inflow into the reservoir in 1999 and 2000 was discarded (i.e. without generating electric power) due to request by the residents in Pangkalan Kotabaru village (in upstream as seen from the reservoir) to decrease water level of the reservoir. The actual discharge from the power generators in years 1999 to 2001 was 137 m3/sec, 143 m3/sec, and 170 m3/sec, respectively. Figure 3-3 shows the discharge from the power generators and generated power. Red dots represent the output from simulation in the planning stage with discharge data in 1977 to 1995, while blue dots show the results of actual operation of power generators in 1999 to 2001. It is clearly shown that these dots are on a single line, which implies that the hydropower plant has been functioning as designed.

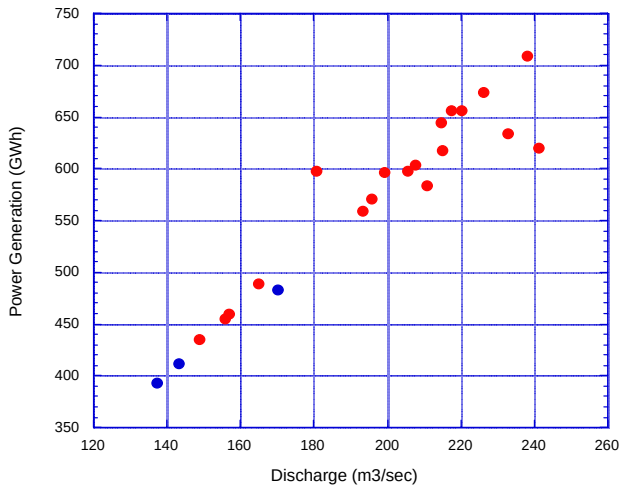


Figure 3-3: Discharge from power generators and generated power

3.7 Financial and Economic Performance

3.7.1 Financial Internal Rate of Return (FIRR)

Financial performance of the project was re-evaluated based on the following conditions:

a) Basic Assumptions

Except for benefits, basic assumptions of the calculation follow the same methodology as used in the appraisal. The economic life of the project is assumed to be 50 years after the operation (1998). All prices and costs are expressed in the 1998 constant price of Indonesian rupiah by using consumer price index.

b) Costs

The costs used for re-evaluation are financial capital costs and operation and maintenance (O&M) costs of the power station and the dam. The financial capital cost of the project is derived from the actual financial costs of the both stage of the project, which include civil work, construction cost of power station/ transmission line/ substations/ relocation road & bridge, consulting service, land acquisition, monetary compensation for ousters and tax, but doesn't include resettlement villages related cost[8] O&M costs from 1998 to 2001 are used as actual costs, and future O&M costs are assumed to be same price as 2001 actual costs.

c) Benefits

In calculating the project's benefit, re-evaluation is not following original methodology adopted at appraisal, because the following methodology is deemed to be reflected much real situation. At appraisal, the benefit consisted of (a) incremental revenue generated from the power station, and (b) fuel cost saving by construction of transmission line. As that time, incremental revenue was worked out by multiplying the gross energy production generated from the project with the electricity tariff to the consumers after due consideration to the transmission and the distribution loss. Under this formula, all incremental revenue generated by the project was considered as a benefit of the project. However, the incremental benefit is derived not only from the generation project, but also from the transmission and distribution system. Thus, normally only the portion of total incremental revenue proportionate to the capital investment for power generation and transmission lines need to be pulled out as the benefit specific to the project. In addition, fuel cost saving should not be considered as benefit.

In re-evaluating FIRR of the project, benefit was defined as sales volume from North KITLUR to PLN Region multiplied by average transfer price[*9]. Sales volume to PLN Region was worked out by "net energy production" minus "auxiliary use of power station" minus "transmission loss of the system". Benefit from 1998- 2001 was calculated based on available data collected during the site survey. Future auxiliary use[*10] is assumed by using actual average auxiliary use ratio[*11] of 0.67%. Future transfer price and transmission loss are assumed same as 2002 actual price and 2001 actual loss (2.70%), respectively. In base case, future gross energy production are assumed to be the same volume as the target level.

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[8] Estimated Resettlement Related costs include, development and rehabilitation cost of rubber plantation, construction of water supply system and housing for resettlement village. Resettlement Related cost was estimated based on the actual disbursement from Riau province, and rehabilitation/ maintenance cost for the action plan.

[9] In 1997, PLN divided their electricity business in Sumatra Island into two Generation & Transmission Business Units (KITLUR- North and South), and four Distribution Business Units (PLN Region I - IV). PLN's business units prepare their own financial statement, in order to pursue profitable business. In case of Sumatra, KITLUR selling their electricity to PLN Region at prescribed price by PLN headquarter. However, actually this internal transfer is only for preparing financial statement of each business unit, thus no actual transaction is made.

[10] The consumption of station service or auxiliary needs (such as fan motors, pump motors, and other equipment essential to the operation of the generating units.

[11] Auxiliary use divided by gross energy generated

Table 3-6: Benefit of the Project

	Benefit of the Project
Original	Incremental Revenue (Originate from Construction of Power Station) Sales Volume from PLN to consumer (Gross Energy Production – System Loss[*12]) x Selling Price to Consumers
	Fuel Cost Saving (Originate from Construction of Transmission Line) Energy Production x Heat Rate of Existing Generating Unit x Unit Fuel Price / Heat Content of Fuel
Re-Evaluation	Incremental Revenue Sales Volume to Region: (Net Energy Production – Transmission Loss) x Transfer Price from KITLUR to Region

The Financial Internal Rate of Return (FIRR) of the project that was re-calculated based on the above conditions finally summarized in Table 3-7 which shows that the newly calculated FIRR was only 6.1%, much lower than the appraisal estimate of 9.9 %.

Table 3-7: Cash Flow of FIRR Calculation (Base Case)

		Sales Volume (MWh)	Transfer Price (Rp/kWh)	Total Revenue (Mil Rp.)	Capital Cost (Mil Rp.)	O/ M Cost (Mil Rp.)	Total Cost (Mil Rp.)	Net Benefit (Mil Rp.)
91					10,425.5		10,425.5	-10,425.5
92					171,421.4		171,421.4	-171,421.4
93					210,937.3		210,937.3	-210,937.3
94					181,098.7		181,098.7	-181,098.7
95					143,462.2		143,462.2	-143,462.2
96					213,947.9		213,947.9	-213,947.9
97					89,624.8		89,624.8	-89,624.8
98	1	299,929.4	105.680	30,881.9	185,952.7	689.0	186,641.7	-155,759.8
99	2	390,463.4	222.327	84,510.2	90,091.8	1187.4	91,279.2	-6,769.0
00	3	409,521.7	149.059	59,394.9		2888.9	2,888.9	56,506.0
01	4	480,823.4	137.308	64,238.3		5415.0	5,415.0	58,823.3
02	5	538,368.6	211.846	110,971.9		5415.0	5,415.0	105,556.9
|	|	|	|	|	|	|	|	|
47	50	538,368.6	211.846	110,971.9		5415.0	5,415.0	105,556.9

FIRR= 6.14%

Note: Future Energy production: same as target level, Transfer price: Same as 2002 actual transfer price, Excluding Resettlement Villages Related Costs.

3.7.2 Sensitivity Analysis

Sensitivity scenario is based on twenty-four cases: including the resettlement related cost[*13], decrease and increase of energy production and transfer cost (see Table 3-8 and Table 3-9). Transfer cost to PLN Region was increased from 191.78 rupiahs/ kWh in 2001 to 319.93 rupiahs kWh in 2002. This price increase was based on the increase in selling price from PLN Region to consumers.

[12] System Loss (15.5%) comprised of transmission and distribution loss (13.5%), and auxiliary consumption (2.0%).

[13] Annual resettlement cost (1990-97) is estimated on the basis of the implementation schedule of resettlement and total amount of resettlement cost provided by Provincial Government. The annual resettlement costs from 1999 to 2004 is data provided from Provincial and Regional Governments.

Table 3-8: FIRRs in Sensitive Analysis Excluding Resettlement Villages Related Cost

Future Energy Production \ Future Transfer Price	20% lower than actual price in 2002	10% lower than actual price in 2002	Same as actual price in 2002	10% higher than actual price in 2002
10% lower than target	4.47%	5.05%	5.59%	6.09%
Same as target level	4.99%	5.59%	6.14% (Base Case)	6.65%
10% higher than target	5.47%	6.09%	6.65%	7.18%

Table 3-9: FIRRs in Sensitive Analysis Including Resettlement Villages Related Cost

Future Energy Production \ Future Transfer Price	20% lower than actual price in 2002	10% lower than actual price in 2002	Same as actual price in 2002	10% higher than actual price in 2002
10% lower than target	3.56%	4.11%	4.62%	5.09%
Same as target level	4.05%	4.62%	5.14%	5.63%
10% higher than target	4.51%	5.09%	5.63%	6.13%

Knowing the fact that market price of the Indonesian electricity has been under very strong control of the government for the benefit of electricity consumers, therefore, a more radical estimate of a more liberalized level of electricity market price is still very important to be introduced in the IRR analysis. It seems impossible to expect that HEPP would be profitable without imposing a more realistic market price of this industry.

3.7.3 Economic Internal Rate of Return (EIRR)

A rough re-evaluation of Economic Internal Rate of Return (EIRR) of the project is undertaken, for reference. All cost and benefit streams used in the re-evaluation were expressed in 1998 prices, and denominated in Indonesian Rupiah. As a result, the EIRR of the project is calculated to be 10.6% (see Table 3-10). As FIRR calculation, the economic life of the project is assumed to be 50 years after operation (1998).

Table 3-10: Cash Flow of EIRR Calculation

		Sales Volume of Electricity (MWh)	Fuel Cost for Diesel Gen (Rs./kWh)	Other Cost for Diesel Gen (Rs./kWh)	Total Benefit (Mil Rs.)	Capital Cost (Rs. Yen)	O/ M Cost (Mil Rs.)	Total Cost (Mil Rs.)	Net Benefit (Mil Rs.)
91						1383.412		1383.4	-9,382.9
92						1505.279		1505.3	-154,279.3
93						1741.193		1741.2	-189,843.6
94						1948.417		1948.4	-162,988.8
95						2205.330		2205.3	-129,115.9
96						1982.663		1982.7	-192,553.1
97						2177.598		2177.6	-80,662.4
98	1	299929.4	185.0	45.0	68,970.3	6884.302	8.11	6892.4	-99,076.2
99	2	390463.4	153.6	37.3	74,526.1	6224.592	18.73	6243.3	-7,744.0
00	3	409521.7	150.6	36.6	76,635.8		38.94	38.94	73,746.9
01	4	480823.4	205.9	50.0	123,029.4		75.61	75.61	117,614.4
02	5	538368.6	269.5	65.5	180,347.8		75.61	75.61	174,932.8
03	6	538368.6	269.5	65.5	180,347.8		75.61	75.61	174,932.8
04	7	538368.6	269.5	65.5	180,347.8		75.61	75.61	174,932.8
05	8	538368.6	269.5	65.5	180,347.8		75.61	75.61	174,932.8
|	|	|	|	|	|		|	|	|
47	50	538368.6	269.5	65.5	180,347.8		75.61	75.61	174,932.8

EIRR= 10.6%

a) Costs

The costs used for re-evaluation are financial capital costs and operation and maintenance (O&M) costs of the power station and dam. The financial capital cost of the project is derives from the actual financial costs of the both stage of the project, which include civil work, construction cost of power station, transmission line, substations, relocation road & bridge, consulting service, land acquisition, and tax. But it does not include the resettlement related costs. Financial capital costs and O&M costs of the project are transferred into the economic cost by applying conversion factor of 0.9.

b) Benefits

Before the project implementation, some population in villages used their own private small-diesel generators. Thus, in this calculation, fuel cost, other O&M cost of these diesel generators was assumed as Willingness to Pay (WTP) of consumers.

Fuel cost for a private diesel generator with rated capacity of 10 kW was worked out by multiplying specific fuel oil consumption of 0.37 liters/kWh and HSD price (500 rupiahs/liter in 1998 - 1,100 rupiahs/liter in 2002). Other O&M costs of small diesel generator, including depreciation, were calculated as multiplying fuel cost and 0.243[*14].

3.7.4 Stability of Electricity Supply

In evaluating the contribution of the Kotapanjang HEPP on the regional stability in electricity supply, it is very realistic to isolate the discussion to the region (regions) wherein this HEPP operates. To some extent it is also important to compare its contribution to other electricity suppliers in a bigger regions.

Out of many stability indicators, two indicators, i.e. the "System Average Interruption Duration Index" (SAIDI)[*15] and the "System Average Interruption Frequency Index" (SAIFI) [*16] from 1997 to 2001 available at the PLN regional office (Table 3-11 and Table 3-12) were employed to analyze, while Riau province is considered as the region of concern.

Table 3-11: SAIDI of the Region III

	West Sumatra Province			Riau Province		
Area	Padang	Bukit tinggi	Solok	Pekan baru	Dumai	Rengat
1997	15.19	28.22	16.27	80.69	19.21	33.59
1998	31.38	20.14	7.63	38.96	20.51	27.84
1999	44.25	17.97	7.03	36.05	17.12	30.06
2000	35.76	16.14	4.32	37.18	67.46	30.38
2001	25.62	14.06	3.78	23.66	67.28	24.18

Table 3-12: SAIFI of the Region III

	West Sumatra Province			Riau Province		
	Padang	Bukit tinggi	Solok	Pekan baru	Dumai	Rengat
1997	15.46	16.01	41.86	75.2	13.25	31.54
1998	36.04	14.02	20.15	46.4	17.84	31.88
1999	46.6	13.09	13.4	31.07	13.06	31.36
2000	45.38	16.14	9.14	31.51	20.38	28.26
2001	35.1	12.71	5.6	19.15	30.03	21.77

Source: PLN

3.8 Conclusion and Recommendation

Based on the discussion, the following conclusions and recommendations are presented:

(i) Operational effectiveness is very high, especially in connection with the role of the Kotapanjang HEPP in contributing to the stability of electricity supply in the provinces of Riau and West Sumatra. However, high electricity production cost due to an extremely high depreciation component might need better consideration to

[14] In case of PLN average generation cost of diesel (231.92 Rp/kWh) in 2000, 75.7% of generation cost was occupied by fuel cost (175.49 Rp/kWh). Accordingly, using (1 - 0.757)= 0.243 for conversion factor.

[15] SAIDI: The cumulative length of power interruption, in hours, that a customer within a certain area experiences on the average, during a year

[16] SAIFI: The average number of times each customer within a area experiences interruption during a year

reduce; Observation shows that high production cost could be attributed to the fact that the huge investment is solely shouldered by the Kotapanjang HEPP, not for other purposes. In addition to that, internalization of indirect and intangible benefit into the profitability analysis of the HEPP is recommended.

(ii) It is very irony knowing that during high level of water availability, free discharged must be done, while during lean water availability electricity production is lower and electricity shedding must be implemented, (Note : Refer to JBIC Comment 5.) In smoothening the fluctuation of water availability, therefore, it is strongly recommended to find strategic measure for water and soil conservation towards the improvement of water holding capacity at the upstream area through basin management approaches;

(iii) Knowing the fact that the concept of the Basin water resource management (BWRM) approaches cover also the role of community, therefore, it is highly recommended that any socio-economic development must be integrated with the need for having better effectiveness of soil and water conservation efforts in the catchments area.

(iv) The calculated IRRs found to be much lower than those estimated during the design activity might stem from the fact that it was overestimated at the appraisal. Strategic measures to improve profitability level of the plant are unnegotiably required for the HEPP to be more effective. Otherwise, effectiveness of the Kotapanjang HEPP would be in a more serious danger. (Note : Refer to JBIC Comment 6.)

(v) Introduction of a more liberalized market price of the Indonesian electricity that might be applied in the near future is strongly recommended to meet possible profitability of the industry in realizing industrial sustainability, facing the future demand that is expected to be significantly improving. This introduction is very realistic in nature knowing the fact that under liberalized market system, government intervention would be soon minimized. (Note : Refer to JBIC Comment 6.)

4 SUSTAINABILITY

4.1 Introduction

Sustainability of the project is of very important aspects in the DAC evaluation criteria. Specific purpose of sustainability assessment in connection with this ex-post evaluation study is to measure:

- the extent to which the project's objectives have been maintained;
- the degree to which the implementing organizations or beneficiary groups that were affected by the project can or will assume responsibility for the achievement of the project's goals (presence or absence of ownership);
- the degree of environmental and/or economic sustainability.

In fact, the ultimate objective of the project is to supply electric power to cope with rapidly growing demand in Riau and West Sumatra Provinces as well as to push the electrification levels and to improve standard of living of the people in the provinces. However, considering that objective, coupled with the fact that the project sustainability of the project is very much dependent upon the quality of environment and the quality of life of the people affected families (PAFs), project sustainability that will be considered in this ex-post evaluation activity is not solely concentrated on the conventional business performance of the power plant. To some extent, this sustainability criterion would cover also the project performance connected with environmental as well as socio-economic development progress which could be stimulated by the growth progress of the power plant (PLN) as simplified in Figure 4-1.

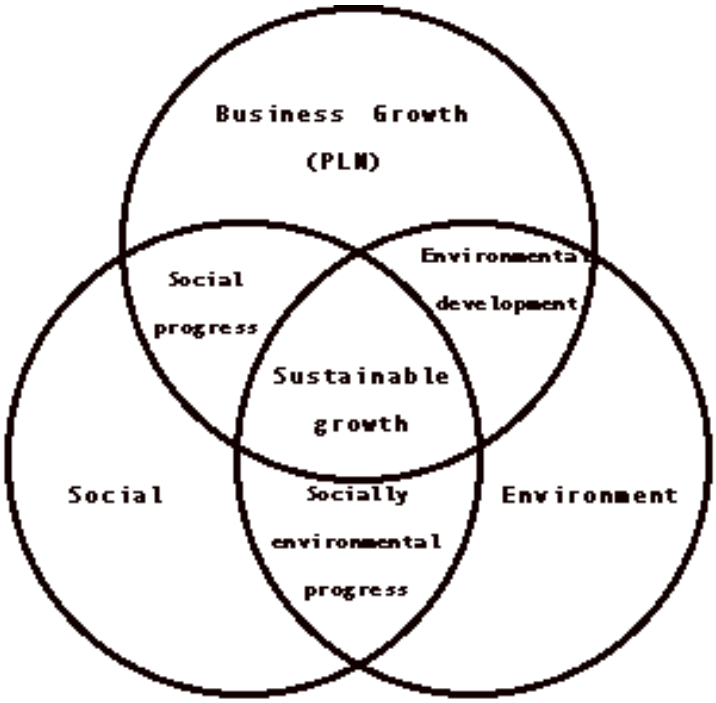


Figure 4-1: Growth-Environment-Social development contribution to the business sustainable growth[1]

[1] Under this model, business security could be better guaranteed to provide a more sustainable growth, not a maximum growth. Read in Maksum, Mochammad. 2002. Hubungan antara Perusahaan Pertamnbangan dan Enersi dengan Masyarakat Sekitar: Charity, Social Responsibility atau Social Investment (Relationship between Mining & Energy Companies and Nearby Community: Charity, Social Responsibility or Social Investment). Paper presented at a national training-workshop on Social Acceptance Analysis. Gadjah Mada University, May 14, 2002.

The growth-social-environment inter-relationship as it is illustrated by Figure 4-1 shows that, to be sustainable on the long run, PLN as a business enterprise in this case must be able to provide meaningful social progress and environment development, the two constraints that will finally determine the capacity of PLN to materialized its expected sustainable growth, otherwise, business security of PLN would be significantly insecure.

4.2 Financial Sustainability

Financial sustainability for this case is based on the business performance of PLN as a quasi-monopolistic state-owned company in electricity market. The discussion of this financial sustainability is started from presenting aggregative financial analysis at the macro level followed by raising selected management issues currently concerned by PLN as measures to anticipate operational bottlenecks.

4.3 Financial Conditions of the PLN

It is worthwhile to start the discussion of the financial sustainability by observing financial performance of PLN as a state-owned business enterprise with a significantly large amount of business asset amounted to Rp 77,995,058 Million. Aggregative profile of this financial condition is stipulated in Table 4-1. It is not very surprising to notice that operational revenue of this company, which is dominated by electricity sales, is far below the company's operational cost both with a tendency of progressively growing. At the operational level, it is not very surprising finding the fact that financial condition of the PLN Region III and the KITLUR have the same financial tendency with that of PLN (Table 4-2 and Table 4-3).

Table 4-1: Profit and Loss Statement of PLN (1996-2000) (Unit: million Rp.)

	1996	1997	1998	1999	2000
Total Operation Revenues	9,645,993	11,126,100	14,036,015	15,997,118	22,556,663
Total Operation Cost	7,642,510	9,449,753	16,808,773	21,502,678	27,215,821
Operational Income (Loss)	2,003,483	1,676,347	(2,772,758)	(5,505,561)	(4,659,158)
Non Operating Expense (Net)	(7,545,41)	(2,255,361)	(6,382,787)	(5,349,229)	(19,331,236)
Net Income (Loss) before Tax	1,178,415	(579,014)	(9,155,545)	(10,854,790)	(23,990,394)
Deferred Tax			(390,077)	(514,293)	(620,975)
Net Income (Loss) after Tax	1,178,415	(579,014)	(9,545,622)	(11,369,083)	(24,611,369)

Source: PLN

Table 4-2: Profit and Loss Statement of the Region III (Million Rp.)

	1996	1997	1998	1999	2000
Income from Operation	201,382.5	255,076.0	340,512.9	399,864.3	576,148.3
Total Operational Cost	316,935.9	328,666.5	370,800.6	642,616.3	801,226.9
Operating Profit (Loss)	(115,553.3)	(73,590.5)	(30,287.7)	(42,752.0)	(225,078.6)
Net Other Income Expense	(2,480.0)	(3,520.0)	(19,190.7)	(12,010.9)	(38,619.7)
Net Profit (Loss)	(118,033.3)	(77,110.4)	(49,478.4)	(254,762.9)	(263,698.3)

Source: PLN

Table 4-3: Profit and Loss Statement of the North KITLUR (Unit: 1000 Rp.)

	1998	1999	2000	2001
Income from Operation	489,171.0	1,280,048.3	951,882.3	1,048,267.4
Total Operating Expense	1,264,235.8	1,182,148.5	1,262,321.8	1,554,677.8
Operating Profit (Loss)	(775,064.8)	97,899.8	(310,439.5)	(506,430.4)
Net Other Income Expense	(9,429.6)	(7,817.9)	(39,264.0)	(32,928.4)
Net Profit (Loss)	(784,494.4)	90,081.9	(349,703.5)	(539,358.8)

Source: PLN

It is very important to notice, wider financial gap could be observed after 1997, where the crisis started to hit the country with a very sharp depreciation of local currency. Although, stronger deterioration financial performance was mostly attributed to the monetary crisis due to the failure of the country's macroeconomic policy, as far as financial sustainability is concerned, operational losses clearly indicated the need of the Kotapanjang HEPP to be more careful in strengthening its profitability performance.

4.4 Operational Constraints

Poor profitability characterizing financial performance of PLN both at the national and the regional level (PLN Region III and North KITLUR) could be very easily understood due to some business environment of this industry which could be classified as the external and the internal conditions constraining operational profitability of this company.

4.4.1 External Constraints

Negative profitability of PLN could be partly attributed to the fact that electricity market was highly controlled and subsidized by the state. In addition to this, electricity industry in this country was dictated also by extremely high electricity purchase. It is also very rationale to believe that at internal level, PLN as a state-owned company ultimately needs some policy measures to optimize its operation to be more financially efficient.

Increasing sale price of electricity was in fact very idealistic strategy in improving profitability level of PLN. However, considering the fact that electricity was among basic needs of people, coupled with the fact that purchasing power of average consumers is very limited, increasing price is not a very easy program in this highly subsidized industry. Price setting in this industry is normally proposed by PLN through the approval of the government to the country's legislative body (Parliament). PLN proposal in the increase in electricity tariffs differentiated by territories and consumer category in April 2000 and 2002 was among serious efforts of PLN which were finally approved by the Government and the Parliament.

The most controversial effort to increase the electricity tariff was introduced early this year. Though it is still far below the private electricity tariff, public objection and strong criticism against that increase in electricity tariff decided by the Government on January 1, 2003, forced the Government to reshuffle such policy decision, several weeks after its issuance. Under current global economy, privatization and market liberalization of this industry might be recommended to be reviewed as possible tool in improving the efficiency of the country's electricity industry.

In addition to the need for liberalizing the industry, taking the case of Kotapanjang HEPP and in line with the spirit of decentralization and regional autonomy, it is very timely to recommend possible decentralization price setting in electricity industry. Taking the case of Riau Province as one of the richest provinces in the country with better purchasing power of its people, local government might choose either increasing electricity price or retaining electricity industry be subsidized by local government.

Another important recommendation to externally induce for improving profitability prospect of PLN is the creation of political will to speed up business privatization of PLN. PLN as a state-owned company is typically the same with other state-companies anywhere in the world which is commonly characterized by inefficiency, poor transparency and dominated by political interest. Major source of operational inefficiency under this state-owned status could strongly be attributed to significant inefficiency in human resource performance.

4.4.2 Internal Constraints

It is highly suspected that significantly high operational cost of PLN at any level could be minimized by a more efficient business operation. In coping with better efficiency, PLN is currently undertaking a major restructuring initiative which could be called as an "Early Wins" strategy, a short-term strategy aimed at improving internal management operation of PLN including both cost reduction and marketing strategies. Both strategies are elaborated to relevant actions presented in Table 4-4.

Table 4-4: Early Win strategy of PLN

NO	Operating Cost Reduction Strategies	Marketing Strategies
1	Reducing network loss	Preparation of manpower and company organization
2	Increasing asset utilization	Market research
3	Improving O&M system	Product development & differentiation
4	Creating new production package through establishing subsidiaries and joint venture	Market Promotion
5	Transparent procurement process for reasonable project price and quality results	Increase in service
6	Shortening product cycle	Increase in distribution reliability

In addition to the improvement of operational management, human resource development has been promoted as a set of PLN business policy to have more efficient operation, especially connected with capability strengthening in operation and maintenance (O&M). Among other training programs, the training programs are: (i) training program concentrated on O&M in at manufacturer's factory and at the project site (under the ODA loan); and (ii) HRD Training to sustain both the technical and management capability of the employees concerned. The latter could alternatively be conducted through: (i) in-house training in Kotapanjang; (ii) practical training in Java; (iii) theoretical trainings in Jakarta; and (iv) comparative study in the form of site visit to other parts of Indonesia. This training program is not only positive in contributing to significant improvement of human resource capacity, but it is also considered as the best way for human resource promotion. In smoothening the execution and implementation of the construction phase of the project, series of seminars regarding construction implementation were also conducted.

Operationally, operational standardization has also been adopted by PLN since years ago by formulating operational procedure and manual through the help of contractors. Such procedure covers, among other, operational aspect, maintenance activities, spare-parts inventory, system monitoring and reporting. It was reported that this standardization has been significantly providing better working efficiency. Table 4-5 shows an example of standardized maintenance that must be made more effective.

Table 4-5: Major Maintenance Activities and its Frequency and Scope

Maintenance Activity	Frequency	Scope of Work
Predictive	Daily	To check vibration of the monitor, temperature of water/oil, pressure on the monitor.
Preventive	Monthly Yearly	Monthly inspection (checking and cleaning) Dismantling (but not all units at the same time)
Breakdown	-	Action to be taken only when the preventive work cannot work.
Overhauling	5 to 6 years	Dismantling and Detailed Inspection with replacement of necessary parts.

Source: Interview at Kotapanjang HEPP

It has been elaborated earlier that such human resource development, covering training activities for operation and maintenance, has been made possible through an ODA loan given to PLN, it is expected that a hugh amount in this human resource investment might guarantee better and more efficient operation of the company. Budget procurement problem might seriously arise when this company have to simultaneously invest a huge amount of money for community development.

4.5 Demand-Supply Imbalance as Captive Market

As it has been mentioned that the Kotapanjang HEPP has been able to contribute to approximately 20% of the total electricity supply in the Provinces of West Sumatra and Riau. However, the fact that electricity demand in those provinces is still higher than the supply must be considered by PLN as potential captive

market. It is indeed unfortunate if such captive demand is unreachable by supply capacity that has been installed.

Such unreachable captive demand could be well understood as has been constrained by distribution, transmission, tariff and capacity problems, this condition clearly means that PLN has significantly loss part of its market opportunity. Necessary measures need to be formulated to expand operational capacity of PLN to catch the demand. In addition to this, frequent shedding observed during the survey indicated also market losses of the company due to serious decrease in power generation capacity.

Increasing criticism as has been frequently raised in connection with the shedding needs be properly anticipated by the company through better socialization on the importance of building public awareness in electricity use knowing the fact that electricity capacity has been seriously disturbed by unavoidable environment in terms of available water supply dictated by the climate. In addition to this, environmental enhancement needs to be promoted to improve water holding capacity of the catchments area. Otherwise, public criticism might create a more serious social problem to the company without being responded by better environmental protection.

4.6 Dam Safety Community and Business Sustainability

The technical and economic losses connected with the attainable water level and catchments area conservation will certainly influence life expectancy of the dam to support existing power generation system. Greater sedimentation, which could be easily observed in the field in case it is not being well managed, will strongly illustrate that sedimentation might remarkably shorten the dam technical life (life expectancy).

It is very meaningful to learn from the experience of the Center for Rural and Regional Development Studies of Gadjah Mada University. Based on its research on the technical assistance for rural empowerment for the community surrounding Sermo Dam in Yogyakarta, the team criticized that life expectancy of the dam which was originally designed to be still 45 years at this point in time, 2002, has bees drastically dropped to its actual life expectancy of about 35 years only due to extremely poor basin management of the upstream area[2].

Taking that experience, therefore, any socio-economic interventions should not only be based as compensation and recognition to the resettled community. Without nullifying the importance of providing sustainable support for the Project Affected families (PAFs), proportional intervention strategies must be formulated to meet the need for having better life expectancy of the dam in the context of improving business security of PLN.

Such integrated strategies is ultimately required based on the fact that life expectancy of Kotapanjang Dam (and of PLN business security) is very much dependent upon upstream management, coupled with the fact that upstream community especially the PAFs is not part of major beneficiaries of power plants, therefore, special attention needs be considered to mobilize upstream community participation in safe guarding the dam.

Adopting approaches has been implemented in the dam management of several parts in the world, including Sermo Dam, it is very advisable for the case of Kotapanjang HEPP to initiate what has been called as the dam safety community (DSC). By DSC it is expected that community participation and awareness on soil and water conservation activity of the Kotapanjang Basin could properly be materialized for the sake of energy production.

Intervention strategies for stimulating DSC in developing countries normally conducted through socio-economic empowerment towards the improvement of people's livelihood through participative measures.

[2] Read: Maksum, Mochammad, at al. 2002. Technical Assistantship for Community Empowerment Surrounding the Greenbelt Area of the Sermo Dam in Yogyakarta Special Province. Action research conducted by the Center for Rural and Regional Development Studies of Gadjah Mada University in cooperation with Water Resource Development Project of Yogyakarta Special Province and World Bank.

However, ultimate objective of such intervention is not merely to implement participative action for sustainable and better livelihood of PAFs. As far as PLN interest is concerned, better PAFs' livelihood is just a mean to attain business sustainability of the company. This principle has never been raised as the most important context nowadays wherein socio-economic development is being reviewed.

4.7 Empowerment as Social Investment

For the case of Indonesia, involvement of companies in socio-economic development started only very recently. The country's development policy concentrated on capital accumulation approach with extremely strong support of government did not require any investors both national and multinational in ensuring their business security. Strong support of the state was reflected in general policy measures, including security approaches, for the sake of growth creation.

Based on security approach, resource occupation and required occupation could be easily implemented, though in a very careless process. Mining and energy companies enjoyed such security approach, protecting business security through military power, very much. Public criticisms on this approach escalated in the mid of 1990s, while at the bottom level, such approach was found to be ineffective. Collective violence and public protest were common phenomena in the regions[3]. Conflict between local communities and big companies started to disturb business security of the companies.

Historically[4], prosperity approach was originally implemented by companies through charity activities. The companies normally very reactive to what were being claimed and proposed by local communities without meaningful planning process. This charity process was proven to be very ineffective in providing sustainable growth to companies. Global issues on corporate social responsibility were then adopted by companies to replace charities. Better planning and implementation process in community development was much better during those years. However, to be more effective, community development and empowerment must be internalised in the business activities, and consequently such principle was replaced by the principle of social investment, without which opportunity losses due to business insecurity will be very significant.

Early years of occupation and evacuation of the Kotapanjang HEPP land was conducted very easily without meaningful protests from the people. However, during the last few years of operation, it was observed that many cases claimed by community are getting higher. Various problems reported during both the PRA and the survey activities illustrated common social phenomena faced by big companies in Indonesia.

Based on the extreme fluctuation of seasonal water inflow, community empowerment in this sense must be integrated with the need for improving conservation performance of the upstream area. For the HEPP to be sustainable, therefore, meaningful expenses must be allocated as social investment in the form of socio-economic empowerment and soil and water resources conservation in overall Kotapanjang basin.

4.8 Conclusion and Recommendation

Based on the above discussions, necessary conclusions and recommendations are presented in the followings:

(i) It is a real irony. Despite the fact that captive market in the form of electricity demand was very largely available, financial performance of the company is observed to be extremely poor during the first years of Kotapanjang HEPP operation. In addition to the country's monetary

[3] The Indonesian collective violence during the years was very well documented in Mas'oed, Mochtar; Mochammad Maksum and Moh. Syuhada (eds.) 2001. *Kekerasan Kolektif: Kondisi dan Pemicu (Collective Violence: Condition and Precipitation).* Published by the Center for Rural and Regional Development Studies of Gadjah Mada University, Yogyakarta.

[4] This historical perspective which shows the shift from charity activities, to corporate social responsibility, and to social investment could be searched in Maksum, Mochammad. 2002. *Pemahaman Sistem Sosiokultural Masyarakat Sebagai Dasar Pendekatan Pembangunan dan Pemberdayaan (Understanding Sociocultural System of the Community as the basis for development and empowerment).* Paper submitted at a national training on Social Acceptance Analysis for the Mining and Energy Companies, Yogyakarta, August 27, 2002.

crisis, it was found out that factors constraining that operational performance could be classified as the external and internal factors. Among other external factors are: electricity pricing policy and inflexible electricity market. While among internal factors are high operational cost and operational inefficiency; (Note : Refer to JBIC Comment 6.)

(ii) In anticipating the internal constraints it is recommended that operational efficiency could be improved by continuing education and training activities of the HEPP staffs while administrative inefficiency could be better minimized through transparency and democratisation of the company;

(iii) For the case of external constraints, the recommendations are: (a) decentralization of electricity policy; (b) liberalization of electricity market; and (c) speeding up the privatisation process of PLN;

(iv) In addition to those constraints, operational capacity of the Kotapanjang HEPP needs to be protected through watershed protection measures in avoiding to the decrease in the availability of water. In addition to water availability, soil erosion is also very potential in determining life expectancy (technical life) of Kotapanjang reservoir. In turns, sustainability performance of the Kotapanjang HEPP will be directly affected;

(v) Considering the fact that life expectancy of the dam and the company is very much dependent upon basin conservation management, therefore, Participation of the upstream community including PAFs is highly needed; Action plan in the form of intervention strategies for stimulating active participation of the community in soil and water conservation needs be formulated towards the creation of the so called the dam safety community (DSC);

(vi) Necessary change in the mindset must be placed as the basic principle for any action plans that will be formulated and implemented. The ultimate objective of socio-economic development for the PAFs was not merely conducted for the purpose of compensation and recognition of their willingness to be relocated to the newly established villages. It is conducted to guarantee sustainable growth of PLN operation in electricity supply in the region; Based on the above principle, therefore, any intervention strategies must be framed and conducted in the context of social investment guaranteeing business security;

5. IMPACT

5. 1 Environmental Impact

5.1.1 Review of Current Situation

5.1.1.1 Background of Environmental Monitoring

As supplementary reports of the official Environmental Impact Assessment, the Environmental Management Plan (RKL) and the Environmental Monitoring Plan (RPL) were prepared by Riau University in 1984. and the EIA, RKL, and RPL were approved by the Central Environmental Committee of the Government of Indonesia in 1989. The objectives of these plans were to identify measures to minimize adverse environmental impact. They also identify the responsible agencies to implement each item. In order to make strategic decisions and management regarding RKL and RPL, Provincial Environmental Coordination Teams (PECT) was established. PECT were chaired by the Vice Governor of Riau and West Sumatra, and were coordinated nationally by BAPPENAS[1].

Although PLN is the implementing agency responsible to the whole project, it did not seem to play a central role within PECT. It is only responsible for water pollution (except lead pollution) and disease vector control regarding the environmental monitoring. Other environmental issues are to be implemented by different agencies as shown in Table 5-1-1. For example, Department of Forestry is responsible for wildlife conservation and forest protection, while provincial governments take care for land use planning. Downstream impact mitigation and development is to be implemented by Public Works Department. PNL was not authorized to coordinate and to control other agencies. Moreover, BAPEDAL (Ministry of the Environment), which is in charge of overall environmental issues including monitoring and EIA in Indonesia, and the Ministry of Health and Social Welfare (MoH) have not been involved in this project at all.

Table 5-1-1: Responsible Agencies

Issue	Agencies
Water pollution: lead	Department of Mines and Energy
Water pollution: removal of vegetation	PLN
Water quality monitoring	PLN
Forest Protection	Department of Forestry
Erosion Control	Department of Forestry; local governments
Wildlife conservation and management	Department of Forestry
Fish conservation	Department of Fishery; universities
Fisheries development	Department of Fishery
Disease vector control	PLN; Department of Fishery
Downstream impact mitigation and development	Pubic Works Department
Land use planning	Provincial government

Environmental management is a cross-sectoral issue, and involvement of many agencies is quite usual. It is crucial to assign a single agency with a determined incentive for and authority responsible to environmental management. Through this approach, it becomes possible to properly implement and to monitor the assignments of the relevant agencies. In this project, this approach did not seem to be adopted. PLN or BAPEDAL are considered to be the most relevant agencies to coordinate PECT. However, the role of PLN seemed to be limited within the PECT. BAPEDAL might not have been fully established, when the PECT was formulated. However, BAPEDAL should have been involved into the PECT, once it was given the responsibility of the environmental management of the whole Indonesia. As a result, workable coordination was not able to be attained, and the actual situation of the implementation of each item was not revealed until PLN conducted monitoring the realization of the environmental management in collaboration with Riau University in 2001.

[1] Record of activities of the PECT was unavailable during this study, and it was unknown what kind of actions was taken according to the PECT decision.

Many of the actions proposed by RKL and RPL in 1984 were not reported up to 1995, when the Research Institute at Padjadjaran University reviewed implementation of RKL and RPL. Until 2002, almost no substantive action was reported to be undertaken in terms of sedimentation, vegetation, and laud use planning as shown in Table 5-1-2. These actions were mostly to be implemented by other agencies than PLN. Proper coordination among the relevant agencies and periodical monitoring of the implementation should have been done.

Table 5-1-2: Proposed actions by RKL and RPL, and their status found during the review by Riau University up to September 2001

Item	Action proposed by RKL and RPL	Status
Water quality	Revoke lead mining license	N
	Remove vegetation from reservoir area	P
	Monitor removal of biomass from the reservoir	P
	Monitor arrival of biomass and aquatic weeds at inflows	T
	Monitor water quality	T
Sedimentation	Restore land and stop erosion near resettlement villages	N
	Train local farmers in soil conservation	N
	Preserve forest areas where slop > 40%	N
	Undertake reforestation	T
	Monitor sedimentation along cross-sections of the reservoir	P
Vegetation	Regulate against forest encroachment	N
	Monitor encroachment	N
	Enforce regulations	N
	Clear weeds from reservoir	N
	Restrict the use of fertilizer in the catchment	N
	Check water quality to assess risk of aquatic weed infestation	P
Wildlife	Relocate elephants	T
	Monitor changes to plankton, fish, and vegetation	T
	Restock rivers with cultured fry	N
	Prepare project proposals for fisheries development	T
	Introduce fish to control mosquito larvae and snails	T
	Monitor incidence of malaria and bilharzia	N
Land use planning	Prepare a tourism development plan	N
	Prepare a reforestation plan	P
	Restrict resettlement areas to land with slopes of < 15%	N
	Reforest and conserve areas with slopes > 40%	N

Status: T: action taken, P: action partly taken or taken subsequently,
N: no action or none reported

5.1.2 Water quality

5.1.2.1 Removal of Vegetation from the Reservoir Area

Before the inundation, vegetation in the reservoir area was not cleared. They have been removed only from 25 ha of reservoir near Tanjung Balit and Muara Takus so far. The major purpose of the clearing is to avoid water quality deterioration due to decomposition of organic matter. As mentioned below, significant adverse impact on the water quality was not observed. However, tree tops can be seen above the water surface and it adversely affects the amenity. Impact of the removal of vegetation to the fishery is complex and unknown: the remaining vegetation may hinder the navigation but may benefit fishery by further eutrophication.

5.1.2.2 Sampling

Water quality monitoring has been carried out since 1994 and is planned to continue up to 2003. Water

samples were collected at seven sampling stations as shown in Table 5-1-3 after impoundment. There is no explanation on the selection of the sites. For example, a guideline established by the Japanese Environment Agency in 1971 (hereafter "Japanese guidelines") recommended to collect lake water samples at (1) the center of the lake, (2) water utilization point, (3) a point where polluted inflow water is well mixed with lake water, (4) a point where upstream water is well mixed with lake water and upstream water, and (5) downstream.

Table 5-1-3: Sampling Stations

Station1: Upstream of dam site in Tanjung Balit
Station2: Reservoir water around Gulamo Bridge
Station3: Upstream of dam site in Desa Tangjung
Station4: Reservoir water around Batu Bersurat
Station5: Reservoir water around dam site
Station6: Kampar River (Rantau Berangin Bridge)
Station7: Kampar River (Bangkinang Bridge)

The frequency of sampling has been irregular, varying from zero in 1995, to one in 1994, 1996, 1998 and 2000, two in 1997 and 1999, and three in 2001. Data recorded in 2001 is shown in Table 5-1-4. No explanation was made about the timing and it is impossible to study monthly change water quality. Since this area has dry and wet seasons, sample should have been corrected at least twice a year, probably in May (rainy season) and in November (dry season). Japanese guidelines recommended collecting samples at least once a month and four times in the day.

At each site visit, water sample were collected from the surface, middle, and bottom of the water column (depth is not known), and mixed to make a composite sample. It is not explained why composite samples were made instead of monitoring every sample taken from different depth. Japanese guidelines recommended analyzing every sample taken at every five to ten meter depth.

Table 5-1-4: Water Quality Analysis on Reservoir and Kampar River, Downstream in September 15 2001

Parameter	Unit	ST 1	ST 2	ST 3	ST 4	ST 5	ST 6	ST 7	BM
PHYSICS									
Conductivity	µmhos/cm	29.3	39.4	49.8	42.4	37.7	51.4	39.0	*
Temperature	^{o}C	30.0	33.0	30.0	32.0	31.0	30.0	31.0	****
Turbidity	NTU	4.5	4.3	5.1	5.6	9.2	12.3	10.7	*
Dissolved solid	Mg/l	20.6	22.1	30.9	25.4	35.6	57.0	42.1	1000
CHEMISTRY									
pH		6.22	6.60	7.10	6.55	7.25	6.09	6.01	5 – 9
Chloride	mg/l	19.2	22.1	30.0	26.5	31.3	37.5	29.8	600
Hardness	mg/l	183.2	193.8	137.0	136.7	225.4	146.9	177.0	*
Sulfate	mg/l	44.78	51.94	10.32	49.53	63.35	17.16	50.49	400
Sulfide	mg/l	0.09	0.05	0.04	0.06	0.06	0.12	0.10	0.1
Dissolved oxygen	mg/l	7.3	7.4	6.8	6.7	5.9	6.8	7.0	> 6.0
BOD_s	mg/l	3.70	4.45	4.61	4.80	5.22	8.96	6.23	6*)
COD	mg/l	9.24	10.56	12.05	11.22	13.50	23.76	16.20	10*)
Nitrite	mg/l	0.034	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	1.0
Nitrate	mg/l	1.516	1.107	0.973	0.832	0.902	0.820	0.611	10
Manganese	mg/l	0.066	0.037	0.041	0.035	0.061	0.117	0.103	0.5
Ferro	mg/l	0.208	0.131	0.106	0.119	0.102	0.125	0.158	5
Copper	mg/l	0.028	0.044	0.037	0.031	0.029	0.024	0.011	1.0
Cadmium	mg/l	n.a	n.a	n.a	n.a	n.a	n.a	n.a	0.01
Lead	mg/l	0.025	0.033	0.011	0.021	0.030	0.019	0.017	0.1

Source : UNRI

Remarks :
Station 1 = Upstream of dam site in Tanjung Balit
Station 2 = Reservoir water around Gulamo Bridge
Station 3 = Upstream of dam site in Desa Tangjung
Station 4 = Reservoir water around Batu Bersurat
Station 5 = Reservoir water around dam site

* : not required
***** : normal water temperature
*) : Ministerial Decree No. 02/MenKLH/I/1998
BM :Indonesia's Quality Standards Category B

Station 6 = Kampar River (Rantau Berangin Bridge)
Station 7 = Kampar River (Bangkinang Bridge)

5.1.2.3 Present Situation

Because the way of sampling seems to be inadequate, it is difficult to accurately assess the water quality, particularly vertical profiles of the water quality. Coliform counts have not made for the monitoring sample although the reservoir water seems to be expected to use domestically (On the other hand, coliform were counted of the water sample taken from ponds around dam site. It was revealed the counts exceeded the clean water standard, and that the pond water was not suitable for drinking without treatment).

Based on the limited data, it may be concluded as follows;

a) Most of the water samples have met the Indonesia's Quality Standards Category B (suitable for human consumption after boiling) except COD. The water seems to be fairly satisfactory for domestic use so far. COD often exceed the quality standards probably due to biomass of vegetation in the reservoir, domestic waste and cage aquaculture. Analysis is necessary at different depth for assessing the impact on fish because heavy metals might be accumulated in sediment and the concentration at depth might be high.

b) Concentrations of Fe, Cd, SO4, Pb, BOD, and COD at "Sampling time 6" were much higher than those at other sampling time. If "Sampling time 6" is 1998, it is right after the impoundment and some disturbances due to the impoundment may contribute to this high value. Strong winds or rain might be another factor causing the high vale although none was reported. High turbidity and dissolved solid at "Sampling time 6" suggest this assumption. However, possibility of experimental error such as sample contamination still can not be excluded.

c) After the impoundment, hydrogen sulphide increased for a while and decreased, and sulphate began to increase in turn. This seems to be due to decomposition of organic matters at first in anaerobic and later in aerobic conditions. In order to assess the present situation and future perspective, measurement of concentration at different depth is necessary.

d) Concentration of hardness, chloride, and cupper increased. This may be due to increased inflow of sedimentation.

5.1.3 Sedimentation

In December 2001, sediment deposition was first monitored by bathymetric method along two transects across the reservoir; one near the dam wall and another at Glamo Bridge (Figure 1). Since the most sediment generally deposit close to river month, monitoring should be made at the river month rather than dam wall. However, no monitoring was made at the river month, and result of this monitoring likely underestimate the rate of sedimentation. In order to accurately monitor sediment deposition, vertical profiles of the entire water surface using a boat and an ultrasonic sounder should be periodically obtained, taking the existence of trees remained in the reservoir into consideration.

Based on the existing insufficient data, it was concluded that estimated current sediment rate was 20.48 to 26.23tons/ha/year, while that estimated at designing stage was 7.5 tons/ha/year. This increasing sedimentation will cause significant negative impact on the lifetime of the dam. While RKL and RPL recommended some actions to regulate sedimentations, almost no substantial action, such as adequate forest management or soil conservation, has been reported to be undertaken. (Note : Refer to JBIC Comment 7.) Logging and slash burn are reported to be taking place in many places, and there is a concern that sedimentation is significant and will further increase. Moreover, people in some resettled villages feel getting poorer and complained that rubber plantations were not yet completed as promised. This situation may force the people to further encroachment on forest regardless it is protected or not, and accelerate the sedimentation.

5.1.4 Forest and Wildlife

5.1.4.1 Forest

Forest conservation within the catchments area is primarily planned for sedimentation control, and indispensable as habitats of wildlife. No substantial action for forest conservation proposed in RKL and RPL, such as forest preservation at steep slope, settlement regulation, and monitor encroachment, was undertaken.(Note : Refer to JBIC Comment 8.) Deforestation seems to proceed at extremely high rate. In 1985, forest of 2,142km^2 within the Kotapanjang catchment are was classified as protected forest. According to the study in 1999 which used satellite images it was found that only 424 km^2 of the protected forest survived with a dense or moderately dense canopy. If the protected forest was intact in 1985, it is estimated that the annual rate of deforestation of the protected area exceeded 10 percents, higher than any other case study known in Sumatra.

No substantial monitoring of forests has been made, but some fragments of information shown in Monitoring Report submitted by Riau University in December 2001 supported the above estimation of seriousness of the deforestation in the catchment area as follows;

- land around reservoir was converted to Gambier plantation (75ha);
- six stone mining stations were observed,
- lands are being converted to settlement areas along access road although these areas are to be buffer zone,

and

- areas of 50m higher from water level are being converted to settlement areas.

There is a great concern that conserved forest will be cleared in the near future without substantial protection measures.

It is not clear how the dam construction itself has affected this deforestation, but it should be noted:

a) primary forest cover has been removed from the most of the land in the immediate vicinity of the reservoir,
b) logging remains a significant commercial activity around the reservoir, and from the Kampar Kanan bridge it is not unusual to see boat trains towing a number of logs,
c) the construction of new road facilitated access to forest, and
d) resettlers have likely encroached forests due to failure of promised rubber plantation. (Note : Refer to JBIC Comment 8.)

Although the impact of the dam construction to forest conservation can not be quantified, it is anyhow necessary to implement proposed forest conservation measures as soon as possible in order to conserve wildlife as well as to control sedimentation. At least, monitoring of forest in the catchment area using satellite remote sensing data should be carried out immediately in order to quantitatively analyze the situation and identify areas to be given higher priority for conservation measures.

5.1.4.2 Wildlife

Mammals and birds have been monitored by KSDA of the Ministry of Forestry Regional Office of Riau from 1992 to 1997, and by the Center for Environment Research at the University of Riau from 1999. Survey reports of University of Riau are seemed to be of little value. Details of the methodology are omitted, some records are doubtful, and sample sizes are too small to make statistical judgement. The KSDA report seemed to be well prepared but data is inadequate to estimate population. Considering rapid deforestation around the reservoir and inundation, it is very likely that the project has significantly impacted on the wildlife. However, the quantification based on the current limited data is impossible. In order to quantitatively assess the impact and to prepare wildlife management plan, extensive study of wildlife experts is necessary.

According to RKL, elephants inhabited in the projected area were relocated in 1993 and in 1995. PLN reported that the total number of the elephants were thirty-six. The Giam Siak Kecil Forest Wildlife Reserve was selected from two alternatives as it offered better elephant habitat and stronger conservation status than another option. WWF verbally reports that seven of the elephant apparently died in the translocation. The fates of the other twenty-nine have not been adequately monitored since then and are unknown. Measures for protecting the wildlife reserve do not seem to be successfully implemented. Seeing natural forests being extensively converted into *Acacia* and oil palm plantation in the surrounding areas of the reserve, it is doubtful that the reserve has been adequately protected. There is a great concern about the fate of the elephant (See Picture 1 to 4). Taking the situation of at appraisal, there was no other option than translocation of the elephant to save them. However, the monitoring of the relocated elephants and the protection measures of the reserve did not seem to be adequate. (Note : Refer to JBIC Comment 9.)

5.1.4.3 Plankton

Plankton has been monitored since May 1999. According to the comparison between the results of the monitoring at December 2000 and September 2001, abundance increased while the number of species remained at relatively same level. Since the monitoring has carried out at the same time and in the same places as water quality monitoring, seasonal change can not be assessed and it is not known to how much extent the comparison of data at different season is meaningful. It may be concluded that plankton communities have been gradually evolved indicating the water is becoming from oligotrophic to mesotrophic. This change may be attributed to the release of nutrient released from submerged vegetation and increasing sedimentation.

5.1.5 Fish

5.1.5.1 Reservoir and Rivers

The EIA lists 27 fish species in the reservoir area without mentioning their habitat. No population monitoring has been carried out. It proposed to monitor the situation of some migratory fish whose migration is hindered by the dam and to introduce their fries into the river. Fry of one of the fish species was introduced in the river, but no monitoring has been carried out.

Fish population in upstream and downstream seemed to decline since several decades ago. Few people now fish at upstream while people were able to sell a surplus before the dam construction. A change in species composition was also reported from downstream. Within the reservoir, the composition of fish catches has changed, but population change can not be assessed due to the lack of information.

It may be concluded that factors causing the fish community changes in this areas includes the dam construction. Hindering migration, increasing sedimentation, and changing water quality caused by the dam construction may contribute the impact, probably adversely, but its quantification is impossible due to insufficient data. As a countermeasure of anticipated declining population of fish, *Pangasius pangasius*, its fry was introduced to the river, but the impact of the introduction is unknown due to the lack of monitoring.

Floating fish farms using cages have been built in the reservoir. As clearing of vegetation from the reservoir recommended by RKL has not properly implemented, remaining tree heads restrict the activities for fish farming, while the remaining vegetation likely benefit fish production by its effect of eutrophication.

Many fish ponds have been established in some resettlement villages. They are created through private initiative of local people rather than project intervention. Some ponds seemed to be successfully operated and people benefited from the aquaculture. Some ponds seemed to be very much eutrophicated probably due to poor operation and management, probably feeding too many food pellets. There are concerns of sustainability of the pond farming and ground water pollution by nitrate.

5.1.6 Flood Control

It was expected that downstream communities would benefited from flood mitigation of the dam and

resulted increase of food production. The project control flood in the downstream in the following ways: the dam allows flood storage in the reservoir, where the maximum water level is two meters below the design; and a siren alert. There has been no major flood since 1996.

5.1.7 Water Related Disease

5.1.7.1 Malaria

In general, MoH carries out monitoring and countermeasures of diseases. As for malaria control, Malaria Metric Survey (MMS) including case finding and vector control is implemented. The MMS was discontinued in 50 Kota Regency between 1996 and 2001 probably due to no case of malaria found. RKL identified the possibility of increased malaria incidence, and fish feeding mosquito larvae were introduced in 2001. After discontinuation of the MMS, neither monitoring of mosquito larvae nor vector borne disease was made. Assessment of impact of the project, therefore, had to be made based only on very limited data accumulated at health centers.

Several indicators of health profile such as infant mortality rate and nutritious status in both Riau and West Sumatra Provinces are not worse than other Indonesian Provinces. Among communicable diseases, TB, acute respiratory infections, and diarrhea are the most prevalent in the provinces. Prevalent diseases at three health centers near the dam and resettled villages correspond with them. Malaria was found to be prevalent in one of them, Rimbo Datar, where local people were resettled in 1994.

Malaria morbidity rate in Rimbo Datar was found to be significantly greater than that in other district, and it is considered to be a candidate target of the MMS. The majority of the malaria patients near the dam reservoir are the followings: gambier farmers and their families, who are sleeping the islands of the reservoir, fishermen and their families, and those lining in houses by the dam or surrounded by a pond or bush. Due to insufficient data, however, it was unable to identify whether the dam reservoir construction itself significantly contributed the high morbidity rate.

5.1.7.2 Diarrhea and Scabies

Diarrhea and scabies thought to be related to quality and quantity of water supply, respectively. Although it is not possible to conclude that the incidence in the area within the project site is statistically greater than other areas, morbidity rates in the area are generally high. This is probably attributed to poor water supply in the resettled villages.

5.1.8 Cultural Heritage

A feasibility study of the dam conducted during 1982-1984 concluded that economically optimum highest water level (HWL) of the dam was 100 m. However, this option would cause submerging a Buddhist temple remains (Muara Takus) accompanied with a part of a village with population of 8,572. Considering the conservation of the remains, it was decided to lower the HWL to 85 m. As a result, it remained intact. Cost of preserving the heritage is decrease of benefit/cost ratio, and it can not be regarded inexpensive. There seems to be no Buddhist among the local people, and the remains is unlikely important for local people as a religious facility. However, it is important not only as a cultural heritage but also as a possible resource attracting tourists.

For the promotion of tourism, the temple underwent overall restrations between 1978 and 1992 by the financial assistance of UNESCO. The number of visitors after the restoration increased rapidly; from 500 – 1,000 visitors annually before the restoration to 10,006 in 2000 and 7,012 in 2001. Besides the promotion by the Government, increasing number of small shops and restaurants are opened near the dam site and the temple taking advantages of their location. Remaining issue is to prepare a plan to adequately promote tourism in order to contribute local economies although it is out of the project scope. For example, proper management existing toilet facility and establishment of a facility for visitors to have a rest around the temple may be included in the plan,

5.1.9 Evaluation of Environmental Management

Both of the Environmental Management Plan (RKL) and the Environmental Monitoring Plan (RPL) have substantially failed. (Note : Refer to JBIC Comment 10.) Except for the water quality monitoring, introduction of fish into reservoir, and establishment of fish farm, few substantial action was undertaken. Monitoring of water quality and wildlife are inadequate and incomplete to properly assess the environmental situation. While some of environmental impacts seem to be very significant, it is difficult to recognize the degree of problems due to the lack of monitoring data.

Deforestation in the catchments is obviously serious, while it is difficult to conclude to how much extent the dam construction is facilitating the deforestation. The deforestation is directly impacting on wildlife and indirectly affecting the life of the dam reservoir by increasing sedimentation. Relocation of elephants was the only substantive measures for wildlife protection, but no monitoring was carried out and the fate of the elephant is unknown. There is a great concern about the fate of relocated elephants, as the situation of the relocation site does not seem to be adequately managed.

Major factor causing this poor environmental management and monitoring seems to be lack of mechanism to undertake necessary measures. PECT, a task force established to implement RKL and RPL, does not seem to function properly and to remain a nominal setting. It is assumed that there is no workable mechanism encouraging relevant agencies to implement RKL and RPL. As a result, there is not enough incentive for other agencies than PLN to adequately and continuously implement PKL and RPL. On the other hand, no authority is given to PLN to compel other agencies to the implementation, although PLN would be directly benefited by the proper implementation of them; lifetime of the reservoir would be prolonged. It is also very likely that an agency responsible for the management of the relocation site of the elephants, the Giam Siak Kecil Forest Wildlife Reserve, has not had any incentives to take care of the relocated elephants because the agency responsible the reserve, far from the project site, would not be benefited from taking care of the relocated elephants[2].

Lack of human and financial resource seems to be another factor causing poor implementation of RPL and RKL. As this is generally common in developing countries and in the projected area, financial mechanism should be established solely to implement RKL and RPL, and this should have been included in the project cost. Incomplete environmental monitoring can also be attributed to insufficient human and/or financial resources.

5.1.10 Conclusions and Recommendations about Environmental Impact

5.1.10.1 Implementation Mechanism

It was revealed that adequate implementation mechanism for environmental management and monitoring was lacking in this project, and that only very limited environmental information has been eventually accumulated. Without sufficient information, proper management can not be conducted. For example, data on fish and water quality are almost unavailable. As a result, it is not possible to identify necessary measures to conserve fauna in the reservoir. It is difficult to evaluate impact of introduction of foreign fish species, although the impact seems to be negative.

Identifying the seriousness of environmental impact and establishing the proper environmental management and monitoring mechanism are chicken and egg issue. Both of them can be facilitated in tandem. Without knowing serious situations, incentive for environmental management and monitoring will remain weak because such activities will not directly benefit relevant agencies in short terms. Without such a mechanism, quick identification of environmental issues is difficult before the issue becoming a serious problem.

Since environment is a cross-cutting issue and a number of agencies are generally involved, it is crucial to

[2] Unlike developed countries, many government agencies in developing countries are facing lacking both of human and financial resources, and the agency of the Giam Siak Kecil Forest Wildlife Reserve is probably not the exception. If additional fund is not allocated, it is unlikely that the agency will allocate its limited resources to take adequate care of the relocated elephants.

establish a framework to facilitate every relevant agency to implement necessary measures. For example, in this case, forest conservation in the catchment area is crucial not only for wildlife but also for the dam reservoir. It is reported that forest management in Indonesia is generally insufficient. Therefore, it is necessary for the Department of Forest to pay some additional attentions in order to conserve the forest lands in the catchment area. However, there seems to be no incentive for the Department to pay such additional attention because the department is uninterested in the dam's lifetime. On the other hand, dam reservoir is attracting local people, road constructed by the dam development is facilitating access to protected forests, and incomplete rubber plantation is forcing some resettlers to encroach forest. As a result, further deforestation is taking place rapidly and increasing sedimentation. Since the forest conservation in the catchment area directly benefit PLN, it should be much more involved in the forest issues. However, bureaucracy within the government and/or unawareness of PLN seems to hinder the involvement of PLN. Information exchange between relevant agencies are important to avoid this, and workable framework binding the agencies is necessary to facilitate the information exchange.

Holding a coordination meeting of relevant agency can be a first step as the framework. If a particular authority, such as an authority compelling implementation to other agencies, can not be given to a single agency, there is a need to create incentives to implement the measures. Provision of a special fund can be a possible option as the agencies are generally facing financial problems.

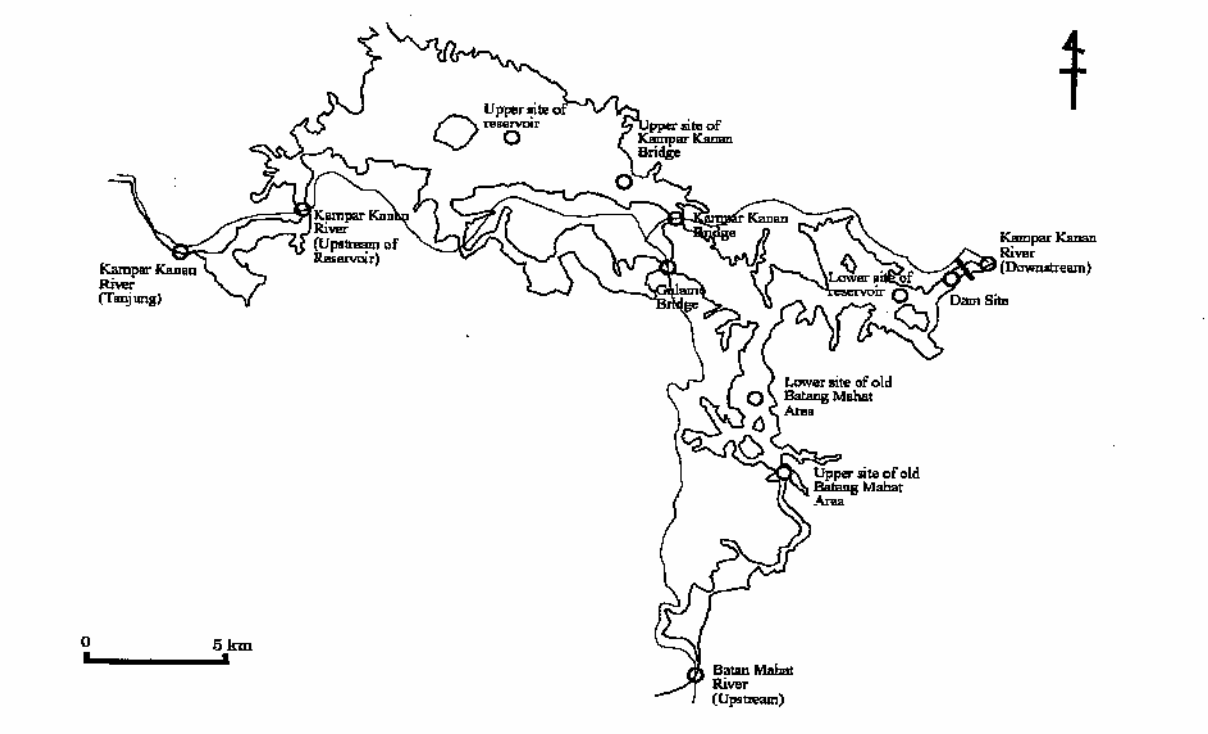
Under this situation, foreign donors can support the recipient to establish the mechanism. In this case, a part of the project cost could be allocated to establish a fund for proper implementation of RPL and PKL. PLN can be a responsible agency for the management of the fund because PLN will be most benefited from proper environmental management and monitoring and it has a stronger incentive to adequately utilize this fund than other agencies. If the fund is provided from the donor to PLN, PLN will automatically have a practical authority to implement RPL and PKL even without formal delegation of the authority to PLN. Donors sometime only pay attention to institutional capacity regarding the "core project" (dam construction and operation in this case), and overlook importance of such capacities as environmental monitoring which seems to be rather marginal at the appraisal stage. Greater attention should be paid to this for environmental conservation and long-term project sustainability. If necessary, the donor should suggest the recipient to establish a necessary fund for such a purpose.

In this case, it is not clear why BAPEDAL has not been involved in the project. Since BAPEDAL has authority and capability regarding monitoring environment in the whole Indonesia, it would contribute to improve the capacity of the monitoring. For example, it would be able to improve the water quality monitoring. If necessary, the capacity of the Environmental Management Center (EMC) in Jakarta, which was provided by the technical assistance and grant aid from Japanese Government, would also be utilized. Since both of this project and EMC were provided by Japanese ODA, it does not seem to be impossible to coordinate them in order to adequately manage the environment of the project areas by the suggestion of the Japanese Government.

5.1.10.2 Scope of the work

In order to make the dam project sustainable, it is indispensable to seriously consider forest management in the catchment area. Cost for the forest management including technical assistances should have been included into the project cost. Particularly the cost for the management and monitoring of the Giam Siak Kecil Forest Wildlife Reserve would have been likely overlooked at the time of project appraisal because the reserve is away form the catchment area. Once the elephant were relocated to outside of the project site, implementing agency, PLN, would likely "forget" them. In such a case the donor can play a role to suggest the recipient to include the cost of environmental management conducted "outside" of the catchment area, and encourages relevant agency to implement them. It is recommended that the donor should pay attentions to the environmental management not only of the catchment area but also whole relevant areas (e.g. management of Giam Siak Kecil Forest Wildlife Reserve as for this project) as early stage of the project cycle as possible (at latest at the appraisal).

Figure 1: Location of Glamo Bridge



Picture 1: Entrance of Giam Siak Kecil Forest Wildlife Reserve.

Picture 2: An acacia plantation near Giam Siak Kecil Forest Wildlife Reserve.

Picture 3: An acacia plantation near Giam Siak Kecil Forest Wildlife Reserve.

Picture 4: Numbers of tracks loaded with acacia timbers. It was told that many of them were waiting for night to bring them out, but the reason was unknown.

All pictures were taken February 2002 by Fujikura

5.2 Socio-Economic Impact

5.2.1 The Resettlement Process

Since the commercial operation of the Kotapanjang Power Plant, the supply of electricity has increased. To arrive at the present stage of commercial operation, it has passed through several complexities. Relocating the inhabitants of Kotapanjang might have not been an easy task to undertake. The main implication of resettlement program is a change in living condition.

The section attempts to analyze the social economic implication of the Kotapanjang resettlement program. The focus is on the implication for the local economic activities in the resettlement villages. How has the resettlement program changed the structure of economic activities? How far has the change resulted in better living condition of the resettlers?

The Kotapanjang Dam project has successfully resettled 4,886 households from eight villages of Riau province and two villages of Sumatra province.

Table 5-2-1 shows the number of population, resettled villages households, and average family size across 16 newly developed resettlement villages. According to the 2000 Population Census, the population of resettlement villages has reached 22,074 inhabitants. The number of population by village ranges from 384 to 2,785 inhabitants. There are 5,194 resettled villages households. The number of households by the resettlement village ranges from 178 to 599. The average family size across villages ranges between 2 and 5 members per household.

Table: 5-2-1

No.	Villages	Number Of Population*	Number of Resettled Villages Households	Average Family Size
	Riau			
1	Pulau Gadang	1,163	333	3
2	Koto Mesjid	1,235	259	5
3	Ranah Sungkai	1,354	337	4
4	Lubuk Agung	947	200	5
5	Batu Bersurat	2,434	522	5
6	Binamang	903	178	5
7	Pongkai Baru	384	200	2
8	Mayang Pongkai	818	259	3
9	Pongkai Istiqomah	939	187	5
10	Tanjung Alai	1,583	313	5
11	Muara Takus	1,056	244	4
12	Koto Tuo	2,785	599	5
13	Muara Mahat Baru	2,335	477	5
14	Gunung Bungsu	1,171	241	5
	West Sumatra			
15	Tanjung Pauh	1,620	450	4
16	Tanjung Balik	1,347	350	4
	Total	22074	5149	4

5.2.2 Resettlement and Changes in the Structure of Economic Activities

Table 5-2-2 shows the structure of economic activities before and after relocation. There are primary, secondary, and tertiary economic activities. Our concern is on primary economic activities, which contribute important share to the main source of income among resettled villagers. Economic activities are

mainly agriculture, ranging from rice, non-rice food, rubber and plantation, fruits, fishery and forestry. The most important source of income is rubber plantation. Before relocation, almost 60% of households' earnings resulted from rubber plantation. Rice agriculture came to next important position after rubber plantation, which accounted for 11% of households' primary economic activities. The working as labor for wage contributed more than 5% to primary economic activities. The rest individually contributed less than 5% to primary economic activities. The dominant rubber economy was very significant before relocation.

Table 5-2-2: The Structure of Economic Activities Before and After Relocation (%)

No.	Source of Income	Primary		Secondary		Tertiary	
		Before	After	Before	After	Before	After
1	Rice Field	11.0	0.6	11.8	0.1	1.6	-
2	Non-Rice Food Crops	2.0	1.3	4.9	0.9	0.7	0.2
3	Rubber Plantation	59.7	19.6	7.8	3.2	0.5	0.2
4	Palm Plantation	0.4	8.6	0.2	1.0	0.1	0.0
5	Fruits	0.9	0.6	9.3	1.3	7.2	0.6
6	Coffee	0.1	0.1	0.9	0.1	1.0	-
7	Fishery	1.5	19.4	4.9	2.6	3.1	0.4
8	Livestock	0.2	1.1	2.4	0.8	1.6	0.3
9	Agro-processing	2.6	2.7	0.6	0.3	2.2	0.2
10	Transportation	2.8	2.4	0.6	0.2	0.0	-
11	Collecting wood	0.9	2.1	1.4	0.3	0.7	-
12	Forestry	0.4	1.0	0.7	0.5	0.6	0.0
13	Carpenter	1.0	2.6	0.7	0.7	0.2	0.1
14	Retailed Trade	3.2	4.1	1.9	1.8	0.5	0.4
15	Civil Servant	3.6	4.2	0.1	0.5	0.1	0.0
16	Waged Labor	5.7	12.6	2.0	2.6	0.7	0.4
17	Remittance	0.1	2.6	0.2	0.5	-	0.2
18	Subsidy	0.0	1.3	0.1	0.1	-	0.0
19	Borrowing	0.1	0.1	0.2	0.5	0.1	0.4
20	Others	2.2	4.6	17.4	1.7	14.0	1.8
21	Gambir Plantation	1.0	2.1	0.9	0.5	0.1	-
22	None	0.6	6.2	31.2	79.9	64.8	94.7
	Total	100.0	100.0	100.0	100.0	100.0	100.0

Notes: - not existent.

Source: Calculated from JBIC Data

The resettlement program has changed the dominant structure of the rural economy of Kotapanjang. The structure of primary economic activities after relocation showed a reducing importance of rubber plantation. Although rubber plantation remained the largest as the source of primary economic activities, the share fell from around 60% to less 20%. By economic tradition of old Kotapanjang, most people were accustomed to living from rubber plantation. Now the role of rubber has diminished substantially. The contribution of rice fell from 11% to less than 1%. The significant drop in the role of rubber and rice indicated that a substantial number of people were in the condition of losing traditional occupation. Although fishery, labor for wage and palm plantation appeared to contribute 19%, 13% and 9% respectively to primary economic activities, the number of families having no primary economic activities rose from 0.6% to 6.2%. Fishery appears to accommodate almost 20% of all households. It used to provide main source of income for less than 2% of households. However, fishery was never planned by the project to play an important economic role for the project-affected families.

The present structure of economic activities is not a process of industrializing where the declining role of agriculture is replaced by the increasing role of non-agriculture economic activities. It is an evidence for the failure of rubber plantation to provide living for the resettled families. (Note : Refer to JBIC Comment 11.) Rubber plantation was planned to remain the main source of income, but the reality did not come according to what had been in the mind of every participant before accepting the relocation. Every participant understood there would be 2 ha productive rubber plantation welcoming them in the resettlement villages. (Note : Refer to JBIC Comment 11.) The reality did not agree with the plan.

According to JBIC SAPS Report 2002, There was only 15-20 of the rubber plantation was successfully grown in Riau and West Sumatra regency in 1996. In Riau Province, the rehabilitation program over an area of 6,892 ha took place in 1999 and 2000. A considerable proportion of the replanted rubber has grown satisfactory as shown in table below.

Table 5-2-3: Classification of Growth Condition in Rubber Plantings in Riau

Class	Definition	Planting in Year 2000	Planting in Year 2001
Class A	Satisfactory developed	2,886 ha (42.9%)	0 ha (0.0 %)
Class B	Supplying vacant points is required at the rate of 10 % of planting area on average	2,000 ha (29.7%)	104 ha (85.9%)
Class C	Supplying vacant points is required at the rate of 35 % of planting area on average	1,419 ha (21.1 %)	17 ha (14.1 %)
Class D	Replanting is required.	424 ha (6.4 %)	0 ha (0 %)
Total		6,729 ha (100 %)	121 ha (0 %)

Source: JBIC

In West Sumatra Province, on the other hand, the rehabilitation was undertaken over an area of 1,022 ha in 1998 and 1999. However, approximately three months after planting, most of the rubber was destroyed by fire. Therefore, the government provided additional living support for the resettled families in the area.

Table 5-2-4: Selected Main Source of Income
Before and After Relocation by Resettled Villages (%)

No.	Villages	Rice Field		Rubber Plantation		Palm Plantation	
		Before	Now	Before	Now	Before	Now
1	Pulau Gadang	4.1	1.7	72.4	70.7	-	-
2	Koto Mesjid	-	-	77.0	53.1	-	0.5
3	Ranah Sungkai	7.8	0.8	84.4	21.9	0.5	2.0
4	Lubuk Agung	42.5	-	3.4	90.1	1.1	0.9
5	Batu Bersurat	29.7	-	46.0	5.2	0.4	1.0
6	Binamang	20.2	-	46.8	1.9	0.9	-
7	Pongkai Baru	-	-	87.0	1.4	-	-
8	Mayang Pongkai	32.4	-	51.4	0.8	1.4	93.8
9	Pongkai Istiqomah	2.8	0.6	90.4	1.1	-	-
10	Tanjung Alai	0.6	-	52.9	29.5	0.6	-
11	Muara Takus	2.7	-	87.3	17.7	-	-
12	Koto Tuo	4.2	0.6	84.0	1.2	0.2	0.2
13	Muara Mahat Baru	1.3	0.3	32.3	0.7	2.0	73.0
14	Gunung Bungsu	83.6	-	9.8	54.2	-	-
15	Tanjung Pauh	2.9	0.9	55.4	16.5	-	0.9
16	Tanjung Balik	4.9	-	34.2	5.8	-	-
Total		11.0	0.6	59.7	19.6	0.4	8.6

Notes: - not existent. Source: Calculated from JBIC Data

Table 5-2-4 shows the role of rubber plantation as a main source of income in almost all villages in Kotapanjang region. The role ranges from 34% for Tanjung Balik to 90% for Pongkai Istiqomah. The reality showed an ironically significant reduction in the role of rubber economic activity. Rubber plantation, which used to be the most dominant source of income, it is now left to provide only for about 20% of households. Although rice field was the most important economic activity after rubber plantation for Kotapanjang as a whole, the dominance was found only at Gunung Bungsu and Lubuk Agung. Economic activity in the rice field was the main source of income for more than 80% of households in Gunung Bungsu and for more than 40% of households in Lubuk Agung. The rice economic activity in other villages ranged from 1% for Muara Mahat Baru to 32% for Mayang Pongkai. Almost 10% of resettlement households reported that they are living from palm plantation activity. The appearance of palm plantation

was planned by the project to support households living, particularly for the people of Mayang Pongkai and Muara Mahat Baru. The people of these two villages chose to relocate following transmigration model.

The dominance of agricultural activities still characterized the economic structure of Kotapanjang resettlement villages. Although agriculture is still absorbing almost 70% of households, the source of living is no longer under the control of rubber plantation. The single dominant rubber plantation as the main source of living has really become the past history of Kotapanjang village's economy. At the same time, fishery sector appears to replace the reducing role of rubber as the main source of income.

The process of development transformation is reflected in the increasing importance of non-agricultural in the total economy. Although agriculture remains a dominant sector, non-agriculture activities have increased its contribution from around 20% to around 30% in providing main source of income for resettlement villages' households. This report groups economic activities originating from retailed trading, carpenter, transportation, processing agriculture products, public servant and waged labor into non-agricultural sector.

Table 5-2-5: Waged Labor and Unemployment by Villages
Before and After Relocation(%)

No.	Villages	Waged Labor		Unemployment					
				Primary		Secondary		Tertiary	
		Before	Now	Before	Now	Before	Now	Before	Now
1	Pulau Gadang	1.5	0.6	7.1	9.4	76.9	89.9	95.3	100.0
2	Koto Mesjid	0.4	0.5	-	-	31.0	19.5	97.1	94.9
3	Ranah Sungkai	3.9	36.0	-	9.3	37.6	92.3	38.5	96.9
4	Lubuk Agung	-	0.9	-	1.8	13.5	96.2	99.5	100.0
5	Batu Bersurat	3.3	11.6	-	4.3	-	94.3	79.9	100.0
6	Binamang	14.7	2.5	-	1.9	44.5	81.0	79.0	99.4
7	Pongkai Baru	2.2	76.8	2.2	1.4	-	86.3	-	100.0
8	Mayang Pongkai	1.4	1.5	-	-	-	83.5	26.2	93.0
9	Pongkai Istiqomah	0.6	1.7	1.1	4.5	5.9	99.4	12.9	100.0
10	Tanjung Alai	11.5	13.1	0.6	5.5	91.4	99.6	-	88.6
11	Muara Takus	2.0	2.0	-	0.7	43.7	94.1	99.0	100.0
12	Koto Tuo	0.7	10.6	0.7	28.3	-	96.7	-	98.8
13	Muara Mahat Baru	4.6	1.7	-	0.7	5.0	75.2	83.9	94.0
14	Gunung Bungsu	1.6	21.1	-	0.7	11.7	69.6	10.0	51.1
15	Tanjung	11.5	19.4	-	0.7	80.9	77.9	98.9	81.7
16	Karya Bhakti	55.8		-	-	81.3	66.7	100.0	97.7
17	Gunung Malero	5.4	3.7	-	1.2	44.7	57.4	3.2	-
18	Tanjung Pauh	10.0	21.6	-	-	15.8	55.7	69.4	94.0
19	Tanjung Balik	16.5	27.6	-	-		21.4	27.6	77.2
Total		5.7	12.6	0.6	6.2	31.2	79.9	64.8	94.7

Notes: - not existent. Source: Calculated from JBIC Data

At the resettlement villages, working as a labor for wage accounts for almost 13% of total households as presented in Table 5-2-5. In comparison to the situation before relocation, the role of waged labor as the main source of income among households has become more than double. Households without main source of income has increased from less than 1% before relocation to more than 6% at the resettlement villages.

Resettlements have brought changes to people way of living. These changes are reflected in the structure of main occupation among households. Some households are still continuing their usual main occupation. For example, if they used to work at rubber plantation, they are still living from rubber economic activity at present. The fact shows that only minority of households belong to this group. While majority of households at the resettlement villages have entered new economic ventures.

If we look at rubber plantation employment, which used to be the dominant sector, it is now less than 14% of households who reported that they continue to living from rubber plantation. Only around 5% of households who reported that living from rubber plantation are really new for them. Overall, more than two third of households who used to live from rubber plantation are trying to get into new economic ventures.

Table 5-2-6: The Distribution of Households by Resettlement Villages and Current Living Condition

No.	Villages	Current Living Condition (%)			Total
		Better	Same	Worse	(%)
1	Pulau Gadang	50.6	39.1	10.3	100.0
2	Koto Mesjid	72.3	26.1	1.6	100.0
3	Ranah Sungkai	2.3	9.4	88.3	100.0
4	Lubuk Agung	4.5	6.1	89.4	100.0
5	Batu Bersurat	2.4	5.3	92.3	100.0
6	Binamang	4.8	1.8	93.4	100.0
7	Pongkai Baru	-	5.2	94.8	100.0
8	Mayang Pongkai	67.9	25.8	6.3	100.0
9	Pongkai Istiqomah	2.7	9.6	87.7	100.0
10	Tanjung Alai	2.3	6.5	91.2	100.0
11	Muara Takus	0.9	3.7	95.3	100.0
12	Koto Tuo	7.3	10.6	82.1	100.0
13	Muara Mahat Baru	43.6	24.6	31.8	100.0
14	Gunung Bungsu	11.3	17.0	71.7	100.0
15	Tanjung Pauh	18.6	9.8	71.6	100.0
16	Tanjung Balik	10.3	23.1	66.5	100.0
Total		18.2	14.0	67.8	100.0

Notes: - not existent. Source: Calculated from JBIC Data

The association of rubber and palm economic activities with better living condition are confirmed when we break down the proportion of resettlers' living condition by villages (Table 5-2-6). Most resettlers from Pulau Gadang, Koto Masjid, Mayang Pongkai, and Muara Mahat revealed that their living condition was getting better in the resettlement villages. In the first two villages, rubber plantation remains dominant as primary economic activities. Resettlers in Mayang Pongkai and Muara Mahat Baru joined the palm plantation transmigration program. Resettlers from other villages mostly experienced worse living condition. The explanation again coming back to whether or not the resettlers are having productive source of income according to the initial set up of the resettlement program. The failure of planning implementation has led to the deterioration of resettlers' living condition.

Although the proportion of households with improving living condition is very small, every village shows that there are resettlers that have achieved an improving living condition, except for Pongkai Baru. No resettlers in Pongkai Baru reported that their living condition improved. Almost 95% of resettlers reported their living condition getting worse.

<Comments of JBIC>

Comment 1

2. Efficiency, 2.2 Project Implementation Period (p.6, l.12-)

The Third Party Evaluation states: “JBIC has conducted a supplementary survey in 2002 to address necessary countermeasures and an action plan. This implies that the whole project implementation has not yet perfectly completed despite of the small economical scale of the remaining additional measures. This problem could be avoided by more prudent project preparation.”

The survey above was conducted in support of the Indonesian Government, the project implementing body, indirectly, in recognition of the fact that a part of infrastructure necessary for daily living of residents who had been resettled needs to be improved after the power plant started operation in February 1998. The purpose of the survey was to promote dialogue between the Indonesian Government and resettled residents, and to increase transparency of the action plan (measures intended to solve the problems).

Generally speaking, responsibility for project preparation should be born by the recipient country Government as the project implementator. In the case of this project, the Indonesian Government as the implementator: (1) prepared the Environmental Impact Assessment (EIA) report at the Feasibility Study (F/S) stage during the project preparations; and (2) reviewed and approved the EIA. The EIA described (a) considerations for socio-environmental aspects by drawing up a plan for resettlement of residents and accompanying compensation; (b) considerations for the natural environment by proposing relocation of elephants inhabiting the project area; and (c) considerations for cultural heritages by referring to the conservation of a Buddhist ruin. JBIC understands that the Indonesian Government has taken measures in accordance with the description of the EIA.

Comment 2

2. Efficiency, Table 2-2 (p.6)

Under the Item “Land acquisition and resettlement,” the Third Party Evaluation states: “Started in May 1990 but completion date was unknown.”

JBIC was informed in November 1999 by the Indonesian Government that it was completed in February 1996.

Comment 3

2. Efficiency, 2.3 Project Cost (p.8, l.1-)

The Third Party Evaluation states: “It should be noted that this cost does not include "hidden cost" regarding the adverse impact of the project. As for resettlement of local villages, some of the resettled villagers are still suffering hardships while some others are economically benefiting by aquaculture in their new resettled villages. Current situation of endangered wild species including elephants, which were relocated from the project area to a natural reserve, is unknown. The adverse impact of the project on the wildlife is likely very significant.”

With regard to resettlement, the Indonesian Government has recognized that living conditions of some of the resettled residents need improvements and taken remedial measures by drawing up an action plan based on views and comments of the residents with their participation to the process. JBIC gave indirect support to such efforts by the Indonesian Government through conducting the above survey, etc.

As for wild life including elephants, the Indonesian Government has instructed the project executing agency to appropriately relocate all elephants inhabiting in the project area to a wild life reserve, based on the wild life preservation and monitoring plan drawn up by the Indonesian Government. JBIC has received a report from the Indonesian Government that 36 elephants had been relocated to the Giam Siak Kecil in northern Riau Province.

Comment 4

2. Efficiency, 2.5 Conclusion (p.9, l.8-)

The Third Party Evaluation states: “some of the people resettled from submerged areas are still suffering hardships due to inadequate preparation of resettlement village. This could be avoided by more cautious project preparation. It is reported the delay of the project implementation of 23 months, but some more preparation period should have been allocated for the resettlement.”

As stated in Comment 1 above, JBIC understands that the Indonesian Government as the project implementing body, took necessary measures at the project preparation stage.

Comment 5

3. Effectiveness, 3.8 Conclusion and Recommendation (p.20, l.5-)

The Third Party Evaluation states: “It is very irony knowing that during high level of water availability, free discharged must be done, while during lean water availability electricity production is lower and electricity shedding must be implemented.”

According to the PLN, the project executing agency, the power plant has been operating in a satisfactory manner, generating 483 GWh/year in 2001, 577 GWh/year in 2002, and 706 GWh/year in 2003, which amounted to 130% of the planned power output (542 GWh/year).

Dam-type hydro electric power plants are aimed at promoting the equalization of power generation throughout rainy season and dry season by storing water in the dam. The construction of the dam has thus helped stabilize power generation during the dry season. Since the project area is located in the monsoon region and has a large volume of rainfall during the rainy season, releasing redundant water is not only natural but also reasonable for preventing disasters.

Comment 6

3. Effectiveness, 3-8 Conclusion and Recommendation (p.20, l.16- & l.21-)

"(iv) The calculated IRRs found to be much lower than those estimated during the design activity might stem from the fact that it was overestimated at the appraisal. Strategic measures to improve profitability level of the plant are unnegotiably required for the HEPP to be more effective. Otherwise, effectiveness of the Kotapanjang HEPP would be in a more serious danger."

"(v) Introduction of a more liberalized market price of the Indonesian electricity that might be applied in the near future is strongly recommended to meet possible profitability of the industry in realizing industrial sustainability, facing the future demand that is expected to be significantly improving. This introduction is very realistic in nature knowing the fact that under liberalized market system, government intervention would be soon minimized."

4. Sustainability, 4.8 Conclusion and Recommendation (p.26, l.37-)

"(i) It is a real irony. Despite the fact that captive market in the form of electricity demand was very largely available, financial performance of the company is observed to be extremely poor during the first years of Kotapanjang HEPP operation. In addition to the country's monetary crisis, it was found out that factors constraining that operational performance could be classified as the external and internal factors. Among other external factors are: electricity pricing policy and inflexible electricity market. While among internal factors are high operational cost and operational inefficiency."

The three statements quoted above mixed up the effectiveness and sustainability of Kotapanjang HEPP with the corporate sustainability of the PLN, the corporate entity of the project executing agency.

The financial performance of PLN worsened from 1997 through 2000. It was attributable to: (a) increases in power generation costs, primarily fuel cost; (b) increases in purchasing prices of electricity (mainly denominated in the dollar) from Independent Power Producers (IPPs); and (c) a smaller rise in electricity rates relative to these increases—all in the aftermath of a plunge in the value of the local currency (Rupiah) against the US dollar in the Asian Currency crisis.*[1] To improve financial performance, PLN has been making efforts to review the price structure and contracts with IPPs, improve efficiency in corporate management, improve the efficiency of power distribution (by reducing technical losses) and shift fuel sources to gas.

In the power sector as a whole, Indonesian Government is tackling financial restructuring as well as corporate realignment of the PLN, and a phased increase in electricity prices to appropriate levels, while encouraging private sector investment by relaxing regulations in the power market. With these measures, it is projected that PLN would turn into surplus from fiscal 2004. There are advances in the New Power Utility Law (2002), as it includes provisions introducing competition in the power generation and retail segments (see Comment 12 Sustainability below).

Comment 7

5. Impact, 5.1.3 Sedimentation (p.31, l.36-)

The Third Party Evaluation states: "While RKL and RPL recommended some actions to regulate sedimentations, almost no substantial action, such as adequate forest management or soil conservation, has been reported to be undertaken."

In 2003, implementation plans and designs of the creation of the green areas (500 ha) in the vicinity of the reservoir of the dam, the reforestation of the protected forest (500 ha) and the construction of check dams and protection dams (15 each) in the Kampar river basin, etc. were prepared and scheduled to be implemented from now on.

Comment 8

5. Impact, 5.1.4.1 Forest (p.32, l.4- & l.23-)

The Third Party Evaluation states: "No substantial action for forest conservation proposed in RKL and RPL, such as forest preservation at steep slope, settlement regulation, and monitor encroachment, was undertaken" and "It is not clear how the dam construction itself has affected this deforestation, but it should be noted: a) primary forest cover has been removed from the most of the land in the

[1] As a result of a plunge of the Rupiah against the dollar, the sum of the purchasing price of electricity and fuel cost rose by 487.3%, from Rp. 4,663,998 million in 1997 to Rp. 22,724,436 million in 2001. The sales-cost ratio accordingly jumped from 41.9% in 1997 to 79.4% in 2001. In contrast, the average electricity rate only rose by 197.8%, from Rp. 169.13 in 1997 to Rp. 334.55 in 2001.

immediate vicinity of the reservoir, b) logging remains a significant commercial activity around the reservoir, and from the Kampar Kanan bridge it is not unusual to see boat trains towing a number of logs, c) the construction of new road facilitated access to forest, and d) resettlers have likely encroached forests due to failure of promised rubber plantation."

As for the former, as we understand, the Indonesian side is addressing the issues raised in Comment 7: in 2003, implementation plans and designs of the creation of the green areas (500 ha) in the vicinity of the reservoir of the dam, the reforestation of the protected forest (500 ha) and the construction of check dams and protection dams (15 each) in the Kampar river basin, etc. were prepared and scheduled to be implemented from now on. Regarding the degree of deforestation, the base of its calculation in 1985, 2,142 square kilometers, is an area designated protected forest, and whether this area used to have actual forest coverage is not clear.

Regarding the latter, as the Evaluation report states "it is not clear how dam construction itself has affected this deforestation," there is no clear cause-effect link involving this project.

Comment 9

5. Impact, 5.1.4.2 Wildlife (p.33, l.10-)

The Third Party Evaluation states: "the monitoring of the relocated elephants and the protection measures of the reserve did not seem to be adequate."

As stated in Comment 3 above, the Indonesian Government, the project implementing body, has made considerations for protecting elephants from the initial project plan, and, accordingly, they were relocated to a wildlife reserve on its own responsibility. However, there is a possibility that after relocation, political and economic turmoil after 1997 might have led to deficiency in the protection activity of wildlife.

Comment 10

5. Impact, 5.1.9 Evaluation of Environmental Management (p.35, l.2-)

The Third Party Evaluation states: "Both of the Environmental Management Plan (RKL) and the Environmental Monitoring Plan (RPL) have substantially failed."

JBIC made a proposal to the Indonesian Government, the project implementing body, on an environmental action plan along with other proposals in the survey conducted in 2002 mentioned above to give indirect support to the Indonesian Government from the view point of environmental management and monitoring. We understand that later, in Kampar, Riau Province, environmental

management and monitoring reports were drawn up, fish spawn were released in the reservoir of the dam, and malaria control measures have been taken, etc. In addition, we understand that the Indonesian government has taken other actions for environmental management and monitoring, including community participatory meetings held for the conservation of natural resources and protection of the living environment, with the participation of representatives from the local residents and regional governments.

Comment 11

5. Impact, 5.2.2 Resettlement and Changes in the Structure of Economic Activities (p.41 l.20- & l.24-)

The Third Party Evaluation states: “It is an evidence for the failure of rubber plantation to provide living for the resettled families.” and “Every participant understood there would be 2 ha productive rubber plantation welcoming them in the resettlement villages.”

JBIC made proposals for improving the rubber plantation in giving indirect help to the Indonesian Government, the project implementing body to draw up an action plan in the survey conducted in 2002 mentioned above . JBIC hopes that the situation will be further improved with implementation of the action plan drawn up by the Indonesian Government based on the proposal in the survey.

We may add regarding the population and resettled households in Table 5-2-1 that the Indonesian Government conducted a population survey (December 1990-January 1991) prior to the resettlement and identified the number of the resettled households as 4,886 totaling a population of some 17,000.

Comment 12

In general, the ex-post evaluation report is prepared based on the Criteria for Evaluating Development Assistance of Organisation for Economic Co-operation and Development (OECD) - Development Assistance Committee (DAC) (relevance, efficiency, effectiveness, sustainability and impact). The following comments are intended to complement the Third Party Evaluation report in the area of effectiveness, impact and sustainability.

[Effectiveness**]**

As brisk demand for electricity led to a sharp increase in annual electricity sales volume in central Sumatra, the Kotapanjang HEPP has been showing its substantial effectiveness, accounting for over one quarter of the total electricity supply in central Sumatra in 2003.

As stated in Comment 5, according to PLN, the project executing agency, the power plant has been operating in a satisfactory manner, producing 483 GWh in 2001, 577 GWh in 2002 and 706 GWh in 2003, which amounted to 130 percent of the planned power output (542 GWh) —an indication of adequate effectiveness of Kotapanjang HEPP.

The electricity generated at the Kotapanjang HEPP is transmitted through its link with the grid system serving West Sumatra and Riau provinces (West Sumatra grid system) and the population benefited from it reached 1.05 million households in 2002.

Total Annual Power Output in central Sumatra and Kotapanjang HEPP

Year	1998	1999	2000	2001	2002	2003
Annual Electricity Sales Volume (Whole Region, GWh)	1,671	1,890	2,182	2,396	2,530	2,624
Annual Electricity Generated (Kotapanjang, GWh)	301	393	412	483	577	706
Share (%)	18.0	20.8	18.9	20.2	22.8	26.9

(Source: PLN) (Figures in 2003 are preliminary.)

[Impact**]**

The impact of this project in terms of household electrification rate is as follows. The percentages of household electrification rate in West Sumatra and Riau provinces were 48.69% and 33.83% respectively in 1997. In 2002, these figures rose by 10.67 percentage points to 59.36% in West Sumatra province and by 1.43 percentage points to 35.26% in Riau province. In the case of Riau province, the figure increased despite growth in the number of households.

Percentage of Households Electrified and Growth in the Number of Households over Time

: West Sumatra and Riau Provinces* (Unit: percent)

Year		1997	1998	1999	2000	2001	2002
West Sumatra	Percentage of Households Electrified	48.69	48.22	50.05	56.00	58.16	59.36
	Number of Households	100	107.1	109.6	103.4	104.8	106.5
Riau	Percentage of Households Electrified	33.83	32.78	33.85	36.38	34.23	35.26
	Number of Households	100	110.4	115.6	117.9	133.3	138.9

(Source: PLN) (* The number of households in 1997 is taken to be 100.)

[Sustainability**]**

With regard to the financial performance of the PLN, the operating revenues of PLN come mainly from electricity sales and accession fees (figures quoted hereafter are based on consolidated financial statements). While operating revenues have been rising every year in the past 7 years, these increases have fallen short of increasing operating costs (see Table below). As a result, PLN posted losses at the operating profit level for 6 consecutive fiscal years from 1998 through 2003. In fiscal 2002 and 2003, the asset revaluation (by applying market price principle) that brought a sharp increase in depreciation cost was a main factor causing losses. Suppose the assets were evaluated based on the cost basis as had been done until 2001, the degree of deficit in 2002 should have shrunk substantially due to increase of operating revenue from the phased increases in electricity tariff, even if setting aside an increase in operating revenues from increased power subsidies since 2002. And there would have been operating profit in fiscal 2003. Although net income in 2001 restored profit, this was due to reduced financial expenses with changes in interest payments and repayment periods and government subsidies from the national budget (APBN) (Rp.6,735,209 million). Never did this imply the complete recovery of business performance in the power market. The liquidity ratio, which indicates short-term stability,*[2] and the capital adequacy ratio, which indicates long-term stability,*[3] have shown signs of recovery since 2000. In the latest figures of fiscal 2003, these figures have reached higher levels than in 1997 (see Table below).

These indicators show a trend move toward improvement, even if it still cannot be said that the financial performance of PLN is completely sound. The worsened financial performance of PLN from 1997 through 2000 was attributable to: (a) increases in power generation costs, primarily fuel cost; (b) increases in purchasing prices of electricity (mainly denominated in the dollar) from IPPs; and (c) a smaller rise in electricity rates relative to these increases—all in the aftermath of a plunge in the value of the local currency (Rupiah) against the US dollar in the Asian Currency Crisis.*[4] To improve financial performance, PLN has been making efforts to review the price structure and contracts with IPPs, improve efficiency in corporate management, improve the efficiency of power distribution (by reducing technical losses) and shift fuel sources to gas.

In the power sector as a whole, Indonesian Government is tackling financial restructuring as well as corporate realignment of the PLN, and a phased increase in electricity prices to appropriate levels, while encouraging private sector investment by relaxing regulations in the power market. With

[2] The liquidity ratio = current assets/current liabilities. This is an indicator of the capacity to pay liabilities.
[3] The capital adequacy ratio = own capital/total assets. This is an indicator of stability of financed funds.
[4] As a result of a plunge of the Rupiah against the dollar, the sum of the purchasing price of electricity and fuel cost rose by 487.3%, from Rp. 4,663,998 million in 1997 to Rp. 22,724,436 million in 2001. The sales-cost ratio accordingly jumped from 41.9% in 1997 to 79.4% in 2001. In contrast, the average electricity rate only rose by 197.8%, from Rp. 169.13 in 1997 to Rp. 334.55 in 2001.

these measures, it is projected that PLN would turn into surplus from fiscal 2004. There are advances in the New Power Utility Law (2002), as it includes provisions introducing competition in the power generation and retail segments.

(Consolidated) Income Statements of PLN (1997-2003) (Unit: billion Rupiah)

	1997	1998	1999	2000	2001	2002	2003
Operating Revenues	**11,126**	**14,036**	**15,997**	**22,556**	**28,624**	**44,183**	**54,430**
Electricity Sales	10,877	13,766	15,670	22,139	28,275	39,018	49,809
Others	248	269	326	416	348	5,165	4,621
Operating Expenses	**9,449**	**16,808**	**21,502**	**27,215**	**31,939**	**52,345**	**55,877**
Electricity Purchase	325	1,885	5,082	9,395	8,717	11,169	10,834
Fuel	4,338	9,408	9,691	10,375	14,007	17,957	21,478
Operation & Maintenance	965	924	1,497	1,610	2,630	3,589	4,827
Personnel Costs	1,068	1,018	1,335	1,802	2,086	2,583	3,828
Depreciation Costs	2,250	3,074	3,224	3,229	3,404	15,627	12,745
Others	501	495	670	802	1,094	1,420	2,165
Operating Profit	**1,676**	**-2,772**	**-5,505**	**-4,659**	**-3,314**	**-8,162**	**-1,446**
Non Operating Income and Expenses	-2,255	-6,382	-5,348	-19,331	3,880	1,584	-1,305
Ordinary Profit	**-579**	**-9,155**	**-10,853**	**-23,990**	**566**	**-6,577**	**-2,752**
Tax	-	-390	-514	-620	-569	-1,814	-1,818
Extraordinary Profits and Losses	-	-	-	-	183	2,333	1,012
Net Income	**-579**	**-9,545**	**-11,368**	**-24,611**	**180**	**-6,059**	**-3,558**

(Source : PLN)

Liquidity Ratio and Capital Adequacy Ratio (Unit : billion Rupiah)

	1997	1998	1999	2000	2001	2002	2003
Current Asset	3,017	6,985	6,456	8,744	11,381	12,893	12,297
Current Liabilities	4,849	17,833	29,722	21,883	24,270	14,846	16,162
Liquidity Ratio (%)	**62.22**	**39.17**	**21.72**	**39.96**	**46.89**	**86.84**	**76.09**
Equity Capital	30,271	23,395	14,506	18,625	19,198	152,084	149,742
Total Assets	60,508	74,460	73,219	77,995	79,885	213,888	207,615

Capital Adequacy Ratio (%)	**50.03**	**31.42**	**19.81**	**23.88**	**24.03**	**71.10**	**72.12**

(Source : PLN)

For your information, see the following page at the JBIC website for this project (in Japanese only).

http://www.jbic.go.jp/autocontents/japanese/news/2003/000039/index3.htm