INDONESIA

East Java Electric Power Transmission and Distribution Network Project(IV)

Report Date: September, 2002
Field Survey: June, 2001

1. Project Profile and Japan's ODA Loan

Location Map of the Project

The Gili Timur Substation

1.1 Background

East Java Province covers an area of 47,922 km^2 and had a population of about 31 million (at appraisal), which was increasing at an annual rate of 1.3%. The geographical area of East Java constitutes only 2.5% of Indonesia, but it accounts for 20% of the country's population and 20% of the country's economic activity, which includes agricultural production and a number of manufacturing industries. The East Java Electric Power Transmission and Distribution Network Project (hereafter the Project) was commenced in June 1971. The first three stages of the Project were completed in October 1975, April 1978 and December 1983, respectively. The power sector in the province had been developed with assistance from the Japanese government, a total of 127.3 billion yen in ODA loans by the time of the appraisal for this project. This had funded 7 other projects, including hydropower electric plants in the Brantas river basin and the Gresik thermal power station.

However, the total capacity of electric power supply in the area was still below demand. As a result, private electric power generation was occupying 65% of electric power generation capacity, and the electrification rate was only 9%. In order to meet growing demand, the Indonesian government proceeded with the construction of a short- and medium-term power transmission and distribution network for Gresik steam power stations 3 and 4 (400MW), and was planning construction of Paiton coal steam power stations 1 and 2 (80MW).

1.2 Objectives

To enable transmission and distribution systems to keep up with increased generation capacity in East Java Province in order to improve the electrification rate and the stability of the electric power grid, and thereby contribute to the regional development of industry and to the public welfare

1.3 Project Scope

1. Transmission Lines
   a. New construction: 150kV-2CCT-68km, 150kV-1CCT-181km
   b. Extension: 150kV-2nd CCT-5km, 70kV-2nd CCT-11km
   c. Rehabilitation: 70kV-2 CCT-11km
2. Substation

a. New construction: 9 places-150/20kV, total capacity-160MVA
b. Extension: 13 places-150/70-20kV
c. Provision: 1×30MVA 150 (70)/20KV mobile transformer

3. Distribution System

Construction and installation of medium and low voltage distribution transformers, service equipment, and sectionalizing switches

1.4 Borrower/ Executing Agency

Government of the Republic of Indonesia / Perusahaan Umum Listrik Negara (PLN)

1.5 Outline of Loan Agreement

Loan Amount Loan Disbursed Amount	14,000 million yen 11,570 million yen
Exchange of Notes Loan Agreement	July, 1984 February, 1985
Terms and Conditions Interest Rate Repayment Period (Grace Period) Procurement	 3.5 % p.a. 30 years (10 years) Partially Untied
Final Disbursement Date	January, 1995

2. Results and Evaluation

2.1 Relevance

The National Five-Year Development Plan, initiated in 1969, outlined the following goals for East Java Province:

i) Further promotion of industrial, commercial and service sector activities in Surabaya and its suburbs;
ii) Intensification of the agricultural sector in the central area of the province, especially plantations and processing industries;
iii) Development of mining and forestry industries in the western area;
iv) Rehabilitation and enhancement of irrigation facilities in the eastern lowlands to increase agricultural production for export; and
v) Development of the eastern area as a center for industry and marine activities.

The government of Indonesia made considerable efforts, during the period covered by the 1st, 2nd and 3rd Five-year Development Plans, to encourage modern economic activities in the country. The resulting economic growth in East Java Province induced demand for electric power, which has increased at an annual rate of 22% over the last decade. Owing to these developments, the Perusahaan Umum Listrik Negara (PLN) has systematically carried out the 1st, 2nd and 3rd stages of the Project, starting in 1971.

In order to meet growing demand, the Indonesian government has proceeded with the construction of large-scale power plants in the province and of a short- and medium-term power transmission and distribution network. After completion of the 3rd stage in November 1983, PLN conducted a long-term master plan and feasibility study for the East Java Transmission System Expansion Project, with technical assistance extended by Japan International Cooperation Agency (JICA). Based on the results of the study, PLN and the Indonesian Government deemed the execution of the 4th stage of the Project (hereafter Stage IV) feasible. Accordingly, Stage IV is considered consistent with the Indonesian Government's Development Plan at that time.

Currently, East Java Province continues to play an important role as the industrial and commercial center of the country. Because of the Project and other related developments, the framework for the transmission and distribution system within the province has nearly matured. With the addition of a 500 kV interconnection trunk line in Java, power supply is no longer limited by the province's local power

generating capacity. However, PLN's planning division predicted[*1] that the Java-Bali system would barely meet demand in the future, even if new power plants planned or under construction were completed on schedule. If power demand indeed increased according to the forecast, power shortages would occur by 2004. To avoid an energy crisis, the Java-Bali grid needs an additional generating capacity of approximately 1,500MW per year and strengthening of the transmission and distribution system. Viewed in this light, it can be said that the Stage IV objective remains relevant.

2.2 Efficiency

2.2.1 Project Scope

The original project scope of Stage IV was envisaged based on the "Long-term Master Plan of East Java Transmission System Expansion Project". However, the construction of the Gresik combined cycle power station (1,500 MW) near Surabaya and its connection to the transmission line system was outside of the plan's parameters. Therefore, the PLN had to establish a system expansion plan to cope with the proposed development of the Gresik power plant and with the additional construction of a 500 kV interconnection trunk line over the island of Java.

To accommodate these changes, PLN had requested engineering consultants to conduct a power system analysis of East Java, including a review of the system expansion plan established by PLN, and to propose necessary modifications. As a result, the scope of the project was modified to conform to actual circumstances at the time, within the allotted budget. Difference between the original project scope and the modified one is shown in table "Comparison of Original Plan and Actual" attached to this report.

2.2.2 Implementation Schedule

The project was completed in May 1994, four years and six months after the originally scheduled completion date of November 1989. This considerable delay was brought about by the following factors:

i) The discovery of gas fields off Madura Island in January 1988 resulted in an unexpected need for the construction of the Gresik power station (1,500 MW) and its associated transmission line system. This unexpected modification of the power development plan forced a review of the original system analysis.
ii) The civil war in Bosnia-Herzegovina delayed the procurement of a disconnecting switch and steel structures by 29 months. The original supplier was a company in Yugoslavia, which was forced to shut down as a result of the war. Eventually, substitutes were purchased from another company.
iii) An Indonesian company was supposed to supply transformer parts, but as a result of a contract dispute, it did not produce them. Manufacturing was undertaken by another company, but by this time the procurement of transformers had been delayed 15 months.

Among the factors above, i) and ii) resulted from unforeseeable circumstances. Factor iii), however, was a controllable risk. After the dispute over the contract price and subsequent non-fulfillment of the contract, necessary actions were taken to remain on schedule.

2.2.3 Project Cost

The actual total project cost was 12.57 billion yen equivalent, 45.4% lower than the appraisal estimate of 23.01 billion yen equivalent. The major reasons for the considerable cost savings were:

i) the rapid appreciation of the Japanese yen against the Indonesian rupiah and the US dollar, and
ii) a lower tender price, resulting from intense competition.

The Japanese yen started to appreciate in value against the US dollar in the second half of the 1980s, and this trend became more dramatic in the 1990s. For example, the yen value in December 1988 (1$= 120 yen) was almost double the value in April 1984 (1$= 235 yen).

As for the Japanese ODA portion, 11.57 billion yen was disbursed, accounting for 82.6% of the approved amount of 14.00 billion yen. Since the ODA loan portion covered 95.2% of total project costs, the portion actually provided by the Government of Indonesia, 18.94 billion rupiah equivalent, was only 49.9 % of its original estimate of 38.02 billion rupiah.

[1] Source: PLN White paper "Immediate and Critical Issues for Decision" October 16, 2000

2.3 Effectiveness

2.3.1 Expansion of the Transmission and Distribution System in the Province

In the late 1980's and mid-90's there was a substantial increase in the capacity of substations and the length of transmission lines, which accompanied the rapid development of power stations. Table 1 indicates the capacity of power stations and the total length of transmission and distribution lines. In the case of transmission lines, while the use of 25-70 kV facilities decreased after the mid-90's, the use of 150 kV and 500 kV facilities progressively increased. Particularly during the 1991-93 period, the length of 150 kV transmission lines increased rapidly to cope with the power station development plan. Currently, a 150 kV transmission line is utilized as a regional and inter-regional backbone, while a 500 kV transmission line unifies the whole transmission grid system on the Island of Java.

Table-1: Power System Development in Indonesia

		88-89	89-90	90-91	91-92	92-93	93-94	1994	1995	2000
Installed Generation Capacity (MW)		8,529	9,088	9,118	10,873	13,600	14,327	14,986	16,109	20,762
Length of Distribution Line (1,000 kmc)	Low Voltage	103.7	114.2	120.9	126.9	138.9	160.9	170.0	194.7	287.5
	Med Voltage	63.4	70.7	77.3	77.4	92.2	105.5	115.5	135.1	216.2
Length of Transmission Line (kmc)	25-70 kV	6,316	6,509	6,206	6,287	6,223	6,284	6,418	5,675	4,945
	150 kV	7,454	7,810	8,316	8,570	10,255	10,975	11,216	12,150	17,102
	500 kV	1,061	1,107	1,148	1,143	1,190	1,502	1,565	1,728	2,774

Source: PLN

Power development in East Java Province progressed smoothly until the early 1990s. However, delays in completing planned power plants, such as the Paiton coal-fired power station (400 MW x 2), caused the province to experience severe energy shortages in the early '90s. Construction of large-scale power stations[*2] was accelerated in the province in order to compensate. Consequently, the expansion/ construction of transmission and distribution facilities was required.

Under Stage IV[*3], ten new substations, one mobile substation, twenty additional transformers, eleven 150 kV transmission lines and five 70 kV transmission lines were built and installed in various locations within East Java Province (see Figure-1). In addition, distribution lines and distribution transformers were installed on Madura Island[*4] and in Kediri Prefecture.

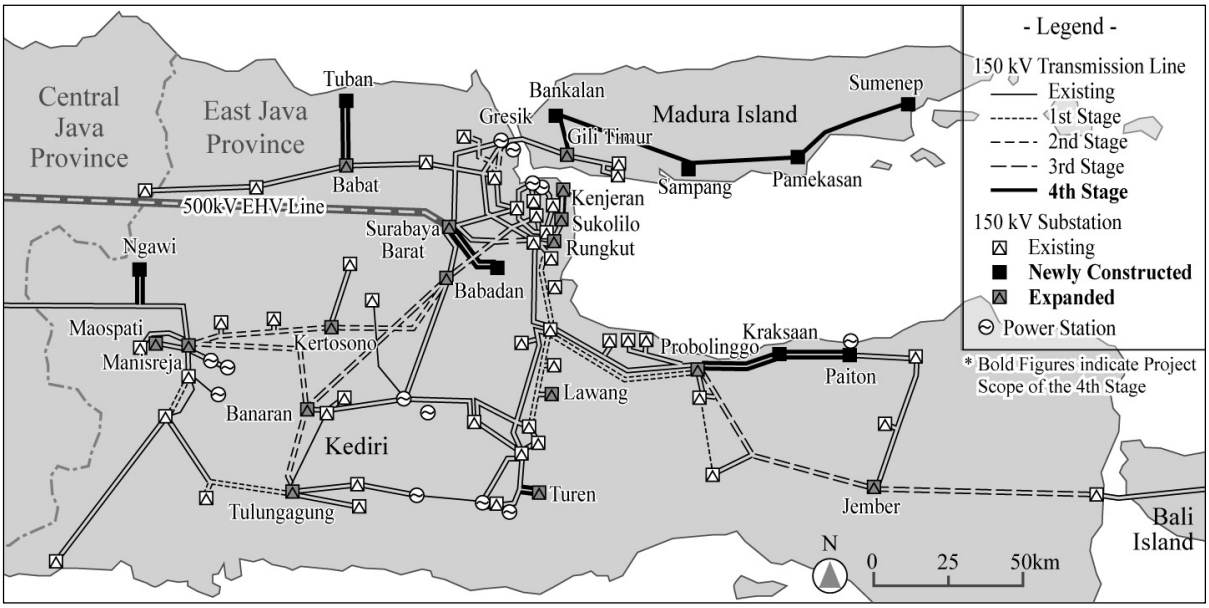

Figure-1: Location Map of the Project (After the completion of Stage IV)

[2] For example, Gresik combined cycle power station (1,500 MW) and Paiton Coal-fired power station (800 MW)

[3] Implementation of the 4th stage of the Project was from April 1987 (start of consulting service) to May 1994 (end of construction work).

[4] Located off the eastern end of Java's north coast, this island measures 160 km from east to west and 35 km north-south, with a total area of roughly 4,250 km^2. It lies only 30-minutes by ferry from Surabaya's harbor of Tanjung Perak. Ferries transporting vehicles of all sizes, passengers and goods, arrive and depart at 15-minute intervals around the clock.

Between the appraisal for Stage IV in 1982 and its completion in 1994, the length of the 150 kV transmission line used in East Java and the capacity of the substation transformer there tripled. The scope of Stage IV was actualized without major deviation. Under the project, a 262.5km circuit of 150 kV transmission lines and substation transformers with a total capacity of 540 MVA were newly constructed/ installed, which accounted for, respectively, 10.5% and 11.4% of the total length/ capacity of East Java Province in 1994.

Distribution lines and distribution transformers were also installed on Madura Island and in the Kendari area in the western part of East Java Province.

Table-2: Contribution of Stage IV to the Transmission and Distribution Facilities in East Java

		1974 (Before the Project)	1982 (Appraisal of The Stage IV)	1991 (Start of the Stage IV)	1994 [(a)] (Completion)	Increased by the Stage IV [(b)]	Contribution Ratio (b)/(a)
Transmission Line	150 kV	105	983	1,868	2,512	262.5	10.45%
	70 kV	342	901	1,479	1,515	56.5	3.73%
(Circuit km)	25, 30 kV	246	354	380	316	0	0.00%
Distribution Line	Low Voltage	N.A	N.A	18,741*	25,040	484	1.93%
(Circuit km)	Mid Voltage	923	5,137	11,336*	14,759	186	1.26%
Substation Transformer (MVA)		337	1,514	N.A	4,655	540.0	11.39%
Distribution Transformer (MVA)		161	1,098	2,079*	2,620	53.0	1.87%

* As of April 1992

Source: PLN, JBIC

2.3.2 Reduction of Transmission and Distribution Loss

During the 1st and 2nd stages of the Project, voltage levels of the transmission lines in the province were 30 to 70 kV. After completion of the 3rd stage of the Project, 150- kV transmission line systems were introduced in high demand areas. Furthermore, a great number of distribution lines were installed in 9 areas of heavy demand in the first three stages of the Project. The T&D (transmission and distribution) loss of 22.68% in 1974 (before the project) was reduced to 11.73% in 1990 as a result.

Table 3 indicates T&D loss during the implementation of Stage IV. The figures clearly show a decreasing trend. Under Stage IV, the 150-kV transmission system in the province was further developed, and shunt capacitors were installed in the Jember substation, both to keep bus voltage within an appropriate range and to reduce T&D loss. After Stage IV, T&D loss in the province fell to 9.07%

Reduction in T&D loss is directly linked to increases in sales volume and revenue. Thus, the reduction of T&D loss has contributed not only to an increase in electricity consumption but also to the financial profitability of PLN. Had T&D loss remained unchanged from 11.73% in 1990, PLN would have lost 107.1 trillion rupiahs[*5] of revenue from 1991 to 1995.

Table-3: Transmission and Distribution Loss of East Java Province

	1974	1990	1991	1992	1993	1994	1995	2000
Generation end Power Supply (GWh)	595	5,226	5,808	6,223	6,893	7,581	8,456	14,366
Transmission and Distribution Loss (GWh)	135	613	586	603	659	727	767	1,231
Energy Sold (GWh)	460	4,613	5,222	5,620	6,234	6,854	7,689	13,135
Transmission and Distribution Loss (%)	22.68	11.73	10.09	9.69	9.56	9.59	9.07	8.57

Data Source: PLN

[5] $\Sigma_{(y=1991\text{-}1995)}$ {Generation-end Power Supply$_y$ * (11.73% - Transmission and Distribution Loss$_y$)/100* Unit Selling Price$_y$}=107.1*10^{12}

2.3.3 Stability of Electricity Supply

Figure 2 indicates SAIDI[*6]/SAIFI[*7] from 1992/93 to 1999 for East Java Province and Madura Island. The figures clearly show a decreasing trend, which signifies a reduction in the frequency and duration of interruptions. The figures for Madura Island in particular indicate remarkable improvements. The project contributed to the stability of the electricity supply, through the introduction of higher voltage regulation; an increase in the transmission and transformation capacity; the formation of a transmission loop at Probolinggo- Paiton- Jember; and the installation of a protective system[*8] in a number of substations.

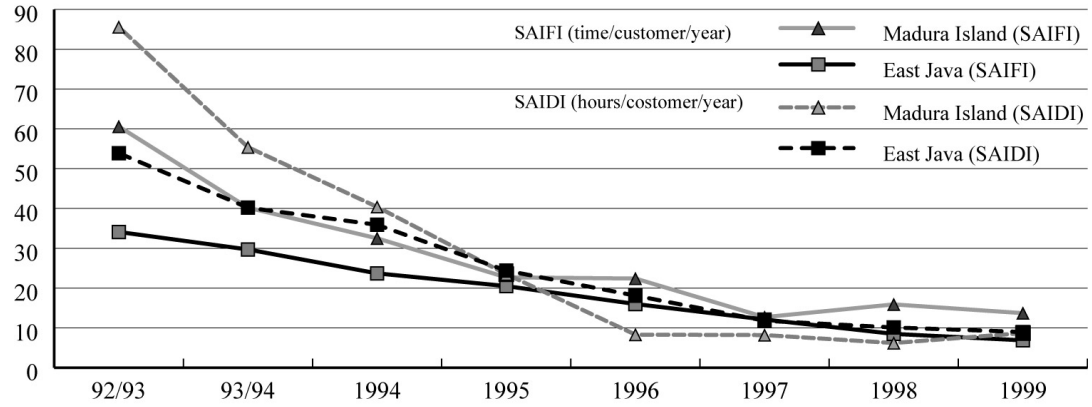

Figure 2: SAIFI and SAIDI within East Java Area and Madura Island Source: PLN

Before Stage IV, Madura Island was not connected to the Java-Bali transmission grid system. The electricity on the Island was supplied by isolated, small-scale diesel power plants with small individual distribution systems. The population on the Island experienced frequent power interruptions and unstable voltage levels.

Under the project plans, a 150 kV transmission line, running the length of the Island, was constructed in 1993. A submarine cable connecting Madura to the Java-Bali grid was constructed the following year, using a British grant. The completion of these projects connected the whole Island to the Java-Bali system and ensured a stable supply of electricity. Evidence of this can be seen in Figure 2.

Admittedly, stable electricity supply is a result not only of this project but also of other generation, transmission and distribution projects. Nevertheless, it is true that this project has played an important role in improving electricity supply in the province, particularly on Madura Island.

2.3.4 Recalculation of Financial Internal Rate of Return (FIRR)

At appraisal, the FIRR of the project was estimated at 11.5%. In that calculation, the benefit of the project was assumed to be the incremental revenue generated by the project. However, in practice it is almost impossible to separate out the project's contribution from PLN's total revenue. In addition, since sufficient data for estimating the actual benefit of the project are not available, a re-evaluation based on actual current data was not carried out.

2.4 Impact

2.4.1 Contribution to the Promotion of Electrification

Because of the 1st, 2nd and 3rd stages of the Project, the transmission line backbone was well developed. However, even after completion of the 3rd stage (1982), the household electrification ratio in the province was only 8.7%. There was also a considerable gap between rural and urban areas in terms of electrification. In the case of Madura Island, the household electrification ratio was only 2.9%, the lowest in East Java.

Under Stage IV, transmission-related facilities (150-kV and 70-kV transmission lines and substation transformers) were constructed or extended. These facilities improved transmission of electricity from existing power stations and increased the supply of electricity to distribution lines, facilitating the

[6] SAIDI (System Average Interruption Duration Index): The cumulative length of power interruption, in hours, that a customer within a certain area experiences, on average, during a year.

[7] SAIFI (System Average Interruption Frequency Index): The average number of times each customer within an area experiences interruption during a year.

[8] Frequency relays were installed in four substations, and carrier relays were furnished in five systems.

electrification of East Java Province. Further, the construction of distribution related facilities (medium/ low voltage distribution lines and distribution transformers) directly contributed to electrification on Madura Island and in the Kendari area.

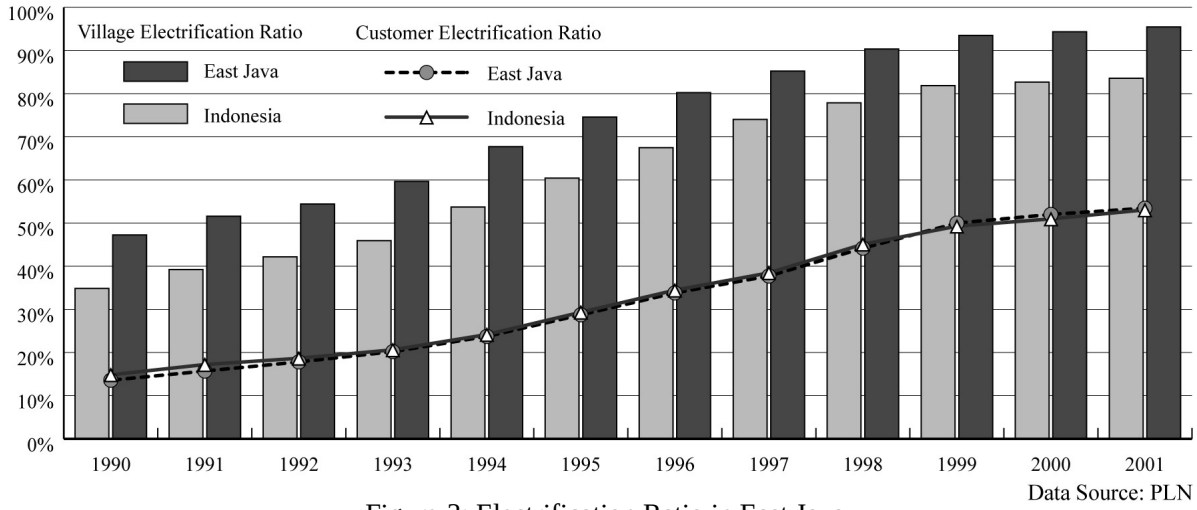

Figure-3: Electrification Ratio in East Java

As the electrification project in the province continued, the household electrification ratio reached 50% in 1999 and village electrification exceeded 90% after 1998. This was made possible by Stage IV's contribution to the expansion of power transmission facilities to both urban and rural areas in Surabaya, Malang, Madiun and Madura Island.

The rate at which the village electrification ratio increased was particularly remarkable on Madura Island. Immediately after the project's completion, the household electrification ratio on the Island was 21.3%[*9], reaching 43.2% in 2000; in the province as a whole it rose to 52.0%. The reduction of the gap between Madura Island and other areas of East Java was achieved by the introduction of the grid transmission system constructed under Stage IV.

2.4.2 Contribution to Making Captive Power Users PLN Customers

The high quality of electric power supply from PLN provides a strong incentive to industrial and commercial consumers to receive power from PLN rather than generate it using their own equipment. However, PLN was unable to satisfy Indonesia's demand for electricity completely. As a result, a large captive power[*10] sector had developed; PLN controlled only 60% of Indonesia's installed capacity at the end of 2000. The captive power sector, in particular the industrial category, controlled about 40% of the country's total electricity. This situation developed because customers were unwilling to rely on PLN's supply. PLN's electricity tariff structure ensured that small electricity users were, in effect, subsidized by larger ones, thus generating a strong financial incentive for the captive customer base.

Table 4 indicates changes in the installed capacity of the captive power sector in East Java Province. The total capacity of the captive power plants has increased year by year. However, the ratio of captive capacity to PLN-controlled capacity decreased from 34.7% at the time of appraisal in 1982 to 20.4% when Stage IV was completed in 1994. Moreover, while total captive power capacity increased, there was a progressive decrease in the pure capacity[*11] of this captive power. The decrease in dependence on captive power is considered to be an indicator of the improvement of PLN's electricity supply. Stage IV made contributions to stable electricity supply, and thus has contributed to turning captive power users into PLN customers.

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[9] This figure was achieved in combination with other PLN projects, which were partially financed by the World Bank.

[10] Captive Power: Power generated by privately owned generation facilities and used for internal consumption.

[11] Pure Capacity: Industry or private operatives that use their own electric power as their main resource in the production process. Standby Capacity: Captive power users that have become customers of PLN.

Table-4: Installed Capacity of the Captive Power Sector in East Java Province (Unit: MVA)

	82/83	92/93	93/94	1994	1995	1996	1997	1998
Pure Capacity	256.0	196.7	199.8	200.9	150.0	142.1	126.1	121.8
Standby Capacity	177.3	734.3	729.5	928.9	1,029.6	1,296.3	1,411.6	1,450.6
Total Capacity	433.3	931.0	929.3	1,129.8	1,179.6	1,438.4	1,537.7	1,572.4

Data Source: PLN

2.4.3 Negative Socio-Economic Impact

Acquisition of land for substations and for the steel towers for transmission lines prior to construction/installation led to legal claims from landowners demanding compensation. The amount of monetary compensation was worked out according to government guidelines, but in some cases, PLN re-routed transmission lines to avoid further conflict. Still, some disputes over the price offered by PLN were brought to court before the parties could arrive at a compromise. According to PLN, in the end, all of these problems reached a settlement.

2.4.4 Environmental Impact

During the implementation period, some trees were cut down on transmission tower and substation sites. In addition, a minimum number of trees/branches were cut down to prevent short-circuiting of the line as a result of contact with trees. Transmission lines, substations and distribution facilities don't emit contaminants, and there have been no reports of any negative environmental impacts so far.

2.5 Sustainability

2.5.1 Profile of the O&M (Operation and Maintenance) Agency

a) Restructuring of PLN

As in many other countries, the electricity sector of Indonesia is in transition, changing its status from a regulated monopoly to a competitive, market-based entity. The Indonesian Government has intended to introduce a competitive power market mechanism, particularly into the Java-Bali area. In line with this strategy, PLN's generation-related assets were transferred to two of PLN's subsidiary companies, namely PT Indonesia Power[*13] and PT Power Generation Java-Bali[*14]. Transmission-related functions were also transferred to P3B (Java-Bali Transmission Company). In addition, PLN is currently preparing four decentralized strategic business units for its distribution business in Java-Bali.

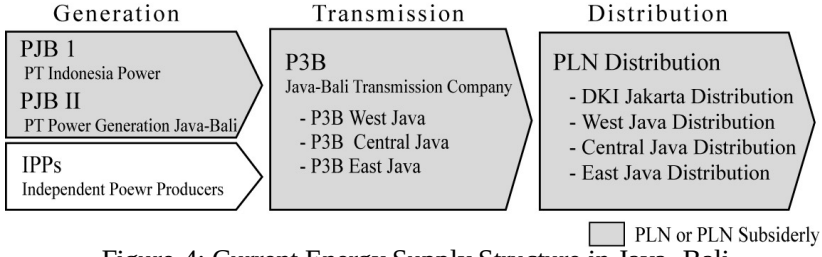

Figure-4: Current Energy Supply Structure in Java- Bali

The P3B is divided into three administrative areas, namely West Java, Central Java and East Java. Except for the 500-kV Extra High Voltage (EHV) transmission line[*15], the ownership and administration of all transmission lines and substations will be transferred to P3B. The company has an obligation to purchase electricity from all generating companies connected to the grid on behalf of the distribution units. It then sells electricity to the distribution units.

The Government is expected to establish a fully competitive power market and lift all restrictions on

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[12] Clearance Space of High Voltage Overhead Transmission Line and Extra High Voltage Overhead Transmission Lines for the Supply of Electric Power, Ministry of Mines and Energy. Guidelines Limit Exposure to 50/60 Hz Electric Magnetic Fields, World Health Organization

[13] PJB-1 became PT Indonesia Power 1st September 2000.

[14] PJB-2 became PT Power Generation Java-Bali 22nd September 2000.

[15] EHV transmission lines will remain the property and monopoly of the PLN head office.

direct contracting between retailers and generating companies. The privatization strategy for the two generation companies and the three distribution units will be implemented after the companies reach profitability, at which time the role of the government will be limited to regulating the competitive power market. However, the actual restructuring and privatization process has not proceeded as planned, and, in essence, PLN remains vertically integrated and state owned.

b) Operation and Maintenance of the Project Facilities

Operation and maintenance of transmission facilities are carried out by the P3B East Java and of distribution facilities are carried out by the East Java Distribution unit.

Maintenance of the transmission lines is undertaken by 23 maintenance groups organized by nine area offices. Each area office has two or three maintenance groups. In each substation, operations are conducted by four groups in three shifts, under the command of the East Java Area Control Center (ACC)[*16]. Maintenance of the substations is executed by the staff of the respective substation, with the help of engineering groups from the area offices. The East Java distribution business unit consists of a head office, 15 branch offices and a Distribution Control Center (DCC)[17]. Each branch office is responsible for operation and maintenance of distribution facilities, and for customer service within its command area. The DCC is in charge of load distribution functions and switching operations.

The number of employees of PLN has been decreasing progressively due to PLN's early retirement program and to a non-recruit policy, both of which are part of its employment optimization program. While the sales volume of PLN increased from 49,748.8 GWh in 1995 to 79,164.8 GWh in 2000, the number of employees decreased from 54,790 in 1995 to 46,016 in 2000. For non-core activities, some technicians/ engineers have already been replaced by contract labor, although PLN is strengthening its training program for employees in order to ensure operational, maintenance and management capabilities. During 2000, 51,763 employees attended various training courses: 6,068 went to managerial courses, 11,906 to professional courses, 5,611 to supervisory courses, and 28,178 to other courses.

Although, the number of employees has decreased, most of those on staff in 1995 were excess employees; consequently, the reduction is not considered to have had any serious, negative impact on the operation and maintenance of the project facilities.

2.5.2 Financial Viability of O&M Agency

The financial condition of the PLN has deteriorated considerably since the Asian Currency Crisis in 1998. The high cost of production is a direct consequence of the depreciation of the rupiah against the US dollar. The portion of production cost in US dollars is about 60%, is the amount allocated for the purchase of natural gas, electricity from IPPs, spare parts, maintenance and debt servicing. All PLN revenue is in rupiahs. Thus, the PLN's ability to pay the US dollar cost has dropped in proportion to the depreciation of the rupiah. A Periodic Electricity Tariff increase program was made effective from 1994-1998 to keep the 1994 Base Electricity Tariff constant in real terms. The tariff adjustment was made automatically every quarter based on exchange rate fluctuations, inflation rates, fuel prices and the price of electricity purchased from IPPs.

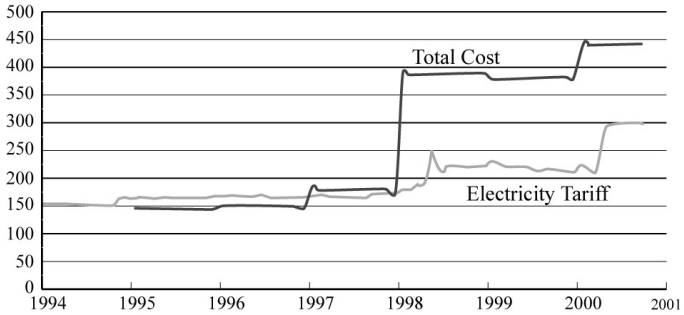

Figure-5: Comparison of Change in Tariff and Total Cost

Quoted from: PLN White Paper 16102000

As a result of the financial crisis, the Periodic Electricity Tariff was suspended. The impact of rupiah depreciation, therefore, has been borne entirely by PLN.

The average tariff increased to 300 rupiah per kWh, in line with the Base Electricity Tariff, effective from April 2000. This tariff is still much lower than the cost of production.

Because of PLN's financial deterioration, no new noticeable investment commitment could be made during the 4 years from 1998 to 2001, during which time electricity sales increased 33%. This situation has

[16] There are three kinds of control centers i.e. JCC (Java Control Center), ACC and DCC. Java Island has one JCC, four ACCs (namely Jakarta, West Java, Central Java, and East Java), and many DCCs. An ACC's functions are: i) to perform switching operations on the 150kV and 70 kV networks for the purpose of power flow control or voltage control, and ii) to maintain the security of the energy supply in its region.

[17] The function of a DCC is to operate small, remote substations. Substations under DCC control are sometimes unattended.

eroded the reserve capacity in many regional power grids, including the Java-Bali system.

The same situation can be observed at the transmission-related facilities in the Java-Bali system. The loading on the transmission lines and substation transformers is getting close to rated capacity, and thus requires expansion and/or new construction. Among the substations that were expanded or built during Stage IV, Sekareputih, Tuban, Ngawi, Turen, Kraksan and Tulungagung need additional transformers. Also, the transmission lines in the Paiton- Kraksan- Probolinggo section cannot cope with increasing demand, and thus the section is in need of additional lines or bypass lines. However, according to the PLN P3B East Java, budget constraints make it difficult for PLN to remove these bottlenecks. In order to avoid a future energy crisis, immediate action to stabilize PLN's financial condition is required.

Comparison of Original and Actual Scope

Items/Activities	Original	Actual
I. Project Scope		
1) Transmission Lines		
- Newly Established	150kV- 2cct- 68km	150kV- 2cct- 73.0km
	150kV- 1cct- 181km	150kV- 1cct-185.0km
- Extension	150kV- 2cct- 5km	150kV- 2cct- 4.5km
	70kV- 2cct- 11km	70kV- 2cct- 38.0km
- Rehabilitation	70kV- 2cct- 11km	70kV- 2cct- 18.5km
2) Substation		
- Newly Established	9 places- 150/20kV Total Capacity- 160MVA	1place - 66/20kV 9 places - 150/20kV Total Capacity - 160MVA
- Extension	13 places- 150/70- 20kV Total Capacity 380MVA	17places - 150/70- 20kV Total Capacity- 350MVA
- Provision	1 x 30MVA 150(70)/20kV mobile transformer	1 x 30MVA 150(70)/20kV mobile transformer
3) Distribution System		
Construction and Installation of		
- Medium Voltage	20kV- 115km	20kV- 186km
- Low Voltage	220/380V- 498km	220/380V- 484km
- Distribution transformers	332Unit 53.120kVA	53.000kVA
- Service equipment	99,385 units	Not Available
- Sectionalizing switches	16 units	Not Available
4) Consulting Service		
- Detailed design	212 M/M	314.2 M/M
- Procurement procedure assistance	(Local: 40 M/M)	(Local: 71.5 M/M)
- Construction supervision etc.	(Foreign: 172 M/M)	(Foreign: 242.7 M/M)
II. Implementation Schedule		
Loan Agreement	Nov 1984	Dec 1985
Tender & contract	Jan 1985-Apr 1987	Sep 1988-Spt 1990
Equipment manufacture & carry-in	Apr 1987-Mar 1988	Nov 1990-Jan 1994
Construction works	Oct 1987-Nov 1989	July 1991-May 1994
Consulting services	Nov 1985-Nov 1989	Apr 1987-Jan 1993
III. Project Cost		
Foreign Currency	14,000 million yen	11,250 million yen
Local Currency	9,010 million Yen	1,320 million yen
	(38,015 million rupiah)	(18,939 million rupiah)
Total	23,010 million yen	12,570 million yen
ODA Loan Portion	14,000 million yen	11,570 million yen
Exchange Rate	1 Rp = 0.237 yen	1 Rp = 0.0696 yen
	1 US$= 235 yen	1 US$= 120 yen
	(As of April 1984)	(As of December 1988)

Independent Evaluator's Opinion on
East Java Electric Power Transmission and Distribution Network Project (IV)

Mohamad Ikhsan
Researcher, Institute for Economic and Social Research Faculty of Economics University of Indonesia

To achieve the Indonesia (particularly East Java) development objective, this project is very relevant in complementing the large scale power plant development which has been built before. Specially, this project is also important for supporting the industrialization in East Java including Madura island. Given a relatively high transmission and distribution losses this project is relevant in order to reduce those losses. Improving the losses will also be translated in improving financial viability of the PLN. Thus, I agree that the relevance of the project was maintained.

This project has been contributed to promoting the electrification return in East Java from 8.7% in 1982 to 90% in 1998. Moreover, this project will have a significant impact on improving the efficiency and hence the cost if distributing electricity across Java and Bali as shown Table 2 in the evaluation report. As a result, the transmission and distribution loss has been reduced from 22.68 in 1974 to 11.73 in 1990 and further to 8.57 in 2000. This project has also contributed to a significant reduction in SAIFI and SAIDI in East Java. It also contributed to a reduction in electricity cost of manufacturing industries in East Java by switch form capture generation to PLN supply. This is important in order to maintain the industrial competitiveness in global market. There is no significant negative socio-economic and environmental impact due the project. I fully support the evaluation report, which claims that the project has achieved its intended goals.