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The World Bank

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Report No. 980

PROJECT PERFORMANCE AUDIT REPORT

ON

PHILIPPINES FOURTH POWER PROJECT (LOAN 491-PH)

January 16, 1976

Operations Evaluation Department

PREFACE

This report presents an audit of achievement under the Philippines Fourth Power Project, for which Loan 491-PH of April 5, 1967 in the amount of US$12.0 million equivalent was made to National Power Corporation (NPC) and was finally closed in February 1974.

This audit is based mainly on correspondence and reports in Bank files (Loan and Guarantee Agreements, Appraisal Report, President's Report, Progress Reports, Supervision Reports, and correspondence between the Bank and the Borrower), as well as discussions with Bank staff members and National Power Corporation staff. A Project Completion Report prepared by the East Asia and Pacific Regional Office in June 1975 was also useful in the preparation of this report.

In July 1975, a seven-day visit was made to the Republic of Philippines in connection with this report. The valuable assistance of National Power Corporation is gratefully acknowledged.

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ABBREVIATIONS USED

M - Million
MW - 1000 KW
MWH - 1000 KWH
GWH - Million KWH
BTU - British Thermal Unit
MVA - 1000 KVA

BOI - Board of Investments
ELC - Electroconsult
GAI - Gilbert Associates Inc.
IFC - International Finance Corporation
MERALCO - Manila Electric Company
NEA - National Electrification Administration
NPC - National Power Corporation
NWSA - National Water and Sewerage Administration
OEC - Office of Economic Coordination
PSC - Public Services Commission
QPR - Quarterly Progress Reports
SGV - Sycip, Gorres, Velayo and Company

PHILIPPINES

FOURTH POWER PROJECT

Performance Audit Basic Data Sheet

1.	Loan No.	491-PH
2.	Borrower	National Power Corporation (NPC)
3.	Amount of Loan	US$12.0 million
4.	Amount Disbursed	US$12.0 million
5.	Date of Loan Agreement	April 5, 1967
6.	Date of Effectiveness	June 12, 1967
7.	Closing Date: Original	November 30, 1970
	1st Extension	June 30, 1972
	Final	December 31, 1973
8.	Term of Loan	20 years
9.	Grace Period	3 1/2 years
10.	Interest Rate	6%
11.	Commitment Charge	3/8%
12.	Fiscal Year	July 1 - June 30
a.	President's Report No. and Date	P-531; March 22, 1967
b.	Appraisal Report No. and Date	TO-516; April 5, 1967

Exchange Rates (Peso)

Through 1969	US$1 = ₱3.9
1970 to October 1973	US$1 = ₱6.75
October 1973 to June 1975	US$1 = ₱7.1

SUMMARY

Loan 491-PH in the amount of US$12.0 million equivalent was made to National Power Corporation (NPC), a Government-owned corporation, for the purpose of financing the foreign exchange costs and interest during construction of a US$21.6 million equivalent project. The loan was approved on April 4, 1967, after prolonged discussions on its justification, signed on April 5, 1967, and fully disbursed in February 1974.

The project comprised: construction of one 75 MW oil-fired thermal station on Bataan peninsula, intended to come on Luzon Grid by mid-1970; installation of an additional (No. 4) 50 MW unit in Maria Cristina hydroelectric station, scheduled to come on Mindanao (Agus) Grid by end-1968; and construction of permanent regulating structures at Lake Lanao outlet to the Agus River. The purpose of the project was to provide power to meet the increasing demand on the two grids, and to provide NPC with a firming capability on the Luzon Grid. Additionally, NPC was to employ management consultants to strengthen its organization and management.

The project suffered a delay of more than two years in its completion and had a substantial overrun of local cost component. At Bataan, the delay was due to changes in civil engineering design following a strong earthquake, bureaucracy in awarding contracts, financial difficulty of the main civil works contractor and apparently indifferent supervision from the engineering consultants, Electroconsult (ELC); the delays at Maria Cristina were due to NPC's indifferent project management and errors by the alternator manufacturer, as well as lack of urgency for the work. The increase in the costs of local components was nearly 100% in current terms, because of devaluation and 33% increase in minimum wage; but the total cost of the project, in equivalent US$, was only 18% greater than the estimate.

The management consultants made useful contributions towards strengthening NPC's managerial effectiveness particularly in the financial area. They introduced analytical techniques to determine tariffs and to re-value fixed assets, and helped to implement their recommendations. NPC's charter was amended to incorporate several improvements, in addition to a regionalization - seemingly unwarranted at the time and of dubious merit even subsequently - and its role was eventually extended to include sole responsibility for construction and operation of future bulk generation and transmission in the country.

The delay in the construction of project did not seriously affect NPC's load growth; in fact, Maria Cristina unit 4 created an excess capacity on Mindanao Grid because expected developments mainly from a potentially large consumer (Iligan Steel) did not take place. On the other hand, slow progress in construction of transmission lines and, to an unclear but probably small extent, the delay in the construction of Bataan, may have affected the growth of the power market in Luzon.

Over the longer run, it does appear that Bataan has assisted in achieving the Government's objective of dispersing industry away from the conurbations and city centers. It has been heavily utilized and efficiently operated, but the expected fuel cost savings from the use of pitch, instead of Bunker "C", have been

almost totally eliminated by the subsequent relative increase in the price charged NPC for pitch.

Because of the difficulty in obtaining adequate tariff increases, and subsequently in implementing them, and to a lesser extent because of lower than forecasted energy sales, NPC's financial performance was unsatisfactory and its rate of return was persistently much lower than the covenanted 8%. NPC also faced liquidity problems, the main one being the build-up of large accounts receivable, a problem on which there has however been substantial improvement since 1973.

In agreeing to help finance this project, and thereby help launch NPC into thermal generation, the Bank made a good contribution to the development of the Philippine electric power supply, the value of which has now become much greater with NPC's greatly expanded responsibilities, leading to plans for construction of geothermal and nuclear plant.

The Bank's cautious approach to the project is understandable, and the 3 1/2-year delay between loan request and approval cannot be criticized. On the other hand, the Bank's supervision of the physical construction of the project could have been more intensive than it actually was. The Bank could have helped more, at the time of loan appraisal and negotiations, by discussing and establishing the procedures for annual review and revision of tariffs, by agreeing to specific targets for transmission expansion, by allocating a small fraction of the loan towards management training of NPC's staff, and perhaps by promoting the use of local management consultants, supported by individual foreign specialists, in place of the very heavy reliance on expensive foreign consultants. Probably the Bank could have contributed to improvement in NPC's financial position by taking a more strict stand on the borrower's adherence to the rate of return covenant.

PROJECT PERFORMANCE AUDIT

PHILIPPINES FOURTH POWER PROJECT (LOAN 491-PH)

I. INTRODUCTION

1.01 Loan 491-PH in the amount of US$12 million was the fourth of the six Bank loans amounting to cumulative total of US$153.7 million so far made to National Power Corporation (NPC), and also the fourth loan to the Philippine power sector. The three previous loans (183 PH - $21.0 million; 297 PH - $34.0 million and 325 PH - $3.7 million) were made for construction of hydro power generation units, and the projects financed by the last two loans were still under construction at the time the Loan 491 PH was under consideration in the Bank. This loan[1] was applied for in September 1963, approved on April 4, 1967 after prolonged discussions on its justification, signed on April 5, and became effective from June 12, 1967. Disbursements were finally completed in February 1974.

1.02 NPC, a wholly Government-owned corporation, was created in 1936 to undertake generation of electric power from all sources, particularly through the development of the country's water resources. It was one of the two principal power generating companies in the country (details in Annex 1a). As of 1966, its plants consisted exclusively of hydroelectric units (totalling 270 MW plus 268 MW under construction) and a number of small diesel units totalling 2.6 MW; most of the hydro units supplied two grids, one in Luzon and the other in Mindanao (Agus) regions, and the diesel and small hydro units operated isolated systems in the three regions of the country. NPC sold its energy in bulk to public utilities and large industrial users and through 1967 its major customer was the Manila Electric Company (MERALCO), with whom it interchanged power through its Luzon grid.

1.03 MERALCO, a public limited company,[2] with an IFC involvement of US$12 million in equity and loan in 1967, was the largest electricity producer in the country, from almost exclusively thermal plants (the latest units were 100 MW capacity). It operated in its franchise area of Manila and environs, where it sold its energy mainly to the end users through its own distribution system. The Company had shown a steady and much faster growth than NPC in installed capacity and energy sales, had a fair profit record (as shown in Annex 1b) and was believed to have competent management - a view supported in the Cisler Report on Philippines Electric Power Survey of 1965.

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[1] The original application was for a loan of US$10.7 million for construction of Bataan thermal station. Maria Cristina Unit 4 and Lake Lanao regulation works were added to the project in August 1965.

[2] The majority interest in the Company was held by the powerful Lopez family, one of whose members was the Vice-President of the Country and the leader of the opposition party.

1.04 In 1964, MERALCO's franchise was extended for a further 30 years and, as a consequence, the company decided to increase its generating capacity through the installation of larger (150-200 MW) and higher efficiency thermal units.

1.05 The Republic of Philippines consists of around 7,000 islands divided into three regions - Luzon, Vasayas and Mindanao, with a total area of 300,000 square kilometers, and a population of nearly 32 million in 1965. The area and population distribution and the role of public utilities in the three regions are given in Annex 1c.

1.06 Manila, located in the Luzon region, is the largest city in the Philippines. Over the years, population from other regions and the lesser developed areas of Luzon had migrated to Greater Manila (and also to the Central and Southern Luzon economic centers), and while this migration has been slowing down, Manila is, and will continue to be for years to come, the center of economic and industrial activity (also reflected by the relatively higher electricity consumption, Annex 1c) for the entire country. The 1965 Power Survey had forecast a long-range requirement on the Luzon grid of around 4,300 MW in new plant capacity between 1967 and 1984, with a corresponding investment of around US$450 million. Clearly, an investment of this magnitude on such a short time scale would require joint planning between NPC and MERALCO. But as of mid-1960s, though the systems of the two main generating companies were interconnected, there was no integrated operation. Therefore, while MERALCO had an agreement to buy cheap hydro energy in the wet season and the peaking energy from NPC, and exchanged its power on a 1:1 basis, it made no commitment to provide NPC with base load energy during the dry season.

1.07 The seasonal nature of NPC's power generating capability, without a committed back-up supply from MERALCO in the dry season, meant that NPC could not guarantee more than 30% of the load factor to its customers, and consequently could not obtain equitable prices[1/] for its energy; futhermore, the prospective industries near Manila, which otherwise may have located their plants away from the conurbation, to avoid congestion in the cities as desired by the Government, were naturally drawn into MERALCO's franchise area - a situation which undoubtedly suited the more commercially-oriented MERALCO.

1.08 In addition to being a sort of 'supplier of secondary energy', NPC, being a Government organization, was saddled with inherent handicaps relative to the private sector. Its salary scales were lower than those in the industry, certainly lower than MERALCO's, hence a disincentive to greater performance from the employees and an obstacle to recruitment of higher-caliber executives. Political patronage seemed to have played a part in the appointment

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1/ A Bank mission, in a discussion with MERALCO's Chief Executive, expressed the view that his company could pay three times what it was offering, (₱0.0162 US¢0.25*) for peaking power from NPC. Through 1971, MERALCO charge ₱0.0182 (US¢0.28)* per unit on the balance of its energy delivered to NPC at the end of each month, and bought NPC's bulk energy at ₱0.0136 (US¢0.21)* per unit; the cost of fuel alone per unit generated by any of the MERALCO machines probably was not lower than the above rates, thus suggesting that NPC did not obtain an equitable price for its energy.

* At US$1.00 = ₱6.4 in 1971.

of Board members; the Board's functions had, inadvertently or otherwise, sometimes overlapped those of the management to the extent of intrusion in the day-to-day management of the corporation. It had to follow the normal bureaucratic systems; the procedure for increasing electricity rates was tedious (first the application for rate increases had to be approved by the Office for Economic Coordination (OEC) and subsequently by the Cabinet) - in contrast to MERALCO, whose application for rate increases had to be approved only by the Public Services Commission (PSC); and even when NPC did obtain tariff increases, it could not implement them immediately, because the system permitted time-consuming court injunctions from the customers.

1.09 NPC's objectives for having Bataan 75 MW thermal unit on the Luzon grid by end 1967 (and a similar size unit tentatively planned to follow soon after) were: firstly, to meet the expected increase in its provincial load; secondly, to increase the commercial value of power generated from its hydro units by supporting it with firming capability; and thirdly, to avail of the advantageously priced residue fuel oil[1/] (about 40% cost saving over Bunker 'C' fuel oil) for boiler firing from a nearby refinery.

1.10 The Bank, having earlier induced a meeting between NPC and MERALCO to prepare a forecast of the load growth and capacity requirements on the Luzon grid, came to the conclusion that the system as a whole would have surplus capacity in December 1968 from units, existing and under construction, of both utilities and that Bataan's contribution would be only marginal to the system. Specific factors against NPC's Bataan were: first, technically retrograde step to install a 75 MW unit on a grid which had 100 MW units and where higher efficiency units (150 MW and 200 MW units) were scheduled to come on line; second, MERALCO's proven capability in operating thermal systems and plants; and, third, NPC's indifferent management capability and its poor performance in the construction of the hydro stations, and lack of operational experience of thermal systems and plants.

1.11 The lukewarm support from the Bank had induced NPC, who seemed determined to go ahead with Bataan with or without the Bank's loan, to look for alternative sources of financial assistance, and had revealed a keen interest from Japanese suppliers. Discussions were held in Washington on August 12, 1965, between NPC and Bank on the project, which was now extended to include work on the Mindanao Grid - the Maria Cristina hydroelectric unit 4 and the Lake Lanao Regulation Works - to meet the large increase in power and energy demand expected mainly from Iligan Steel's installation of electric smelters for pig iron production. NPC inquired about the possibility of a waiver on the debt limitation, covenanted in the earlier loans, in the event of Bank not supporting the Bataan project.

[1/] A high-viscosity fuel (i.e., pitch).

1.12 Prolonged discussion took place within the Bank, one section in the Bank looking at the Bataan project as a part of the Luzon grid system and finding little justification, and the other section viewing the project from the differing circumstances and objectives of the two utilities and finding adequate justification. A joint mission from these two sections to Manila failed to obtain assurances from MERALCO for an integrated operation of the Luzon grid; on the contrary, MERALCO disclosed that it wanted to be independent of NPC's supply and was planning to add more generating capacity. The failure of the mission's objective for integrated operation of Luzon Grid, recognition of the broader economic need for a better power supply outside the Manila metropolitan area, and the prospective Japanese involvement which would have reduced Bank's influence for strengthening NPC's weak management, induced the Bank to swing towards supporting the project.

1.13 The appraisal mission sent to Manila at the end of August 1965 confirmed NPC's need for one 75 MW unit, against the tentatively planned two such units. Discussions within the Bank on the appraisal report and thereafter resulted in decisions to require Bank approval of appointments to the Chief Executive position and retention of management consultants to strengthen NPC's organization and management; and to change the main financial covenant to the rate of return concept, which was more controllable on a yearly basis, than the 19% contribution towards capital expenditure covenanted in the previous loan - which, incidentally, had never been met.

1.14 During the two years that this loan had been under consideration, the Philippines had considerable room for further borrowing on conventional terms. But, in the second half of 1965, the Government's financial difficulties, because of its inability to collect adequate revenues, were growing rapidly, to the extent that the Bank would normally have decided to wait before making any further commitments. The Bank, however, made an exception for this loan and instead wrote to the Philippine Government on March 3, 1966 that it would be unable to present the loan proposal to the Executive Directors unless it received the Government's satisfactory assurances that all necessary peso funds for ongoing Bank-supported projects would be available as and when required.

1.15 Negotiations between NPC and the Bank were held in Washington eventually on May 31 - having been postponed on May 19 because of a last moment intervention by the Philippine President to reexamine the relative merits between one 75 MW unit to be followed later by a similar size unit, and one 150 MW unit. They were completed with the proviso indicated in the Bank's letter of March 3.

1.16 The loan proposal however could not be submitted to the Executive Directors because the Government, as a guarantor, was in default over two of the Bank's loans. On the National Water and Sewerage Authority (NWSA) project, the Bank's supervision mission of April indicated that the utility would shortly be running out of peso funds; and on the other project, the Los Banos College of Agriculture, the April Quarterly Report designated "awaiting funds" as the cause of some of the delays to the project. By the time the Philippine Government took appropriate remedial action guaranteeing funds to these projects, the information in the appraisal report had become out of date.

1.17 By mid-1966, doubts seemed to be arising within the Bank on the justification of Maria Cristina, in view of the then unclear but nevertheless potentially major changes to Iligan Steel's plans. In December 1966, at Bank's request, NPC sent revised load and financial forecasts which included the postponement of Bataan completion date to end 1970, and a decrease in load on Agus grid because of delays at Iligan Steel and loss of a prospective customer.

1.18 The Bank sent a mission to Manila in January 1967 to update the appraisal report, and also to clarify some of the points arising from NPC's latest forecasts. While in Manila the mission reported problems in the construction of Angat (Loan 297-PH), with potentially serious consequences. When the Philippine Government had taken appropriate steps to deal with this problem, the proposed power loan was submitted to the Bank's Executive Directors on March 22.

1.19 A week before the loan was due for discussion, the Bank - being informed that one of its Executive Directors would raise a question at the Board meeting, which he did, on the need for Maria Cristina - made a quick re-assessment and came to the conclusion that Maria Cristina was still justified despite the effect of changes at Iligan Steel and little industrial growth in the area. The loan was approved on April 4, 1967.

II. THE PROJECT AND ITS IMPLEMENTATION

Project Description

2.01 The project objective was to increase NPC's power generation capacity in Luzon and Mindanao, and at the same time to provide a base load generating capability in Luzon. It comprised of:

A. Construction of one 75 MW thermal station, fired by residue oil, on Bataan peninsula, with provision in the site preparation for future installation of an additional similar unit.

B. Installation of an additional 50 MW unit in Maria Cristina hydroelectric station; and construction of permanent regulating structures and dredging of an approach channel at the Lake Lanao outlet to the Agus River.

2.02 The Bank loan of US$12 million, amounting to about 56% of the estimated total project cost, was to finance the foreign exchange costs of plant and equipment, the engineering services and interest during construction.

2.03 Electroconsult (ELC) of Milan, who had made cost estimates and plant layout studies for Bataan, were to be retained to prepare initial designs and specifications, to carry out bid evaluations and detailed supervision of construction, to train NPC's operating personnel, and to commission Bataan station. NPC was to be directly responsible for construction supervision of Maria Cristina unit, where major equipment awards, but not payments, had already been made following international competitive bidding.

2.04 In addition to the standard covenants, the loan and guarantee agreements included undertakings itemized below, either in the form of covenants or by means of supplemental letters.

1. To employ engineering consultants and contractors acceptable to, and on terms and conditions, satisfactory to the Bank.

2. To furnish to the Bank any material modifications subsequently made to the plans, specifications and construction schedules of the project.

3. To employ management consultants acceptable to, and on terms and conditions satisfactory to, the Bank for the purposes of (a) recommending organizational and administrative changes, (b) determining a fair current valuation of fixed assets and establishing depreciation schedules, and (c) assisting in their implementation; and to carry out without delay such changes as necessary.

4. To set and maintain rates for sales of electricity at such levels as would provide an annual rate of return of 8% on the net re-valued fixed assets in operation, and the guarantor to grant such rates.

5. To obtain the prior approval of the Bank in the appointment of the Chief Executive.

6. Not to incur debt unless certain standard debt-service coverage tests could be passed.

7. The guarantor to make arrangements satisfactory to the Bank to provide the Borrower such funds as would be needed to carry out the project, and to maintain the borrowers' cash balance at ₱3 million over and above its cash requirements for any thirty-day period during 1966-68.

8. The guarantor to permit the borrower to repay the three previous Bank loans at the rate of ₱3.20 to US$1.00.

9. The guarantor to allocate to the borrower annual loans amounting to US$3 million equivalent out of funds from the (Japanese) Reparations Schedule for five successive years starting with the 10th year (1967), for the purposes of carrying out the electrification program.

Project Implementation

2.05 Except for the fact that Lake Lanao Regulation Works were reduced in content from the originally envisaged permanent regulating structures to temporary structures the project was implemented largely as planned. However, there was a long delay and a substantial overrun of the local cost component as shown in Tables 1 and 2:

Project Completion Dates - Estimated vs. Actual — Table 1

	Appraisal	Revised Estimate	Actual
Bataan	mid-'70	June '71	end-'72
Maria Cristina	end-'68	June '69	April '71
Regulation Work	(?)	Aug. '70	July '70

Project Costs - Estimated vs. Actual
(in thousands)

Table 2

	Appraisal Estimate		Actual Cost	
	Local (₱)	Foreign (US$)	Local (₱)	Foreign (US$)
Bataan Thermal Plant				
Civil Works	11,000	-	34,090	-
Plant Equipment and Erection	2,668	7,359	6,491	8,661
Engineering Services[a]	1,100	540	6,500	575
Sub-Total	14,768	7,899	47,081	9,236
Maria Cristina Unit 4	...			
Civil Works	17,744	-	17,619	-
Plant and Equipment	-	1,962	-	777
Engineering Services[a]	-	-	4,100	-
Sub-Total	17,744	1,962	21,619	777
Management Services	-	-	2,843	1,146
Contingencies	5,786	1,097	-	-
Interest During Construction	-	1,042	4,010	1,065
TOTAL	38,298	12,000	75,417	12,224
TOTAL COST IN US$	21,574		25,414[b]	
(%)	100%		118%	

a/ Only ₱0.3 million out of the total ₱10.6 million was paid to ELC; the balance was allocated to NPC's engineering department.

b/ Peso costs converted to US$ at the rates of excnange prevailing each year (see Annex 3a).

Delays in Project Completion

2.06 The main causes for delays in Bataan, elaborated in the subsequent paragraphs, were the tedious procedures in awarding contracts, the revision/modification to civil works drawings, the unforeseen problems of the civil works contractor, and the inadequate inspection/supervision of construction and erection of the plant.

2.07 NPC had to follow a bureaucratic procedure in awarding contracts which, as Annex 2 indicates, in two cases took over a year from the dates the bids were opened to the dates the contracts were awarded.

2.08 The civil engineering drawings were revised to incorporate an increase in the earthquake coefficient to 0.2G from the original 0.1G, following a strong earthquake in August 1968; and they were also modified to make provision for the second unit to be 150 MW instead of the originally envisaged 75 MW.

2.09 The main civil works contractor, a Philippine enterprise, had to bring the operation almost to a halt because of financial difficulties - arising from Government-imposed 33% increase in minimum wage in July 1970, and his inability to collect payments on the work under other contracts - and because of organizational problems emanating from the resignation of his key personnel assigned to Bataan. NPC's timely intervention, by providing financial assistance to the contractor, minimized further delays and potential litigation problems.

2.10 The plant was erected in time for its commissioning by the revised target date of end 1971, but the unit could not be put on load for 3 1/2 months, i.e., until March 26, 1972 because the lubricating oil lines were found to carry scale, grit and other solid matter, and therefore had to be dismantled, cleaned and reassembled. A week later the plant had to be shut down because of a leak from a pinhole in an economizer tube caused by inadequate attention during the welding of the areas in the vicinity. The pinhole was sealed by a welder flown from Japan and the plant resumed operation on April 17. Over two months later the plant had to be stopped again because of water leakage from a field-welded joint in the economizer tube, which in turn damaged the superheater tubes. Subsequent radiographic examination of all[1/] field welds of the boiler, indicated that a considerable number of them were below ASME standards. All defective welds were rectified by September 1, 1972 by a team of welders specially brought from Japan.

2.11 The main causes for delays in Maria Cristina unit were faulty erection procedures, inadequate coordination between the suppliers of interconnected equipment, errors and omissions of the generator manufacturer, and NPC's lack of urgency to complete the work. Considerable additional effort and time (6 months' delay) was spent in the erection of the penstock liner, the butterfly valve and the scroll case; apparently the penstock liner was already imbedded in concrete before ensuring that all the above pieces of equipment were properly aligned and adequately secured.

1/ The specifications called for examination of 10% of welded joints.

2.12 Errors by the manufacturer resulted in: shipment of laminated plates of the alternator rotor 3 mm longer than required, which had to be ground and cleaned at site before they could be assembled; and defect at the joints of the two sections of the stator, which had to be ground at site before they could be assembled. Inadequate coordination between the suppliers of turbine and the generator resulted in bolt holes, for coupling these units, being out of line. Much reboring, using a special boring machine, had to be done at site.

2.13 As the envisaged load growth on the grid did not materialize, the work on this unit was confined to normal working hours of the week and to a reduced staff.

2.14 None of the problems of Maria Cristina and the changes to Bataan were reported in the Quarterly Progress Reports (QPR) nor in NPC's correspondence with the Bank, nor even in the supervision mission reports. The reduction in the scope of Lake Lanao Regulation Works was mentioned only briefly by two supervision missions; one mission report indicated the possibility of cancellation of US$1 million from the loan by deferring this work completely; and the subsequent mission reported that NPC was proceeding with a reduced project and expected savings only in local costs, without elaborating on the work or on the probable cost.

2.15 No entity, other than perhaps the OEC, could be held directly responsible for the delays in the earlier stages of Bataan, and credit has to be given to NPC for its timely intervention when the civil works contractor was in financial difficulties. But the responsibility for the problems which caused subsequent delays to Bataan would seem to be that of the engineering consultants for the apparently inadequate inspection of lubricating oil pipes prior to assembly, the inadequate care during economizer tube welding, and the faulty radiographic examination or sampling techniques[1/] of field-welded joints. The delays at Maria Cristina were due to NPC's unsatisfactory performance in project management - apparently faulty erection procedure of penstock and scroll case, and failure to coordinate at design stage between two suppliers of interconnected equipment - and due to the supplier's error in the manufacture of the alternator (NPC probably could have had some redress from this supplier but it was not pursued).

Cost Increases

2.16 The actual cost of the foreign exchange component remained virtually unaltered but the local cost component increased, in current Pesos, by almost 100% from the appraisal estimate, as indicated in Table 2.

1/ The premise here is that a 10% sample should have detected the flaws when a 100% examination indicated a considerable number of such flaws; as a precautionary measure, the size of the initial samples could have been greater than 10%.

2.17 The cost increases were partly due to 33% increase in the minimum wage from ₱6 to ₱8, which naturally had repercussions at all levels of employment, to substantial devaluation of peso which, in turn and together with increase in wages, raised the costs of locally-manufactured equipment, and to the delays in project completion. Other factors which contributed to the increase were the changes made to Bataan civil works, the installation of additive injection equipment to combat the effects of high sulphur and vanadium content in the residual fuel oil, the services of management consultants (whose foreign exchange cost was almost equal to the contingency element in the appraisal estimate), the increase in engineering services, and the interest on the peso component; on the other hand, cost savings[1/] were obtained on Maria Cristina's plant and equipment, but probably none from the reduction in the size and scope of Lake Lanao regulating works.

2.18 But the breakdown of the project expenditure on an annual basis, given in Annex 3a, indicates that while the actual cost of the peso component exceeded the appraisal estimate by nearly 100%, in real terms this increase would be much lower - around 53%, were the yearly peso expenditure adjusted for inflation; around 35%, were this expenditure converted to US$ at the prevailing rates of exchange; and the total cost of the adjusted project in equivalent US$ would be marginally higher (about 18%) than the estimate.

Project Operation

2.19 Bataan went into commercial operation in December 1972, 18 months behind the revised schedule and, as Annex 3b indicates, has been operating satisfactorily since, with annual load factor of over 72%, utilization rate of 80%, and net heat rate of under 10,000 BTU/KWH (monthly optimum - 9,517 BTU/KWH).

2.20 To operate Bataan, its first thermal plant, NPC organized itself effectively. It sent 20 of its engineers for 6 months' training in MERALCO's plants, and to assist in the initial stages of its operation, it employed retired MERALCO technical staff. The operation of Bataan to date, satisfactory by any thermal plant standards, is a credit to NPC's engineers and to the manufacturers of the plant.

2.21 Maria Cristina unit 4 was placed in commercial operation in April 1971, 22 months behind the revised schedule, and has been operating satisfactorily. Information has not been available on the operation of Lake Lanao regulation works, which was completed in July 1970, one month ahead of the revised schedule.

1/ No explanation was forthcoming as to why there was such a substantial cost saving on plant and equipment for which awards, but not payments, had already been made at the time of appraisal.

III. INSTITUTIONAL DEVELOPMENT

Management Consultants

3.01 As required in one of the loan covenants, NPC appointed a firm of management consultants, Gilbert Associates, Inc. (GAI) from the U.S.A. to review the organization structure, the staffing levels, information requirements and systems, financial and accounting systems and procedures, personnel policies and training programs, the Government regulations and charter restrictions. GAI, in association with a local firm of consultants, Sycip, Gorres, Velayo and Company (SGV) carried out a detailed study which included the functions and responsibilities of various positions within the organization including those of the Board, and a comparison of salary structures with other Government and public organizations, and in October 1968, it submitted a number of recommendations which included reorganization of management functions and duties and a radical change in the organization structure[1/] (Annexes 4a and 4b), and which involved revision of NPC Charter.

3.02 Subsequently the consultants carried out revaluation of fixed assets, established depreciation schedules for various types of plant, and devised a trending procedure - based on a combination of wholesale price index of imported manufactured goods and labor cost index - to keep the value of plant current on a continuing basis. In addition to assisting in the implementation of their recommendations, GAI/SGV carried out studies on Upper Pampanga River Project, introduced analytic methods for determining tariffs, prepared proposals for draft legislation aimed at bringing NPC under the PSC regulations for the purposes of tariff adjudication and subsequent implementation, organized the data for the hearing of the tariff case, and assisted in the renegotiation of the agreement with MERALCO.

3.03 Adequate records were not available on the recommendations which had been accepted or modified, nor on the precise extent of their implementation. The consensus within the NPC was that the consultants had performed satisfactorily in several areas, particularly in finance, where the reporting had improved to such an extent that the top management could now receive the information in a matter of days instead of weeks, and in the work order system which was functioning adequately. On the other hand, doubts were raised by NPC on the effectiveness of the organization structure and the reorganization of managerial functions recommended by GAI. But, before this organization structure could be put to test, NPC, under its new Charter of 1971, was regionalized, thereby creating the

1/ The two major changes in the new organization proposed were: (1) making the General Manager the ex-officio Chairman of the Board "in the interests of maximum coordination between policy-making body and management", and (2) creating two additional Assistant General Managers "to do away with unduly heavy burden placed on one Assistant General Manager and requiring him to exercise such highly-diversified expertise as finance, legal, engineering, etc."

need for a different organization structure. The subsequent organization structure (Annex 4c), also devised with the assistance of GAI, while retaining the recommended reorganization of management functions, was more an extension of pre-1968 structure and seemed to have lacked an in-depth study and to involve unnecessary duplication of some activities or underutilization of manpower.

3.04 It would be an almost impossible task to weigh the benefits from the management consultancy services against the substantial costs incurred for these services (detail breakdown in table 3). The views ventured from various quarters of NPC which seem to have some justification, were that the same benefits could have been achieved for lower costs had the Bank given NPC greater flexibility in the appointment and use of consultants. With such a flexibility - and in the context of a Chief Executive, highly motivated towards carrying out improvements in the organization, who had himself initiated a management audit study in 1967 whose findings were much in line with those of GAI/SGV - NPC would have had the option to consider the appointment of local consultants for almost one-tenth of the cost of a foreign consultant 1/ to carry out most of the basic work, and to hire consultants from North America or Western Europe only for those activities where local talent was not available 2/. NPC executives also felt that some of the GAI consultants, probably not regular employees of the organization but recruited 'ad hoc', were oriented more towards utilities under private ownership in the developed world, and their suggested staff training programs were too expensive for NPC's needs.

Institutional Aspects

3.05 Significant developments took place in NPC's role in power generation due to amendments to its Charter in 1971 and 1974, through Presidential decrees No. 40 of 1972 and No. 269 of 1973, and through the Republic Act No. 6038 of 1969.

3.06 Amendments to NPC's Charter provide the following benefits: improvement in rate making procedures and in their implementation; definition of powers and duties of the Board and those of Management; increase in the ceiling on debt; authorization to fix rates and fees to be charged by the Corporation, but introduction of maximum rate of return of 10% on currently valued net assets in service; exemption from taxes and other expenses such as import duties, wharfage fees on foreign goods including petroleum products required for operation; improvement in procedures to accelerate acquisition of rights of way on land to reduce long delays previously experienced in the erection of transmission and distribution lines; and provision for the conversion of bonded indebtedness to a government investment in equity capital. It also placed emphasis on regional development through regionalization and created requirement for rates in the regions to be determined independently of each other.

1/ Total cost of a foreign consultant is generally around $6,000 - 7,000 per month to a client from a developing country.

2/ Evidence was not found of NPC having made a formal request to the Bank for such a flexibility.

Breakdown of Costs of Management Consultancy Services (in thousands) — Table 3

	GAI	Local (SGV, etc.)	Total	% of Project Cost
		US$ Cost		
Management Organization Study	140.4	-	140.4	
Valuation of Fixed Assets	168.5	-	168.5	
Implementation & Assistance	749.2	-	749.2	
Supplemental Services	87.5	-	87.5	
Sub-Total	1,145.6	-	1,145.6	9.4%
		Peso Cost		
Management Organization Study	200	352	552.4	
Valuation of Fixed Assets	200	341	540.8	
Implementation & Assistance	400	766	1,166.1	
Supplemental Services	-	201	200.8	
Upper Pampanga River Project	-	55	55.2	
Metropolitan Car	153	-	153.4	
Income Tax	174	-	174.3	
Sub-Total	1,127	1,715	2,843.0	3.8%

3.07 The decrees,[1] aimed at achieving the national policy objective of total electrification, involving industrial development, dispersal of industry from urban areas and particularly beyond a 50 km radious from the centre of Manila, and rural electrification, by establishing island grids, integrating power generating systems and consolidation of distribution systems, gave NPC responsibility for construction of national grids, the development of all future generation supplying these grids, and ultimately for owning and operating all generation facilities. In this new role, NPC is going ahead with a program for power

[1] The decrees are a part of the sweeping reforms introduced by the President after the declaration of martial law in September 1972 - to accelerate the transition of a relatively agrarian society into an industrial nation, by purging some of the bureaucratic machinery, by assuming a measure of control and coordination over all economic sectors, including rationalization of industries to meet the goals of national economic development. Board of Investments (BOI) has been given the responsibility to induce industries to make optimum use of the country's underemployed and unemployed labor force without involving its migration into town centres, and to restrict further industrialization in Greater Manila.

generation from nuclear and geothermal sources, and is expected to take over MERALCO's base load plants totalling over 1,000 MW.

3.08 Act 6038, subsequently superseded by Decree 269 in 1973, created National Electrification Administration (NEA) with the object of achieving total electrification of the country[1] on an area coverage basis through the establishment of electric cooperatives; NEA provides technical and financial assistance to cooperatives and utilities for construction, operation and maintenance of all transmission lines below 67KV and the associated substations, and for installation of small generating units in isolated areas until such time as NPC could take over.

Manpower Growth and Development

3.09 The more effective use of NPC's manpower, expected from consultants' job evaluation and reorganization of managerial duties and proposed training programs, seems to have suffered at least in the short term, as a result of the regionalization of the organization required by the Congress, in 1972, apparently with the purpose of accelerating development in the regions, one of which (see Annex 1c) does seem to have been the victim of some earlier NPC neglect. The immediate effect on NPC's manpower requirements was an increase[2] of over 20% and 30% in the number of permanent staff and permanent positions respectively, as shown in Annex 6. It is of course, too early to judge the net benefit of regionalization and, as Annexes 5 & 7a indicate, no physical growth of any significance, either in construction or in energy sales, has taken place between 1972 and 1974. But given that NPC was a relatively small entity engaged in hydroelectric operation until the last three years, and that its present managerial and technical capability is already stretched to meet the challenge provided by the expansion programs underway, it may have been possible to achieve these programs' objectives through 1985 probably more effectively by alternative means such as a task force approach under a centralized[3] NPC until such time as the organization had built an adequate bank of managerial and technical capacity. Certainly 1972 seems to have been on the early side for the regionalization move, in view of the human resources available to NPC and its responsibilities.

3.10 As part of its manpower development strategy, NPC carried out 'on the job' and other internal training programs. Furthermore, from 1968 to May 1975 it sponsored its employees to 50 external courses and training programs, lasting from a few weeks to several months, conducted both within the country and abroad as indicated in the following table 4.

1/ Annex 8

2/ Net, after deduction of positions which arose because of Bataan, commissioned in December 1972; but without deduction of a few additional positions required due to NPC's growth.

3/ A centralized entity does not preclude the setting up of regional offices, which is not the same thing as regionalization.

External Courses/Programs Attended by NPC Employees — Table 4

Courses	1966	'67	'68	'69	'70	'71	'72	'73	'74	'75	Total
Abroad	2	6	1	3	-	2	6	4	9	-	33
In the Country	-	2	2	-	1	2	-	2	1	7	17
Total	2	3	3	3	1	4	6	6	10	7	50

3.11 The above courses and training programs, however, were aimed almost entirely to the development of technical knowledge and skills, and not to the development of skills - of probably greater importance, and identified or implied by the Bank missions as being also in short supply among NPC's executives - in the managerial, financial, commercial and long-term planning disciplines.

Transmission

3.12 Though not an inherent part of the project, to achieve full benefits from its capital investment in generating capacity, NPC was required to carry out investment in transmission lines and substations. The Government had undertaken to allocate reparation materials amounting to US$3 million equivalent annually in the form of loans at 3% interest for five successive years from 1966. Delays from the Government in meeting this undertaking resulted in NPC's program coming almost to a halt; and when it did receive the materials, NPC felt that the values attached to these materials were substantially higher than the cost of similar materials obtainable under international tenders. The annual construction of transmission lines and substations and the capital expenditure are given in Annex 5.

IV. PROJECT JUSTIFICATION

4.01 The appraisal justification for the project was to provide additional generating capacity to meet the increasing load demand for NPC on Luzon and Mindanao Grids. Comparison between the actual and the forecast demand on the two grids, given in Annex 11, indicates a large disparity on the Mindanao Grid, but marginal on the Luzon Grid.

4.02 The forecasted large increase in load demand on Mindanao Grid failed to materialize because of lower than expected growth of industry in the area and particularly because of changes in plans at Iligan Steel, explained in detail in Annex 9. Therefore, Maria Cristina unit 4 and the Lake Regulation Works - though reduced in scope - resulted in excess capacity on the grid which probably could have been avoided.

4.03 Bataan, on the other hand, provided generating capacity and, more important, firming capability - the key for NPC's provincial load development particularly from the industrial sector. The delay in its completion may have somewhat affected the load growth; while peak demand has been fairly in line with the appraisal estimate, the energy demand has, since 1970, been lagging the estimate by over a year. Another factor restricting load growth below potential could have been the slowdown, due to shortage of peso funds, in the construction of transmission lines and substations.

4.04 The expected 40% fuel cost savings over the conventional Bunker 'C' fuel had gradually dwindled to 9% in May 1974, as indicated in Annex 3b. Taking into account the operational problems from a two-fuel system[1/] and the additional capital and operating costs,[2/] the originally envisaged overall cost savings may have been totally eliminated by the present day fuel price differential. The fuel price agreement, for whatever it is now worth - since the refinery's nationalization and the steep increases in crude oil prices - should have more appropriately linked the price of high viscosity fuel to that of Bunker 'C' fuel, instead of linking it exclusively to the landed cost of crude oil. Had there been no price incentive, it is doubtful whether Bataan I would have been the choice of site for the thermal plant at the time, in preference to some other site in Southern Luzon, say Bataangas. A further problem for NPC is the refinery's probable inability to provide adequate supply of high-viscosity fuel[3/] to meet the requirements of Bataan II, 150 MW unit presently under construction.

4.05 In addition to contributing towards the dispersal of new industry from Greater Manila (and BOI reports[4/] confirm this trend), the project has provided a number of other benefits, more of an intangible nature, to NPC and even to the country. The firming capability through the entry into thermal technology and the efficient operation of Bataan has placed NPC on a solid footing for further expansion in thermal generation (including the nuclear and geothermal plants included in current expansion planning), and given it some standing in power generation business. The work done by management consultants, the analytic approaches to revaluation of assets and to pricing, and the improvement in salary structures, have raised the professionalism of NPC's executives, and increased their level of confidence and status in dealing with their customers including MERALCO.

4.06 Though the estimated unit cost of generation from Bataan (details in Annex 12) is higher than the unit cost of NPC's overall Luzon grid generation, nevertheless Bataan provides an inexpensive source of base load energy and thus increases the commercial value of NPC's generation on the Luzon grid. As would

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1/ The stand-by fuel for the system is Bunker 'C'.
2/ Fuel additive injection equipment, etc; shutting down the plant for cleaning combustion and heating surfaces.
3/ The original agreement stipulated that the type of fuel to be supplied shall be at the discretion of ESSO, provided only that such fuel shall be pumpable and burnable.
4/ Board of Investments - Eight Investment Priorities Plan, 1975.

be expected from the installation of larger capacity units and from the increase in total capacity, NPC's unit costs (at constant prices) of overall generation have fallen marginally between 1968 and 1974, despite interim increases in the wage bill.

Table 5

Unit Cost of Generation

	1968	1969	1970	1971	1972	1973	1974
Unit Cost of Generation (at 1968 Prices)							
Demand Related Cost (₱)	.035	.041	.042	.037	.036	.030	.029
Energy Related Cost (₱)	.008	.008	.009	.009	.009	.010	.012
Total Cost Per Unit (₱)	.043	.049	.052	.047	.045	.041	.041

Source: Annex 10

V. Financial Aspects

5.01 NPC's financial performance has been unsatisfactory. It did not meet the 8 percent rate of return covenant primarily because of the difficulty in obtaining adequate tariff increases for its contracted customers on the Luzon grid, and secondarily because of lower than forecasted energy sales. Even when tariffs were approved, their implementation was delayed by injunctions from lower courts, following appeals by customers.

5.02 The appraisal report stated that NPC had agreed "to make an annual review of tariffs not later than September 30 and impose new revised tariffs by December 1 of each year, and that any shortfalls or overruns of the preceding year would be considered in computation for the current year." But due to the inflexibility of NPC's long-term contracts with its customers, a rate revision took about 2 years in the case of retail distributors and up to 4 years for sales to MERALCO before such revised tariffs could be implemented. In fact, NPC's 1962 tariff revision was not fully implemented even in 1966, and litigation was pending before the Supreme Court in 1968. Such a situation is not expected to recur in the future, following the substantial revisions of NPC charter. Comparisons of NPC's estimated and actual Income Statements and Balance Sheets are given in Annexes 13 and 14, while similar comparison of financial indicators for 1968-74 is given in Table 6.

5.03 NPC's rate of return dropped from 7.1 percent in 1968 to 4.8 in 1969, both rates being calculated on partly revalued assets. In 1970, based on currently revalued rate base, the rate of return dipped to 2.7 percent. The Bank

Table 6

Financial Indicators

	1968 Est.	1968 Act.	1969 Est.	1969 Act.	1970 Est.	1970 Act.	1971 Est.	1971 Act.	1972 Est.	1972 Act.	1973 Act.	1974 Act.
Total Sales (GWh) 1/	1,516	1,464	2,224	1,208	2,501	1,711	3,314	2,109	3,433	2,385	2,389	2,364
Average Price/Unit (₱)	.035	.035	.035	.039	.034	.035	.030	.036	.033	.045	.052	.081
Total Sales Revenue 1/ (₱ million)	53.1	51.6	78.2	47.3	85.3	60.5	98.2	76.7	113.3	107.1	123.1	191.1
Operating Expenses (₱ million)	25.0	19.0	32.1	24.9	37.0	40.3	43.9	43.4	53.0	49.6	66.9	130.6 2/
Operating Ratio (%)	47	37	41	53	43	66	45	56	47	46	54	68
Rate of Return (%)	6.5	7.1	8.0	4.8	8.0	2.7	8.0	3.6	8.0	5.9	4.6	3.7
Debt/Equity Ratio (%)	48	39	49	41	49	35	48	38	46	38	48	33
Times Debt Service Covered by Net Revenue	1.2	2.1	1.5	1.2	1.5	1.2	1.2	1.2	1.3	1.8	1.3	1.6

1/ Includes Net Sales to MERALCO
2/ Net Energy Purchase from MERALCO costing ₱ 34.8 million

waived the rate covenant subject to NPC making an application for a 73 percent tariff increase which was expected to yield an 8 percent return before taxes. The Special Committee appointed by the President for tariff rate hearings, approved only 42 percent increase and in determining the rate increase stated that "current public utility rates should not include provision for future expansion of facilities." This increase plus the subsequent rate increases of ₱ 0.005 per KWh in Luzon in 1972 marginally improved the rate of return to 3.6 percent and 5.9 percent for 1971 and 1972, respectively, still far short of the covenanted 8 percent. Further tariff increases applied in 1973 and 1974, including a fuel surcharge 1/ form July 1973, though raising the average unit price and total revenue from ₱0 .052 and ₱ 107 million in 1972 to ₱.081 and ₱ 191 million in 1974 achieved rates of return of only 4.6 percent and 3.7 percent respectively.

5.04 Actual operating ratios were greater than the estimates from 1969 onwards, reflecting the collective effect of inadequate tariffs, increasing costs of generation and failure to achieve the sales targets.

5.05 NPC's debt service coverage for the 5-year period 1969-74 was, on the whole, marginally better than the appraisal forecast for 1967-72, and net internal cash generation covered a somewhat higher than expected proportion of total construction expenditures - and nearly one-third for 1969-74 (Annex 15).

5.06 NPC was also faced with liquidity problems from time to time, the most persistent one being the build-up of large sums in accounts receivable which, in 1971, amounted to 64% of the annual operating revenue. The main defaulters in this area were Government utilities, Baguio City utility, and cement companies. Other problems were the difficulty to sell NPC bonds, the inability to withdraw

1/ Fuel surcharge enables NPC to pass on to its consumers any increase in fuel cost above a base price of ₱1.1 per million BTUS.

₱8 million deposited by NPC with the financially embarrassed Overseas Bank, the delay in the receipt of about ₱11 million arising out of exchange rate differential on loan payments, and the devaluation of the peso. The 809-PH loan agreement[1/] had introduced a clause to the effect that by June 30, 1973 accounts receivable would not be greater than the three previous months' billings. Although the annual accounts for 1973 and 1974 suggest that this particular requirement was not met in either year, nevertheless a substantial improvement seems to have taken place as shown in the table below. Baguio utility has now been taken over by NEA, and the cement companies, faced with glut in their market, were permitted to offset their electricity accounts against cement purchases by the Government.

Operating Revenue and Accounts Receivable — Table 7

		1970	1971	1972	1973	1974
1.	Operating Revenue (₱M)	46.3	60.9	90.8	113.2	191.1
2.	Accounts Receivable (₱M)	21.5	38.8	48.2	39.8	53.9
	Ratio (2)/(1) (%)	46	64	53	35	28

5.07 NPC now maintains its fixed assets at current values by arranging for their review every four years by an independent appraiser. In the intervening years, it up-dates the gross fixed assets and depreciation accumulation for rate base purposes by trending. Fixed assets were revalued by appraisers on two occasions during the seven years since Loan 491-PH was made in 1967. The first revaluation was made as of December 31, 1967 but was not brought into NPC's books until FY 1970, and the second as of July 1, 1972, involving an increase of ₱366 million and brought into the books in the same FY.

5.08 NPC's practice was to record the peso value of its foreign debt liabilities at the exchange rate in force at the time the debt was incurred. The debt was serviced on the basis of the free market rate of exchange, and the resulting foreign exchange losses were written off each year. As from June 30, 1973, NPC revalued its foreign debt on the basis of the exchange rate as of that date, which increased its long term debt by ₱367 million. This produced a debt/equity ratio of 48/52. In FY 1974 the Government subscribed over ₱160 million to NPC's equity capital by the conversion of existing bonded indebtedness, and reduced NPC debt to 33 percent of its capitalization. NPC does not declare any dividend on its share capital, which is wholly Government-owned.

5.09 The debt limitation covenant required NPC to obtain the Bank's agreement before incurring long-term debt when its current revenues are less

1/ Because of slow recovery of load from severe floods in 1972, the rate of return covenant was reduced to 6 percent in 1973.

than 1.3 times the maximum future debt service on existing debt, including the debt to be incurred. Since its net revenues did not provide the stipulated cover on the future debt service, NPC has obtained Bank's prior approval for new borrowings.

VI. BANK PERFORMANCE

6.01 The substantial delays in the approval of the loan arose from many factors, including the conflicting project information from NPC, and the Bank's actions seem to have been prudent. The Bank was right in principle to expect an integrated operation of Luzon Grid; and it was equally right in practice to eventually recognize the unrealism of such an expectation given that the background and objectives of NPC and MERALCO were so different from each other. The Bank was also right in not submitting the loan for the approval of the Executive Directors until the Government had taken appropriate steps concerning the earlier loans. The Bank's concern on the capability of NPC to operate a thermal unit was not unreasonable, against the background of its past performance in dealing with problems emanating from a relatively simpler technology; but subsequent excellent operation of Bataan has dispelled the concern.

6.02 The Bank was also helpful to the borrower in specific ways. It advised NPC on the outdatedness of its agreement with MERALCO which placed emphasis on energy sales whereas NPC's principal contribution was capacity. It put in a large amount of time and effort interceding with Government, on behalf of NPC, for increases in tariff, and for other actions to improve NPC's organization and management. The Bank deserves the credit for initiating the first meeting between NPC and MERALCO to prepare a forecast of loads and capacity requirements of the Luzon Grid.

6.03 Employment of consultants was an important part of the project, and a necessary means to strengthen NPC's organization and management. But the appraisal estimate of project cost surprisingly did not include the cost of management services; a year later though, the Bank finally agreed to NPC's requests and a supervision mission's recommendation to finance the consultants' foreign exchange costs from the loan. More importantly, the Bank was aware of NPC's Chief Executive's interest and determination to improve the management and the organization; in such a situation the Bank could have placed greater emphasis on the objectives rather than the means; NPC would then have had the option to consider hiring foreign consultants on a piece-meal basis, and probably achieving substantial savings without harm to achievement of the desired overall improvements. Another area where the Bank could have increased the contribution towards the improvement in NPC was to earmark a small amount from the loan towards management training. Almost none of the external courses and training programs to which NPC sponsored its employees included a management discipline.

6.04 The Bank does not seem to have made any specific comments on the management consultants' recommendations, even though they were hired at its instance. There is no record of the Bank having kept track of which recommendations were accepted, which rejected and which modified, or of implementation.

6.05 Regionalization in 1972 suddenly and greatly increased NPC's manpower requirements, at a time when NPC was short in management capability, thus tending to negate one of the Bank's objectives in making the loan - to strengthen NPC's overall management. A change of this nature did not require Bank approval under the terms of the loan agreement, but there is no evidence that the consequences of this timing and the possible alternatives were discussed during Bank supervision of the project.

6.06 As regards tariffs, the presentation in the appraisal report of procedures for their regular review seems to have been overoptimistic, judged by the results. Perhaps this might have been foreseen by the length of time that it took to implement the Government-approved 1962 tariff changes, indicating that the procedures were really not feasible, given the legal framework within which NPC operated at the time of the appraisal. Furthermore, since the Government was continually in default on the loan covenant dealing with the return on the rate base from the year following appraisal, and the Bank devoted substantial time and effort to attempting to rectify this, more serious consideration should have been given to making a tariff increase, sufficient to achieve the existing rate covenant, a condition for negotiating (approving, signing or making effective) the subsequent loan to the same borrower made approximately four years later (Loan 809-PH for Bataan II, 150 MW unit was under negotiation at the time of the supervision of the loan).

6.07 On the technical - economic side, the Bank seems to have given inadequate attention to the minor components of the project and the program, both at appraisal and supervision. Commitments were obtained regarding the availability of reparation payments, and the delays in releasing them were periodically followed up, but no targets were given in the appraisal report for construction of transmission lines and substations.

6.08 In retrospect, the work on Maria Cristina and Lake Lanao could have been deferred by three years, and possibly more. While the Bank had justifiably given most of its attention to the problems related to Bataan and at its instance, had even obtained a revised load forecast from NPC in December 1966, nevertheless the imprecise, rather unrealistic and, with hindsight, outdated information made avialable to the Bank on the developments at Iligan Steel - which presumably was used as a basis for the revised forecast - should have strongly suggested an earlier and a more thorough re-assessment of justification for this part of the project than that made a week before the loan was approved.

VII. CONCLUSIONS

7.01 All major parts of the project have been brought to successful physical completion, and they seem to be worthwhile, although the works on the Mindanao system accounting for some 15% of total project costs were probably done some three years ahead of the time they were really needed. The 18% cost overrun for the project as a whole was mainly accounted for by real increases in scope, at Bataan and in the form of the management consultants' services. The lengthy delays in both preparation and execution of the project do not seem to have had too serious an effect on power market growth except to an unclear, but probably relatively small extent, in Luzon. Difficulty in obtaining approval of adequate rate increases and then in implementing them effectively resulted in NPC's rate of return falling persistently short of the covenanted 8%, but this did not cause problems of local currency shortage to be a major factor in delaying project works. The impetus provided by the successful operation of Bataan, the work done by the management consultants, the amendments to NPC's charter (other than the regionalization) and the involvement of the Office of the President have helped NPC become a more effective organization, and thus more capable of discharging the greatly increased responsibilities it has since been given.

ANNEX 1a

ENERGY GENERATED IN PHILIPPINES
(GWH)

	1961	1962	1963	1964	1965	1966	1967	Growth '61-'67 (% p.a.)
NCP	1,132	1,169	1,376	1,465	1,430	1,436	1,586	5.8
MERALCO	1,251	1,550	1,709	2,010	2,400	2,853	3,015	15.8
Other	216	223	240	283	330	362	396	10.5
Total	2,599	2,942	3,325	3,758	4,160	4,651	4,997	11.5

Note: In 1961 there were 280 entities (76 large employing 10 people or more and 204 small) in generation business.

ANNEX 1b

MERALCO - KEY STATISTICS

	1961	1962	1963	1964	1965	1966	1967
Customers	368,925	385,516	403,653	419,062	440,651	461,786	483,325
Generating Capability (MW)	319	319	385	385	485	595	595
Net Utility Plant (PM)	223.3	266.8	303.5	344.7	509.4	568.6	657.3
Sales (GWH)	1,689	1,939	2,175	2,493	2,721	3,055	3,431
Average Price/Unit (P)	.0532	.0521	.0515	.0511	.060	.0614	.0610
Revenues (PM)	89.8	101.1	112.1	127.5	163.2	187.8	209.3
Net Income (PM)	24.6	24.3	25.0	28.1	38.1	49.8	55.1
Net Income as % of Net Utility Plant	11.0	9.1	8.3	8.2	7.5	8.8	8.4

ANNEX 1c

AREA AND POPULATION DISTRIBUTION OF PHILIPPINES

	Mindanao	Visayas	Luzon (incl. Manila)	(Metropolitan Manila)	Total
Area (000 Km^2)	102	58	140	n.a.	300
Population in 1965 (M)	6.4	9.1	16.4	(2.7)	31.9
2/ Total Employment in Public Utilities	1,546	1,907	11,226	(5,428)	14,679 / 13,802 1/
2/ Total Payroll (PM) in Public Utilities	4.6	6.4	49.2	31.3	60.3 / 56.6 1/
2/ Total Receipts (PM) in Public Utilities	52.9	28.3	308.9	206.8	389.1 / 384.3 1/
2/ NPC Sales (GWh)	225.6	6.6	1,050.0	-	1,282.3
2/ NPC Sales Revenue (PM)	4.60	0.43	36.59	-	41.61

1/ Corresponding figures for Electric Light and Power Utilities.
2/ Data for 1967.

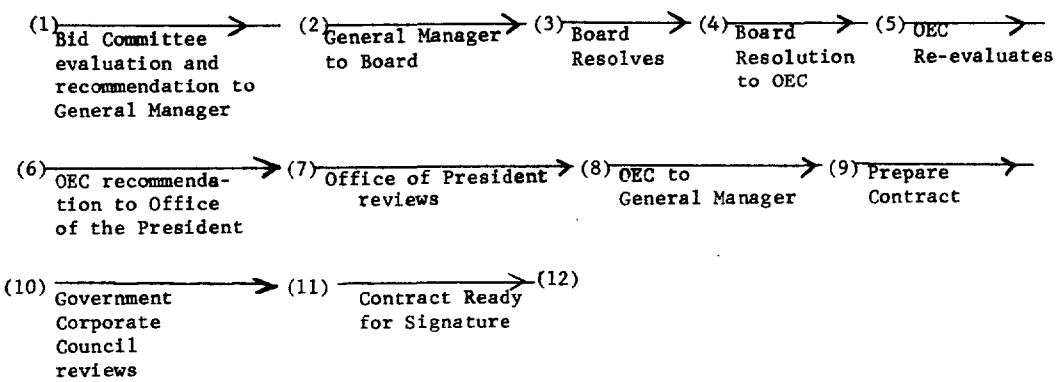
ANNEX 2

KEY DATES OF PRINCIPAL CONTRACTS

Contract	Date Bid Opened	Date Contract Signed	Contract Awarded to	Contract Value (million)
Main Machinery (Boiler, Turbo. alternator)	8/16/67	7/29/68	Remerco	$5.57
Transformer	8/16/67	8/19/68	Macondray	$0.36
Switchgear	8/16/67	8/19/68	(EdKeller 1/)	$0.98
Civil Works	12/22/67	6/13/68	Heights Cons	₱13.95

1/ Office of Economic Coordination (OEC) disapproved award to Keller. This contract was subsequently integrated with the transformer contract and awarded to Macq dray.

NORMAL PROCEDURE IN AWARDING CONTRACTS



1-2 Bid Committee (consisting of 3 representatives from NPC, and one from OEC who is the chairman, and an observer from the Office of Auditor General) evaluates bids and makes recommendations to the General Manager.

2-3 General Manager forwards the recommendations to the Board.

3-4 Board approves the recommendations through a resolution and returns to the General Manager.

4-5 General Manager forwards the Board resolution to OEC.

5-6 OEC Committee re-evaluates the bid.

6-7 Re-evaluated bid, if in excess of ₱ 500,000 is sent to the Office of the President (otherwise directly back to the General Manager).

7-8 Office of the President Screening Committee reviews the bid and sends it back to OEC.

8-9 OEC sends it back to the General Manager.

9-10 General Manager's office prepares the contract and sends it to Government Corporate Council.

10-11 Government Corporate Council reviews the contract and returns it to the General Manager.

11-12 Contract ready for signature.

NOTE: Since the disbanding of OEC and with the enlarged role played by the Office of the President in the Electricity Generation, the time span for the above procedure is reduced from one year to about 3 months.

ANNEX 3a

ANNUAL EXPENDITURE ON PROJECT
(in millions)

Fiscal Year	Inflation Factor	M.C. No. 4 Peso	M.C. No. 4 US$	Bataan No. 1 Peso	Bataan No. 1 US$	Total Peso	Total US$	Total Peso at 1968 Prices	Total Peso in Equivalent US$[a]
1965	0.89	-	-	0.83	-	0.83	-	0.93	0.21
1966	0.93	.33	-	0.08	-	0.41	-	0.44	0.11
1967	1.00	1.71	-	0.68	-	2.39	-	2.39	0.61
1968	1.00	4.13	-	3.96	-	8.09	-	8.09	2.06
1969	1.04	4.16	-	0.59	1.99	4.75	1.99	4.57	1.21
1970	1.28	6.37	1.02	17.78	3.63	24.15	4.65	18.87	3.75
1971	1.37	2.51	0.03	10.96	3.30	13.47	3.33	9.83	2.09
1972	1.42	0.63	-	13.40	0.60	14.03	0.60	9.88	2.09
1973	1.56	-	-	2.23	1.15	2.23	1.15	1.43	0.33
1974	2.17	-	-	5.13	0.28	5.13	0.28	2.36	0.73
TOTAL		19.84	1.05	55.64	10.95	75.48	12.00	58.79	13.19

[a] Converted from current Pesos at exchange rates prevailing each year.

ANNEX 3b

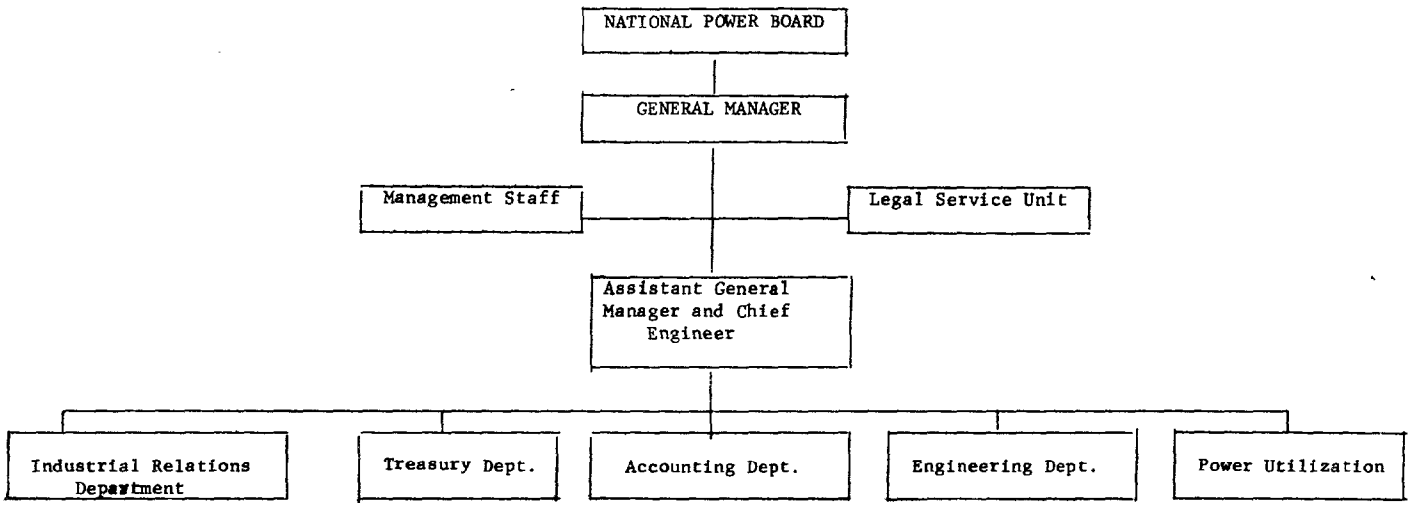
OPERATIONAL DATA ON BATAAN

Period	Load Factor %	Utilization Rate 1/ %	Generation MWH Gross	Generation MWH Net	Heat Rate BTU/KWH (net)	Fuel Costs Hi-Vis ₱/MBTU	Fuel Costs Bunker 'C' ₱/MBTU	Savings Hi-Vis vs. Bunker 'C' %	Cost (Fuel & Additives) ₱/KWH (net)
FY 71-72	36.48	-	61,064	58,579	10,776	-	-	-	0.0321
May '72	46.26	59.73	25,810	25,677	10,217	2.618	3.875	33	0.0298
FY 72-73	58.81	64.98	386,384	364,875	9,926	-	-	-	0.0296
May '73	68.00	75.35	38,118	34.905	10.138	2.882	4.355	33	0.0318
FY 73-74	72.08	77.43	473,540	442,831	9,730	-	-	-	0.0803
May '74	95.00	98.12	53,011	49,904	9,555	12.800	14.058	9	0.1238
FY 74-75	56.96	62.34	347,227	326,225	9,843	-	-	-	0.1319
May '75	80.18	85.06	44,743	42,354	9,530	13.695	16.698	18	0.1232

1/ The availability of the plant (probably of the order of 90%+) is much greater than the Utilization Rate.

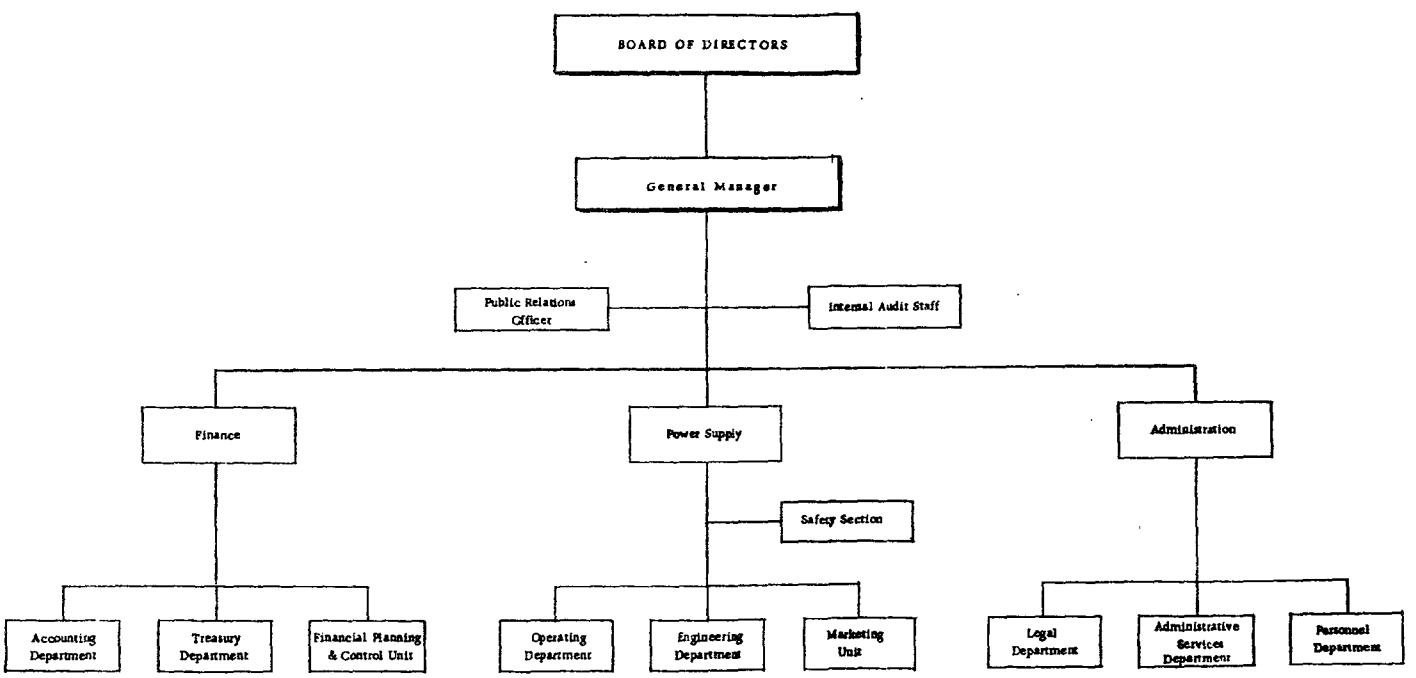
ANNEX 4a

NATIONAL POWER CORPORATION ORGANIZATION CHART (1967)

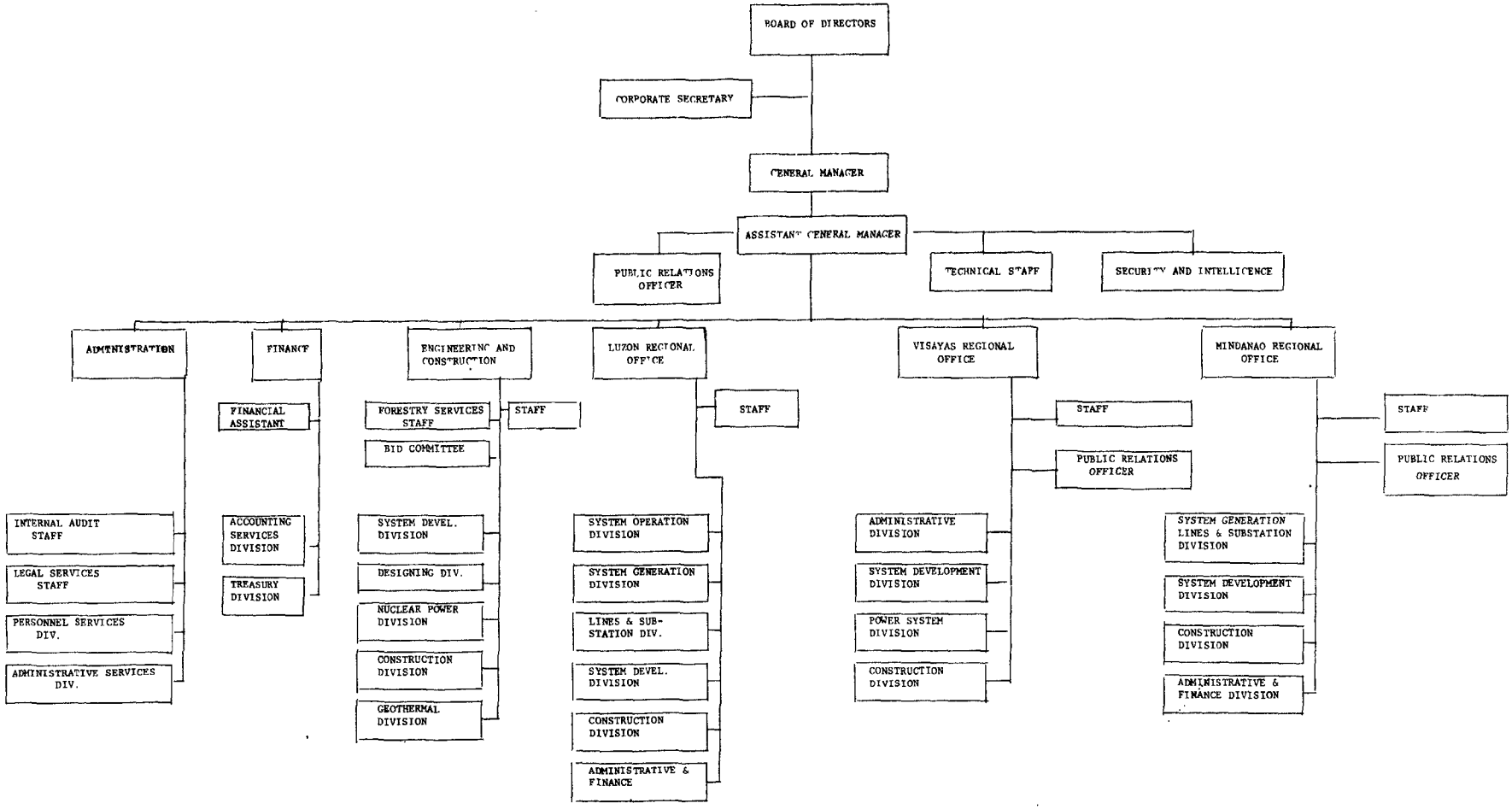


ANNEX 4b

NATIONAL POWER CORPORATION
ORGANIZATION CHART (proposed by Consultants)



NATIONAL POWER CORPORATION ORGANIZATION CHART
(1974)



ANNEX 4-c

CONSTRUCTION OF TRANSMISSION LINES
(in km)

		1967	1968	1969	1970	1971	1972	1973	1974
kV									
230	Luzon Grid			481.0	481.0	483.4	680.8	680.8	680.8
115	Luzon Grid			197.9	197.9	191.7	191.7	191.7	191.7
69	Luzon Grid			659.5	682.5	1,047.5	915.3	957.7	1,060.7
	Mindanao			99.6	99.6	118.0	118.0	102.0	102.0
23 & 34.5	Luzon Grid			88.1	100.1	1,125.6 1/	116.1	98.5	86.8
	Luzon Other			42.5	42.5	57.9 1/	42.5	66.8	97.4
	Visayas			54.3	54.3	95.2 1/	54.3	54.3	54.3
	Mindanao			62.6	62.6	88.1 1/	62.6	63.0	63.0
13.8 & Below	Luzon Grid			839.0	890.8		1,039.3	1,111.4	934.0
	Luzon Other			68.0	99.6		15.4	24.0	24.0
	Visayas			40.9	40.9		40.9	42.9	42.9
	Mindanao			22.5	22.5		8.2	17.0	17.0
	TOTAL			2,655.9	2,774.3	3,207.4	3,284.1	3,410.1	3,354.6 2/

CONSTRUCTION OF SUBSTATIONS
(in MVA)

Plant Switchyards								
Luzon Grid			567.8	597.8	579.8	697.0)	706.6	: n.a
Luzon Other			5.2	5.2	3.3	3.3)		
Visayas			3.0	3.0	3.0	3.0	2.5	2.5
Mindanao			70.4	134.4	198.2	194.4	(a)	(a)
Main Substations								
Luzon Grid			327.5	407.5	457.5	457.5	457.5	532.5
Luzon Other			-	-	-	-	-	-
Visayas			-	-	-	-	-	-
Mindanao			64.4	64.4	64.4	64.4	274.3	280.0
Load Centres Substations								
Luzon Grid			114.0	121.0	161.1	170.1)	196.6)	222.6
Luzon Other			1.0	1.0	-	-)	)	
Visayas			1.0	1.0	-	-	-	-
Mindanao			12.0	12.0	12.0	12.0	(a)	(a)
Load End Substations								
Luzon Grid			31.3	31.3	28.6	28.6)	31.2)	22.9
Luzon Other			3.0	3.0	3.0	3.0)	)	
Visayas			2.7	2.7	2.7	3.6	3.6	3.6
Mindanao			4.2	4.2	4.2	2.7	(a)	(a)
TOTAL			1,207.5	1,388.5	1,536.7	1,639.6	1,672.3	1,064.1 3/

1/ Includes 13.8 kV.
2/ Turned Over 189.1 km.
3/ Does not include Luzon Plant Switchyard; Turned Over 5.0 MVA.
a/ Include in Main Substations.

INVESTMENT IN TRANSMISSION AND SUBSTATIONS

Balance Beginning (P million)		209.65	218.01	254.73	274.61	313.64	364.45
Trending Factor 1/	1.00	1.012	1.158	1.063	1.018	1.123	1.400
Cumulative Factor 2/	1.00	1.01	1.17	1.24	1.26	1.43	1.97
Trended Balance (P million)	-	212.16	252.46	270.77	279.51	352.25	510.06
Net Increase (Actual) (P million)	-	5.85	2.27	3.84	34.13	12.20	24.43
Balance Ending (P million)	-	218.01	254.73	274.61	313.64	364.45	534.49
Net Investment at 1967 Prices (P million)		5.79	1.94	3.03	27.09	8.65	12.40

1/ Yearly Trending Factor.
2/ Trending Factor relating current value of PIS to 1968 price level.

NPC's MANPOWER AND POSITIONS

ANNEX 6

Permanent Personnel

	December 1967	1968	1969	1970	1971	1972	1973	1974	May 1975
National Power Board	22 (26)	27 (27)	27 (27)	28 (28)	26 (29)	29 (29)	24 (27)	26 (28)	26 (28)
Office of the General Manager	6 (7)	6 (7)	7 (7)	7 (8)	8 (10)	8 (10)	10 (21)	18 (21)	18 (21)
Legal Services Staff	15 (17)	13 (17)	12 (17)	13 (17)	23 (25)	22 (25)	16 (16)	-	-
Internal Audit Staff				0 (10)	12 (12)	11 (12)	13 (14)	-	-
Industrial Relations & Gen. Services Department	71 (71)	71 (72)	69 (75)	71 (71)	92 (103)	-	-	-	-
ADMINISTRATION DEPARTMENT	-	-	-	-	-	98 (100)	74 (86)	111 (117)	115 (117)
Treasury Department	70 (76)	71 (78)	71 (76)	68 (68)	-	-	-	-	-
Accounting Department	50 (56)	53 (56)	53 (56)	54 (63)	-	-	-	-	-
FINANCE DEPARTMENT	-	-	-	-	103 (119)	104 (118)	102 (114)	99 (103)	106 (120)
Engineering Department	176 (196)	176 (195)	176 (194)	192 (194)	196 (202)	168 (175)	163 (178)	190 (226)	192 (226)
ENGINEERING & CONSTRUCTION DEPARTMENT	-	-	-	-	-				
Power Utilization Department	845 (954)	860 (955)	840 (941)	893 (981)	852 (990)				
LUZON REGIONAL OFFICE 1/	-	-	-	-	-	1042 (1206)	1121 (1177)	1154 (1213)	1177 (1212)
VISAYAS REGIONAL OFFICE	-	-	-	-	-	47 (104)	89 (104)	112 (132)	114 (133)
MINDANAO REGIONAL OFFICE	-	-	-	-	-	140 (308)	226 (294)	276 (408)	277 (409)
TOTAL (PERMANENT)	1255 (1403)	1277 (1407)	1255(1393)	1326 (1440)	1312 (1490)	1669 (2087)	1838 (2031)	1986 (2248)	2025 (2266)
Temporary Personnel	856	694	764	746	771	874	644	961	1146
Casual Personnel	183	15	36	97	163	670	813	1393	1501
TOTAL PERSONNEL	2294	1986	2055	2169	2246	3213	3295	4340	4672

NOTE: Figures in parentheses correspond to number of positions
In the reorganization, the Industrial Relations & General Services Department became the ADMINISTRATION DEPARTMENT. The Legal Services Staff and the Internal Audit Staff were absorbed by the ADMINISTRATION DEPARTMENT in 1974. The Treasury Department and the Accounting Department became the FINANCE DEPARTMENT, while the Engineering Department became the ENGINEERING & CONSTRUCTION DEPARTMENT. LUZON, VISAYAS and MINDANAO REGIONAL OFFICES were also created.

1/ Includes Bataan

June 1972	1973	1974	1975
22 (22)	111 (121)	112 (125)	130 (130)

GENERATION and SALES BY REGIONS

FY	1968	1969	1970	1971	1972	1973	1974
TOTAL GENERATING CAPACITY (MW)	432.2	482.9	532.6	579	650.5	653.7	654
TOTAL ENERGY GENERATED (GWH)	1,745.7	1,530.3	1,934.9	2,240.5	2,525.6	2,583.1	2,362.9
TOTAL ENERGY SOLD (GWH) 2/	841.0	1,084.8	1,336.8	1,552.4	1,745.0	2,011.3	2,363.7
TOTAL SALES REVENUE (₱'000) 2/	30,775.5	37,944.4	46,337.8	60,941.3	90,849.1	113,156.3	191,111.0
UNIT PRICE (₱) average 2/	0.0352	0.0350	0.0346	0.0392	0.052	0.056	0.0808
LUZON GRID 1/							
Generating Capacity (MW)	369	419.5	419.5	419.5	494.0 4/	494.0	494.0
Energy Generated (GWH)	1,488.6 4/	1,204.2	1,508.3	1,826.8 4/	2,151.4 4/	2,146.9	1,832.5
Energy Sold (GWH) 2/		781.4	932.7	1,140.2	1,373.3	1,595.4	1,829.5
Sales Revenue (₱'000) 2/		30,780.5	37,550.1	50,787.3	79,526.5	100,587.6	174,924.5
Unit Price (₱) average 2/		0.0394	0.0403	0.0445	0.058	0.063	0.095
LUZON OTHER							
Generating Capacity (MW)	6.6	6.6	6.6	2.9	2.9	5.9	5.9
Energy Generated (GWH)		15.6	18.9	-	-	13.5	20.7
Energy Sold (GWH)		14.8	17.8	11.1	12.9	13.1	18.9
Sales Revenue (₱'000)		1,059.0	1,271.4	1,514.5	1,030.4	1,222.5	2,453.3
Unit Price (₱) average		0.071	0.071	0.136	0.0797	0.093	0.1298
VISAYAS REGION							
Generating Capacity (MW)	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Energy Generated (GWH)	8.0	7.0	8.1	8.8	9.8	7.5	9.7
Energy Sold (GWH)	7.0	6.3	7.3	7.8	9.6	6.7	8.8
Sales Revenue (₱'000)	447.5	424.8	472.4	535.1	751.5	587.4	767.6
Unit Price (₱) average	0.0637	0.067	0.065	0.068	0.078	0.0872	0.0876
MINDANAO REGION							
Generating Capacity (Mw)	54.9	54.9	105.0	154.6	152.0 3/	152.0	152.0
Energy Generated (Gwh)	249.1	303.4	399.6	404.9	364.4	415.2	519.7
Energy Sold (Gwh)	229.7	282.3	379.0	393.1	349.0	396.2	506.5
Sales Revenue (₱'000)	4,741.4	5,680.2	7,043.8	8,104.3	9,540.8	10,758.8	12,965.6
Unit Price (₱)	0.0206	0.0201	0.0186	0.0206	0.0273	0.027	0.0256
1/ NPC - MERALCO Interchange							
Energy Sales to MERALCO (GWH)	962	537	668	796	893	647	376
Energy Purchase from MERALCO (GWH)	140	334	266	239	255	217	395
Net Revenue (or Purchase) from MERALCO (₱'million)	20.8	9.4	14.1	15.8	16.2	10.6	(34.7)

2/ Excludes sales to MERALCO.
3/ Talomo System (2.9 MW) leased out
4/ Including Luzon Other

NPC's CUSTOMERS

Utilities	n.a.	145	151	157	165	177	148
Non Utilities	n.a.	88	89	91	94	104	106
Total No. of Customers	221	233	240	248	259	281	254

ELECTRIFICATION IN PHILIPPINES

	1971	1972	1973	1974	Growth Rate 1971-1974 % p.a.
Total Population in Cities (000's)	7,825	8,232	8,444	8,812	4.0
City Population Served with Elect. Systems (000's)	4,223	5,390	5,798	5,957	12.2
% of Total City Population Served	54.0	65.5	68.7	67.6	-
Total Population in Municipalities (000's)	29,914	30,585	31,571	32,607	2.9
Town Population Served by Elect. Systems (000's)	4,319	5,432	6,523	6,780	16.2
% of Total Town Population Served	16.9	17.8	20.6	20.8	-
Total Population of Country (000's)	37,739	38,817	40,015	41,419	3.1
Total Population Served by Elect. Systems (000's)	8,538	10,822	12,321	12,737	14.3
% of Total Population Served	22.5	27.9	30.8	30.8	-
Total No. of Cities	61	63	63	63	-
No. of Cities Served by Elec. Systems	61	63	63	63	-
% of Cities Served	100	100	100	100	-
Total No. of Municipalities	1,423	1,421	1,422	1,427	-
No. of Towns Served by Electric Systems	716	741	766	778	-
% of Towns Served	50.3	52.1	53.9	54.5	-

NEA's TARGETS

1. Total Electrification of all municipalities by 1980.
2. Total Electrification of all barrios by 1984.
3. Electricity to 95% of total population by 1990.

Source: National Electrification Administration.

Iligan Steel's Role in Agus Grid Load Growth

The expected growth of industry in Mindanao, and the consequent increase in power and energy demand[1] particularly from Iligan Steel had created the justification for Maria Cristina unit No. 4. Iligan Steel had obtained a U.S Ex-Im Bank loan of $62 million for expansion of its annual production capacity by 300,000 tons by means of a fully integrated plant which included electric smelting furnaces - the main consumers of electrical energy - for production of pig iron. Subsequent to Ex-Im Bank's authorization of the loan in May 1961, it transpired that the costs of capital equipment for the plant had soared substantially from the estimates based on prices for earlier years. Faced with this and other problems, including the relative inflexibility of this form of integration for future capacity expansion, Iligan Steel cancelled the original plans for the fully integrated steel plant and decided to install only hot and cold rolling mills[1] with an annual steel output of 500,000 tons. The option to have an integrated plant - in this case a backward integration - was left open for the future, with a high probability that blast furnaces would replace the envisaged electric smelters. Ex-Im Bank approved Iligan's decision on rolling mills, the civil engineering work of the project started in 1965 and the plant was in operation in 1969.

Electricity consumption of rolling mills is much lower relative to that expected from the proposed electric smelter. NPC, apparently not having been kept adequately informed by Iligan Steel of the actual or imminent changes to its expansion program, had already placed orders for Maria Cristina equipment by mid-1966, before the loan was approved.

Financial difficulties compelled Iligan to close down its plant in August 1971. It was re-started in November 1972, and the cold strip mill was operating at 70% capacity.

1/ Steel slabs, the feedstock for these mills were to be imported from Australia and Japan.

NATIONAL POWER CORPORATION

ANNEX 10

Determination of Cost Per GWH of Generated Energy at 1967-68 Prices

	1967-68	1968-69	1969-70	1970-71	1971-72	1972-73	1973-74
I. Generated Energy (GWH)	1746	1530	1505	1684	1685	2205	2383
II. Operating Expenses (Energy Related Cost) at Current Prices:							
a. Production (P million)	5.148	5.880	9.406	11.033	12.866	22.063	49.225
b. Transmission (P million)	2.357	2.348	3.396	4.480	5.889	6.524	10.236
c. Administrative & General (P million)	6.560	4.488	4.955	5.282	5.912	6.828	3.649
TOTAL (P million)	14.065	12.716	17.727	20.796	24.667	35.415	63.110
Cost Per KWH (P)	0.0081	0.0083	0.0118	0.0124	0.0131	0.0161	0.0265
III. Fixed Costs (Demand Related) Based on Average Revalued Assets in Service:							
a. Depreciation @ 2.31% (Gross) (P million)	17.98	21.08	26.25	28.60	31.26	36.10	51.04
b. Interest @ 6% (Net) (P million)	42.60	43.00	53.01	55.70	62.71	67.98	95.18
TOTAL (P million)	60.58	64.08	79.26	84.30	93.97	104.08	146.22
Cost Per KWH (P)	0.0347	0.0419	0.0527	0.0501	0.0498	0.0472	0.0614
Total Cost (Energy Related Cost Plus Demand Related Cost) Per KWH (P)	0.0428	0.0502	0.0644	0.0624	0.0629	0.0633	0.0879
IV. Conversion Factors (Denominators) to 1967-68 Prices	1.00	1.03	1.25	1.34	1.40	1.55	2.15
Energy Related Cost per KWH Stated at 1967-68 Prices (P)	0.0081	0.0081	0.0094	0.0092	0.0093	0.0104	0.0123
Demand Related Cost per KWH Stated at 1967-68 Prices (P)	0.0347	0.0407	0.0421	0.0374	0.0356	0.0305	0.0285
Total Unit Cost per KWH at 1967-68 Prices (P)	0.0428	0.0487	0.0515	0.0466	0.0449	0.0408	0.0409

POWER AND ENERGY DEMAND ESTIMATED V/S ACTUAL

ANNEX 11

		1967		1968		1969		1970		1971		1972		1973		1974	
		Est.	Act.	Est.	Act.	Est.	Act.	Est.	Act.	Est.	Act.	Est.	Act.	Est.	Act.	Est.	Act.
LUZON GRID																	
NPC (Provincial)	Power (MW)	87	121	136	132	153	170	185	190	214	224	257	250	n.a.	294	n.a.	352
MERALCO	Power (MW)	659	613	735	670	820	731	913	851	1,013	912	1,124	1,002	-	-	-	-
TOTAL	Power (MW)	746	734	871	802	973	901	1,098	1,041	1,227	1,136	1,381	1,252	-	-	-	-
NPC (Provincial)	Energy(GWh)	567	746	852	773	1,081	1,026	1,303	1,097	1,549	1,248	1,798	1,467	n.a.	1,777	n.a.	1,872
MERALCO	Energy(GWh)	n.a.	3,629	n.a.	4,053	n.a.	4,530	n.a.	4,897	n.a.	5,147	n.a.	5,427	n.a.	n.a.	n.a.	n.a.
TOTAL	Energy(GWh)	n.a.	4,375	n.a.	4,826	n.a.	5,556	n.a.	5,994	n.a.	6,395	n.a.	6,894	n.a.	n.a.	n.a.	n.a.
MINDANAO (AGUS) GRID 1/																	
TOTAL Power		41	49	58	41	114	57	142	67	224	76	238	82	n.a.	85	n.a.	95
Iligan Power (MW)		11	n.a.	20	n.a.	60	n.a.	80	n.a.	160	n.a.	170	n.a.	n.a.	22	n.a.	n.a.
TOTAL Energy (GWh)		157	226	225	230	519	282	795	379	1,296	393	1,377	356	n.a.	396	n.a.	507
Iligan Energy (GWh)		20	n.a.	37	n.a.	240	n.a.	480	n.a.	960	n.a.	1,020	n.a.	n.a.	73	n.a.	n.a.
Plant Capacity	(MW)	50	55	100	55	150	55	150	105	250	152	250	152	n.a.	152	n.a.	152
	(GWh)	420	420	595	420	1,060	420	1,060	595	1,573	1,060	1,573	1,060	n.a.	1,060	n.a.	1,060

1/ Actual includes output from isolated units of very small capacity.

NOTE: The actual figures for Power and Energy on Luzon Grid were taken from 'Load and Energy Forecast Study' by International Engineering Company in 1973. They differ slightly from NPC's records.

ESTIMATED COST OF BATAAN GENERATION
(US$ = ₱7.0)

	Local ₱	Foreign US$	Total (in ₱ equivalent)
Construction Cost (million)	40.3	8.7	101.2
Interest Capitalized (million)	2.7	1.1	10.4
Engineering Services (million)	6.5	0.8	12.6
Sub-Total (million)	49.5	10.6	123.7
Annual Capital Cost[1] (million)			10.9
Operation & Maintenance[2] (million) P.a.			3.7
Sub-Total			14.6
Transmission Cost[3] (million)	p.a.		4.4
Total Fixed Cost[4] (million)	p.a.		19.0
Annual Generation in '73-'74 443 GWh			
Fixed Cost per KWH			.042
Fuel Cost per KWH[5]			.011
Total Cost per KWH			.053
Overall Luzon Grid			
Operating Expense[5] (million) 73-74			90.0
Annual Generation '73-'74 1,832 GWH			
Total Cost per KWH '73-'74			.049

1/ Capital Recovery over 30 years at 8%.
2/ Assumed 3% of Capital Cost.
3/ Assumed 30% of Capital Cost.
4/ Fixed Cost includes semi-variable O + M cost.
5/ Less Fuel surcharge.

PHILIPPINES

NATIONAL POWER CORPORATION

ANNEX 13

Income Statements FY 1966/67 through 1973/74
(In Millions of Pesos except where otherwise stated)

June 30	1966/67		1967/68		1968/69		1969/70		1970/71		1971/72		1972/73		1973/74	
	Estimate	Actual	Estimate	Actual	Estimate	Actual	Estimate	Actual	Estimate	Actual	Estimate	Actual	Estimate	Actual	Estimate	Actual
Sales (Gwh)	1,233	1,282	1,516	1,653	2,224	1,085	2,501	1,337	3,314	1,544	3,433	1,745	2,325	2,051	2,679	2,355
Average Revenue (in Pesos per Kwh)	0.034	0.032	0.035	0.031	0.035	0.035	0.034	0.035	0.030	0.039	0.033	0.052	-	0.055	-	0.081
Operating Revenue	41.4	41.6	53.1	51.6	78.2	37.9	85.3	46.3	98.2	60.9	113.3	90.9	125.1	113.1	162.1	191.1
Operating Expenses																
Operating Expenses	12.9	10.3	15.1	11.5	16.2	13.3	19.6	14.6	23.8	20.8	28.8	24.7	31.5	35.4	34.0	63.1
Real Estate and Income Taxes	0.8	0.7	0.9	0.5	3.0	1.2	3.6	3.7	3.7	-	5.3	-	-	-	-	-
Depreciation	5.8	4.8	9.0	7.0	12.9	10.4	13.8	22.0	16.4	22.6	18.9	24.9	35.7	31.5	38.2	32.7
Power Interchange with Meralco	-	-	-	-	-	(9.4)	-	(14.2)	-	(15.8)	-	(16.2)	(8.6)	(10.0)	0.2	34.8
Total - Operating Expenses	19.5	15.8	25.0	19.0	32.1	15.5	37.0	26.1	43.9	27.6	53.0	33.4	58.6	56.9	72.4	130.6
Operating Income	21.9	25.8	28.1	32.6	46.1	22.4	48.3	20.2	54.3	33.3	60.3	57.5	66.5	56.2	89.7	60.5
Add: Other Income	-	1.6	-	1.5	-	1.0	-	0.1	-	2.4	-	5.4	0.5	5.6	0.8	7.8
Total - Income	21.9	27.4	28.1	34.1	46.1	23.4	48.3	20.3	54.3	35.7	60.3	62.9	67.0	1.8	90.5	68.3
Less: Deductions																
Interest on Equity	12.0	-	8.8	-	8.8	-	8.8	-	-	-	-	-	-	-	-	-
Interest on Long Term Loans	14.8	18.0	17.5	17.7	20.5	20.0	23.2	21.8	33.0	31.3	33.1	37.0	36.2	38.0	47.9	-
Interest during Construction (Cr)	(6.9)	(7.9)	(4.6)	(8.1)	(3.1)	(5.6)	(5.5)	(2.7)	(3.9)	(8.9)	(1.8)	(10.9)	(6.3)	(4.0)	(16.1)	-
Interest on Sinking Fund	(0.6)	-	(0.7)	-	(0.8)	-	(0.8)	-	(0.9)	-	(1.0)	-	-	-	-	-
Interest Charged to Operations	19.3	10.1	21.0	9.6	25.4	14.4	25.7	19.1	28.2	22.4	30.3	26.1	20.9	34.0	31.8	34.4
Exhange Rate (Loss)	-	2.0	-	3.2	-	3.3	-	5.6	-	11.2	-	12.6	-	-	-	-
Total - Deductions	19.3	12.1	21.0	12.8	25.4	17.7	25.7	24.7	28.2	33.6	30.3	38.7	29.9	34.0	31.8	34.4
Net Surplus to Reserve	2.6	15.3	7.1	21.3	20.7	5.7	22.6	(4.4)	26.1	2.1	30.0	24.2	37.1	27.8	58.7	33.9
Rate Base (Average Net Fixed Assets 1/ less Contrib. to Construction)	303.0	231.9	429.5	457.8	576.5	467.0	603.4	744.0	678.3	935.0	754.1	974.1	1,039	1,225	1,100.	1,628
Rate of Return (Operating Income as % of Rate Base 2/	7.2	11.1	6.5	7.1	8.0	4.8	8.0	2.7	8.0	3.6	8.0	5.9	6.4	4.6	8.2	3.7
Operating Ratio (Operating Expenses as % of Revenue	47	38	47	37	41	41	43	56	45	45	47	37	47	50	45	68
Loan Interest covered by Net Income (times)	1.5	1.5	1.6	1.9	2.2	1.1	2.1	0.9	1.6	1.1	1.8	1.7	1.8	1.6	1.9	-

1/ Estimates for FY 1966/67-1971/72 prepared in 1967 and estimates for FY 1972/73 and 1973/74 prepared in 1972.
2/ Rate Base to FY 1969 based on historical values. From FY 1970 base adjusted by Ps.390 m in 1970, and Ps. 366 m in 1974 for surplus after reappraisal, with figures in the interim period adjusted on basis of indices adopted to maintain commercial values.

March 1975

PHILIPPINES

NATIONAL POWER CORPORATION

ANNEX 14

Condensed Balance Sheets as of June 30, 1966/67 through 1973/74
(in Millions of Pesos)

June 30	1966/67		1967/68		1968/69		1969/70		1970/71		1971/72		1972/73		1973/74	
	Estimate	Actual	Estimate	Actual	Estimate	Actual	Estimate	Actual	Estimate	Actual	Estimate	Actual	Estimate	Actual	Estimate	Actual
ASSETS																
Fixed Assets																
Gross Plant in Operation	344.5	303.2	622.5	521.6	682.0	548.2	702.9	939.7	862.0	951.5	886.9	1061.7	1465.8	1440.8	1581.4	1510.4
Less: Depreciation	(38.7)	(36.5)	(47.8)	(42.5)	(60.6)	(51.8)	(74.4)	(212.4)	(90.9)	(218.9)	(109.8)	(228.5)	(381.5)	(359.7)	419.7	380.0
Net Fixed Assets	305.8	266.7	574.7	479.1	621.4	496.4	628.5	727.3	771.1	732.6	777.1	833.2	1084.3	1081.1	1161.7	1130.4
Work in Progress	305.7	297.6	107.3	88.1	134.3	97.2	177.3	95.5	69.0	103.2	85.6	14.7	168.7	42.3	368.7	98.0
Plant Leased or Not in Service										0.3		6.3		15.9		15.5
Total - Fixed Assets	611.5	564.3	682.0	567.2	755.7	593.6	805.8	822.8	840.1	836.1	862.7	854.2	1253.0	1139.3	1530.4	1243.9
Current Assets Net of Current Liabilities	65.6	57.4	61.4	82.5	61.9	83.9	72.9	84.6	62.9	69.3	66.7	82.7	47.0	107.8	46.3	145.5
Sinking Fund Investments	20.3	21.4	22.5	24.8	25.3	28.6	28.4	26.6	31.5	30.0	34.8	33.9	37.2	16.4	46.2	-
Non Utility Assets	-	-	-	-	-	-	-	-	-	16.3	-	16.3	16.3	16.3	16.3	16.3
Deferred Payments - Receivables	-	-	-	-	-	-	-	-	-	-	-	0.9	-	17.7	-	35.6
TOTAL ASSETS	697.4	643.1	765.9	674.5	842.9	706.1	907.1	934.0	934.5	951.7	964.2	988.0	1353.5	1297.5	1639.2	1441.3
LIABILITIES																
Equity and Reserves																
Ordinary Stock	250.0	300.0	250.0	300.0	250.0	300.0	250.0	300.0	250.0	300.0	250.0	300.0	300.0	300.0	300.0	716.3
Capitalized Interest on Equity	40.7	-	49.5	-	58.4	-	67.3	-	64.6	-	61.9	-	-	-	-	-
Revaluation Reserve	-	-	-	-	-	-	-	188.0	-	184.5	-	173.4	208.4	172.6	208.4	199.5
Earned Surplus	68.7	70.1	75.8	80.5	96.6	88.0	119.1	86.6	145.2	77.6	175.3	108.4	128.1	186.1	186.8	40.1
Total - Equity and Reserves	359.4	370.1	375.3	380.5	405.0	388.0	436.4	574.6	459.8	562.1	487.2	581.8	636.5	658.7	695.2	955.9
Long Term Debt	316.5	251.7	369.1	272.7	416.4	296.8	449.2	338.1	453.2	368.3	455.5	384.9	695.7	617.5	922.7	464.1
Contribution to Construction	21.5	21.3	21.5	21.3	21.5	21.3	21.5	21.3	21.5	21.3	21.5	21.3	21.3	21.3	21.3	21.3
TOTAL LIABILITIES	697.4	643.1	765.9	674.5	842.9	706.1	907.1	934.0	934.5	951.7	964.2	988.0	1353.5	1297.5	1639.2	1441.3
Net Debt/Equity Ratio	45/55	38/62	48/52	39/61	49/51	41/59	49/51	35/65	48/52	38/62	46/54	38/62	51/49	48/52	56/44	33/67

March 1975

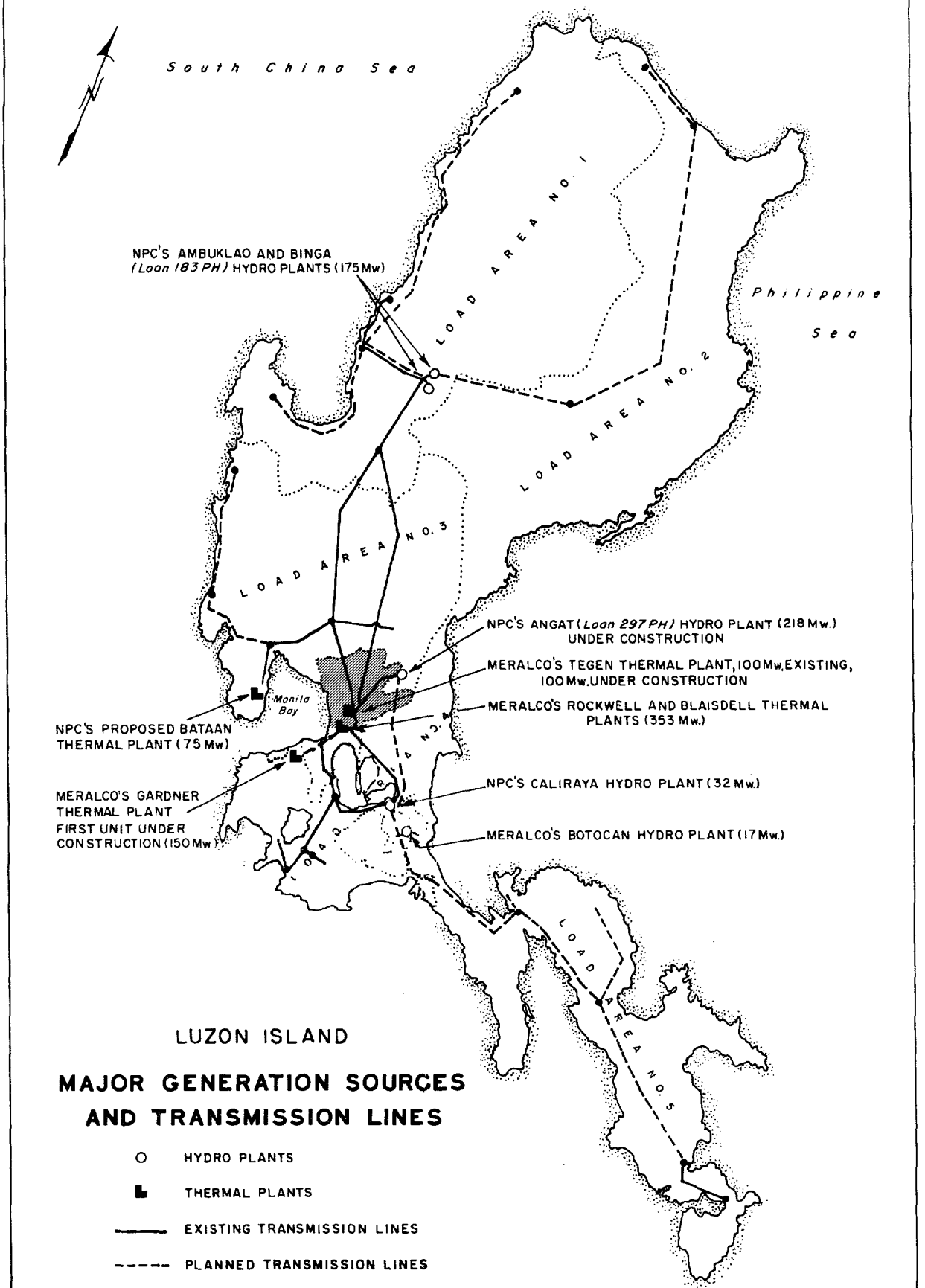
ANNEX 15

SOURCES AND APPLICATIONS OF FUNDS (APPROXIMATE)

(P million)

	1967		1968		1969		1970		1971		1972		1967-1972	1973	1974	1969-74
	Est.	Act.	Est.	Act.	Est.	Act.	Est.	Act.	Est.	Act.	Est.	Act.	Est.	Act.	Act.	Act.
SOURCES OF FUNDS																
Internal Cash Generation																
Net Income[1]	21.9	26.7	28.1	32.5	46.1	22.4	48.3	13.7	54.3	21.0	60.3	50.3	259.0	61.8	67.4	236.6
Depreciation	5.8	4.8	9.0	7.0	12.9	40.4	13.8	22.1	16.4	22.6	18.9	24.9	76.9	31.5	33.0	144.5
Others	-	-	-	-	-	(3.4)	-	(1.3)	-	(1.8)	-	(1.8)	-	(1.7)	(0.4)	(10.4)
Total Internal Cash Generation	27.7	31.5	37.1	39.5	59.0	29.4	62.1	34.5	70.7	41.8	79.3	73.4	335.9	91.6	100.0	370.7
Borrowings																
Foreign Loans	30.4	12.4	27.9	14.6	39.2	15.1	36.1	20.2	12.0	14.5	12.0	1.1	157.5	9.6	35.9	96.4
Reparations	12.0	-	12.0	-	12.0	-	12.0	-	12.0	-	12.0	-	72.0	28.7	-	28.7
Local Loans/Bonds	20.0	15.3	25.0	18.0	10.0	7.9	-	29.1	-	22.1	-	42.7	55.0	-	86.5	188.3
Others	18.2	12.3	1.4	-	1.4	5.0	1.4	-	1.4	-	1.4	-	25.4	25.2	0.2	30.4
Total Sources	108.3	71.5	103.5	72.5	121.6	57.4	111.6	83.8	96.1	78.4	104.7	117.2	645.8	155.1	222.6	715.5
APPLICATION OF FUNDS																
Construction Expenditure[2]		71.5		48.2		36.7		55.3		39.3		35.1		49.0	87.3	
Preliminary Surveys and Investigations		-		-		1.7		1.6		3.5		4.8		5.9	14.9	
Geothermal Exploration	-	-	-	-	-	-	-	-	-	-	-	-	-	3.4	4.1	
Total Construction Expenditure	81.0	71.5	74.9	48.2	83.4	38.4	58.4	56.9	46.8	42.8	39.6	39.9	384.2	58.3	106.3	342.6
Interest	14.8	10.1	17.5	9.6	20.5	14.4	23.2	19.1	24.2	22.4	24.3	26.1	124.4	34.0	33.5	149.5
Amortization Payment of Foreign Loans	12.0	7.4	13.9	7.7	15.8	8.1	17.5	8.4	22.1	11.3	24.1	11.9	105.4	27.0	28.5	
Sinking Fund Amortization	-	1.0	-	1.5	-	1.6	-	1.7	-	2.1	-	2.4	-	2.8	0.9	
Payment of Advances and Mortgage	-	-	-	-	-	-	-	-	11.6	-	11.6	-	23.1	5.0	1.4	
Total Debt Service	26.8	18.5	31.4	18.8	36.3	24.1	40.7	29.2	57.8	35.8	59.9	40.4	252.9	68.8	64.3	262.6
Others	8.3	0.7	-	3.2	-	0.6	-	0.2	-	0.4	-	2.9	8.3	2.7	14.3	21.1
Increase in Working Capital	-	(19.2)	-	1.8	-	(5.7)	-	(1.6)	-	(0.9)	-	34.0	-	25.1	37.7	88.6
Total Applications	116.1	71.5	106.3	72.0	119.7	—	99.1	—	104.7	—	99.5	—	645.3	—	—	714.9
Ratio, Total Internal Cash Generation to Total Sources													52%			52%
Ratio, Total Debt Service to Total Applications													39%			37%

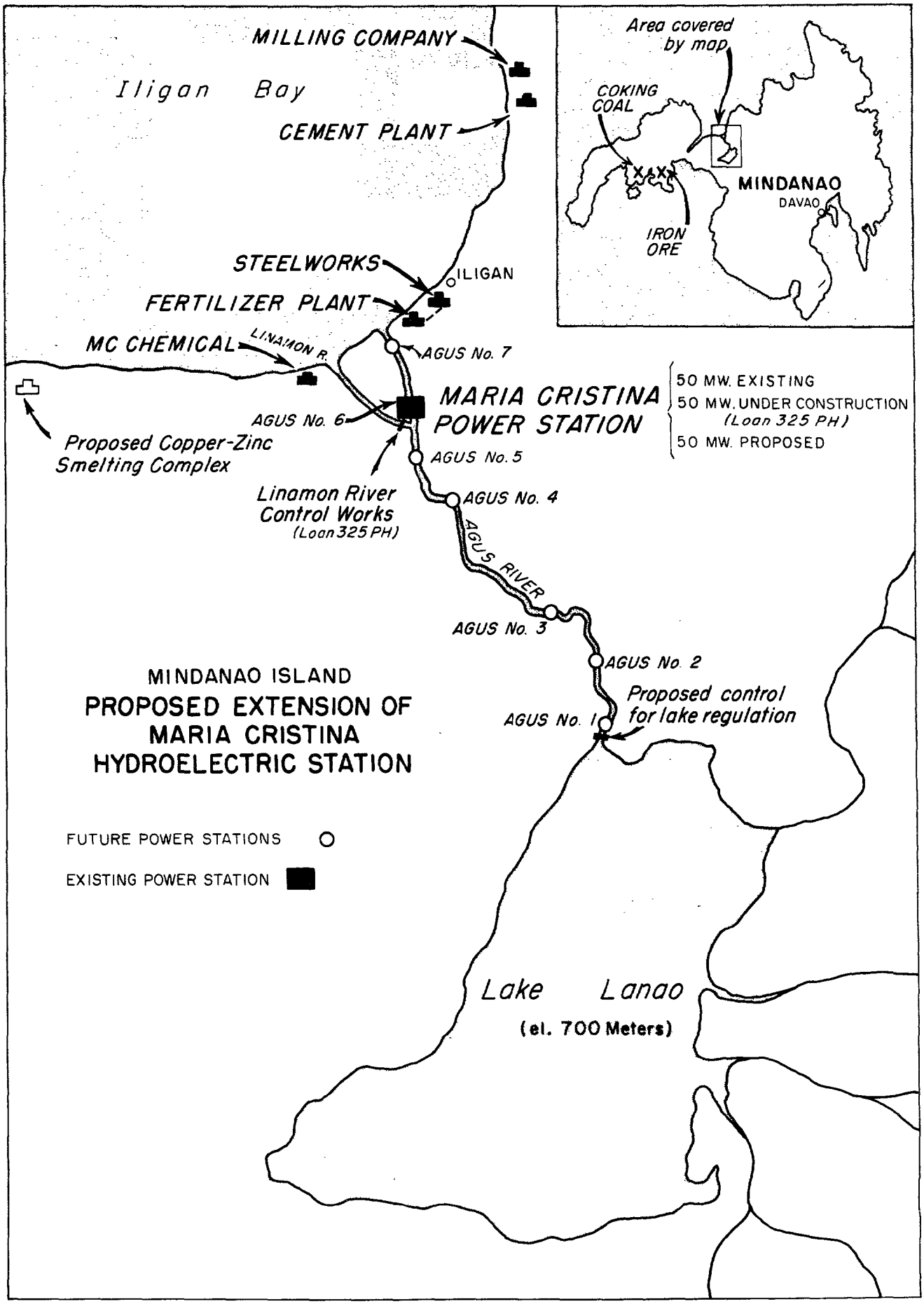
1/ Before Interest and Depreciation.
2/ Net of Disposals.



LUZON ISLAND

MAJOR GENERATION SOURCES AND TRANSMISSION LINES

- ○ HYDRO PLANTS
- ▙ THERMAL PLANTS
- ——— EXISTING TRANSMISSION LINES
- - - - - PLANNED TRANSMISSION LINES
- ..... LOAD AREA ZONES
- ▨ MERALCO LOAD AREA NO.6



OCTOBER 1965

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