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INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT

APPRAISAL REPORT

NORTON BRIDGE HYDRO AND SECOND GRANDPASS

THERMAL POWER PROJECT

CEYLON

April 17, 1961

Department of Technical Operations

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CURRENCY EQUIVALENTS

Unit = Ceylonese Rupee

U.S. \$1 = Rs. 4.76

Rs. 1 = U.S. \$0.21

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NORTON BRIDGE HYDRO AND SECOND GRANDPASS

THIRD POWER PROJECT - CEYLON

SUMMARY

- i. The Government of Ceylon has asked the Bank to finance the foreign exchange cost of an expansion of the power system operated by the Department of Government Electrical Undertakings (DGEU). The project would add 75 MW of additional capacity to the system. The total cost is estimated at Rs 154.7 million (US\$32.5 million) of which the equivalent of about US\$15 million is needed in foreign exchange. The Government of Ceylon would be the borrower.
- ii. The DGEU integrated power system has a present effective capacity of 74.5 MW serving the major load centers in the island. A new steam power station equipped with a 25 MW unit is presently under construction at Grandpass in Colombo.
- iii. The present organization of the DGEU is unsatisfactory and the rules and regulations which apply to it as a government department make it difficult to conduct operations in accordance with sound public utility practice. The government has now decided to present legislation to Parliament to create an autonomous Electricity Board. The setting up of such a board would solve many of the existing problems, although there are additional measures that need be taken thereafter. It would not now be practicable to defer a loan until the Board is established, since it will take several months to complete the legislative procedures and there is danger of an early power shortage. It would therefore be appropriate for the Bank to consider a loan at this time.
- iv. The Bank has made two previous loans to the government totalling US\$26.5 million (of which US\$2.6 million was cancelled) for expansion of the DGEU system. Market studies indicate a high rate of growth in power demand. The 75 MW of additional capacity which would be built with proceeds of the proposed third loan would meet requirements through most of 1966. Additional projects would have to be undertaken to meet the demand thereafter.
- v. The project proposed for Bank financing consists of a 50 MW hydro plant at Norton Bridge, the addition of a second 25 MW steam unit at the Grandpass station, and associated transmission and distribution facilities. The project is technically sound and satisfactory arrangements have been made for its execution. The estimated cost is reasonable and includes adequate allowance for contingencies.
- vi. Deficiencies in the accounting system prevent an wholly accurate assessment of past earnings. After making adjustments to correct these shortcomings, the present financial position of the DGEU appears sound. The financial plan contemplates the creation of the Board and the consequent

revision of the capital structure to eliminate debt owed to the Ceylon Government. The plan is sound. A strong financial position will be maintained during the period of the program through 1967.

vii. The project is suitable for a Bank loan in an amount of US\$15 million equivalent with a term of 25 years including a grace period of $3\frac{1}{2}$ years.

APPRAISAL REPORT

NORTON BRIDGE HYDRO AND SECOND GRANDPASS THERMAL POWER PROJECT - CEYLON

I. INTRODUCTION

1. The Government of Ceylon has asked the Bank to finance the foreign exchange cost of an expansion of the power system operated by the Department of Government Electrical Undertakings (DGEU). The project consists of the construction of a 50 MW hydro plant at Norton Bridge, a second 25 MW thermal unit at Grandpass, and additional transmission and distribution facilities. The total cost of the project is estimated at Rs.154.7 million (\$32.5 million) of which the equivalent of about US\$15.0 million would be in various foreign currencies. As in previous Bank loans the Government of Ceylon would be the borrower.

2. A Bank mission visited Ceylon in November 1960 to appraise the project. This report is based on information obtained in the field by the Bank mission and on a report of the consulting engineers, Preece, Cardew and Rider of London.

II. HISTORY AND OPERATIONS

3. The DGEU was formed in 1927 to operate a small private electricity supply undertaking which had been purchased by the government. Under an ordinance of 1935 provision was made for the establishment of an independent Electricity Board of Ceylon. This Board was dissolved two years later and since then all matters pertaining to government electricity supply have been the responsibility of the DGEU as a government department. In addition, a number of Local Authorities - municipal, urban and village communities - maintain public utility services of their own. The Local Authorities operate under licenses obtained from the government and may either generate and distribute power or purchase power for distribution from the DGEU. There are now 121 Local Authorities, of which about 75 are supplied in bulk by the DGEU. The service area of the DGEU covers some 3,500 square miles with a population of about 4 million, close to half the total population of Ceylon.

Previous Bank Loans

4. In July 1954 the Bank made a loan of \$19.1 million to the Government of Ceylon to finance the foreign exchange cost of the expansion of the 25 MW Laksapana hydro plant. The expansion included the construction of the Castlereagh storage dam on the Kehelgamu River, the installation

in the Laksapana powerhouse of an additional 25 MW of generating capacity and the construction of transmission and distribution facilities. As foreign exchange requirements were lower than had been estimated, the loan was later reduced to \$16.5 million. The project has been completed and is in operation.

5. In September 1958 the Bank made a second loan of \$7.4 million for the purpose of financing the foreign exchange cost of a thermal power plant at Grandpass with one 25 MW turbo-generator, a 132 kv transmission line to the Kolonnawa switchyard in Colombo and an expansion of distribution facilities. It is expected that construction of the project will be completed by March 1962, about on schedule.

Existing Facilities

6. The effective generating capacity of the integrated power system is at present 74.5 MW, consisting of 50 MW hydro capacity at Laksapana and 10 MW steam and 14.5 MW diesel capacity at the Stanley and Pettah power stations in the city of Colombo. The main switchyard at Kolonnawa is adjacent to the Stanley power station. The transmission system consists of 228 miles of 132 kv and 66 kv primary lines and 922 miles of 33 kv and 11 kv secondary lines. In addition, the DGEU has a 4 MW diesel generating station at Jaffna in the north of the island, which is not connected to the grid. This station is being enlarged by an additional 4 MW. Generating facilities of the system are shown in Annex 1 and the primary transmission lines are indicated on the attached map.

7. The DGEU retails power in Colombo, which is by far the most important load center, and in the towns of Nuwara Eliya, Norton, Diyatalawa and Jaffna. The number of customers as of September 30, 1960 was 33,500. Included in this number are the Local Authorities receiving bulk supply, but not their customers, so that the total number of consumers receiving power from the system is considerably higher. The DGEU retails also to certain large industrial consumers even though they are situated within the area licensed to Local Authorities.

III. ORGANIZATION AND MANAGEMENT

8. The DGEU is a department of the Ministry of Agriculture, Land, Irrigation and Power. As a government department it is subject to control and supervision by this Ministry which in turn is responsible to the government through the Ministry of Finance in respect of any major expenditures. The DGEU's operations are governed by the Electricity Act of 1950 and by the accompanying regulations.

9. The internal organization of the department follows broadly the recommendations of an electrical engineering advisor retained in 1955 under the Colombo Plan who recommended the establishment of greater delegation of authority along functional lines. It is headed by a General Manager assisted by four principal officers: a Deputy General Manager and Chief Engineer; a Chief Commercial Officer, a Chief Accountant; and a Chief Administrative Officer. The operation of the transmission and distribution systems is handled by four regional divisions whose managers report directly to the General Manager.

10. There are a number of organizational shortcomings which seriously impair the operating efficiency of the department. A major portion of these stem from the application of the Financial Regulations, a code of 1,760 provisions broadly covering any activity in the government which involves the spending of money. These regulations severely limit the authority of the General Manager to act without ministerial approval. They require the authorization of the ministry for even minor expenditures, as well as resort to government stores for purchases regardless of price or availability. They govern accounting practices, modes of travel, employment policies, etc. and they make government employees personally liable for any violation, which has an inhibiting effect on initiative.

11. As a government department the DGEU is subject to normal government budgetary procedures. Every position on the permanent staff outside the labor grades is listed in the budget and additional personnel cannot be engaged without a parliamentary vote. Expenditures have to be approved annually by parliament and all appropriations lapse at the end of the fiscal year. This system is not suitable for a commercial organization.

12. Civil service regulations impose a complex structure of job and salary classifications and tenure provisions. In addition there are 18 separate unions operating within the DGEU, covering all its 3,600 employees except the General Manager and his deputy.

13. While the DGEU keeps separate accounts from those of the government, the accounting system leaves much to be desired and established principles of commercial utility accounting are not followed. As the figures are many months late in being prepared, an up-to-date financial position at any given time is not available. Adherence to the Financial Regulations makes operations inflexible and time consuming. Accountants are frequently transferred from one government department to another.

14. The shortcomings of the existing organization were discussed by the government and the Bank even before the first Bank loan. At that time it was agreed that the more important defects could be remedied by organizational and procedural changes. However, with the rapid growth of the DGEU system it became plain that the best solution would be to establish an Electricity Board to replace the DGEU and the government has stated its intention of putting the necessary legislation before parliament as early as possible.

15. The bill provides for the transfer of all assets, liabilities and operations of the DGEU to the new body, which is to be governed by a five-member Board to be appointed by the minister under whose jurisdiction the department now falls. Authority will remain with the minister to remove Board members without assigning cause.

16. This act should go far toward solving the administrative problems of the present organization. The Financial Regulations will no longer apply. The Board will have its own budget, separate from that of the government. The law requires that the present employees be retained on terms not less favorable than those they now enjoy. The Board will have freedom to hire new personnel without the previous government restrictions.

17. The problem of setting up a proper commercial accounting system will be a major one. The government has expressed its intention to obtain an experienced accounting advisor as soon as possible to set up accounting procedures in accordance with established commercial and utility practices and to assist in the execution of such a program after it had been adopted by the Board.

18. Since the legislative procedures are likely to take several months and since there is an urgent need to begin construction in order to avert a power shortage, it would not be practicable to postpone consideration of the proposed loan until the Board has been established.

19. The government intends to submit the bill to the next session of parliament which convenes in June 1961, and it would accordingly be appropriate for the Bank to consider a loan to the government now rather than await creation of the Board. After the Bill has been passed there will necessarily be a transitional period during which the Board will be appointed and organizational procedures implemented. This may require some additional time and for the purposes of the financial forecasts it has been assumed that the financial provisions of the Bill will become effective late in 1962.

IV. THE POWER MARKET

20. In the fiscal year ended September 30, 1960, the DGEU's energy sales amounted to 218 million kwh distributed among consumer classes as follows: Domestic 16.4%; Commercial 23.3%; Industrial 32.8%; Local Authorities 24.1%; Traction and Public Lighting 3.4%. The peak demand was 57.7 MW.

21. The table in Annex 2 shows the growth of load and generation since 1955 and future estimates through 1967. In the five-year period ended September 30, 1960 the peak demand increased from 33.5 MW to 57.7 MW, or at an average annual rate of 11.5%, and energy sales increased from 121 million kwh to 218 million kwh, or at an average annual rate of 13%.

22. In order to estimate the future peak demand, the basic rates of growth derived on the basis of past experience were taken for each consumer class. Additions to these estimated loads were made in respect of new Local Authorities, other prospective loads (including a hospital, broadcasting station, municipal water supply, army cantonment, etc.), and the Planned Sector. The Planned Sector is a government scheme for the establishment of basic government-owned industries. Only those requirements were included in the forecast which could be considered reasonably certain, either for increases to existing consumers or for new projects in an advanced stage of planning. The plans have been discussed with responsible officials of the government and the requirements that have been included in the forecasts appear realistic. Details of prospective Planned Sector loads are shown in Annex 3.

23. The foregoing load projections indicate a growth of peak demand during the five-year period ending September 30, 1965 from 57.7 MW to 116.0 MW, or an average annual rate of 15%. This compares with the average rate of growth of 11.5% for the preceding five years, during which no such major industrial projects as those of the Planned Sector were undertaken. Energy sales are expected to grow from 218 million kwh to 515 million kwh, or at an average annual rate of 18%. This is a higher rate than in the past, reflecting an improvement in the system load factor due to a larger contribution of industrial load. The rate of growth of peak load from 1965 through 1967 has not been studied in detail but has been assumed to continue the trend established in the preceding five years. The present load factor of 52% is expected to reach 60% in 1965 and to remain at this level.

V. CONSTRUCTION PROGRAM

24. The estimated peak demand and energy requirements of the system compared with available plant capacity and generation are shown in tabular and graphic form in Annex 4. The effective firm capacity, including the thermal unit under construction at Grandpass, would be sufficient to meet requirements only to about September 1962. Thereafter it would be neces-

sary to have recourse to stand-by capacity or to rely on favorable water conditions if curtailment of the electricity supply is to be avoided.

25. It was first proposed to start construction of a 50 MW hydro plant at Norton Bridge in 1958. The Bank agreed to consider a loan for the project. However, as the government at that time had come to the conclusion, after discussions with the Bank, that the time had come to set up an Electricity Board to take the place of the DGEU, the Bank said it would prefer to await the establishment of the Board before making the loan. However, due to changes in government and other events, there has been considerable delay in proceeding with this proposal and appropriate measures were initiated only recently. Since the hydro plant cannot now be completed before mid-1964, it is necessary to start construction of a second thermal unit at Grandpass immediately, which could be ready a year earlier. This unit will be required in any event for thermal backup for later stages of hydro development. After both the hydro and the thermal units have been put in operation, it should be possible to meet system requirements until the latter part of 1966. Brief periods of shortage of firm generating capacity are expected to occur during the construction period, but these would not be critical provided the construction of Norton Bridge and the second Grandpass unit are started on time and carried out expeditiously.

26. Further hydro capacity should be added in 1966. A Bank mission has recently visited Ceylon to consider, amongst other things, what priorities should be given to the development of the various river basins. However, for the purposes of this report it is assumed that the next development would be that of the Maskeliya River for which the preliminary investigations are the most advanced. The first stage of the Maskeliya project (75 MW) would be started in April 1963 and the second stage (50 MW) in 1966. This assumption does not reflect on the merits of other alternate projects and has been made only for the purpose of estimating financial requirements until 1967. The completion of these works is expected to provide adequate capacity to satisfy requirements until the early 1970's.

Description and Status of the Project

27. The project proposed for Bank financing consists of (a) the Norton Bridge Hydro Plant, (b) the Grandpass second thermal unit, and (c) associated transmission and distribution facilities, described more in detail below.

(a) Norton Bridge Hydro Plant

This plant would utilize the difference of head of 746 feet between the dam at Castlereagh and the Norton reservoir which provides the daily storage for the existing Laksapana power station. Water from the Castlereagh reservoir would flow through a tunnel 20,000 feet long, then drop through penstocks to the powerhouse and discharge into the Norton reservoir. The new plant would have an installed capacity of 50 MW, would operate at an average annual load factor of 28% and would be connected to the Laksapana plant by a 132 kv transmission line. The general location of the existing and proposed hydro installations is shown in Annex 5.

(b) Second Grandpass Thermal Unit

A second 25 MW unit of the same specifications as the one presently under construction would be installed in the powerhouse at Grandpass. The unit would operate at a steam pressure of 900 p.s.i. and a temperature of 900°F. The installation would be of conventional design, comprising a single boiler, turbo-generator, and step-up transformer and would be connected by a 132 kv transmission line to the Kolonnawa switchyard. Part of the auxiliary installation provided for the first unit will be common to both, such as cooling water intake, fuel oil storage tanks, feed water treatment plant, outdoor step-up station, etc.

(c) Transmission and Distribution Facilities

Double circuit 132 kv transmission lines would be constructed between Laksapana and Galle in the southern part of the island (93 miles) and between Bolawatta and Puttalam in the north (50 miles). A three-mile 132 kv line would connect Norton to Laksapana. About 200 miles of 33 kv and 11 kv lines and about 200 substations would be constructed. A more detailed description of the projects is given in Annex 6.

28. Tender documents for the Norton Bridge hydro plant and for the primary transmission lines were prepared by the consulting engineers, Preece, Cardew and Rider of London. Tenders invited on the basis of international competition were received in March 1959 and were reviewed by the consultants who advised on the selection of the contractors. The government Tender Board issued in March 1961 letters of intent to the selected contractors in which it indicated that firm orders would be placed with them after a Loan Agreement had been concluded with the Bank.

29. In order to avoid delays in the procurement of the second thermal unit for Grandpass, the consultants were instructed to obtain quotations from the manufacturers of the first unit who had been chosen on the basis of international competitive bidding. Because of the advanced stage of engineering of the first unit, these manufacturers were able to quote generally lower prices than those quoted for the first unit and also offer shorter delivery terms. In view of the urgent need for additional capacity to tide the system over until the Norton Bridge plant would come in operation, the Bank agreed to the proposed procurement procedure after a review of the quotations indicated that prices would be satisfactory.

30. The equipment and materials for the lower voltage transmission and distribution facilities will be purchased on the basis of international competition as in the case of the primary transmission at 132 kv.

31. The present consultants will be responsible for the engineering of the project and for the supervision of construction. The existing contracts with the consultants would be extended to cover the new project. It has been agreed with the borrower that design and tender specification for 33 kv and 11 kv lines and substations and for the low voltage distribution would be prepared by the DGEU and that the construction would be carried out partly under contract and partly departmentally. Consultants, however, would be retained by the DGEU to make a general review of these facilities and to appraise the adequacy of design and construction.

Cost Estimates

32. Details of the estimated costs of the project are given in Annex 7. A summary is as follows:

	<u>Foreign Exchange</u> <u>\$Mil. Equiv.</u>	<u>Local Currency</u> <u>\$Mil. Equiv.</u>	<u>Total</u> <u>\$Mil. Equiv.</u>
Norton Bridge Hydro Plant	7.4	10.7	18.1
Grandpass Second Thermal Unit	3.0	1.6	4.6
Transmission and Distribution Facilities, including Carrier System	<u>4.6</u>	<u>5.2</u>	<u>9.8</u>
Total	15.0	17.5	32.5

Interest during construction is included in the total cost of the project, but is not included in the amount of foreign exchange (\$15 million) proposed for financing by the Bank.

33. Construction costs are based on tenders received for the Norton Bridge project and on quotations obtained for the thermal unit from the manufacturers of the first unit. The contingency allowances on the estimated direct cost of the project are about 15% on foreign and 20% on local currency costs for the Norton Bridge project and 12% on foreign and 15% on local costs for the second Grandpass thermal unit. These allowances should be adequate to cover possible omissions from estimates, unforeseen expenses and price escalation during construction. The estimated cost per kw of installed capacity is \$360 for the hydro station and \$180 for the second thermal unit. These costs are reasonable.

Construction Schedules

34. The construction of the Norton Bridge project is scheduled over a period of three years; that of the second steam unit at Grandpass is estimated to require 26 months. If a Bank loan is approved for the projects, the target date for starting operation is June 1963 for the thermal unit and April 1964 for the first hydro unit, followed two months later by the second hydro unit. This schedule is feasible. Estimated completion dates for other projects included in the long-range program are given in Annex 4.

35. The estimated schedule of expenditures in foreign and in local currencies is given in the following table:

Schedule of Expenditures for the Project
(Rs. Million)

<u>Years ending</u> <u>September 30</u>	<u>Foreign</u> <u>Currency</u>	<u>Local</u> <u>Currency</u>	<u>Total</u>
1961	16.2	11.8	28.0
1962	27.6	24.4	52.0
1963	22.8	20.5	43.3
1964*	<u>4.8</u>	<u>18.8</u>	<u>23.6</u>
Total**	71.4	75.5	146.9
	<u>=====</u>	<u>=====</u>	<u>=====</u>
(Million US\$)	(15.0)	(15.9)	(30.9)

* Includes retention and customs duties, which will be paid following completion of construction. These payments may extend into the following year.

** Exclusive of interest during construction amounting to Rs. 7.8 million.

Justification of the Project

36. The project is designed to meet the estimated annual growth of the DGEU system requirements for the next five years. While hydro power is produced in the system at a lower cost than thermal power, its generation is limited by the water availability in the existing storage reservoirs on the Kehelgamu River. The general conception of the proposed hydro schedule is to develop the difference of head between the seasonal storage of the Castlereagh dam and the diurnal storage of the Norton dam. The effect would be to use the same water at different levels for both the existing and the new hydro stations. The Norton Bridge power station would add about 123 million kwh per year to the system, calculated at low water conditions, and would permit utilization of the full potential development of the Kehelgamu River. The balance of requirements would be supplied by thermal generation from the Grandpass station. Although it would have been required ultimately for thermal backup in any case, construction of the second thermal unit at Grandpass is necessitated immediately in order to avert a power shortage before Norton Bridge can be completed.

37. A comparison has been made of the costs of the Norton Bridge project with those of a theoretical thermal alternative based on the costs of Grandpass. This shows a return on the additional investment for the hydro project of 17.9%. Details are set forth in Annex 8.

VI. FINANCES

A. Past Record

38. Being a government department, the DGEU does not follow the accounting practices of private commercial utilities. Examples of departures from commercial practice are the following:

- (i) No depreciation has ever been charged and the entire amount of all past capital expenditures is carried on the balance sheet.
- (ii) The total debt services, including both interest and amortization, is charged to operating revenues which, to a certain extent, offsets the fact that no depreciation has been charged. This is again different from normal commercial practices.
- (iii) Certain replacement expenditures which are of an operating nature are regularly made out of reserves and not shown in the income statement.

39. For these reasons it is impracticable to obtain a true picture of earnings and financial position. In Annex 9 the income statements for the five years ended September 30, 1960 have been set forth with adjustments for (ii) and (iii) above, but no adjustment has been possible for the depreciation that should have been charged in those years. The figures are shown here solely to indicate the general order of magnitude of the items shown, and should not be interpreted as an accurate statement of past results.

40. In similar fashion the year-end balance sheets for the five years to September 30, 1960 are shown in Annex 10. The property and surplus accounts are, of course, overstated because of the failure to charge depreciation, and the statements accordingly do not reflect the true financial position.

41. Because of the length of time required for the DGEU's accounts to be prepared, the income statement for the year ended September 30, 1960 and the balance sheet as of that date have had to be estimated, following the form of presentation of prior years. Both have then been adjusted. An analysis of the property account has been made from estimated and from such records of acquisition dates and costs as there are. The net value of the plant has then been calculated as if proper depreciation charges had been made, and the plant account has been written down to this figure by a charge to earned surplus. Work in progress has been shown as a separate item. That portion of the writedown applicable to the year ended September 30, 1960 has been charged in the income statement for that year, and other minor adjustments have been made.

42. The foregoing adjustments result in a balance sheet which substantially reflects the financial position of the DGEU on September 30, 1960 and which could be summarized as follows (Rs. million):

<u>ASSETS</u>		<u>LIABILITIES</u>	
<u>Current Assets</u>		<u>Current Liabilities</u>	
Cash	-	Deposits	2.5
Treasury Deposit	10.4	Accounts Payable	.6
Accounts Receivable	10.3	Other	<u>.2</u>
Stores	8.5	Total Current Liabilities	3.3
Other	<u>.6</u>		
Total Current Assets	29.8	<u>Long-term Debt</u>	
<u>Fixed Assets</u>		IBRD	67.1
Gross Fixed Assets	261.8	Ceylon Government	<u>137.1</u>
Less Depreciation	<u>49.4</u>	Total Long-term Debt	204.2
Net Fixed Assets in Operation	212.4	<u>Equity</u>	
Work in Progress	<u>3.5</u>	Capital	-
Total Fixed Assets	215.9	Surplus and Reserves	<u>38.2</u>
		Total Equity	38.2
Total Assets	<u>245.7</u>	Total liabilities	<u>245.7</u>

B. Rates

43. The DGEU's Commercial Advisor has recommended a change in the existing rate structure which has been in effect since 1953. Although the proposals are designed to bring rates for individual service classifications more into line with their costs, they will at the same time result in an increase in revenues of about 3%. The government proposes to put the new rates into effect at the earliest possible date. (Once in operation, the Board will have the power to set its own rates.) The financial forecasts are based on the assumption that this rate increase will be in effect starting October 1, 1961.

C. Financial Plan and Projections

44. The financial plan for the present phase of expansion up to 1967 is predicated upon the assumption that the Bill for the creation of the Electricity Board will be enacted before June 1962 and that the financial provisions of that Bill will then come into effect by October 1962. The financial plan is made up of the following elements:

- (i) Conversion into equity capital of the DGEU's present debt to the Ceylon Government as well as of the additional debt to be incurred by the DGEU in 1961 and 1962. The present debt totals Rs. 137 million and has been incurred over the past 30 years to finance construction expenditures. It has maturities running from one year to 50 years and interest rates varying from $3\frac{1}{2}\%$ to 5%. The financial forecast shows that the DGEU would need approximately Rs. 63 million of additional financing during the period 1961-62, and it has been assumed that this amount would be provided through government loans. It is proposed by the Draft Legislation to convert all outstanding debt into equity on which would be paid a dividend not to exceed 4%. For the purpose of the financial forecast this conversion, including the Rs. 63 million in government loans in 1961-62, has been shown as taking place as of October 1, 1962.
- (ii) Undertaking by the Board of obligations to the Ceylon Government equivalent to the government's obligations under the two existing Bank loans. These debts would be counterparts of the Bank loans in amount, interest rate and maturity.
- (iii) Assumption by the Board of all assets and liabilities of the DGEU. Included in the assets is an amount of Rs. 10.4 million on deposit with the treasury which would be paid over in cash. (The draft bill also obliges the government to provide the Board with working capital, although the projections do not show an immediate need for additional amounts.)
- (iv) Withdrawal of the remaining Rs. 42 million (US\$8.8 million) of the existing Bank loans and completion of the projects for which they were granted.
- (v) A Bank loan to the Ceylon Government at this time of Rs. 71.4 million (US\$15 million) for the foreign exchange costs of the Norton Bridge hydro plant and the second thermal unit at Grandpass. It is assumed that this loan would be for 25 years with $3\frac{1}{2}$ years' grace and an interest rate of $5\frac{3}{4}\%$. It would have a counterpart as in (ii) above after the Board is created.
- (vi) Loans in 1963 and 1966 of Rs. 64 million (US\$13.4 million) and Rs. 62 million (US\$13.0 million) respectively for the foreign exchange costs of the first two stages of the Maskeliya project. The load forecasts indicate the need for additional capacity in 1966 and it would be necessary to start the Maskeliya project in 1963 for it to be available at that time. However, it is emphasized that there are alternatives to this project and that the cost estimates for it are based only on preliminary engineering studies. It has been included in the financial plan only because it would be unrealistic not to show some further development during this period and because it is the one at present in the most advanced stage of study.

(vii) Additional funds totalling Rs. 120 million invested by the Ceylon Government to cover a portion of the local currency costs of the construction program. These funds would be provided in the form of loans amounting to Rs. 63 million in 1961-62 (see (i) above) to be converted into equity as of October 1, 1962 and of share capital amounting to Rs. 57 million in 1963-66.

(viii) Internally generated funds amounting to Rs. 262 million including depreciation of the various components of the written-down plant on a straight line basis over their remaining useful lives.

45. The foregoing program, extending through September 30, 1967, is set forth in the cash flow in Annex 11 and is summarized below (Rs. million):

<u>Sources of Funds</u>		<u>Application of Funds</u>	
Internal Funds	262.0	<u>Plant Additions</u>	
<u>Long-term Borrowings</u>		Existing Projects	71.0
Existing IBRD Loans	41.9	Norton Bridge and	
Proposed IBRD Loan	71.4	Grandpass II	146.9
Assumed Loan - Maskeliya A	64.0	Maskeliya A	124.0
Assumed Loan - Maskeliya B	26.4	Maskeliya B	45.0
Total	203.7	Other	21.6
		Total	408.5
Government Funds	120.0	Interest and Amor-	
		tization	118.7
		Dividends	47.9
		Income Taxes	6.4
		Cash Accrual	4.2
Total Sources	<u>585.7</u>	Total Applications	<u>585.7</u>

46. Income statement and balance sheet projections encompassing this plan are shown in Annexes 9 and 10. Certain conclusions can be drawn therefrom:

(i) Creation of the Board and conversion of the Ceylon Government debt into equity is the basis of the plan. If the outstanding government loans were not converted into equity and all future government investment took the form of debt, coverage of the total

debt service would be unsatisfactory. For the purpose of the financial forecast it has been assumed that prior to the creation of the Board the government would provide additional funds needed by the DGEU in the form of loans and that upon creation of the Board in 1962 these funds would be converted into equity. The additional investment by the government during the period 1963-67, after creation of the Board, was also assumed to be in the form of equity. Under these assumptions the debt service coverage would be satisfactory. It would range from slightly under one time in 1962 before creation of the Board to 2.7 times in 1967, averaging around 2.2 times. (See Annex 9). The draft legislation specifically authorizes additional borrowings from the Ceylon government, but if the Board were permitted to build up again a large indebtedness, the point would soon be reached where debt service coverage was endangered unless rates were increased to cover the additional financial burden.

- (ii) The Board will have no cash with which to begin operations unless the amount on deposit with the treasury is paid over in cash. Such transfer is provided for in the draft legislation.
- (iii) Additional working capital will not be required if the present high level of receivables (about four months' billings, largely due to delays in payments by local authorities,) can be controlled. It has been assumed that this will be possible once the Board is free to pursue more generally recognized commercial practices. Also, stores have been kept at an abnormally high level because of the purchasing regulations now in effect, and should not need to be materially increased for some time.
- (iv) Because of credits for the heavy capital expenditures, income taxes will be payable in only one year during the period studied. This is 1962, when the present carry-forward will be exhausted and before credits are available from the new expansion program.
- (v) Net income would show a sharp increase in 1963 when interest charges on Ceylon government loans would cease. Thereafter it would remain relatively constant for several years before turning upward again at the end of the period covered. The rate of return on the written-down plant would range from 5.8% to 8%, averaging around 6.9%.

- (vi) After meeting all debt service requirements, taxes and dividends over the seven-year period, the Board would be able to finance about 22% of its construction costs from internally generated funds. If the government were to forego dividends during these years, the percentage would rise to 34%.
- (vii) The financial condition of the Board would be strong, with a debt/equity ratio on September 30, 1967 of 40/60. The ratio would not, of course, remain as strong if the additional funds provided by the government took the form of loans.

VII. CONCLUSIONS

47. To meet the immediate prospective demand for power in the area served by the DGEU system, installation of 75 MW of generating capacity and associated transmission and distribution facilities will be required. It is proposed to meet this demand by the construction of a 50 MW hydro plant at Norton Bridge and the addition of 25 MW of thermal capacity at Grandpass. The total system capacity after completion of these plants would be sufficient to meet the demand until the latter part of 1966, although some shortage might occur before the thermal plant could be put into operation. It is essential that further construction be started in 1963 in order that the required new capacity be available by 1966.

48. The proposed hydro plant will produce the cheaper power, though the thermal plant can be completed earlier and, while it would be required ultimately in any event, is needed at this time to prevent an immediate shortage of capacity. It will be necessary to complete both plants on schedule if curtailment of supply is to be avoided.

49. Construction cost estimates are realistic and include adequate allowances for contingencies. Satisfactory arrangements have been made with consultants for the engineering of the project and supervision of its construction.

50. The present organization of the DGEU is not satisfactory and the rules and regulations under which it is required to operate as a government department are not suitable for commercial operations.

51. Legislation providing for the establishment of an autonomous Electricity Board has been prepared by the government. Many, although not all, of the organizational defects of the DGEU will be cured by the establishment of the Board.

52. The financial position would be sound if all the steps contemplated by the financial plan are taken. The rate of return, the coverage of debt service and the internal contribution to construction requirements will not be high, but can be considered adequate in view of the heavy expansion program.

53. It is not now practicable to postpone consideration of the proposed loan until the Board has been established, since the impending power shortage makes it imperative to begin construction immediately. The Bank has been assured that the bill creating the Board will be enacted during the next session of Parliament, and it is therefore appropriate that the proposed loan be considered at this time.

54. The project is considered suitable for a Bank loan equivalent to an amount of \$15 million for a period of 25 years including 3-1/2 years grace.

C E Y L O NDEPARTMENT OF GOVERNMENT ELECTRICAL UNDERTAKINGSGenerating Facilities of the DGEU Interconnected System
(excluding Jaffna)

	<u>Condition</u>	<u>Effective Capacity* kw</u>
<u>At Colombo</u>		
<u>Stanley Power Plant</u>		
3 x 3,000 kw Steam units	Old	7,500
<u>Pettah Power Plant</u>		
1 x 3,000 kw Steam unit	Old	2,500
3 x 1,000 kw Diesel units	Old	2,500
6 x 2,000 kw Diesel units	New	12,000
<u>At Laksapana</u>		
<u>Laksapana Power Plant</u>		
3 x 8,333 kw Hydro units	New	25,000
2 x 12,500 kw Hydro units	New	<u>25,000</u>
Total effective capacity		<u>74,500</u>
Total effective firm capacity		
(effective capacity less		
largest unit in reserve)		62,000
Under construction at Grandpass (Colombo):		
1 x 25,000 kw Steam unit scheduled		
for operation in March 1962		(25,000)

*Effective capacity calculated after derating the name-plate capacity of the older units to take into account present condition of equipment.

C E Y L O NDEPARTMENT OF GOVERNMENT ELECTRICAL UNDERTAKINGSProduction and Sales Records and Forecasts*

<u>Year Ended Sept. 30</u>	<u>Generation</u> (million kwh)	<u>Losses</u> (million kwh) %		<u>Sales</u> (million kwh)	<u>Peak Load</u> (mw)	<u>Load Factor</u>
<u>Actual</u>						
1955	148.7	27.3	18.4	121.4	33.5	50.7
1956	163.1	30.7	18.8	133.3	37.6	49.5
1957	181.1	29.3	16.2	151.8	41.5	49.8
1958	199.3	36.7	18.2	163.1	45.1	50.4
1959	228.3	40.1	17.5	188.2	52.3	49.8
1960	263.4	45.3	17.2	218.1	57.7	52.1
<u>Forecast</u>						
1961	305.0	47.0	15.4	258.0	67.0	52.0
1962	360.0	52.0	14.5	308.0	73.0	56.0
1963	440.0	68.0	15.4	372.0	89.0	56.2
1964	540.0	89.0	16.4	451.0	105.0	58.6
1965	610.0	95.0	15.5	515.0	116.0	60.0
1966	695.0	105.0	15.1	590.0	132.0	60.0
1967	780.0	115.0	14.8	665.0	148.0	60.0

*Excluding Jaffna

N.B. Peak load is that recorded at generating station busbars;
load factor is expressed in relation to units generated.

C E Y L O N

DEPARTMENT OF GOVERNMENT ELECTRICAL UNDERTAKINGS

PLANNED SECTOR
(Government Scheme for the Establishment of New Industries)

Year ending September 30	Maximum Demand - Megawatts													
	1961		1962		1963		1964		1965		1966		1967	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Cotton Spinning (Veyangoda)	1.0	1.0	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Cotton Weaving	-	-	-	-	2.0	2.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Kaolin Refinery	-	-	0.4	0.1	0.4	0.1	0.4	0.1	0.4	0.1	0.4	0.1	0.4	0.1
Tile Factory - Bangadeniya	0.1	-	0.1	-	0.1	-	0.1	-	0.1	-	0.1	-	0.1	-
Tile Factory - Peradeniya	-	-	0.1	-	0.1	-	0.1	-	0.1	-	0.1	-	0.1	-
Ceramic Factory	0.2	-	0.2	-	0.2	-	0.2	-	0.2	-	0.2	-	0.2	-
Second Ceramic Factory	-	-	-	-	0.5	0.1	0.5	0.1	0.5	0.1	0.5	0.1	0.5	0.1
Leather Factory	0.2	-	0.2	-	0.2	-	0.2	-	0.2	-	0.2	-	0.2	-
Paranthan Chemicals	-	-	-	-	-	-	-	-	-	-	-	-	1.0	1.0
Gintota Plywood	-	-	-	-	-	-	0.5	-	0.5	-	0.5	-	0.5	-
Second Spinning and Weaving Mills	-	-	-	-	-	-	-	-	1.0	1.0	2.0	2.0	4.5	4.5
Glass Sheet	-	-	-	-	0.3	0.1	0.3	0.1	0.3	0.1	0.3	0.1	0.3	0.1
Steel Rolling Mill	-	-	-	-	-	-	4.5	4.5	4.5	4.5	5.8	5.8	7.2	7.2
Tire Factory	-	-	-	-	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Fertilizer Plant	-	-	-	-	-	-	-	-	(13.0)	(13.0)	13.0	13.0	13.0	13.0
Oil Refinery	-	-	-	-	-	-	-	-	(4.5)	(4.5)	(4.5)	(4.5)	(4.5)	(4.5)
K.K.S. (Jaffna Line)	-	-	-	-	-	-	-	-	-	-	-	-	(6.0)	(6.0)
Puttalam Cement	-	-	-	-	-	-	2.5	2.5	2.5	2.5	2.5	2.5	5.0	5.0
Clinker Grinding - Galle	-	-	-	-	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Flour Mill - Galle	-	-	-	-	-	-	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Concrete Products	-	-	-	-	0.3	-	0.3	-	0.6	-	0.6	-	0.9	-
Galle Harbour	-	-	-	-	-	-	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Colombo Port (Electrification and Additions)	-	-	-	-	-	-	-	-	1.0	1.0	1.5	1.5	2.0	2.0
Total ^{1/}	1.5	1.0	2.5	1.6	9.1	7.3	20.1	17.8	22.4	19.8	38.2	35.6	46.4	44.0
Diversified Contribution to System														
Maximum Demand (Diversity 1.3)	1.5	1.0	1.9	1.2	7.0	5.6	15.2	14.7	17.2	15.2	29.4	27.5	35.6	33.8

^{1/} Excluding loads indicated in brackets, which are not considered sufficiently firm.

C E Y L O NDEPARTMENT OF GOVERNMENT ELECTRICAL UNDERTAKINGSEstimated Peak Demand and Plant Availability

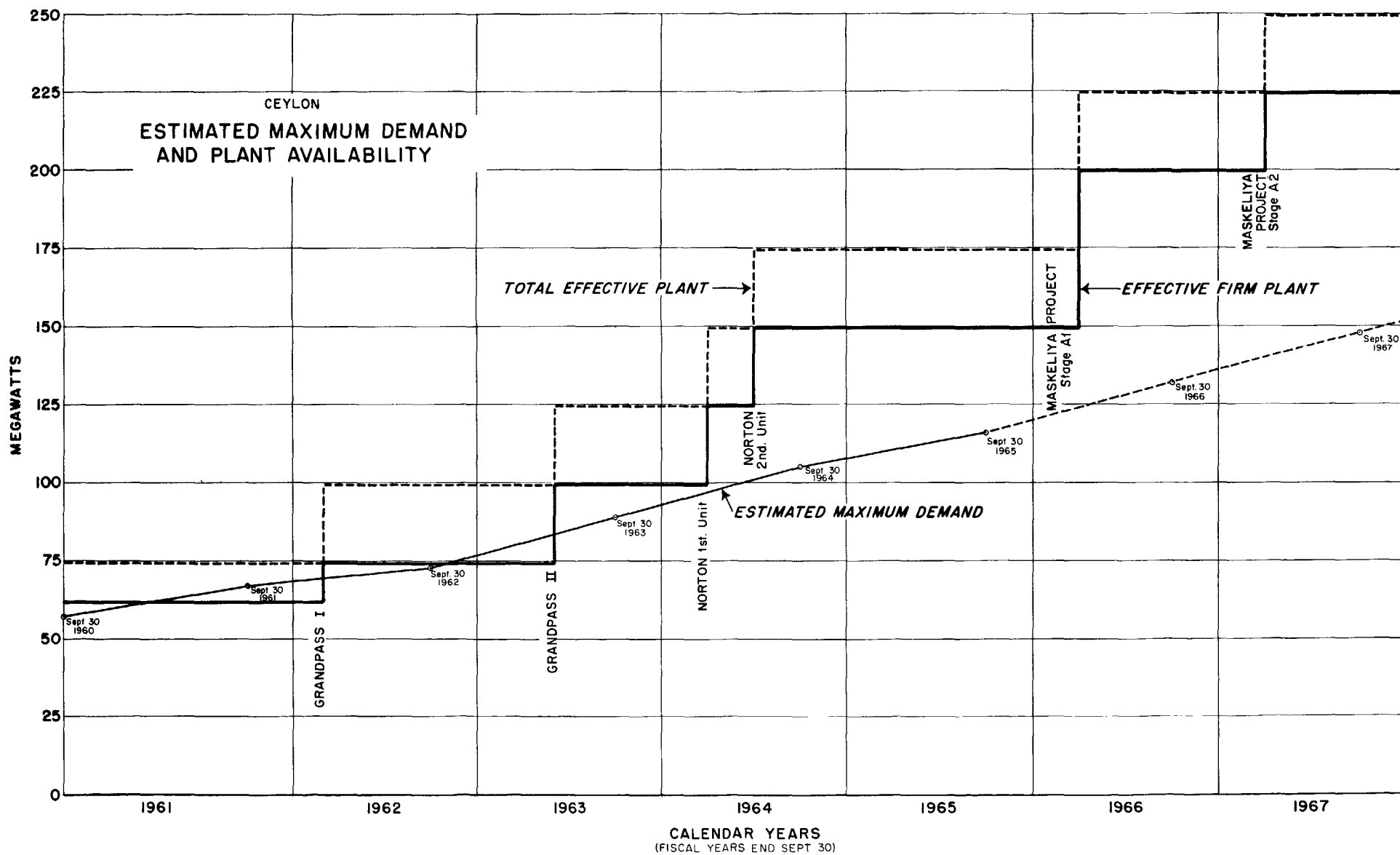
<u>Year ending</u> <u>September 30</u>	<u>Peak Demand</u> (MW)	<u>Effective</u> <u>Plant Capacity</u> (MW)	<u>Effective Firm</u> <u>Plant Capacity</u> (MW)
1961	67	74.5	62
1962	73	99.5	74.5
1963	89	124.5	99.5
1964	105	174.5	149.5
1965	116	174.5	149.5
1966	132	224.5	199.5
1967	148	249.5	224.5

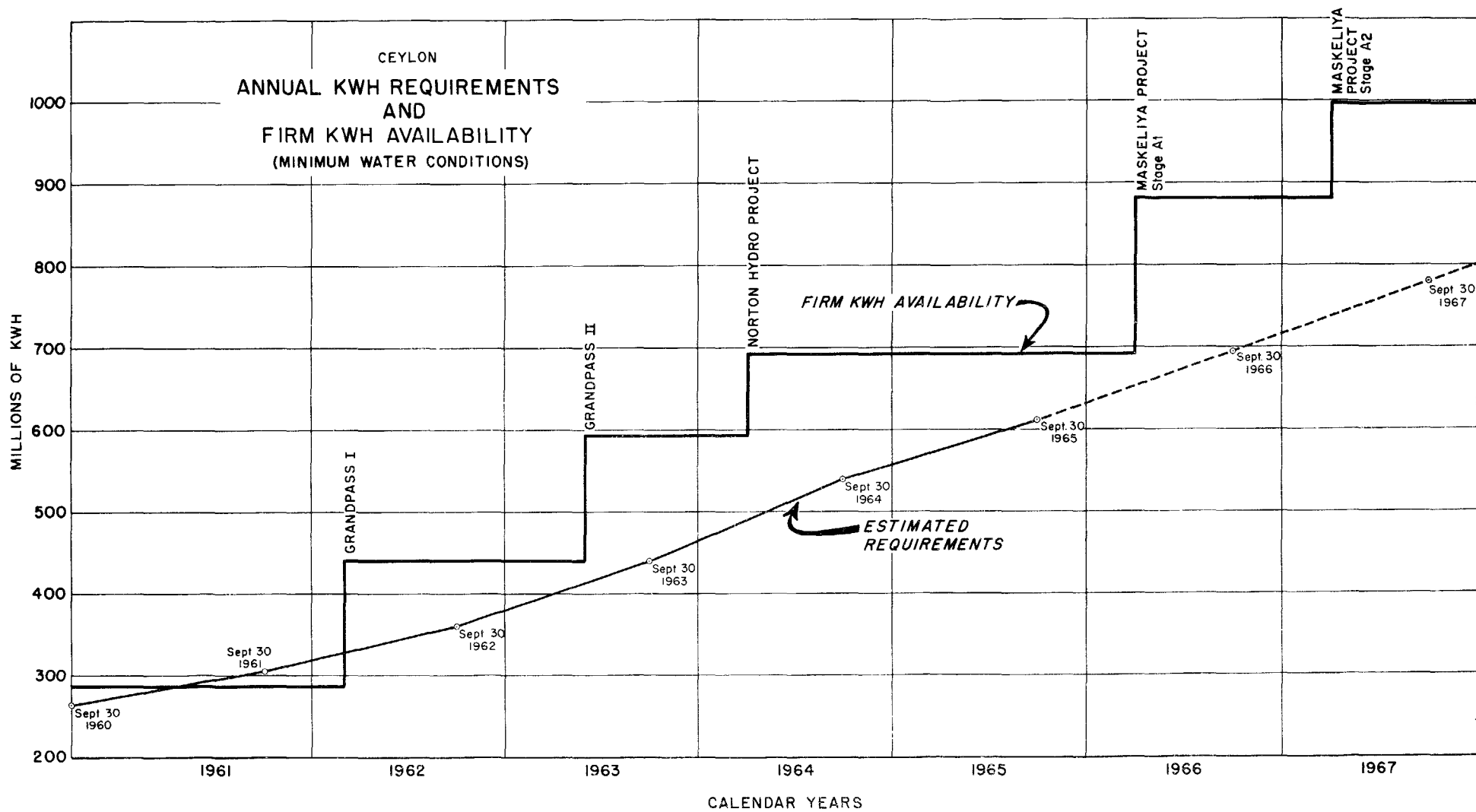
Estimated Energy Requirements and Availability
(million kwh)

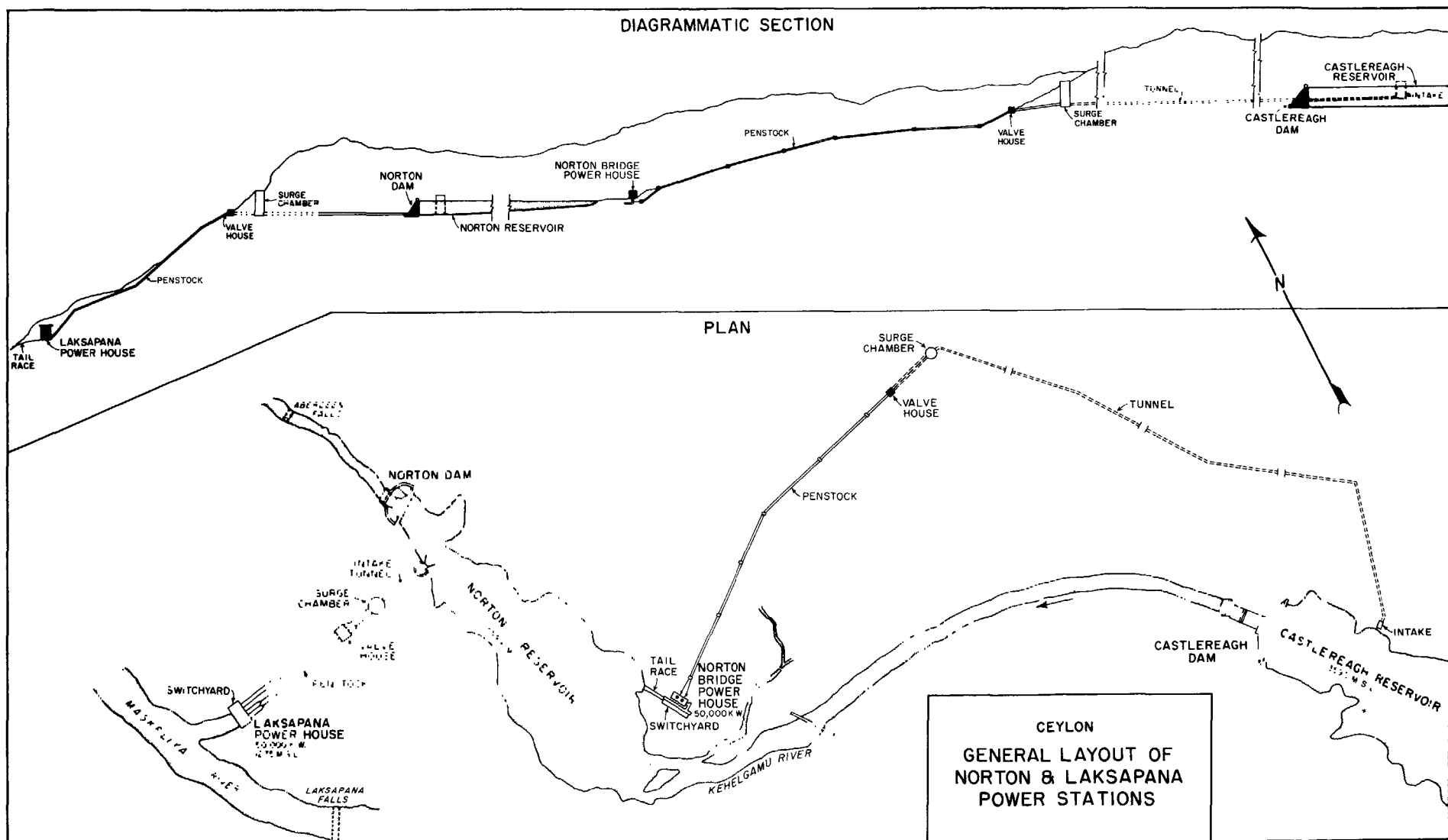
<u>Date</u>	<u>Project</u> <u>Completed</u>	<u>kwh</u> <u>required</u>	<u>Firm hydro</u> <u>kwh available</u>		<u>Thermal</u> <u>kwh</u> <u>available</u>	<u>Total</u> <u>firm kwh</u> <u>available</u>
			<u>average</u> <u>water</u> <u>year</u>	<u>minimum</u> <u>water</u> <u>year</u>		
Sept. 30 1960		263.4	270	225	63	288
Sept. 30 1961		305	270	225	63	288
March 1962	Grandpass I	-	270	225	216	441
Sept. 30 1962		360	270	225	216	441
June 1963	Grandpass II	-	270	225	369	594
Sept. 30 1963		440	270	225	369	594
April 1964	Norton Bridge	-	393	323	369	692
Sept. 30 1964		540	393	323	369	692
Sept. 30 1965		610	393	323	369	692
April 1966	Maskeliya A.1 ^{a/}		603	513	369	882
Sept. 30 1966		695	603	513	369	882
April 1967	Maskeliya A.2 ^{b/}		708	608	369	977
Sept. 30 1967		780	708	608	369	977

^{a/} Maskeliya A.1 - 50 MW and 210 million kwh per annum

^{b/} Maskeliya A.2 - 25 MW and 105 million kwh per annum







C E Y L O N

DEPARTMENT OF GOVERNMENT ELECTRICAL UNDERTAKINGS

Description of the Projects

Norton Bridge Hydro Plant

This plant would develop the head of 746 feet between the Castlereagh and Norton reservoirs on the Kehelgamu River. The upstream reservoir has a useful capacity of 1,300 million cubic feet, sufficient to provide seasonal regulation. The downstream reservoir, with a capacity of 13.3 million cubic feet provides daily regulation for the existing Laksapana power plant.

The intake structure at Castlereagh has been constructed in connection with the dam. The works to be carried out include a concrete lined intake tunnel about 20,000 feet long designed for a maximum flow of 1,000 cubic feet per second, a surge chamber, a valve house, two 2,900 foot steel penstocks, a powerhouse and a short tailrace channel. The powerhouse would be equipped with two 25,000 kw generating units driven by vertical, Francis type turbines. An outdoor substation would be provided with two banks of three 10 MVA single phase, 11/132 kv transformers. Because of the limited capacity of the Norton reservoir, the operation of the two plants would have to be closely co-ordinated to avoid wasting water at the Norton Bridge spillway. The Norton plant would therefore be operated by remote control from the control room at Laksapana.

The evaluation of 15 years of streamflow and 35 years of rainfall records show that the new capacity could be effectively utilized, mainly to provide peaking power to the system. Geological studies based on borings indicate that the conditions in general are favorable.

Second Grandpass Thermal Unit

A second steam unit of 25 MW would be installed at the Grandpass powerhouse. It would operate at a pressure of 900 p.s.i. and at a temperature of 900°F. It would be equipped with regenerative feed heating, surface condenser and necessary auxiliary equipment. The single boiler would be of the outdoor type designed to produce 250,000 lbs. of steam per hour. It would be fired by fuel oil.

The installation of this unit would be arranged on the unit system, i.e. the turbo-alternator connected to its own boiler, with however, provision for a limited degree of interconnection on the steam and feed systems so as to permit either unit to be supplied with steam from either boiler.

Cooling water would be pumped from the Kelani River. The intake and discharge culverts are part of the construction program for the installation of the first unit and have been designed accordingly. A suitable water treatment plant and storage tanks for city water are also included in the first project.

Fuel oil would be delivered to the site through branchoffs from the existing pipeline connecting the port area with the storage tanks at Kolonnawa.

One 32 MVA, 11/132 kv, 3-phase transformer with the necessary switchgear and control equipment would be installed in the outdoor substation.

Transmission Lines and Substations

There would be provided a 132 kv double circuit interconnection between the Norton Bridge and Laksapana power stations. Two new 132 kv double circuit transmission lines would be constructed between Laksapana and Galle (93 miles) and between Bolawatta and Puttalam (50 miles). Stepdown substations would be built at Galle, Balangoda and Puttalam to supply power to new areas mainly in the southern part of the island. A total of about 200 miles of 33 kv and 11 kv transmission lines and about 200 service substations ranging in size from 25 kvA to 200 kvA would be constructed.

C E Y L O NDEPARTMENT OF GOVERNMENT ELECTRICAL UNDERTAKINGSConstruction Cost Estimates

(Thousand Rupees)

	<u>Foreign Exchange</u>	<u>Local Currency</u>	<u>Total</u>
<u>Norton Bridge Hydro Plant and Associated Facilities</u>			
<u>Generation</u>			
1. Civil works comprising gates at the existing intake at Castlereagh reservoir, lined tunnel, surge chamber, powerhouse and auxiliary works	9,300	19,260	28,560
2. Penstocks	3,080	970	4,050
3. Electrical and Mechanical Plant for the powerhouse and substations	<u>15,880</u>	<u>3,720</u>	<u>19,600</u>
Sub total	<u>28,260</u>	<u>23,950</u>	<u>52,210</u>
<u>Transmission and Distribution</u>			
4. Transmission lines to Puttalam, Galle and between Laksapana and Norton Bridge power stations	8,430	5,100	13,530
5. 33 and 11 kv lines and substations (about 200 miles of lines and 200 substations)	8,680	5,100	13,780
6. Low voltage connections	<u>1,000</u>	<u>250</u>	<u>1,250</u>
Sub total	<u>18,110</u>	<u>10,450</u>	<u>28,560</u>
<u>Communications</u>			
7. Extension of Carrier system to Norton, Puttalam, Galle and Balangoda	<u>500</u>	<u>100</u>	<u>600</u>
<u>General</u>			
8. Transportation Equipment, Wayleaves, Acquisitions, Buildings and Roads	700	9,070	9,770
9. Engineering and Supervision	2,300	3,730	6,030
10. Customs Duty	-	10,250	10,250
11. Unallocated (Contingencies*)	<u>7,250</u>	<u>11,500</u>	<u>18,750</u>
Sub total	<u>10,250</u>	<u>34,550</u>	<u>44,800</u>
Total Norton Bridge	<u>57,120</u>	<u>69,050</u>	<u>126,170</u>

	<u>Foreign Exchange</u>	<u>Local Currency</u>	<u>Total</u>
<u>Second Grandpass Thermal Unit</u>			
1. Civil works	1,180	1,090	2,270
2. Steam Generating Plant	3,650	1,090	4,740
3. Turbo-Generator	5,900	470	6,370
4. Switchgear, Transformer, Cabling, and Control Equipment	1,400	570	1,970
5. Engineering and Supervision	650	400	1,050
6. Customs Duty	-	2,000	2,000
7. Unallocated (Contingencies*)	<u>1,500</u>	<u>830</u>	<u>2,330</u>
Total Grandpass II	<u>14,280</u>	<u>6,450</u>	<u>20,730</u>
Interest during construction**	<u>-</u>	<u>7,800</u>	<u>7,800</u>
Grand Total	<u>71,400</u>	<u>83,300</u>	<u>154,700</u>
(Thousand US\$ Equivalent)	(15,000)	(17,500)	(32,500)

* Contingency allowances for the Norton Bridge Hydro Plant and transmission and distribution equipment are 15% on direct foreign costs and 20% on local currency costs; for the Grandpass II unit contingency allowances are 12% and 15% respectively.

** Interest during construction estimated at about \$1.6 million is not included in the proposed Bank loan.

C E Y L O NDEPARTMENT OF GOVERNMENT ELECTRICAL UNDERTAKINGSComparison of Hydro Plant with Thermal Alternative

	<u>Steam</u>	<u>Hydro</u>
Capacity	50 MW	50 MW
Cost per kw installed	US\$215	US\$360
Total estimated cost	US\$10.7 million	US\$18.0 million
Additional investment in hydro		US\$7.3 million
Sales per annum	123 million kwh	123 million kwh

Annual Operating Costs

Fuel	US\$1,160,000	-
Operation and maintenance	250,000	US\$180,000
Depreciation ^{1/}	<u>225,000</u>	<u>150,000</u>
Total	US\$ <u>1,635,000</u>	US\$ <u>330,000</u>

Savings in annual costs (\$1,635,000 - \$330,000) = US\$1,305,000

Return on additional investment (US\$1,305,000 ÷ US\$7,300,000) = 17.9%

^{1/} 5% sinking fund basis. Steam 25 years; hydro 40 years.

C E Y L O N
DEPARTMENT OF GOVERNMENT ELECTRICAL UNDERTAKINGS

Past and Projected Income Statements
(Thousand Rupees)

-----Fiscal Years ending September 30:-----

	<u>A c t u a l^{1/}</u>				<u>1960 Estimated</u>		<u>F o r e c a s t</u>						
	<u>1956</u>	<u>1957</u>	<u>1958</u>	<u>1959</u>	<u>Before Adjustment</u>	<u>After Adjustment^{2/}</u>	<u>1961</u>	<u>1962</u>	<u>1963</u>	<u>1964</u>	<u>1965</u>	<u>1966</u>	<u>1967</u>
<u>Sales (Main System)</u>													
Units sold (million kWh)	132.4	151.8	163.1	188.2	218.1	218.1	258.0	308.0	372.0	451.0	515.0	590.0	665.0
Average Revenue per kWh (Ceylon #)	14.9	14.9	15.1	14.8	14.6	14.6	14.3	14.4	14.1	13.8	13.2	12.3	12.3
<u>Revenues</u>													
Main System	20,414	22,609	24,496	28,168	31,789	31,789	36,800	44,400	52,500	62,200	68,000	72,600	81,800
Jaffna	573	633	740	987	1,166	1,166	1,250	1,350	1,860	2,730	2,900	3,000	3,100
Fees and Reimbursements	1,299	1,580	1,401	2,292	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Total Revenues	22,286	24,822	26,637	31,447	33,955	33,955	39,050	46,750	55,360	65,930	71,900	76,600	85,900
<u>Operating Expenses</u>													
Cost of Operations	10,239	12,407	12,304	12,061	13,242	13,242	14,735	20,244	24,282	30,050	30,470	30,680	28,970
Depreciation	-	-	-	-	-	7,550	7,580	8,880	11,130	11,990	13,410	14,850	16,300
Total Operating Expenses	10,239	12,407	12,304	12,061	13,242	20,792	22,315	29,124	35,412	42,040	43,880	45,530	45,270
Operating Income	12,047	12,415	14,333	19,386	20,713	13,163	16,735	17,626	20,948	23,890	28,020	31,070	40,630
<u>Income Deductions</u>													
Interest	3,498	3,977	4,573	7,598	7,884	7,884	9,882	14,075	8,168	9,385	10,142	11,367	12,616
Interest during Construction (credit)	(802)	(1,093)	(1,757)	(71)	(107)	(407)	(548)	(1,638)	(3,007)	(3,529)	(1,214)	(213)	(972)
Income Taxes	3,645	3,253	2,859	-	-	-	-	6,400	-	-	-	-	-
Total Income Deductions	6,341	6,137	5,675	7,527	7,977	7,477	9,334	18,837	5,161	5,856	8,928	11,154	11,644
Net Income	5,706	6,278	8,658	11,859	12,736	5,686	7,401	(1,211)	15,817	18,034	19,092	19,916	28,986
Dividends	-	-	3,595 ^{3/}	-	-	-	-	-	8,562	9,442	9,842	10,042	10,042
Earnings Retained	5,706	6,278	5,063	11,859	12,736	5,686	7,401	(1,211)	7,255	8,592	9,250	9,874	18,944
Return on year end net fixed assets in operation (%)					N.A.		7.5	6.6	7.9	5.8	7.0	6.1	8.0
Return on year end net fixed assets, including work in progress					6.4		5.8	5.0	5.2	5.4	5.9	6.0	7.4
Interest coverage						1.7	1.7	1.2	2.6	2.5	2.8	2.7	3.2
Net Income after taxes, plus interest and depreciation						20,713	24,315	20,106	31,078	35,880	41,430	45,920	56,930
Debt Service						12,814	15,035	20,720	12,256	13,684	16,743	18,969	21,295
Debt Service Coverage						1.6	1.6	1.0	2.5	2.6	2.5	2.4	2.7
Debt service coverage if Ceylon Government contributions through 1962 would be converted into equity, but thereafter would be in the form of loans							1.6	1.0	2.3	2.2	2.1	2.0	2.3
Debt service coverage if present Ceylon Government loans would not be converted into equity and if future Government contributions would be in the form of loans							1.6	.9	1.2	1.3	1.3	1.3	1.6

^{1/} After certain adjustments.

^{2/} Adjusted to reflect creation of account for depreciation.

^{3/} Earnings are transferred to reserves by parliamentary vote. In 1958 parliament voted this amount into consolidated revenues of the government.

C E Y L O N
DEPARTMENT OF GOVERNMENT ELECTRICAL UNDERTAKINGS

Past and Projected Balance Sheets
(Thousand Rupees)

	Actual					Sep. 30, 1960 Estimated		Forecast ^{1/}						
	Sep. 30 1956	Sep. 30 1957	Sep. 30 1958	Sep. 30 1959	Mar. 31 1960	Before adjustment	After adjustment ^{2/}	Sep. 30 1961	Sep. 30 1962	Sep. 30 1963	Sep. 30 1964	Sep. 30 1965	Sep. 30 1966	Sep. 30 1967
ASSETS														
Current Assets														
Cash	841	91	1,614	835	55	-	-	1,942	2,618	13,888	14,392	13,637	14,436	12,329
Treasury Deposit	1,976	-	1,140	7,021	10,260	10,380	10,380	10,380	10,380	-	-	-	-	-
Accounts Receivable	6,004	6,942	9,163	10,385	11,276	10,300	10,300	10,300	10,300	10,300	10,300	11,000	11,000	12,000
Stores	10,919	11,473	9,809	7,684	8,157	8,500	8,500	8,500	8,500	8,500	8,500	9,000	9,000	10,000
Other	552	479	580	526	1,258	580	580	580	580	580	580	580	580	580
Total Current Assets	20,292	18,985	22,306	26,451	31,006	29,760	29,760	31,702	32,378	33,268	33,772	34,217	35,016	34,909
Fixed Assets														
Gross Fixed Assets	144,297	185,553	219,592	236,324	245,598	265,280	261,796	281,506	334,066	342,326	500,153	503,153	622,096	638,696
Less Depreciation	-	-	-	-	-	-	49,350	56,930	65,810	75,910	87,900	101,310	116,160	132,460
Net Fixed Assets, in Operation	144,297	185,553	219,592	236,324	245,598	265,280	212,446	224,576	268,256	266,416	412,253	401,843	505,936	506,236
Work in Progress ^{2/}	-	-	-	-	-	-	3,484	62,732	-	136,977	30,629	75,143	11,323	46,195
Total Net Fixed Assets	144,297	185,553	219,592	236,324	245,598	265,280	215,930	287,308	334,066	403,393	442,882	476,986	517,259	552,431
Total Assets	164,589	204,538	241,898	262,775	276,604	295,040	245,690	319,010	386,304	436,661	476,654	511,203	552,275	587,340
LIABILITIES														
Current Liabilities														
Consumers' Deposits	1,593	1,705	1,944	2,233	2,382	2,500	2,500	2,500	2,500	2,600	2,700	2,800	2,900	3,000
Accounts Payable	797	1,073	1,361	556	937	600	600	600	600	1,000	1,000	1,000	1,000	1,000
Other	282	1,407	301	202	7,668	210	210	210	210	210	210	210	210	210
Total Current Liabilities	2,672	4,185	3,606	2,991	10,987	3,310	3,310	3,310	3,310	3,810	3,910	4,010	4,110	4,210
Long-term Debt														
IBRD Loan 101-CE	17,265	35,817	51,205	54,290	57,204	63,656	63,656	71,362	68,782	66,074	63,232	60,262	57,149	53,884
IBRD Loan 209-CE	-	-	-	304	2,906	3,484	3,484	23,184	31,420	32,530	31,073	29,536	27,913	26,204
Proposed IBRD Loan	-	-	-	-	-	-	-	16,200	43,800	66,600	71,400	69,306	67,212	65,118
Assumed Loan - Maskeliya A	-	-	-	-	-	-	-	-	-	1,400	10,200	32,000	57,528	61,617
Assumed Loan - Maskeliya B	-	-	-	-	-	-	-	-	-	-	-	-	7,400	26,400
Ceylon Government Loans	101,856	115,462	129,138	134,804	137,341	137,090	137,090	159,403	194,652	-	-	-	-	-
Total Long-term Debt	119,121	151,279	180,343	189,398	197,451	177,746	204,230	270,149	338,654	166,604	175,905	191,104	217,202	233,223
Equity														
Capital	-	-	-	-	-	-	-	-	-	214,652	236,652	246,652	251,652	251,652
Surplus and Reserves	42,796	49,074	57,949	70,386	68,166	87,500	38,150	45,551	44,340	51,595	60,187	69,437	79,311	98,255
Total Equity	42,796	49,074	57,949	70,386	68,166	87,500	38,150	45,551	44,340	266,247	296,839	316,089	330,963	349,907
Total Liabilities	164,589	204,538	241,898	262,775	276,604	295,040	245,690	319,010	386,304	436,661	476,654	511,203	552,275	587,340
Debt/Equity						84/16		86/14	88/12	38/62	37/63	38/62	40/60	40/60

1/ Figures from 1963 on reflect creation of Ceylon Electricity Board.

2/ Cannot be separated from assets in operation before 1960 due to inadequate records.

3/ Adjusted to reflect the creation of accounts for depreciation and work in progress.

C E Y L O N
DEPARTMENT OF GOVERNMENT ELECTRICAL UNDERTAKINGS

Financial Statement
in Rupees

Fiscal Years ending September 30:

	1960 Estimated	1961	1962	1963	Forecast 1964	1965	1966	1967	Total 1961-67
SOURCES OF FUNDS									
Internal Cash Generation:									
Operating Income	20,770	21,770	25,526	20,970	22,830	28,020	31,070	40,630	178,949
Depreciation	-	-	-	-	1,400	-	-	16,300	17,700
Total Internal Funds	20,770	21,770	25,526	20,970	24,230	28,020	31,070	56,930	196,649
Long-term Borrowings:									
IBRD Loan 209-CE	11,710	10,170	-	-	-	-	-	-	10,170
Proposed IBRD Loan	3,180	19,700	5,550	2,490	-	-	-	-	31,740
Assumed Loan - Maskeliya A	-	10,300	27,600	22,800	4,800	-	-	-	71,400
Assumed Loan - Maskeliya B	-	-	-	1,400	8,800	21,800	26,300	5,700	64,000
Ceylon Government Loans	4,770	25,000	38,000	-	-	-	7,400	19,000	26,400
Total Borrowings	19,656	71,070	71,150	26,690	13,600	21,800	33,700	24,700	266,710
Share Capital	-	-	-	20,000	22,000	10,000	5,000	-	57,000
Total Sources	40,426	92,840	101,656	77,660	71,480	73,220	84,520	81,630	458,359
APPLICATIONS									
Additions to Plant:									
Lakshmana	13,430	17,410	-	-	-	-	-	-	17,410
Grandpass I	5,700	30,700	16,760	6,110	-	-	-	-	53,570
Norton Bridge & Grandpass II	-	52,000	52,000	43,300	23,000	-	-	-	146,900
Maskeliya A	-	-	-	5,000	22,100	43,300	40,700	12,900	124,000
Maskeliya B	-	-	-	-	-	-	11,110	33,900	45,010
Other	7,919	1,500	4,500	1,500	1,500	2,000	2,000	2,500	13,500
Replacements and Renewals	-	-	600	650	750	-	-	1,200	3,200
Total Additions to Plant	27,049	101,610	75,860	56,560	47,950	67,300	56,710	50,500	414,130
Interest:									
IBRD Loan 101-CE	3,794	2,390	3,570	3,442	3,308	3,180	3,037	2,835	22,312
IBRD Loan 209-CE	300	548	1,467	1,719	1,753	1,587	1,587	1,501	10,248
Proposed IBRD Loan	-	-	1,638	2,967	3,990	4,075	3,956	3,832	20,458
Assumed Loan - Maskeliya A	-	-	-	40	334	1,814	2,574	3,426	7,588
Assumed Loan - Maskeliya B	-	-	-	-	-	-	213	772	1,185
Ceylon Government Loans	-	-	-	-	-	-	-	-	-
Total Interest	4,094	3,486	6,675	6,163	9,385	10,142	10,367	12,346	64,129
Amortization:									
IBRD Loan 101-CE	2,350	2,400	2,590	2,702	2,844	2,990	3,113	3,265	19,944
IBRD Loan 209-CE	-	-	1,214	1,380	1,477	1,547	1,623	1,709	9,020
Proposed IBRD Loan	-	-	-	-	-	2,094	3,094	3,094	8,282
Assumed Loan - Maskeliya A	-	-	-	-	-	-	772	1,511	2,283
Ceylon Government Loans	-	-	-	-	-	-	-	-	-
Total Amortization	2,350	2,400	3,804	4,082	4,321	4,584	4,509	4,485	24,534
Total Debt Service	6,444	5,886	10,479	10,244	13,706	14,726	14,876	16,831	98,663
Dividends	-	-	-	8,562	9,442	9,842	10,042	10,042	47,930
Income Taxes	-	-	6,400	-	-	-	-	-	6,400
Total Applications	44,222	95,144	110,980	77,386	78,173	73,220	81,837	81,837	581,522
Cash Accrual	1,184	1,940	676	390	307	345	683	(207)	4,249

