

Report No. 719

CONFIDENTIAL

INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT

PROJECT PERFORMANCE AUDIT REPORT

on

SINGAPORE FIRST AND SECOND POWER DISTRIBUTION PROJECTS

(Loans 503-SI Part I and 595-SI)

May 22, 1975

Operations Evaluation Department

PREFACE

This report represents the outcome of a performance audit of financing provided by the Bank for expansion of the electricity distribution network of the Public Utilities Board of Singapore. It deals with Part I of Loan 503-SI of July 1967 (Part II was devoted to water supply and is dealt with in another performance audit) and the whole of Loan 595-SI of April 1969; final disbursements under the latter agreement occurred in April 1973.

The performance audit is based principally on review of relevant Bank archives and documents (including final reports prepared by the East Asia and Pacific Regional Office on the two projects) and a mission to Singapore in November 1974.

Assistance provided by the Singapore authorities is very gratefully acknowledged.

Approximate Currency Equivalents (Singapore Dollar)

Through 1971: US\$ 1.00 = S\$ 3.00
1972: US\$ 1.00 = S\$ 2.80
1973: US\$ 1.00 = S\$ 2.50

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PROJECTS BASIC DATA

SINGAPORE FIRST AND SECOND POWER DISTRIBUTION

	<u>IBRD Loan 503-SI (Part I)</u>	<u>IBRD Loan 595-SI</u>
Borrower:	Public Utilities Board, Singapore (PUB)	
Loan Amount:	US\$ 15 million	US\$ 20.5 million
Amount Disbursed:	US\$ 15 million	US\$ 20.5 million
Date of Loan:	July 5, 1967	April 25, 1969
Effective Date:	July 26, 1967	June 17, 1969
Closing Date: - Original	December 31, 1969	September 30, 1972
- Final	December 31, 1971	April 30, 1973
Terms of Loan:	20 years, 3 years grace period. Interest 6% p.a.	20 years, 3½ years grace period. Interest 6½ p.a.
Exchange Rates: - Original	US\$ 1 = S\$ 3	US\$ 1 = S\$ 3
- Final	US\$ 1 = S\$ 2.8	US\$ 1 = S\$ 2.54
Fiscal Year:	-----January 1 to December 31-----	
Appraisal Report:	TO-588a, May 29, 1967	PU-11a, April 7, 1969
Joint Financing:	None	None
Appraisal Mission:	January/February 1967	November/December 1968
Supervision Missions:	August 1967 March 1968 August 1969 February 1971	August 1969 February 1971 December 1971 October 1973
Project Completion Report:	February 15, 1973 ^{a/}	June 10, 1974
Project Completion Date:		
- Forecast	Mid-1969	End 1971
- Actual	End 1970	End 1972
Total Project Cost:		
- Forecast	US\$ 24.3 million	US\$ 43.3 million
- Actual	US\$ 22.3 million	US\$ 49.7 million

^{a/} Date of Final Construction Report. No PCR was made for 503-SI, Part I.

SUMMARY

Loans 503-SI/Part I (Part II was for a Water Project) and 595-SI of US\$ 15 and 20.5 million respectively, in 1967 and 1969, were the 4th and 5th loans made by IBRD to Singapore's Public Utilities Board (PUB), to finance parts of PUB's 1967-68 and 1969-71 power distribution expansion programs, estimated to cost US\$ 24.3 and 43.3 million respectively. Both loans were also to finance consultants studies for recasting of PUB's electricity tariffs and for long-range planning of distribution network expansion. The first Loan was signed and became effective in July 1967, and was closed two years behind schedule on December 31, 1971. After some delays in defining the scope of the project and the amount of the Loan, the 2nd Loan, 595-SI, was signed in April 1969, became effective in June 1969 and was closed six months behind schedule on April 30, 1973.

Physical implementation of both projects was delayed by late deliveries of 66 kv equipment principally; for equipment of other voltages, first Bank-financed orders delivered were used to reconstitute PUB's stocks which had been used initially in the project works in order to avoid expansion disruption and meet the demand. Actual projects financed by the loans were the 1967-1968 and 1969-1971 expansion works of networks with voltage below 66 kv, and the 1968-1969 and 1970-1972 expansion of the 66 kv network. Quantities of equipment installed were as forecast for transformer capacity, and substantially larger than forecast for high voltage cables. Total actual costs were US\$ 22.3 million and 49.7 million for the 1st and 2nd distribution projects respectively; a 35% increase in the 2nd project foreign cost was due to increases in equipment costs and in scope of work. Over the whole 1967-1971 period, average unit costs per km of cable and associated transformers were 10% lower than estimates.

Despite a greater than expected growth in power demand, which increased by 18% p.a. on average over 1968-1973, PUB has been able to meet all demand satisfactorily. The number of consumers increased by 50 percent over the 1967-1971 period, and the annual electricity consumption per capita more than doubled over 1967-1972, reaching 1,290 kwh in 1972. Both projects were fully justified in retrospect on the basis of demand and load growth. Technical operations have steadily improved and distribution losses decreased, resulting in a decrease of 32% in unit operating costs and permitting a decrease of 14% in unit sales revenue over the period 1967-1973. On the basis of consultants' recommendations, new tariffs, simplified and geared to capital and recurrent costs, were introduced in December 1972; new high-tension tariffs have included a maximum demand charge aiming at improving demand patterns. Financial performance of PUB overall and of its Electricity Department has remained outstanding, with rates of return increasing above 12%. PUB's management has continued to strengthen and a satisfactory middle-level staff built up. All Loan Agreement covenants were complied with.

Aside from its significant financial contribution, the Bank performed a useful role with its recommendations for new tariffs and

recourse to outside consultants for long-range network planning and for creation of certain new senior technical positions in the Electricity Department. However, in light of the excellent performance of PUB, the Bank seems to have been unduly concerned about the lack of a General Manager, going so far as to drop a loan in 1970/71. Also, the adoption by the Bank of rather stricter positions against advance contracting than seem to have been desirable and than are indicated in current Bank policy statement caused some unnecessary delay.

PERFORMANCE AUDIT MEMORANDUM

SINGAPORE: FIRST AND SECOND POWER DISTRIBUTION PROJECTS

Introduction

1.01 The Public Utilities Board, Singapore (PUB) is an autonomous public corporation, established in May 1963, solely responsible for the electricity, water and gas utilities of Singapore. Although a single financial entity, it is required to keep separate accounts for its Electricity, Water and Gas Departments.

1.02. The installed generating capacity, all thermal, of the Electricity Department increased from 150 MW in 1958 (in PUB's predecessor organization) to 437 MW in 1967 and 1,109 MW in 1974 in four main plants called Pasir Panjang A, Pasir Panjang B, Jurong and Senoko. Until recently there was no significant transmission system, and power has been distributed at 66 kv, 22 kv, and 6.6 kv through mainly underground network^{1/}. The major part of electricity demand has come since the mid-1960s from the manufacturing sector, the leading source of growth of the economy and of exports.

1.03 The PUB received five loans from the Bank totalling US\$ 74.2 million, of which US\$ 59.4 million financed power generation (4 x 60 MW units) and distribution expansion, as shown below:

<u>Loan No.</u>	<u>Date of Agreement</u>	<u>Amount^{a/} (US\$ mln)</u>	<u>Project Scope</u>	<u>Final Closing Date</u>
337-SI	5/63	14.4	Generation (2 x 60 MW) ^{b/}	12/67
405-MA	2/65	6.8	1st Water Project	6/69
473-SI	11/66	9.5	Generation (2 x 60 MW) ^{b/}	6/68
503-SI/Part I	7/67	15.0	1967-68 Power Distribution	12/71
/Part II	7/67	8.0	2nd Water Project	6/73
595-SI	4/69	20.5	1969-71 Power Distribution	4/73
Total		74.2		

a/ After cancellations of US\$ 0.6 and 0.5 million in 337-SI and 473-SI.

b/ Loan 337-SI financed the 1st stage of Pasir Panjang B, Loan 473-SI the 2nd stage.

This project performance audit covers the two power distribution projects financed by Loans 503-SI/Part I and 595-SI.

1/ Except for rural areas, it has been the Government's and PUB's policy to carry electricity distribution underground because of lack of land for overhead lines and for safety reasons (lightning strikes).

Projects Initiation and Objectives

2.01 In continuation of the uninterrupted relationship between the Bank and the PUB during 1962-1966^{1/}, the PUB applied for, and the Bank appraised, in January 1967 a loan of US\$ 41 million to finance: (a) the US\$ 8 million foreign exchange component of a water project (see separate Project Performance Audit); and (b) the US\$ 33 million foreign exchange cost of PUB's 1967-1970 four-year program for the normal expansion of its distribution network. Until 1965, power had been transmitted at 22 kv from generators to main step-down substations where it was connected for distribution over the 6.6 kv primary distribution system. With the increase in load and load density, this arrangement grew inadequate, and PUB started developing a 66 kv network to connect the main distribution centers with the generating stations and converting the 22 kv network to supplement primary distribution; this structural transition was to account for most of the large 1967-1970 investments.

2.02 Due to pressures on its resources and uncertainties about its own borrowing prospects, the Bank decided to cut down the power loan to US\$ 15 million to finance part of the 1967-1968 segment of PUB's program. The Bank considered at length whether it should process separately the water and power loans and postpone the latter to FY 1968^{2/}. Finally, the Loan 503-SI of US\$ 23 million for both power and water was made in July 1967. Loan Part I for power, of US\$ 15 million, was to finance the foreign currency component^{3/} of PUB's 1967-1968 distribution expansion program with a total estimated cost of US\$ 25 million. PUB agreed to continue the covenants adopted in the previous loans regarding maintaining tariffs sufficient to give an overall return of at least 8% p.a., consultations with the Bank before the appointment of senior officers, sound management of its sinking fund, and short-term and long-term debt limitations (in particular, short-term debt to be limited to S\$ 12 million). Moreover, following the Bank's recommendations, PUB agreed to engage consultants to review:

^{1/} For details, see Operations Evaluation Report No. Z-17/7 on PUB, dated March 24, 1972.

^{2/} The water project could not be deferred due to the urgency of the need for it and possible difficulties in providing the amount of retroactive financing that would be necessitated by further delays.

^{3/} Some 66 kv and 22 kv equipment, totalling US\$ 2 million equivalent, were not covered by the loan because PUB had to order and finance them before the delayed signing of the loan, in order to meet pressing needs.

- (a) its tariff structure, which needed rationalization and simplification;
- (b) its basic distribution planning, as a system voltage higher than 66 kv might become necessary in the early 1970s to cope with rapid increases in the load density.

2.03 In Spring 1968 the Bank was asked by PUB to consider a new loan to finance part of the 1969-1970 segment of PUB's 1967-1970 program for distribution expansion. The appraisal mission of November 1968 recommended a US\$ 18 million loan to finance the foreign exchange costs of PUB's 1969 orders. Because of the necessity to place orders for specialized distribution equipment some 12-18 months ahead of installation schedules and past difficulties and delays in delivery of equipment under Loan 503-SI (see para. 3.01 below), the PUB invited tenders in late 1968-early 1969 for much of the equipment required during 1969 and 1970 in order to ensure continuity of its program; PUB started also to extend the quantities tendered to include equipment required during 1971 in order to take advantage of the favorable prices quoted. However, the Bank decided that all orders not only paid but also placed before signing of the Loan Agreement would not be reimbursable^{1/} (although PUB's normal procedures for procurement through international competitive bidding had been recognized to be in accordance with the Bank's Guidelines). The Bank pressed PUB to extend the validity of tenders made or to defer orders until loan signature and to use the contracts' repeat order clauses for placing orders for 1971 at a later stage; the PUB described the difficulties involved in such arrangements. Finally, the total foreign exchange component of PUB's 1969-1971 distribution program (excluding the carry-over from 1967/68 of S\$ 16 million partly financed from Loan 503-SI) was revised, on the basis of the February 1969 report of PUB's network consultants, to US\$ 26 million; by March 1969, tenders already invited by PUB to avoid disruption of its program amounted to about US\$ 13 million, with US\$5.5 million firmly ordered^{2/}.

2.04 The Bank expedited its procedures and made, in April 1969, the Loan 595-SI of US\$ 20.5 million to cover all foreign exchange costs of orders not yet placed^{3/}. The covenants adopted in the previous loans were repeated^{4/}; two new covenants required PUB to: (1) consult with the Bank on actions it proposed to take regarding the recommendations on

^{1/} Such orders were totalling about US\$ 2.5 million in February 1969.

^{2/} These US\$ 5.5 million orders were financed by suppliers credits (for 80% of costs) and PUB's cash (20%).

^{3/} I.e., 20.5 being the difference between 26 and 5.5.

^{4/} Except for the limit on PUB's short-term debt, which was made more flexible; PUB's short-term debt was limited to a maximum of 15% of its cash operating costs.

distribution network expansion made by the consultants^{1/} in their final report (to be submitted to the Bank); and (ii) introduce within 3 years of the Loan Agreement a revised system of tariffs in accordance with the recommendations of the May 1968 report of the consultants^{1/} on tariffs. Moreover, in response to the Bank's concern about staff shortages in PUB's senior posts, the PUB expressed in a Supplementary Letter its intention to take immediate steps to appoint a Commercial Engineer (to supervise the introduction of new tariffs) and a Load Dispatch Engineer.

Project Implementation and Achievements

3.01 Due to the delayed finalization of Loan 503-SI in 1967, the first tenders called by PUB under the Loan were closed in September and the first orders placed in late October 1967; as a result, no delivery was made until the second quarter of 1968. PUB carried out its works in 1967 and part of 1968 by drawing on its equipment stocks, and managed to meet consumer demands; it met load commitments in all critical areas by reinforcing its 22 kv network pending delivery of 66 kv equipment, for which PUB has not carried stocks^{2/}. The Bank agreed that PUB reconstitute out of Bank-financed orders the portions of stocks drawn for the project. Construction of the project financed by Loan 503-SI/Part I was generally carried out in accordance with the planned schedule, which covered the period 1967 to mid-1969; the only exception was 66 kv works which continued up to early 1970. For practical purposes^{3/}, the project is estimated to have comprised all distribution investments in 1967 and 1968 for voltages up to 22 kv, and the 1968-1969 investments in 66 kv network (Annex II).

3.02 Slow deliveries were experienced for 66 kv cables during the project financed by Loan 595-SI, despite the precautions taken by PUB prior to the loan signing (para. 2.03). Again, all works financed under this loan were satisfactorily completed in accordance with the original schedule, with the exception of 66 kv works^{4/} which continued until end of 1972; for practical purposes, this second distribution project comprised all distribution investments in 1969-1971 for voltages up to 22 kv, and the 1970-1972 investments in the 66 kv network. Some modifications in the projects' contents were necessary in order to meet changing load

^{1/} Both consultants for network planning and tariffs had been engaged by PUB in compliance with the covenants of the 503-SI Loan Agreement.

^{2/} For 66 kv equipment, orders are placed on project basis.

^{3/} For such projects, it is difficult to list in detail all individual items and works implemented.

^{4/} One substation was delayed by difficulties for land acquisition and later by shortages of cement and iron bars for its construction.

conditions, as shown in Annex II and summarized below:

<u>Projects Physical Achievements:</u>	<u>Loan 503-SI</u>		<u>Loan 595-SI</u>	
	<u>Forecast</u>	<u>Actual</u>	<u>Forecast</u>	<u>Actual</u>
Transformers: No. of substations	n.a.	189	n.a.	308
Capacity (MVA)	480	375	980	1,089
High Voltage Cables (km)	233	279	403	798
Low-voltage cables (km)	n.a.	1,713 ^{a/}	n.a.	1,030
Electricity meters (000)	110	75	-	-

a/ Includes 1,396 km of overhead conductors financed by Loan 503-SI; 3,490 km of such conductors installed in 1969-1971 were not financed by second loan. Overhead conductors are used for the rural electrification schemes (para. 8.03).

Quantities of equipment installed were larger than forecast, particularly for cables. Distribution networks expanded considerably; transformer capacity and cables length of the 66 kv primary network increased from 450 MVA and 180 km in 1966 to 950 MVA and 590 km in 1972 (see Map 1). A total of 14,300 new connections, of which 2,450 underground, were made in 1967-1968; and 25,600 were made in 1969-1971, of which 3,700 were underground. The number of consumers increased from 186,000 in 1966 to 219,000 in 1968 and 291,000 in 1971, and annual consumption per capita increased from 560 kwh in 1966 to 820 kwh in 1969 and 1,290 kwh in 1972. Disbursements were slower than anticipated, particularly for Loan 503-SI/ Part I due to delays (Annex III). Meters required under Loan 503-SI/ Part I were overestimated and savings were used to purchase additional transformers. Deferred payments and retention periods explain the latest disbursements.

Project Costs

4.01 The additional equipment installed in 1967-1968 (in some cases, to meet new consumer loads unforeseen at appraisal time), could be purchased from the savings realized in the procurement of equipment due to lower prices than estimated for bids, devaluation of Sterling and lower costs for freight insurance. Total actual cost of the 503-SI distribution project amounted to US\$ 18 million, on the basis of the stock value of 6.6 and 22 kv equipment installed (Annex IV); reconstitution of stocks implied an additional cost of about US\$ 4.3 million^{1/}, due to inflation in suppliers countries. Total cost of the project, including replacement, was thus about US\$ 22.3 million, corresponding to 8% savings on forecasts.

^{1/} Financed mostly by suppliers credits.

4.02 The actual total cost of the 595-SI distribution project was 14.5% higher than the original estimate. A considerable overrun (35%) in foreign cost, due to the increase in the scope of work and increase of equipment cost (inflation) was partly offset by savings in local costs due to part of the equipment and 66 kv cables being procured on a supply and erection basis. This latter reason contributed to the increase in foreign cost, and explains part of the cost pattern of the first distribution project as well (see Annex IV for details). Average unit costs over the period 1967-1971 were actually lower than estimates, as shown below:

Network	Average Unit Costs (US\$ 000)			
	Forecast		Actual	
	Unit (Cables/MVA)	Unit Cost	Unit (Cables/MVA)	Unit Cost
66 kv	1 km and 2.1 MVA	80.3	1 km and 1.2 MVA	53.3
22 kv	1 km and 1.8 MVA	91.6	1 km and 2.9 MVA	88.2
<u>6.6 kv</u>	<u>1 km and 3.1 MVA</u>	<u>53.6</u>	<u>1 km and 0.9 MVA</u>	<u>41.7</u>
All	1 km and 2.3 MVA	75.7	1 km and 1.4 MVA	54.3

The overall unit cost per km of cable associated with 1.4 MVA was estimated on average at US\$ 60,300; actual cost was 10% lower. About 2% of projects costs were due to partial capitalization of PUB's supervision and engineering services. Consultants and specialized agencies were also engaged to inspect manufacturers' works on equipment and to carry out tests before dispatch.

Projects Operations and Economic Justification

5.01 PUB's 1966 forecast for power demand was worked out carefully on the basis of known industrial plans, establishment of new industry and information from the Government. It projected an average rate of increase in peak load and sales of about 16% p.a. over 1966-1972, due mainly to the expected growth of demand from large industrial customers; industrial sales were forecast to account for 67% of total in 1970 (Annex V). PUB had planned for expansion of generating capacity by 4 x 60 MW units in Jurong plant to be commissioned in 1969-1971 and financed by suppliers credits; generating capacity was to increase from 464 MW to 677 MW over 1966-1971, and firm spare capacity to remain at about 100 MW. The distribution program was designed to complement the increased generation facilities and to meet the rapidly growing demand. PUB's 1963 forecast updated for Loan 595-SI showed some levelling-off in the growth of load demand and sales, the growth rate falling to 15 percent in 1972 and 11.5 percent in 1973. The generating capacity was planned to increase further in 1973 and 1974 by 2 x 120 MW units in Jurong, to be financed by suppliers credits.

5.02 Actual development of power demand was greater than expected, with average growth rates of 18 and 17 percent p.a. for sales and peak load respectively over 1968-1973; this was due, in 1972 in particular^{1/}, to the upsurge of large capital- and energy-intensive industrial projects.

Industrial sales of power in the early 1970s accounted for 80 percent of total. In early 1973, 2 x 22.5 MW gas turbines, which had not been planned for, had to be installed to meet peaking requirements; peak demand reached 615 MW in 1973, as compared to 575 MW forecast, and spare capacity at 1973 effective-peak^{2/} was 24 MW only (see Annex V and Chart I). PUB was able to meet all requests for power and no prolonged outage was recorded, due to the large investment programs for generation and distribution carried out in 1967-1973. New connections are presently made with satisfactory delays (15-30 days). Distribution and other operational losses decreased from 13 percent of gross generation in 1967 to 11.2 percent in 1973, as compared to 12 percent forecast; this has contributed in part to the decrease in average unit operating cost from S\$ 4.4/kwh in 1967 to 3.2 in 1970 and 3.0/kwh in 1973. The distribution projects financed by Loans 503-SI/Part I and 595-SI appear to have been justified by the developments in demand.

5.03 In the early 1970s, delays of up to two months were occurring in the connection of a small part (about 15 percent) of the housing units completed annually by the Housing and Development Board (HDB). This was mainly due to the insufficiency of stocks of connection equipment carried by PUB. It is envisaged that additional stocks will be carried by PUB, and financed by HDB, to cover 3 months additional of HDB's requirements.

Financial Performance

6.01 The Electricity Department's balance sheets, income statements and cash flow statements for the period 1967-1972 are given in Annexes VI, VII and VIII, respectively, compared with those forecast in appraisal reports. Revenues from the sales of electricity increased from S\$ 89 million in 1967 to S\$ 177 million in 1972; average revenue per kwh sold decreased steadily from S\$ 7.2 to S\$ 6.4 over this period. Total operating expenses increased from S\$ 60 million to S\$ 98 million over 1967-1972, with average cost per kwh sold decreasing sharply from S\$ 4.4 in 1967 to S\$ 3.1 in 1972. As a result, the net operating incomes exceeded largely those anticipated in the appraisal reports, increasing from S\$ 29.3

^{1/} In 1972, maximum demand increased by a record 25 percent, and sales by 22.5 percent.

^{2/} Effective-peak: critical time in the year when margin between demand and available capacity was least (excluding short-term outages).

million in 1967 to S\$ 79.4 million in 1972. The important financial indicators covering the 1967-1972 period are summarized below:

	<u>1967</u>	<u>1968</u>	<u>1969</u>	<u>1970</u>	<u>1971</u>	<u>1972</u>
Operating Ratio (percent)	67	61	59	53	52	55 ^{a/}
Debt/equity	56/44	55/45	52/48	51/49	46/54	43/57
Rate of Return (percent)	9.3	12.4	12.6	14.5	15.7	15.9
Interest Coverage (times)	2.3	2.6	2.7	3.1	3.3	3.6
Debt Service Coverage (times)	2.0	2.1	2.1	2.1	1.8	2.2

a/ Increase due to increases of fuel oil prices.

Financial covenants under both loans have been fully met.

6.02 The financing plans made at the times of appraisals are compared with the actual financing plans in Annex IX. As a result of accelerated growth, capital investments were larger than forecast, with distribution investments accounting for about 60 percent of total. Net internal cash generation financed some 48 percent of total capital requirements, and IBRD loans about one-fourth over both periods 1967-1971 and 1969-1972. Larger than expected amounts of suppliers credits were used, accounting for about one-fifth of total capital requirements.

Electricity Tariffs

7.01 PUB had achieved since 1966, when tariffs were increased, an overall return in excess of the 8 percent required by the Loan Agreement. Although more than adequate for yielding the required level of revenue, the twelve electricity tariffs enforced during the 1960s contained anomalies and duplications and were inadequately spread over the range of consumers. The appraisal mission for Loan 503-SI recognized the need for re-casting the tariffs and establishing a simple and more rational structure. Consultants (Electrowatt of Switzerland) were engaged by PUB in compliance with a covenant to Loan 503-SI Agreement (para. 2.02) and submitted their report and recommendations in April 1968, and a revised version in June 1971. PUB delayed the application of proposed new tariffs, in view of possible social reactions. Loan 595-SI Agreement called for enforcement of new tariffs before April 1972; the new tariffs recommended by Electrowatt were first applied to newly connected large consumers, and became effective in December 1972 for all. The six new tariffs have been generally well accepted by the public.

7.02 In its terms of reference, PUB requested the consultants to undertake an "examination of the tariffs and their relationship to the present and probable future cost structure". The new low-tension tariffs, as a result, have comprised declining block rates on a single meter, and the new high-tension tariffs have contained a maximum demand charge in addition to declining block rates. All new tariffs have

contained a Fuel Oil Variation clause to compensate automatically for increases in fuel oil prices^{1/}. Careful study by PUB of the new tariff effects on consumers bills showed that 44 percent of domestic consumers (including small users) would pay less and that 42 percent would pay additional amounts not exceeding 15 percent of previous charges. More than half of nondomestic, and industrial, consumers would pay less than before.

Institutional Development

8.01 The relationship between the PUB and IBRD had been affected in the late 1960s by a "formal" management problem. When the first Loan 337-SI of 1963 was made, PUB had no General Manager; this post was filled during 1966-1969, but the Bank found unsatisfactory the working relationship between the General Manager and PUB's chairman, a strong personality. Under Bank's pressure, PUB advertised world-wide in 1970 and 1971 for the post of General Manager, but unsuccessfully and probably without firm belief; the Bank dropped in 1971 a loan appraised in late 1969 and negotiated in 1970, because of the lack of a General Manager which it considered detrimental to PUB's operations. PUB finally appointed the Chief Water Engineer as General Manager in October 1973 and the Bank accepted this as a solution to the problem.

8.02 Some reorganization of PUB was necessary in the early 1960s, and the shortage of experienced staff remained a problem for many years. The recommendations made in 1965 by management consultants, that the Bank insisted PUB hire in 1964, were found unsatisfactory by PUB and implemented only to a small extent. However, substantial progress was achieved after 1965. PUB's accounting system was established on a commercial basis with the assistance of external auditors engaged in compliance with the first Loan Agreement (1963); since 1966, accounts have been adequately prepared and progressively refined, and management reporting, which virtually did not exist before 1967, has greatly improved and resulted in a meaningful budget control and a useful tool for further improvements in PUB's management. An efficient training program was designed in mid-1960s and yielded results in building a strong middle-level staff in PUB; technical staff, however, has remained in shortage, a general situation in Singapore's public agencies. The Electricity Department was strengthened by the creation of a planning division and a load dispatching section.

8.03 PUB carries out the planning and design of the expansion of the distribution system, and seeks advice of consultants for generation expansion and long-range system network development; this has worked satisfactorily. PUB's computerized accounting and billing systems function

^{1/} This clause was applied in December 1973, and all tariffs increased by S¢ 0.66 per kwh.

well, and there is no problem concerning uncollected accounts^{1/}. Since the adoption of a "rural electrification" policy in 1963^{2/} and with the provision after 1968 of S\$ 1 million per year to subsidize financially non-viable schemes, total electrification of Singapore has been practically achieved and some 500 schemes have been completed over 1963-1973 at an aggregate cost of over S\$ 16 million, benefitting some 40,000 houses with a population estimated at 230,000; this has encouraged the growth of "cottage" and rural industries. Finally, due to increasing operational efficiency in generating plants and decreasing distribution losses, the average operating cost per kwh sold has decreased steadily (cf. para. 5.02 and Annex X), and benefits of these economies were given in part to the customers, essentially to industrial customers. Financial and management indicators (Annex X) show a continuously improving situation, and a sound financial management; however, the customer per employee ratio, though improving, has remained low, due probably to Government policy in favor of employment and PUB's processes adopted in the 1960s. All Loan Agreement covenants were complied with.

Bank's Performance

9.01 The distribution projects financed by Loans 503-SI/Part I and 595-SI contributed importantly to the development of the electricity network and to meeting a rapidly growing demand during Singapore's impressive industrial development of the late 1960s and early 1970s. By pressing for the use of tariff and network consultants and for implementation of consultants' recommendations, the Bank contributed greatly to strengthen two essential functions of PUB, rationalize its operations and build up its management of financial and technical operations. The posts of Commercial Engineer and Load Dispatch Engineers, which were filled in October 1971 by two PUB engineers after training in Europe, proved useful, as well as the Load Dispatch Center financed from Loan 503-SI and commissioned in December 1970^{3/}. On the other hand, however, the Bank may have showed an unnecessary lack of confidence in PUB's ability

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- 1/ Water, gas and electricity meters are read once per month and billed together; non-payment of a bill results in prompt cut-off of some of the services. PUB also collects the sewage fees and the 1969-instituted Government surtax of 10 percent on all utility bills in excess of S\$ 20. Both the sewage fee and the surtax are included in the bill, but not shown in the income statements of PUB.
 - 2/ Under this policy, a scheme is considered viable and implemented if the cost of supply is exceeded by the expected revenue return from the scheme houses over a period of seven years (instead of five years for ordinary consumers); rural electrification schemes are also considered on a group basis so that schemes yielding high revenues compensate for those with low revenues.
 - 3/ In at least one instance of generator failures, the Load Dispatch Center quickly shed load in parts of the network, averting a total system failure, and restored supply within a couple of hours.

to carry out its network expansion planning and procurement procedures and bid evaluation, and did not adjust (mainly due to strict application of principles discouraging retroactive financing and advance contracting)^{1/} quite as much as would have seemed desirable in this case to PUB's need for placing orders long ahead of delivery to avoid disruption of its expansion program, thus contributing somewhat to delays in equipment delivery and project implementation (paras. 2.03 and 3.01). Also, some modifications required by the Bank in PUB's bidding procedures may not have been desirable^{2/}. It would seem that the Bank was over-concerned about PUB's management, despite PUB's satisfactory performance and capable middle-level staff, because of undue importance given to the top management situation which was subject essentially to local administrative and governmental considerations. Nevertheless, PUB is keen for resumed Bank lending for power and the consequent assistance attached to it.

Conclusions

10.01 Singapore's First and Second Power Distribution Projects have been successful and have met their main objective, to meet the rapidly

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- ^{1/} The Bank seems to have taken a stricter position in this case than its most recent relevant policy statement (intended to clarify but not to innovate) indicates: "...the Bank has consistently taken the view that only the payment, prior to loan signing, of eligible expenditures constitutes retroactive financing...financing of expenditures, incurred under contracts awarded prior to loan signing but paid after signing, pose no special problems." (OMS No. 2.41, dated February 1975). Also it might be desirable to treat explicitly in this policy statement the cases of long-term borrowers receiving repeated Bank loans.
- ^{2/} Bank asked PUB in October 1968 to modify in tenders specifications the repeat order clauses for purchase of additional equipment at the tendered prices within 2 years of tender acceptance, fearing that manufacturers might quote enhanced initial prices to cover their 2-year risks. The clause was modified and the period of option limited to 1 year. Analysis by PUB of unit prices obtained in 1963-1967 without any repeat order clause and prices obtained with the initial clause after 1967 showed that the latter prices were substantially lower, by 4 to 18 percent, and the initial clause yielded large savings, due probably to the added incentive provided by the possibility of extra purchases.

growing demand for electricity. They were executed largely as originally planned, except for the 66 kv network expansion which was delayed by one year in both cases by late equipment deliveries. The projects have helped PUB to maintain its increasingly good operational performance and financial viability. The Bank's performance has been adequate on the whole; it recommended desirable reforms in tariffs and the useful recourse to consultants for long-range planning. However, the Bank may have given insufficient confidence to PUB's management and ability, and contributed by its controls and its positions on advance contracting to some of the delays in implementation. Also, in light of the excellent performance of the company, the Bank does seem to have been unduly rigid with regard to the rather unconventional top management structure of PUB.

ANNEX I: LOAN AGREEMENTS COVENANTS AND FULFILLMENT

Loan 503-SI

- Consult with the Bank before appointment of Senior Officers.
- Maintain tariffs sufficient to give an overall return of at least 8 percent p.a. for PUB.
- Long-term debt service coverage should be at least 1.5.

- Short-term debt be limited to S\$ 12 million

- Engage consultants to review electricity tariffs.

- Engage consultants to review basic distribution planning.

Loan 595-SI

- Short term debt limited to 15 percent of cash expenses.

- Introduce new tariffs by April 1972 at the latest.

- Consult with Bank on actions to be taken about consultants recommendations.

- Supplementary Letter: Appoint a Commercial Engineer and a Load Dispatch Engineer.

Fulfillment

- Complied with.

- PUB overall return steadily over 9 percent.

- Debt service coverage steadily over 1.8.

- Complied with.

- Electrowatt engaged in 1967. Reports submitted in 1968 and 1971. New tariffs effective December 1972

- Montreal Engineering engaged in 1968. Report used for preparation and appraisal of Loan 595-SI.

- Two PUB engineers sent to Europe in October 1970 for training and appointed to the posts in October, 1971.

ANNEX II: DISTRIBUTION EXPANSION

Forecast/Actual

Equipment Installed During the Period 1967-1972 (Actual)

	<u>1967</u>	<u>1968</u>	<u>1969</u>	<u>1970</u>	<u>1971</u>	<u>1972</u>
a. <u>Transformers (MVA)</u>						
		<u>503-SI/Part I</u>		<u>595-SI</u>		
66 kv/down	62	31	62.5	187.5	93.5	93.5
22 kv/down	51	94	102.5	150	156	69.5
6.6 kv/L.V.	62	74	80	134.5	91.5	108
TOTAL	175	199	245	472	341	271
No. of substations commissioned	79	109	84	107	118	82
Accumulated No. of sub- stations, year-end	985	1,094	1,178	1,285	1,403	1,485
Accumulated capacity (MVA) year-end	1,566	1,765	2,010	2,482	2,823	3,094
b. <u>Cables (Km)</u>						
		<u>503-SI/Part I</u>		<u>595-SI</u>		
66 kv	22	43	18	261	31	60
22 kv	17	39	32	42	57	63
6.6 kv	63	99	85	116	114	103
L.V. underground	127	128	152	166	182	196
Pilot/alarm/telephone	143	174	90	226	214	254
L.V. overhead conductors	698	698	811	1,065	1,615	1,895
TOTAL	1,070	1,181	1,188	1,876	2,213	2,571

PROJECTS CONTENT:

		<u>503-SI/Part I</u>		<u>595-SI</u>	
		<u>Forecast</u>	<u>Actual</u>	<u>Forecast</u>	<u>Actual</u>
<u>Transformers:</u>	66 kv	90	93.5	430	374.5
(MVA)	22 kv	140	145	200	408.5
	<u>6.6 kv</u>	<u>250</u>	<u>136</u>	<u>350</u>	<u>306</u>
	Total (MVA)	<u>480</u>	<u>374.5</u>	<u>980</u>	<u>1,089</u>
<u>Cables:</u>	66 kv	48	61	201	352
(km)	22 kv	97	56	97	131
	<u>6.6 kv</u>	<u>88</u>	<u>162</u>	<u>105</u>	<u>315</u>
	Sub-total	233	279	403	798
	<u>L.V. Cables</u>	<u>n.a.</u>	<u>1,713</u>	<u>n.a.</u>	<u>1,030</u>
	Total (Km)	<u>n.a.</u>	<u>1,992</u>	<u>n.a.</u>	<u>1,828</u>
Electricity meters (000)		110	75	-	-

ANNEX III

LOAN DISBURSEMENTS: Forecast/ Actual

I. Accumulated Disbursements (US\$ million)

	<u>1967</u>	<u>1968</u>	<u>1969</u>	<u>1970</u>	<u>1971</u>	<u>1972</u>	<u>1973</u>
<u>Loan 503-SI:</u> Forecast	5.94	13.30	15.00				
Part I Actual	-	4.87	9.21	13.63	15.00		
Actual/Forecast%	0	37	61	91	100		
<u>Loan 595-SI:</u> Forecast			2.07	11.85	19.65	20.50	
Actual			1.78	12.15	16.70	20.10	20.5
Actual/Forecast%			86	103	85	98	100

II. List of Goods (US\$ million)

	<u>503-SI/Part I</u>		<u>595-SI</u>	
	<u>Initial</u>	<u>Final</u>	<u>Initial</u>	<u>Final</u>
Transformers	1.78	2.42	2.53	2.51
Switchgears	4.28	4.70	1.68	1.68
Cables	5.85	6.50	13.90	13.71
Meters/L.V. Cables	0.83	0.54	1.50	1.64
Consulting/Engineering	0.10	0.14	0.88	0.96
Unallocated	1.46	-	0.01	-
Interest	0.70	0.70		
All	<u>15.00</u>	<u>15.00</u>	<u>20.50</u>	<u>20.50</u>

ANNEX IV: COSTS OF DISTRIBUTION PROJECTS

Forecast/Actual

PUB'S TOTAL CAPITAL EXPENDITURE FOR DISTRIBUTION (S\$ million)

	<u>1967</u>	<u>1968</u>	<u>1969</u>	<u>1970</u>	<u>1971</u>	<u>1972</u>
		<u>503-SI/Part I</u>		<u>595-SI</u>		
66 kv network	5.41	5.12	7.59	27.73	14.15	24.76
22 kv network	4.71	8.52	10.83	10.97	14.46	16.38
6.6 kv network	8.86	10.16	8.20	13.59	18.91	17.56
Others	2.41	3.76	4.50	6.19	6.66	6.95
Total	21.39	27.56	31.12	58.48	54.18	65.65

TOTAL INVESTMENTS: Under 503-SI: S\$ 51.13 million; Under 595-SI: S\$ 161 million.

PROJECTS TOTAL COST (US\$ million equivalent)

I. <u>Loan 503-SI</u>	<u>Forecast</u>			<u>Actual (at cost from stocks)</u>				
	<u>F.X.</u>	<u>L.C.</u>	<u>Total</u>	<u>F. X.</u>		<u>Total</u>	<u>L.C.</u>	<u>Total</u>
				<u>IBRD</u>	<u>Others</u>			
Transformers	1.78	1.24	3.02	2.42	-	2.42	0.07	2.49
Switchgears/Miscel.	4.28	2.92	7.20	4.70	-	4.70	0.35	5.05
Cables	5.85	3.09	8.94	6.50	1.40	7.90	0.70	8.60
Meters	0.83	0.10	0.93	0.54	0.51	1.05	0.01	1.06
Land and Buildings	-	0.80	0.80	-	-	-	0.22	0.22
Consulting/Engineering	0.10	1.01	1.11	0.14	0.04	0.18	0.33	0.51
Contingencies	1.46	0.84	2.30	-	-	-	-	-
Total	<u>14.30^{a/}</u>	<u>10.00</u>	<u>24.30^{a/}</u>	<u>14.30^{a/}</u>	<u>1.95</u>	<u>16.25^{a/}</u>	<u>1.68</u>	<u>17.93^{a/}</u>
II. <u>Loan 595-SI</u>								
Transformers	3.69	0.59	4.28	2.51	2.53	5.04	0.06	5.10
Switchgears	8.96	1.61	10.57	1.68	14.57	16.25	0.14	16.39
Cables	15.04	4.23	19.27	15.35	4.97	20.32	3.58	23.90
Meters/Miscel.	2.94	0.86	3.80	-	0.85	0.85	0.25	1.10
Land and Buildings	-	1.08	1.08	-	-	-	1.39	1.39
Engineering	0.10	1.68	1.78	0.96	0.19	1.15	0.63	1.78
Congingencies	1.60	0.95	2.55	-	-	-	-	-
Total	<u>32.33</u>	<u>11.00</u>	<u>43.33</u>	<u>20.50</u>	<u>23.11</u>	<u>43.61</u>	<u>6.05</u>	<u>49.66</u>

^{a/} Does not include US\$ 0.7 million for interest during construction.

ANNEX V: PUB - ELECTRICITY DEPARTMENT

OPERATING CAPACITY, GENERATION AND SALES

		<u>Forecast/Actual</u>							
		<u>1966</u>	<u>1967</u>	<u>1968</u>	<u>1969</u>	<u>1970</u>	<u>1971</u>	<u>1972</u>	<u>1973</u>
<u>Forecast Loan 503-SI/Part I</u>									
<u>Load:</u>	Installed capacity	464	464	584	557	617	677	797	
(MW)	Firm capacity ^{a/}	379	379	499	472	532	592	652	
	Peak Demand	223	281	331	383	440	492	545	
	Spare capacity	156	98	168	89	92	100	107	
<u>Sales:</u>	Gross Generation	1,223	1,394	1,668	1,919	2,153	2,380	2,590	
(Gwh)	Sales: Domestic	470	501	534	570	608	648	692	
	Industrial	580	702	909	1,093	1,259	1,420	1,561	
	Total	1,071	1,227	1,468	1,689	1,895	2,098	2,384	
	Losses (percent)	12.4	12.0	12.4	12.0	12.0	11.8	11.8	
<u>Forecast Loan 595-SI</u>									
<u>Load:</u>	Installed capacity				557	617	677	677	797
(MW)	Firm capacity ^{a/}				472	532	592	592	652
	Peak demand				330	381	448	516	575
	Spare capacity				142	151	144	76	77
<u>Sales:</u>	Gross Generation				1,875	2,170	2,551	2,938	3,274
(Gwh)	Sales: Domestic				547	583	624	668	718
	Industrial				1,075	1,295	1,588	1,882	2,125
	Total				1,650	1,910	2,245	2,585	2,881
	Losses (percent)				12.0	12.0	12.0	12.0	12.0
<u>Actual</u>									
<u>Load:</u>	Installed capacity	464	464	464	584	644	704	726.5	869
(MW)	Average available capacity	413	349	392	463	523	558	597	640
	Annual peak demand	223	248	283	320	377	422	527	615
	Average spare capacity	190	101	109	143	146	136	70	25
	Effective-peak spare capacity	78	72	101	80	109	143	70	24
<u>Sales:</u>	Gross Generation	1,236	1,424	1,639	1,876	2,206	2,585	3,143	3,719
(Gwh)	Sales: Domestic	471	496	518	567	638			700*
	Industrial	583	720	903	1,058	1,273	1,788		2,534*
	Total	1,075	1,239	1,447	1,653	1,942	2,269	2,777	3,304
	Losses (percent)	13.0	13.0	11.7	11.9	12.0	12.2	11.6	11.2

* Estimates

^{a/} Installed capacity less 1x60 MW and 1x25 MW out up to 1972, and 1x120 MW and 1x25 MW out in 1972.

LOAN 595-SI

PUBLIC UTILITIES BOARD - SINGAPORE

ELECTRICITY DEPARTMENT

BALANCE SHEET

(Millions of S\$)

Item	1968		1969		1970		1971		1972	
	Appraisal (595-SI)	Actual	Appraisal (595-SI)	Actual	Appraisal (595-SI)	Actual	Appraisal (595-SI)	Actual	Appraisal (595-SI)	Actual
<u>ASSETS</u>										
<u>Fixed Assets</u>										
Gross Fixed Assets in Operation	492.49	494.45	605.25	599.89	660.22	631.92	705.20	720.55	785.51	758.93
Less: Depreciation	<u>163.68</u>	<u>162.26</u>	<u>165.72</u>	<u>182.81</u>	<u>189.39</u>	<u>203.97</u>	<u>215.28</u>	<u>227.01</u>	<u>242.94</u>	<u>253.46</u>
Net Fixed Assets in Operation	328.81	332.19	439.53	417.08	470.83	427.95	489.92	493.54	542.57	505.47
Work-in-Progress	<u>83.61</u>	<u>81.46</u>	<u>26.38</u>	<u>17.19</u>	<u>47.21</u>	<u>68.80</u>	<u>55.95</u>	<u>53.63</u>	<u>40.05</u>	<u>144.76</u>
Total Net Fixed Assets in Operation	412.42	413.65	465.91	434.27	518.04	496.75	545.87	547.17	582.62	650.23
<u>Current Assets</u>										
Cash	14.79	13.81	10.60	19.79	13.73	28.88	24.78	16.24	11.62	(3.21)
Inventories	<u>18.74</u>	<u>18.38</u>	<u>16.55</u>	<u>31.58</u>	<u>16.75</u>	<u>50.63</u>	<u>17.25</u>	<u>59.66</u>	<u>17.25</u>	<u>56.78</u>
Total Current Assets	33.53	32.19	27.15	51.37	30.48	79.51	42.03	75.90	28.87	53.57
<u>Deferred Charges</u>	<u>0.11</u>	<u>0.10</u>	<u>0.06</u>	<u>0.06</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>(0.75)</u>	<u>-</u>	<u>(0.65)</u>
<u>TOTAL ASSETS</u>	<u>446.06</u>	<u>445.95</u>	<u>493.12</u>	<u>485.70</u>	<u>548.52</u>	<u>576.26</u>	<u>587.90</u>	<u>622.32</u>	<u>611.49</u>	<u>703.15</u>
<u>LIABILITIES AND EQUITY</u>										
<u>Equity</u>										
General Reserve & Earned Surplus	178.30	179.06	205.26	212.01	236.52	259.23	273.02	311.81	318.89	374.11
Customers Contributions	<u>19.71</u>	<u>19.37</u>	<u>21.41</u>	<u>21.09</u>	<u>23.21</u>	<u>24.50</u>	<u>25.01</u>	<u>26.52</u>	<u>26.81</u>	<u>29.79</u>
Total Equity	198.01	198.43	226.67	233.10	259.73	283.73	298.03	338.33	345.70	403.90
<u>Debt</u>										
Existing Loans	158.06	158.06	158.06	158.06	158.06	158.06	141.63	141.63	125.66	125.66
Less: Sinking Fund Investments	<u>93.93</u>	<u>94.32</u>	<u>102.28</u>	<u>103.12</u>	<u>110.98</u>	<u>113.37</u>	<u>103.55</u>	<u>106.89</u>	<u>95.73</u>	<u>99.29</u>
Net Existing Loans	64.13	63.74	55.78	54.94	47.08	44.69	38.08	34.74	29.93	26.37
IBRD Loans 337-SI, 473-SI & 503-SI	81.99	81.94	106.67	98.94	102.20	138.99	97.47	153.53	92.42	209.32
IBRD Loan 595-SI	-	-	6.20	35.55	35.55	58.95	58.95	60.48	60.48	209.32
Government Loans	64.87	64.62	60.04	59.79	55.21	54.96	50.37	50.13	46.92	46.92
Supplier's Credits	34.43	34.59	36.64	36.79	47.65	52.68	44.40	45.59	36.04	63.56
Refundable Deposits	<u>2.63</u>	<u>2.63</u>	<u>1.10</u>	<u>2.14</u>	<u>1.10</u>	<u>1.21</u>	<u>0.60</u>	<u>-</u>	<u>-</u>	<u>-</u>
Total Debt	<u>248.05</u>	<u>247.52</u>	<u>266.45</u>	<u>252.60</u>	<u>288.79</u>	<u>292.53</u>	<u>289.87</u>	<u>283.99</u>	<u>265.79</u>	<u>299.25</u>
<u>TOTAL LIABILITIES & EQUITY</u>	<u>446.06</u>	<u>445.95</u>	<u>493.12</u>	<u>485.70</u>	<u>548.52</u>	<u>576.26</u>	<u>587.90</u>	<u>622.32</u>	<u>611.49</u>	<u>703.15</u>
Debt/Equity Ratio	56/44	55/45	54/46	52/48	53/47	51/49	49/51	46/54	43/57	43/57

LOAN 595-SI

PUBLIC UTILITIES BOARD - SINGAPORE

ELECTRICITY DEPARTMENT

INCOME STATEMENT

(Millions S\$)

Item	1968		1969		1970		1971		1972	
	<u>Appraisal</u> (595-SI)	<u>Actual</u>	<u>Appraisal</u> (595-SI)	<u>Actual</u>	<u>Appraisal</u> (595-SI)	<u>Actual</u>	<u>Appraisal</u> (595-SI)	<u>Actual</u>	<u>Appraisal</u> (595-SI)	<u>Actual</u>
Total Energy Generated (GWh)	1,639	1,639	1,875	1,876	2,170	2,205	2,551	2,585	2,938	3,143
% Non-Revenue	11.7	11.7	12.0	12.0	12.0	12.0	12.0	12.2	12.0	11.6
Total Energy Sold (GWh)	1,447	1,447	1,650	1,653	1,910	1,942	2,245	2,269	2,585	2,777
Average Price (¢ per kWh)	7.00	7.00	6.75	6.88	6.53	6.72	6.29	6.55	6.12	6.38
Revenue from Sales	101.30	101.30	112.07	113.65	124.77	130.38	141.11	148.66	158.09	177.18
Other Revenue	1.43	1.30	1.54	1.43	1.63	1.37	1.73	1.02	1.83	0.50
Total Revenue	102.73	102.60	113.61	115.08	126.40	131.75	142.84	149.68	159.92	177.68
Operating & Maintenance Costs	18.03	18.03	22.01	22.01	24.17	24.17	27.62	27.62	29.41	29.41
Fuel Costs	17.06	41.27	19.01	45.88	21.64	48.25	25.32	53.76	29.17	71.64
Property Tax	6.35	6.35	7.77	7.77	8.48	8.48	9.66	9.66	10.73	10.73
Depreciation	21.46	21.02	23.46	21.84	23.63	22.15	25.85	23.16	27.62	26.68
Total Operating Costs	62.90	62.29	72.25	67.72	77.92	70.40	88.45	76.92	96.93	98.32
Gross Income	39.83	40.31	41.36	47.36	48.48	61.35	54.39	72.76	62.99	79.36
Interest	15.46	15.57	18.39	17.91	21.55	20.02	22.66	22.21	21.57	22.07
Discount Amortized & Other Misc. Items	0.26	0.26	0.05	0.56	0.06	0.06	-	3.09	-	0.56
Net Income	24.11	24.48	22.92	28.89	26.87	41.27	31.73	47.46	41.42	56.73
Average Net Fixed Assets in Operation	322.48	324.17	384.17	374.64	455.18	422.52	480.37	460.66	516.24	499.50
Rate of Return	12.4%	12.4%	10.8%	12.6%	10.7%	14.5%	11.3%	15.7%	12.2%	15.9%
Ratio of Operating Costs to Total Revenue	61%	61%	64%	59%	62%	53%	62%	52%	61%	55%
Interest Coverage	2.6	2.6	2.3	2.7	2.3	3.1	2.4	3.3	2.9	3.6

LOAN 503-SI - PART I POWER PROJECT

PUBLIC UTILITIES BOARD - SINGAPORE

ELECTRICITY DEPARTMENT

INCOME STATEMENT

(Millions of S\$)

<u>Years Ended December 31</u>	<u>1967</u>		<u>1968</u>		<u>1969</u>		<u>1970</u>		<u>1971</u>	
	<u>Actual</u>	<u>Appraisal Estimate</u>	<u>Actual</u>	<u>Appraisal Estimate</u>	<u>Actual</u>	<u>Appraisal Estimate</u>	<u>Actual</u>	<u>Appraisal Estimate</u>	<u>Actual</u>	<u>Appraisal Estimate</u>
Total Energy Generated (mln of kwh)	1,424	1,394	1,639	1,668	1,876	1,919	2,205	2,153	2,585	2,380
% Non-Revenue	13%	12%	11.8%	12%	12%	12%	12%	12%	12.2%	11.8%
Total Energy Sold (mln of kwh)	1,238	1,227	1,447	1,468	1,653	1,689	1,942	1,895	2,269	2,098
Average Price (Cents per kwh)	7.17	7.21	7.00	6.91	6.88	6.75	6.72	6.63	6.55	6.50
Revenue from Sales	88.82	88.42	101.30	101.48	113.65	113.99	130.38	125.61	148.66	136.41
Other Revenues	0.79	3.01	1.30	3.22	1.40	3.34	1.37	3.46	1.02	3.58
	89.61	91.43	102.60	104.70	115.05	117.33	131.75	129.07	149.68	139.99
Operating and Maintenance Costs	39.27	35.86	41.27	41.63	45.88	47.00	48.25	51.80	53.76	57.38
Property Tax	-	6.13	-	7.02	-	7.86	-	8.65	-	9.38
Depreciation	21.04	17.55	21.02	19.30	21.84	20.79	22.15	25.17	23.67	27.65
Total Operating Costs	60.31	59.54	62.29	67.95	67.72	75.65	70.40	85.62	77.43	94.41
Income from Operations	29.30	31.89	40.31	36.75	47.33	41.68	61.35	43.45	72.25	45.58
Interest Payable (including discount amortized)	14.64	15.69	15.84	18.36	17.91	20.53	20.02	21.43	22.21	22.02
	14.66	16.20	24.47	18.39	29.42	21.15	41.33	22.02	50.04	23.56
Gain (Loss) on Currency Revaluation	4.01	-	-	-	(0.96)	-	(0.14)	-	(3.09)	-
Net Income	18.67	16.20	24.47	18.39	28.46	21.15	41.19	22.02	46.95	23.56
Operating Ratio	67%	65%	61%	65%	59%	64%	53%	66%	52%	67%
Rate of Return on Average Net Fixed Assets in Operation	9.3%	9.0%	12.4%	9.8%	12.6%	9.7%	14.5%	8.9%	15.7%	8.9%
Interest Coverage	2.3	2.9	2.6	2.0	2.7	2.0	3.1	2.0	3.3	2.1

PUB - ELECTRICITY DEPARTMENT
CASH FLOW STATEMENTS - FORECAST/ACTUAL

	1967		1968		1969			1970			1971			1972			1973	
(Forecast of Loan:)	Forecast (503)	Actual	Forecast (503)	Actual	Forecast (503)	Forecast (595)	Actual	Forecast (503)	Forecast (595)	Actual	Forecast (503)	Forecast (595)	Actual	Forecast (503)	Forecast (595)	Actual	Forecast (595)	Actual
	(US\$ million)																	
SOURCES OF FUNDS																		
Internal Cash	49.44	50.38	56.05	61.36	62.47	64.86	69.29	68.62	72.15	83.77	73.23	80.28	96.37	78.72	90.65	106.68	101.27	123.34
Less: Debt Service	24.84	24.81	30.05	29.40	35.15	35.06	33.54	39.20	42.48	40.38	41.20	45.94	53.32	41.68	43.82	48.85	43.56	41.72
Net Internal Cash	24.60	25.57	26.00	31.96	27.32	29.80	35.75	29.42	29.67	43.39	32.03	34.34	43.05	37.04	46.83	57.83	57.71	81.62
Capital Contributions	1.30	1.73	1.10	2.53	1.10	1.70	1.72	1.10	1.80	3.49	1.10	1.80	1.94	1.10	1.80	3.28	1.80	4.71
Grants: IBRD	29.15	8.89	22.10	17.17	5.10	33.47	18.35	-	29.35	44.61	-	23.40	17.81	-	2.55	9.54	-	27.65
Government	8.00	10.00	30.00	10.00	25.00	-	-	25.00	-	30.00	-	-	-	12.00	-	5.00	20.00	-
Suppliers Credits	8.06	9.26	18.33	28.72	2.91	7.17	6.35	0.99	18.31	22.56	-	6.23	8.16	-	0.67	32.60	-	39.25
TOTAL SOURCES	71.11	55.45	97.53	90.38	61.43	72.14	62.17	56.51	79.13	114.05	63.13	65.77	70.96	50.14	51.85	108.25	79.51	153.23
APPLICATIONS OF FUNDS																		
Distribution Works	34.03	21.39	32.97	27.56	29.05	45.82	31.12	31.39	53.34	58.48	32.39	46.64	54.18	29.51	50.62	65.65	47.46	n.a.
Other Works	25.35	19.49	64.62	53.00	29.08	31.17	25.28	21.87	22.46	26.40	30.69	7.08	19.92	18.90	13.79	64.84	33.83	n.a.
Total Capital Expenditures	59.38	40.88	97.59	80.56	58.13	76.99	56.40	53.26	75.80	84.88	63.08	53.72	74.10	48.41	64.41	130.49	81.29	131.80
Net Increase Working Capital	0.50	0.56	0.50	3.75	1.50	(2.19)	(0.70)	0.50	0.20	19.15	1.00	0.50	9.03	0.50	-	(2.88)	0.20	(1.31)
Net Refundable Deposits	0.90	(0.42)	0.50	0.36	0.20	1.53	0.49	0.20	-	0.94	0.20	0.50	0.46	0.20	0.60	0.09	-	0.07
TOTAL APPLICATIONS	60.78	41.02	98.59	84.67	59.83	76.33	56.19	53.96	76.00	104.97	64.28	54.72	83.59	49.11	65.01	127.70	81.49	130.56
Cash Surplus (Deficit)	10.33	14.43	(1.06)	5.71	1.60	(4.19)	5.98	2.55	3.13	9.08	(1.15)	11.05	(12.63)	1.03	(13.16)	(19.45)	(1.98)	22.67
Cash at Year End	1966: (4.70)	9.73		15.44			21.42			30.50			17.87		1.58			21.00

ANNEX IX: PUB - ELECTRICITY DEPARTMENT

FINANCING PLANS - FORECAST/ACTUAL

(S\$ million)

	<u>Loan 503-SI/Part I</u>				<u>Loan 595-SI</u>	
	<u>1967 - 1969</u>		<u>1967 - 1971</u>		<u>1969 - 1972</u>	
	<u>Forecast</u>	<u>Actual</u>	<u>Forecast</u>	<u>Actual</u>	<u>Forecast</u>	<u>Actual</u>
<u>SOURCES OF FUNDS</u>						
Cash Generation	167.96	181.03	309.81	361.17	307.94	356.11
<u>Less: Debt Service</u>	<u>90.04</u>	<u>87.75</u>	<u>170.44</u>	<u>181.45</u>	<u>167.30</u>	<u>176.09</u>
Net Internal Cash	77.92	93.28	139.37	179.72	140.64	180.02
Capital Contributions	3.50	5.98	5.70	11.41	7.10	10.43
IBRD Loans	56.35	44.41	56.35	106.83	88.77	90.31
Government Loans	63.00	20.00	118.00	20.00	-	5.00
Suppliers Credits	<u>29.30</u>	<u>44.33</u>	<u>30.29</u>	<u>75.05</u>	<u>32.38</u>	<u>69.67</u>
Sub-total Borrowing	148.65	108.74	204.64	201.88	121.15	164.98
TOTAL SOURCES	<u>230.07</u>	<u>208.00</u>	<u>349.71</u>	<u>393.01</u>	<u>268.89</u>	<u>355.43</u>
<u>APPLICATIONS OF FUNDS</u>						
Distribution Investments	96.05	80.07	159.83	192.73	196.42	209.43
<u>Other Investments</u>	<u>119.05</u>	<u>97.77</u>	<u>171.61</u>	<u>144.09</u>	<u>74.50</u>	<u>136.44</u>
Sub-total Capital						
Expenditure	215.10	177.84	331.44	336.82	270.92	345.87
Other Capital Requirements	-	-	-	-	-	-
Net Repayment Deposits	1.60	0.43	2.00	1.83	2.63	1.98
Increase Working Capital	<u>2.50</u>	<u>3.61</u>	<u>4.00</u>	<u>31.79</u>	<u>(1.49)</u>	<u>24.60</u>
TOTAL APPLICATIONS	<u>219.20</u>	<u>181.88</u>	<u>337.44</u>	<u>370.44</u>	<u>272.06</u>	<u>372.45</u>
Cash Surplus (deficit)	10.87	26.12	12.27	22.57	(3.17)	(17.02)

ANNEX X: PUB - ELECTRICITY DEPARTMENT

SELECTED OPERATIONAL INDICATORS

I. <u>AVERAGE UNIT COST</u> (US\$ per kwh sold)	<u>1966</u>	<u>1967</u>	<u>1968</u>	<u>1969</u>	<u>1970</u>	<u>1971</u>	<u>1972^{a/}</u>	<u>1973^{a/}</u>
Depreciation	0.47	0.57	0.48	0.44	0.37	0.33	0.34	0.33
Administration	0.16	0.13	0.09	0.11	0.09	0.08	0.09	0.06
Fuel	0.56	0.40	0.39	0.39	0.32	0.33	0.43	0.52
Other Operational Costs	<u>0.40</u>	<u>0.36</u>	<u>0.30</u>	<u>0.27</u>	<u>0.26</u>	<u>0.22</u>	<u>0.25</u>	<u>0.26</u>
Total	1.59	1.46	1.26	1.21	1.04	0.96	1.11	1.17
Decrease (Increase) over previous year of:								
Fuel cost/kwh, percent		29	3	-	18	(3)	(30)	(21)
Due to: Fuel cost/ton, percent		26	(3)	-	17	(3)	n.a.	(24)
Operational Efficiency ^{b/} , percent		3	6	-	1	-	n.a.	3

a/ Rate of exchange used: US\$ 1 = S\$ 3.06 up to 1971, 2.82 in 1972 and 2.54 in 1973.

b/ As reflected by the number of fuel tons/Gwh generated and by distribution losses.

II. <u>FINANCIAL AND MANAGEMENT INDICATORS</u>	<u>1967</u>	<u>1968</u>	<u>1969</u>	<u>1970</u>	<u>1971</u>	<u>1972</u>	<u>1973</u>
Sales Revenues (S\$ million)	88.82	101.30	113.65	130.38	148.66	177.18	204.82
Operating Costs ^{a/} (S\$ million)	54.11	55.31	59.93	61.52	66.92	86.56	98.24
Average Rev./kwh sold (S\$ kwh)	7.2	7.0	6.9	6.7	6.55	6.4	6.2
Average Cost/kwh sold (S\$ kwh)	4.4	3.8	3.6	3.2	2.95	3.1	3.0
Net Operational Income ^{a/} (S\$ million)	34.71	45.99	53.72	68.86	81.74	90.62	106.58
Average Net Fixed Assets (S\$ million)	316.0	324.2	374.6	422.5	460.7	499.5	565.0
Rate of Return ^{a/} , percent	11.0	14.2	14.3	16.3	17.7	18.1	18.9
Financial Rate of Return, percent	9.3	12.4	12.6	14.5	15.7	15.9	16.5
PUB's Financial Rate of Return, percent	9.2	11.6	11.5	n.a.	13.6	14.0	16.1
Debt Service Ratio	2.0	2.1	2.1	2.1	1.8	2.2	3.0
Debt/Equity Ratio, percent	56/44	55/45	52/48	51/49	46/54	43/57	40/60
Self-Financing Rate, percent	62	38	64	41	52	45	63
Distribution Losses, percent	13.0	11.7	11.9	12.0	12.2	11.6	11.2
Number of customers/employee	64	67	68	67	70	72	78
Residential Customers/as percent of Households	59	62	66	70	75	80	85
Distribution as percent Total Investments	52	34	55	69	73	50	n.a.

a/ Before direct taxes.

**SINGAPORE – PUB ELECTRICITY DEPARTMENT
LOAD AND CAPACITY DEVELOPMENT
Actual and Forecasts**



