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INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT

SUMMARY AUDIT OF FIRST TRINIDAD & TOBAGO  
POWER PROJECT

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Programming & Budgeting Department  
Operations Evaluation Division

PREFACE

As one product of the Operations Evaluation Division's current effort to test different approaches to evaluation and audit of Bank activities, this paper represents the second attempt to apply the simplest technique -- summary audit. (The first was the "Summary Audit of Costa Rica First Highway Project," dated October 20, 1972.) This report covers the Bank's first power project in Trinidad & Tobago, supported by Loan 293-TR. It assesses the extent to which the basic project objectives and loan covenants were fulfilled, reasons for significant deviations and implications regarding the efficacy of Bank action. To the extent possible lessons are sought as to how the lending activity might have been improved.

The first Bank-supported power project in Trinidad & Tobago was chosen for summary audit because loan disbursements ended in 1968, the year from which it was decided to select projects for initial attempts at auditing. The elapsed period of five years is considered adequate for the project's outcome to be fairly fully visible, although much of the benefits should still lie in the future.

To prepare the audit relevant Bank files and documents were briefly reviewed and the project was discussed with staff who had been involved. A one-week mission was undertaken to complete basic tables and to discuss the project with the Trinidad & Tobago authorities and the power company.

The considerable assistance provided by Government officials and by the Trinidad & Tobago Electricity Commission is gratefully acknowledged.

Note: Currency Equivalent:  
1956 - Nov. 1967: US\$1.00 = TT\$1.71  
Nov. 1967 - 1971: US\$1.00 = TT\$2.00

### SUMMARY

The Trinidad & Tobago Electricity Commission was given its present legal form as an autonomous entity, with Chairman and directors appointed by Government, solely responsible for all phases of public power supply throughout the country, by legal changes introduced in 1961 as a condition for a Bank loan. Loan 293-TR of US\$23.5 million was made in August 1961 to cover most of the foreign exchange cost of a five-year power development program.

There were two principal elements to the power development program, each of about equal importance: construction of a new thermal power station at Port-of-Spain with two 50 MW units installed and a pipeline to link the station with the gas fields and, secondly, substantial expansion of the T&TEC power transmission and distribution network. The generation part of the project was accomplished in well under the four years expected and with a cost overrun of some US\$2 million equivalent or about 10% of expected costs. The transmission and distribution part of the project was modified somewhat over time and took seven years instead of the projected five, mainly due to shortage of engineering staff; foreign costs were somewhat lower than expected but there was a 150% overrun on local costs, partly due to the extended time required to complete the project and the rapid increase in wage rates that took place simultaneously. Elements that had to be dropped from the distribution program, to make place for other items that proved more urgent, have been completed subsequently. The delays in execution do not seem seriously to have constrained load growth. The percentage of households connected increased from about half in 1961 to two-thirds in 1971.

Despite variations from year to year, load growth has generally been closely in line with the projections which constituted the main justification of the project, and T&TEC has met this load satisfactorily. It has at the same time invested in substantial amounts of additional generating capacity not foreseen at the time the Bank's loan was made. However this additional capacity was obtained rather cheaply so that total system investment has been only slightly more than expected. Average system costs per kwh sold almost halved in the 1960s to reach US¢1.1 in 1969, although they rose about 25% over the next two years due to rapid wage increases.

Except for the first three years after the Bank's loan was made, when the general level of tariffs was being gradually raised and some

special costs were incurred, T&TEC has adhered to all the targets of financial performance specified in its agreements with the Bank. Returns on average net fixed assets have, since 1964, remained in the 8-12% range, compared with 4-6% in the years through 1963. Net internal self-financing, at 40% for the period 1961-70, exceeded the level forecast by the Bank; it approximated 75% in each of the years 1969-71. These good results have been achieved even though one third of sales each year have been to a single large enterprise at subsidized rates.

Loan agreements with the Bank and related supplementary letters appear to have played a useful role in enabling T&TEC's satisfactory performance. Under the 1961 legislation it has had a fair degree of autonomy with regard to tariffs and the power to accumulate its own reserves. At the strong urging of the Bank in 1961 T&TEC negotiated a long-term contract for gas supply which proved quite favorable. The target operating ratio agreed with the Bank (70%) appears to have encouraged cost consciousness and contributed to the fall in unit costs. T&TEC's power to manage its own personnel has not been infringed, and it has actually been able to reduce its staff somewhat at the same time as customers and sales have been increasing quite rapidly; senior staff, which was about 50% expatriate in 1961, is now virtually 100% Trinidadian.

The Government has sometimes been concerned that T&TEC may be too strong financially compared with other utilities, attracting to itself an undue proportion of skilled people and investing in expansion more than would be strictly necessary. The Bank has strongly urged preservation of T&TEC's full autonomy against various proposals for superior commissions with powers over all utilities, but it too has recently been concerned that overinvestment may have occurred. Following the criteria that the Bank accepted for capacity planning it is not easy to demonstrate substantial overinvestment except for brief periods, related to the variability of loads. On the other hand it is quite possible that economies could have been made by improvements in load forecasting, better analysis of the capacity margin required to allow for outages, clearer decision as to appropriate reliability standards, elimination of tariff structure anomalies, etc. These are complex matters which warrant more study than they seem to have received.

Judgment on the key questions whether T&TEC's development is out of balance with that of other utilities in the country, and how far it is desirable that it should be so, are beyond the scope of this audit because it would involve broad review of other services and utilities.

The Trinidad authorities exempted T&TEC from the control of the Statutory Authorities Service Commission, responsible for personnel matters in public entities. T&TEC is subject to regulation by the Public Utilities Commission established in 1966, but it is not clear whether this Commission has yet succeeded in securing a better allocation of resources among utilities and discouraging their acceptance of inflationary wage increases, as was its purpose. As regards T&TEC the Bank played a useful role in urging an increase in the rate of interest which T&TEC pays on the substantial advances that the Government has made to it and that constitute the bulk of its equity.

Relations between the Bank and T&TEC have on a number of occasions been rather unproductively strained for reasons that are hard to identify with precision; T&TEC seems to have sometimes been unduly sensitive and reluctant to accept advice but the Bank appears also not always to have shown the consistency and diplomacy that would have given its voice as much weight as it might have had. In two areas in particular it would seem that the Bank could have contributed more than it did, in connection with Loan 293-TR, to sound development: (i) improvement of T&TEC's own system planning capabilities and (ii) conception and implementation of a sound regulatory framework for public utilities.

SUMMARY AUDIT OF FIRST TRINIDAD & TOBAGO POWER LOAN

The Project

In October 1958 the Government of Trinidad & Tobago approached the Bank for assistance in financing public utility investment. The initiative was supported by the British Government which remained responsible for the islands (now with about 1 million population) until they were given independence in 1962. The Bank reacted favorably and dispatched, in the spring of 1959, an economic mission to review the islands' overall prospects and an appraisal mission to analyze a power project submitted in January. The Government was concerned that there might have been temporary overinvestment in power in the past and sought the Bank's help to rationalize financial and institutional relationships between itself and the various public authorities responsible for electric power, principally the Trinidad & Tobago Electricity Commission (T&TEC). In December 1959 the Government agreed to take the reform measures suggested by the Bank -- mainly amalgamation of the two other entities responsible for public power supply into T&TEC and increased financial and organizational autonomy for the consolidated operation. The necessary legislation was prepared, approved by the Bank late in 1960 and passed by the Trinidad & Tobago Legislature in April 1961, when a further appraisal mission also visited the country to review the revised expansion project which had been prepared in the meantime. Loan Agreement 293-TR was signed August 16, 1961 to provide US\$23.5 million to cover most of the foreign exchange cost of a five-year power development program. The original closing date was December 31, 1965, but the final disbursement was made in 1968, after two postponements of closing date. At the eventual closing date of March 31, 1968, US\$2.1 million of unspent funds were cancelled from the loan.

The project comprised all the main elements in T&TEC's 1961-65 expansion program -- a 2 x 50 MW first stage of an eventual 220 MW Port-of-Spain "B" thermal station, a 41-mile 16" gas pipeline to provide fuel for the generating station and other uses, and substantial expansion of the power transmission and distribution system. The following table summarizes the main elements in the project and their forecast and actual construction periods and costs (excluding interest during construction).

	<u>Construction Period (months)</u>			<u>Construction Cost (US\$ mln)</u>		
	<u>Forecast</u>	<u>Actual</u>	<u>% Increase</u>	<u>Forecast</u> <sup>a/</sup>	<u>Actual</u>	<u>% Increase</u>
Port-of-Spain "B" Plant	52	43	-17%	14.9	17.7	19%
Gas Pipeline	23	26	13%	3.6	2.7	-25%
Transmission & Distribution	59	83	41%	13.4	17.9	34%
Eng'g. & Admin.				1.7	2.6	53%
Total Project				33.6	40.9	22%

a/ including contingencies.

The principal objectives of the project were to meet growing energy requirements in Trinidad & Tobago in the most economical way and at the same time to assist the development of T&TEC along sound utility lines. The Bank gave particular attention to the entity's freedom to establish its own rates within approved guidelines and to accumulate reserves, to clarification of its financial obligations to the Government and to non-interference by other public bodies in its personnel management. Some of the most important matters covered in the Loan Agreement and supplementary letters related to these points. T&TEC was to maintain an operating ratio (operating expenses, including depreciation -- of at least 4% of fixed plant in service -- but excluding interest, as a ratio to operating revenue) not greater than 70%, calculated on the basis of a three-year moving average beginning January 1, 1962. The Government would not call for repayment during the life of the Bank's loan of the advances it had made and was to make to T&TEC, and, with these advances regarded as equity rather than debt, T&TEC would not allow its debt/equity ratio to exceed 60/40. The Government would give prior notice to the Bank, in time for it to be able to make comments, of any proposed changes in the T&TEC Ordinance, any legislation which would affect the operations of the Commission, and proposed appointments to the three top management positions.

The Loan became effective on December 19, 1961, four months after signing. Effectiveness had been briefly delayed by negotiations to

finalize a long-term contract for supply of gas to T&TEC, which the Bank had required to be agreed before commitment of the loan and signed before the loan was declared effective.

### Project Execution

The Port-of-Spain thermal station, with two 50 MW units,<sup>1/</sup> was commissioned in March 1965, about nine months ahead of schedule and at a unit cost (including allowances for engineering and administration) of about US\$190/kw, 18% above the appraisal estimate of US\$160/kw. The first 50 MW unit was actually completed in October 1964, but a fracture in one of the reinforced concrete inlet culverts of the sea water cooling system required extensive repairs and the unit was not returned to service until January 1965; the second 50 MW unit was completed in March. The cause of the fracture was inadequate reinforcement of the concrete culvert. The civil engineering consultants (Howard Humphreys and Sons) admitted a serious design error and, after initial reluctance, accepted full responsibility for the repairs and additional costs; these costs are therefore not reflected in the figures shown here. The cost overrun on the plant, which was partially compensated by savings on the related gas pipeline, occurred entirely in the civil works portion and was mainly in local currency costs. The pipeline was completed a few months behind schedule but in sufficient time for the existing Port-of-Spain "A" station to be converted to gas before the end of 1963, which enabled substantial savings in running costs, since the well-head cost of gas was about one-third the price of fuel oil.

Most of the original transmission and distribution program was eventually accomplished but some minor changes were made in light of evolving needs and there were substantial overruns in time and in costs (all on the local cost side); extensions of the loan closing date were entirely to allow more of this part of the original project to be accomplished. Approximately 62 miles of 66 kv transmission line (as originally expected), 79 miles of 33 kv primary distribution line (against 73 miles planned) and 5 miles of 33 kv underground cable (against 6 miles planned) were built. Additional secondary distribution lines were installed, but due to technical difficulties only 75%, instead of the planned 100%, of the distribution systems supplying Port-of-Spain and San Fernando were reconstructed by the time of the extended closing date to operate at 6.6 kv instead of 2.3 kv; this work has however since been completed. The delays were principally due to persistent shortage of engineering staff for both the planning and execution aspects of the work; T&TEC was

<sup>1/</sup> and civil works designed in part for the anticipated eventual 220 MW station.

reluctant to hire the consultant assistance advised by the Bank in view of the expense and a desire to develop local experience. Foreign costs were somewhat lower than expected, but there was a 150% cost overrun on local costs, an unidentifiable part of which was due to repeated increases in wage rates over the extended period eventually required for execution of the project.

When the second extension of the closing date was under discussion late in 1967 T&TEC wanted to apply the approximately US\$2 million which was expected to be undisbursed by March 31, 1968 to its 1968-69 transmission and distribution program. However this would have meant substantial expenditure of loan funds on works not originally envisaged under the project and the Bank considered it preferable that a new project be prepared. Such a project was appraised in August 1968 and the Bank eventually made, in May 1969, a US\$2 million loan (Loan 601-TR) in support of T&TEC's 1969-70 transmission and distribution program.

#### System Growth

In 1961, when the Loan 293-TR project was appraised, it was believed that gas would be available in sufficient quantity that T&TEC would be able not only to meet the needs of its own power plants in Port-of-Spain by the pipeline from the oilfields at Penal but also to sell gas directly to industrial users in the Port-of-Spain area. All existing fuel oil users there were expected to convert to gas. However, recoverable gas reserves turned out less than expected and T&TEC's own requirements were greater, and so this facet of the project never became operative; it has remained purely a power project.

T&TEC's generating capacity in 1961 consisted of 72.5 MW of steam plant (50 MW at Penal and 22.5 MW at Port-of-Spain "A" station) and 8.7 MW of diesel plant, a small part of it in Tobago, a much smaller island some 19 miles distant from Trinidad; another 20 MW unit at Penal was under construction. Addition of the two 50 MW units at Port-of-Spain "B" would therefore bring total system capacity to some 200 MW which would provide a firm generating capacity (i.e. total capacity less the largest single unit) of 150 MW. This in turn was expected to be enough to cover peak load through 1970 when a new 60 MW unit would be brought on line.

In practice significantly larger amounts of additional generating capacity have been installed, even though loads have generally been

slightly below the levels forecast. Through 1970, instead of the 60 MW allowed for, 105 MW of additional capacity was installed independently of the Bank project. Peak load on the other hand was 142 MW in 1970, compared with the 149 MW forecast in the appraisal report. Despite the larger physical expansion, however, T&TEC's overall investment program through 1970 was only slightly more expensive than expected (see Table II-B), mainly because the additional capacity was obtained at quite low prices.

The first capacity increment that had not been envisaged at the time of appraisal came in 1964. A serious accident at the Penal station in August 1963 had necessitated temporary load shedding and also put 20 MW of capacity out of commission until March 1964. At the same time industrial loads were growing much faster than had been anticipated and, in particular, T&TEC had a contractual obligation to meet a new 20 MW load of Federation Chemicals Ltd. expected for December 1963. Consequently it decided to purchase 25 MW of gas turbines on an emergency basis. The large new load did not in fact materialize until March 1964 when the Penal unit came back on line. Nevertheless the gas turbines did play a key role in keeping firm generating capacity ahead of system demand until January 1965 when the first 50 MW unit at Port-of-Spain came into full operation; they were heavily used in this period. In 1965-68, with more ample capacity available including the gas turbines as well as the new "B" station, T&TEC decommissioned 6 MW of 25-year old diesel plant and 18 MW of steam plant at Port-of-Spain "A" station that was only some 12-20 years old. This had not been envisaged in 1961 but may have been economically justified once the gas turbines had been installed, even though the old steam units had lower heat rates and the gas turbines have presented considerable problems of maintenance and reliability.

In 1967 T&TEC increased its forecast of 1970 load by some 15-20 MW to 165 MW, apparently in light of industrial prospects, and this required that addition of further generating capacity be brought forward to 1969. Bids (with offers of financing terms) were called for a unit in the range 50-75 MW, since it was felt there might be some economies to be had by purchasing a larger unit than the 60 MW originally envisaged. It was eventually decided to accept, apparently largely on grounds of low unit cost, the International General Electric offer, on a turnkey basis, of an 80 MW unit, estimated to cost only US\$105/kw installed and with good financing terms available from the US ExIm Bank. The unit was duly completed, at Port-of-Spain, by September 1969, at a total cost of US\$115/kw.

In 1970, T&TEC was envisaging purchase of a further 80 MW unit, again on supplier credit terms with a turnkey contract, for completion

about 1973 or 1974 when load was expected to reach 180 or 190 MW and firm capacity would be only 195 MW without the addition of another unit. Early in 1971 it signed a new contract with International General Electric for a second 80 MW unit. The decision was based not only on prospects for the growth of peak load but also on the consideration that T&TEC loads had unusually high industrial component (72% in 1970 as compared, for instance, with the 57% expected in the Bank's 1961 appraisal report) and load factor (73% on an annual basis in 1970 as compared, for instance, with the 57% expected in the Bank's 1961 appraisal report), both factors warranting higher reliability than would otherwise be justified. The new unit is now expected to be completed in 1974, at a unit cost of US\$150/kw.

The Bank's permission for these unforeseen system additions was not required because T&TEC was able to finance them without departing from Loan Agreement covenants. However the Bank was fully aware of the decisions and did not advise against them when they were being made, unless it was by informal comment of visiting staff members of which no records exists. Then in October 1971 it wrote letters to T&TEC and to the Government sharply criticizing T&TEC management for overinvestment in generating capacity and adoption of excessive unit size; it recommended, in very general terms, a substantial strengthening of the Commission's System Planning Department. In retrospect it would seem that the first 80 MW unit might possibly have been postponed a year or two without affecting T&TEC's ability to meet the load which actually materialized -- mainly because the political troubles of April 1970 and ensuing strikes curtailed load and load growth unexpectedly. The slowdown in load growth also raises a question whether 80 MW may not have been too large a unit size, especially given the high reliability standards desired, although it represented significantly lower proportions of total installed capacity and of expected system peak load on initial introduction than was the case with the Bank-supported 50 MW units<sup>1/</sup> five years earlier. However, beyond better foresight of the events of 1970 -- which

<sup>1/</sup> It is noteworthy that the Bank had even suggested at one point that these units should be 60 MW rather than 50 MW. It was convinced to accept 50 MW size for these units by a letter in which the consultants (Preece, Cardew and Rider) placed main emphasis on the relatively small advantage to be obtained in Trinidad from lower heat rates due to the very low price at which gas was then available.

could hardly have been expected -- improvements in planning, to achieve more economical results, would clearly have required new criteria -- for instance on appropriate reliability standards -- and new investigations -- T&TEC plant outage records, for instance, are notably poor. These the Bank at no point suggested.

The delays on the transmission and distribution program do not appear to have restrained T&TEC's load growth to any significant extent. Industrial loads have generally been connected expeditiously and the percentage of households in the country receiving electricity has increased sharply from about half in 1961 to two-thirds by 1971. Rural electrification has received some support from the Canadian Government.

T&TEC's average costs per unit sold have declined sharply since 1961, aided by the rising system load factor, the increasingly efficient thermal plant added and the good gas supply contract negotiated at the advice of the Bank in 1961. Distribution system losses have been reduced from some 14% in 1961 to about 9% in 1971. The labor force has been reduced slightly in absolute terms despite the simultaneous tripling of loads, and the number of customers per employee increased from less than 50 in 1961 to more than 75 in 1971. Average system costs have fallen about in line with 1961 projections. The following table shows the trend in T&TEC's average unit costs and compares them with those for the somewhat similar Singapore system<sup>1/</sup> (all in terms of US¢ per kwh sold, with conversions at official exchange rates):

	<u>Trinidad &amp; Tobago: T&amp;TEC</u>				<u>Singapore: PUB</u>			
	<u>1961</u>	<u>1965</u>	<u>1969</u>	<u>1971</u>	<u>1960</u>	<u>1962</u>	<u>1965</u>	<u>1970</u>
Depreciation	0.53	0.47	0.38	0.41	0.55	0.51	0.45	0.37
Fuel	0.38	0.20	0.15	0.15	0.59	0.48	0.66	0.32
Other Op. Costs	0.83	0.54	0.42	0.59	0.40	0.41	0.46	0.26
Administration	<u>0.43</u>	<u>0.24</u>	<u>0.16</u>	<u>0.23</u>	<u>0.14</u>	<u>0.16</u>	<u>0.17</u>	<u>0.09</u>
	2.17	1.45	1.10	1.38	1.68	1.56	1.74	1.04
Peak Demand (MW)	53	105	143	153	118	139	192	377
Customers ('000s)	99	128	151	161	98	119	169	268
per cap. income (\$)			900			550		800

<sup>1/</sup> Public Utility Board (PUB), which differs from the T&TEC system most importantly in relying entirely on fuel oil rather than gas, with the consequence that generation maintenance costs per unit generated (included in Other Operating Costs) could be expected to be slightly higher. Fuel costs themselves, per unit generated, should not of course be compared directly between the two entities in view of the different circumstances confronted by each.

The table shows that T&TEC's costs practically halved between 1961 and 1969, with the largest reductions occurring in the administration and other operating cost items that include all wages and salaries; by 1969 these items were virtually identical with those for Singapore in 1962 when its system was of similar size, although with less customers. The same items increased substantially in 1971, mainly due to large wage increases, but the higher level compared with Singapore in 1962 seems fully explicable by Trinidad & Tobago's higher per capita income and wage-level. The continuing downward trend in Singapore with increasing system size suggests potential for substantial further economies in Trinidad as its system grows, leaving aside the substantial increase in gas prices that T&TEC may face from 1974 as a result of its original 11-year fuel supply contract coming to an end.

#### Financial Aspects and Tariffs

Under the Bank's 1961 loan the most important covenant relating to financial performance was that specifying a maximum 70% operating ratio. Senior T&TEC officials feel that this covenant focussed attention on cost reduction; hence it may have contributed to achievement of the downward trend in unit costs shown above. T&TEC initially had difficulty living up to the agreement. Despite tariff increases of 5% in January 1963 and 10% in March 1964 it failed to meet the test for the first three-year period, 1962-64, for which the actual operating ratio was 75%. When T&TEC explained that results had suffered from the accident at Penal, the ensuing purchase of emergency gas turbines that were expensive to run, and hurricane damage in Tobago in 1963, the Bank did not press for an immediate tariff increase. After 1965 the three-year moving average operating ratio never again exceeded 70% (see Table II-A). The 1969 loan agreement replaced the operating ratio covenant with an 8% minimum rate of return on average net fixed assets, and T&TEC has also adhered to this.

Overall financial performance has in fact improved sharply during the period the Bank has been associated with T&TEC. Returns on fixed assets have improved from the 4-6% level for the years through 1963 to the 8-12% range since. T&TEC's net internal self-financing rate was 26% over the main project construction period 1961-65, compared to the appraisal report's target of 27%, and was 40% for the 1961-70 period compared to a forecast of 38%; it has been in the neighborhood of 75% for each of the last three years. Debt-service coverage over the 1961-71 period has been below 1.5 only once (1.4 in 1966) and the debt/equity ratio has never exceeded 45/55, well below the limit of 60/40 specified in loan documents.

Part of T&TEC's financial strength rests on the substantial advances it has received from the Government, amounting to US\$22.7 million equivalent (including accrued interest) since its establishment in 1945, which are treated as part of the Commission's permanent capital under the agreements with the Bank; they still account for nearly one-third of total capitalization although their share has been falling as T&TEC has borrowed elsewhere. These advances were made from time to time for capital improvements and expansion and fall into two categories. Advances received prior to March 1956 (US\$5.3 million) had no terms of repayment but carried interest rates of 2-5%. The bulk of the advances were made after April 1956, mainly to cover T&TEC's 1956-61 expansion program. No interest had been paid or accrued on this second group as of 1960, pending a final decision by the Government as to their ultimate status. The Bank urged that they be treated as equity, on which dividends would be payable. But the Government wanted a fixed interest rate, and it was finally agreed that 5% p.a. would be accumulated on them (without being paid out) for the five years through December 31, 1965, when T&TEC would face a fairly tight cash flow situation; after that date interest would be payable to the Government at rates to be determined but not exceeding 5% p.a. During negotiations in 1968-69 for Loan 601-TR the Government requested that the ceiling be raised to 8% and it was agreed that this would be done, the difference between 8% and 5% again being accumulated rather than paid out in the two years of anticipated relatively tight cash flow, 1969 and 1970. T&TEC however showed considerable reluctance to accept the higher interest rate, despite its strong financial situation, its freedom from income-tax and the fact that the original value of the advances has never been adjusted in light of inflation. The Bank usefully urged the case for implementing a more adequate interest rate and actual payments at the 8% rate finally started with effect from January 1, 1972.

Late in 1964, in implementation of a Cabinet decision in principle in February, the Government published a draft Bill to establish a Public Utilities Commission (PUC) which would regulate utilities, review the adequacy of their services and approve changes in their tariffs. The Bill was not sent to the Bank but early in 1965 it came to the notice of a supervision mission which expressed strong disapproval, on the grounds that T&TEC was already publicly owned and run by Government appointees so that establishment of a new commission to regulate it would be expensive duplication for a small economy as well as being inconsistent with the Loan Agreements with the Bank; it also feared the Commission might delay implementation of tariff increases and hence have the effect of prolonging T&TEC's failure to meet the 70% operating ratio target. Despite the Bank's adverse comments, work continued on the preparation of the Bill. In April

1966 the Government sent to the Bank a revised draft but by the time (June) that the Bank sent its comments, again advising against establishment of such a Commission but also adding useful suggestions for improvement in the Bill if the Government were determined to go ahead, it had already been passed by both houses of the Legislature. In the same month T&TEC decided to increase its rates 15% in order to reduce its dependence on borrowing, but the Government required approval from the new Commission before implementation. It took a considerable time to get the Commission into operation and not until March 1968, twenty months later, was T&TEC permitted to introduce a temporary 10% increase -- which was then made permanent one year later, as a condition of the Bank's 1969 loan. Despite the delay in the rate increase T&TEC fulfilled all financial covenants with the Bank throughout these years and earned better than 8% rate of return. However T&TEC, which initially also strongly opposed creation of the PUC and sought the Bank's support for its opposition, has since come to feel that it plays a useful role in legitimizing tariff increases, and it has suggested that had the Bank taken a more positive attitude and possibly even offered assistance in getting the Commission off the ground then its 1968 rate increase would probably have been less long delayed; whether this assumption would have proved well-founded can now only be a matter of speculation. The Government saw the PUC more as a means to help strengthen the resistance of utility boards to inflationary wage increases and to improve coordination among utilities by its effect on their cash flows and investment policies; how far it has succeeded in accomplishing these objectives could only be judged on the basis of a deeper study than has been possible here, and a broader one reviewing the situation of all the utilities which are subject to its regulation.

That there may well have been a need for an outside body, with a trained staff, to review T&TEC's tariffs is also suggested by the fact that since 1964 about one-third of total sales each year have been to a single enterprise, Federation Chemicals Ltd., at heavily subsidized rates. Sales to this enterprise have been at a price of 5-6 US mills equivalent, which is less than half T&TEC's average cost of production, less than one-third its average price over all sales and only just over half its lowest kwh rate to other customers (for entirely off-peak consumption). Reference to this enterprise was oddly omitted from the tariff discussion in the Bank's 1969 appraisal report but taken up for the first time in a 1971 supervision report.

#### Organizational Aspects

The 1961 revision of the T&TEC Ordinance, on which the Bank advised and also insisted as a precondition for its lending, appears to

have been an important factor enabling T&TEC's substantial achievements of the last decade. It delayed the Bank's lending more than a year but this had no significant effect on system expansion since interim capital expenditures were met by the Government. As a result of these efforts the separate entities previously responsible for distribution in Port-of-Spain and San Fernando were amalgamated into T&TEC, as the Government desired and the Bank recommended. Secondly, T&TEC was given greater freedom to run its own affairs, manage its own personnel, budget for the longer periods that are essential in electric power, borrow, accumulate reserves to contribute towards expansion costs and set rates on agreed general principles without having to obtain specific Government approval each time.

The Government has on several occasions expressed concern that T&TEC has been allowed to move too far ahead of other utilities, due to the very success of its operational freedom and to its financial strength; there has been fear that T&TEC was an isolated enclave of development or was in danger of becoming so, with its typically higher salaries; and the feeling that too much may have been invested in power, which the Government expressed in first soliciting the Bank's assistance in 1959, has persisted. Limitation of T&TEC's independence in regard to its rates and standards of service by creation of the Public Utility Commission was partly designed to deal with this problem and was probably desirable, although it is as yet unclear what real impact this will have. Another Government initiative in the same direction was passage of the Statutory Authorities Act in 1966 creating a Statutory Authorities Service Commission (SASC) with substantial powers over personnel matters in all public entities. T&TEC was brought under the Commission in principle in 1967, but in fact there appears to have been no interference in T&TEC's management of its own personnel. Nevertheless the Bank, when it came to hear of the Act, was naturally concerned about the possibility of such interference. Signature of the 1969 loan was delayed several months by intensive negotiations on an appropriate legal formula to prevent this, but eventually the Bank was satisfied with Government confirmation of a formal letter noting the Bank's understanding that SASC would not initiate any personnel actions for T&TEC and would act expeditiously to permit actions initiated by T&TEC in the interests of efficient operation. In September 1969 the SASC did explicitly delegate back to T&TEC its powers with regard to T&TEC, and no practical cases of alleged interference have arisen.

T&TEC has not of course been without staffing problems. They were particularly acute in the early 1960s when many experienced expatriates left Trinidad & Tobago just before and just after independence. The serious accident at the Penal station in 1963 resulted mainly from staff inexperience. The Bank urged immediate measures to retain remaining

expatriate staff (by increasing their remuneration) and to hire a few key people from abroad. Action was taken and the situation was restored by 1965. Scarcity of qualified personnel does not in fact seem to have been a serious bottleneck since that time, although T&TEC is still somewhat short of technical and financial staff at the intermediate level. It has had an effective training program throughout the period. Senior staff, which was about 50% expatriate in 1961, is now virtually 100% Trinidadian.

The Board of T&TEC, which presently consists of a Chairman, Deputy Chairman and eight members, all appointed by the Governor-General, plays a somewhat fuller and more active role in the day-to-day running of the Commission than is normal in a public utility. The Bank expressed some concern about this in 1961 and made an important issue of it in 1971, apparently on the basis of some comments by senior T&TEC staff to a new supervision mission. But the Trinidad & Tobago authorities have not been convinced, and there does not appear to be strong evidence of excessive Board involvement hampering the effectiveness of the Commission. The existing system seems to suit local conditions. The Bank appears to have played a useful role in 1963 in drawing the Government's attention to the need for a stronger and more qualified Board, which was put in office a few months later.

### Conclusion

The delays leading up to the Bank's first loan to T&TEC seem to have been worthwhile, and the legislation which was then prepared with Bank assistance appears to have worked reasonably well. The principal physical objectives of the Bank's loan were achieved with a significant saving in time on the key generation component and with cost overruns that were absorbed by T&TEC without excessive difficulty and that were not of such a size as to throw doubt on the economic validity of the project. At the same time T&TEC has matured as an effective national power company, meeting a rapidly growing demand for power with only rare resort to load shedding, substantially increasing efficiency, evolving from heavy reliance on expatriates to almost none, and rapidly strengthening financially. The various covenants connected with the Bank's Loan Agreements appear to have played a useful role, and the Bank has in several instances adjusted them wisely to fit changing circumstances.

There was a more fundamental objective for which the Government of Trinidad & Tobago sought the Bank's help -- development of a power company which would contribute to a balanced pattern of development in the country. Judgment as to how far this objective has been attained is beyond the scope of this audit, because it would require comparative review of other institutions and services in the country, especially other

utilities. The Government has continued to express considerable concern about it. The Bank's current feeling that there has been significant overinvestment in power, not financed by it but undertaken by an entity which it played an important part in sponsoring, also raises a question. From the institutional point of view, the Bank has focussed rather exclusively on what would be necessary to protect and foster the development of the utility with which it has been directly involved and it may have helped prevent some weakening of T&TEC that could have ensued from the interventions of the PUC and the SASC. Whether such weakening would have been desirable is quite doubtful; some of the principal factors relevant to consideration of this point would be the relative adequacy of other public services, the financial and human strength of the institutions responsible for them, and the degree of demonstration effect that a well-run power company has had upon them -- all matters beyond the scope of the present review, but meriting serious study.

T&TEC and the Government have not been particularly responsive to the Bank's suggestions, especially since about 1963, and at times relations have been quite strained. These tensions do not seem to have yielded productive results. Why they occurred is very difficult to identify, particularly without the framework of a broader review. The Bank may sometimes have been lacking the diplomacy required for handling an entity which had achieved important growth, was steadily adhering to all major performance covenants with the Bank and was sufficiently strong to be able to raise financing elsewhere with considerable ease. The inconsistencies in the Bank's initiatives and views (for instance in the matter of overinvestment at various points in time), and its seemingly rather unsympathetic attitude on the problems Government was attempting to solve with the PUC and the SASC were also probably factors. Doubtless there were sensitivities on the side of the Trinidadians which made them reluctant to accept advice too and sensitive to any criticism.

But the record suggests that the Trinidad authorities were not so reluctant to accept advice that the Bank could not have played an even more useful role than it did. Recent discussion with the Trinidad authorities suggests that they would have welcomed further assistance in certain instances.

In retrospect there would seem, in this case, to be two matters on which the Bank might have taken more constructive action than it did:

1. System Planning: T&TEC has successfully accomplished major expansions of its system sufficient to keep up with a load growth that has been very variable from year to year and hard to predict. Overinvestment has almost inevitably occurred at certain points and the Bank has sometimes been very concerned about this. But at no point does it appear to have given systematic attention to T&TEC's own system planning capabilities, possibilities of improving load forecasts (which have been changed frequently and may have been unduly influenced by recent events), appropriate levels of system reliability for the particular conditions faced, criteria for selecting appropriate unit size, etc. And in some respects, as for instance recording and analysis of plant outages, T&TEC appears comparatively weak. The Bank may have accepted too readily in 1960 that system planning would be done by foreign consultants and it would probably have helped more by giving closer attention to matters such as these and the development of T&TEC's own internal capability for coping with them.
  
2. Utility Regulation: Although the evidence does not support the view that T&TEC has been inefficient as a result of lack of supervision by a regulatory authority, it seems unfortunate in retrospect that the Bank took such an unsympathetic and unconstructive stand at the start of discussion about the Public Utility Commission which the Government had decided to establish. The Bank does not appear to have investigated the merits of the Government's case that there was need for such a Commission to secure better coordination and resource allocation among utilities and to help slow the wage spiral. Serious analysis of these issues, from a broad perspective, might have changed the Bank's view on the need for PUC and would at least have made more persuasive whatever position the Bank chose. Eventually such analysis and advice could probably have helped achieve a more effective regulatory commission more quickly.

TRINIDAD AND TOBAGO-TRINIDAD AND TOBAGO ELECTRICITY COMMISSION (T&TEC)

TABLE I

	Unit	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	Average Annual Increase Rate (%)					
																		1956-60	1961-66	1966-71	1961-71		
<b>Operations</b>																							
1. Installed Capacity (year end)																							
Steam	MW	32.5	52.5	52.5	52.5	72.5	72.5	92.5	92.5	142.5	192.5	180.0	180.0	175.0	255.0	255.0	255.0	255.0	255.0	255.0			
Gas Turbine	MW									25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0			
Diesel	MW	9.2	9.0	8.5	8.5	8.4	8.7	8.7	9.7	9.7	7.5	3.1	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9			
Total	MW	41.7	61.5	61.0	61.0	80.9	81.2	101.2	102.2	177.2	225.0	208.1	207.9	202.9	282.9	284.3	284.3	284.3	284.3	284.3			
2. Firm Capacity <sup>a/</sup>	MW	31.7	41.5	41.0	41.0	60.9	61.2	81.2	82.2	127.2	175.0	158.1	157.9	152.9	202.9	204.3	204.3	204.3	204.3	204.3			
3. Peak Demand	MW	25.5	29.4	36.5	41.9	46.9	52.5	59.9	65.0	96.7	105.0	121.8	117.5	129.1	142.8	141.7	153.2	142.8	141.7	153.2			
4. Load Factor	%	62	60	59	61	64	63	63	65	64	66	66	71	71	71	73	71	73	71	71			
5. Gross Spare Capacity (1 - 3)	MW	19.2	32.1	24.5	19.1	31.0	28.7	41.3	37.2	80.5	120.0	86.3	90.4	73.8	140.1	142.6	131.1	140.1	142.6	131.1			
6. Firm Spare Capacity (2 - 3)	MW	6.2	12.1	14.5	(0.9)	14.0	8.7	21.3	17.2	30.5	70.0	36.3	40.4	23.8	68.1	62.6	51.1	68.1	62.6	51.1			
7. Gross Spare Capacity as % of Peak Demand	%	75	109	67	46	72	55	69	57	83	114	71	77	57	80	101	86	80	101	86			
8. Firm Spare Capacity as % of Peak Demand	%	24	41	12	0	30	17	36	26	32	67	30	34	18	42	44	33	42	44	33			
9. Gross Generation	Gwh	138	153	188	223	262	290	335	371	540	609	701	731	806	892	908	956	892	908	956			
10. Generation Sent-Out	Gwh	126	140	173	209	244	269	311	345	511	578	664	692	764	842	853	900	842	853	900			
11. Total Sales	Gwh	118	131	157	189	223	231	269	294	459	524	614	629	702	782	760	820	782	760	820			
12. Number of Residential Customers	000's	31.4	35.9	41.7	48.3	55.5	89.9	97.9	104.4	107.3	113.6	120.2	125.1	130.1	133.7	139.0	142.8	133.7	139.0	142.8			
13. Number of Employees	No.	1063	1074	1233	1426	1491	2099	2022	2080	2056	2088	2088	2042	2009	2016	n.a.	n.a.	142.8	139.0	142.8			
<b>Finances</b>																							
14. Sales Revenues <sup>b/</sup>	TT\$ mln	4.47	5.15	5.98	7.07	8.24	10.33	12.38	13.27	17.01	19.20	21.93	22.92	26.51	30.60	29.96	34.85	30.60	29.96	34.85			
15. Operating Costs <sup>c/</sup>	TT\$ mln	3.82	4.52	4.99	5.64	6.40	8.60	9.62	10.81	12.20	13.02	14.49	15.38	16.25	17.14	20.93	22.55	17.14	20.93	22.55			
16. Average Revenue/kwh Sold	TT\$	3.79	3.93	3.81	3.74	3.70	4.47	4.60	4.51	3.71	3.66	3.57	3.64	3.78	3.91	3.94	4.01	3.91	3.94	4.01			
17. Average Cost/kwh Sold	TT\$	3.24	3.45	3.18	2.98	2.87	3.72	2.97	3.68	2.66	2.48	2.36	2.45	2.31	2.19	2.75	2.75	2.19	2.75	2.75			
18. Average Revenue/kwh Sold <sup>d/</sup>	US\$	2.22	2.30	2.23	2.19	2.16	2.61	2.69	2.64	2.17	2.14	2.09	2.13	1.89	1.96	1.97	2.01	1.96	1.97	2.01			
19. Average Cost/kwh Sold <sup>d/</sup>	US\$	1.89	2.02	1.86	1.74	1.68	2.18	1.74	2.15	1.56	1.45	1.38	1.43	1.16	1.10	1.38	1.38	1.10	1.38	1.38			
20. Net Sales Revenues	TT\$ mln	0.65	0.63	0.99	1.43	1.84	1.73	2.76	2.46	4.81	6.18	7.44	7.54	10.26	13.46	9.03	10.30	13.46	9.03	10.30			
21. Other Operating Income	TT\$ mln	0.18	0.10	0.14	0.12	0.12	0.14	0.34	0.11	0.39	0.51	0.59	0.54	0.49	0.54	0.55	0.72	0.54	0.55	0.72			
22. Net Operating Income	TT\$ mln	0.83	0.73	1.13	1.55	1.96	1.87	3.10	2.57	5.20	6.69	8.03	8.08	10.75	14.00	9.58	11.02	14.00	9.58	11.02			
23. Gross Fixed Investments	TT\$ mln	4.70	4.30	5.41	7.99	7.77	7.49	7.70	19.13	19.01	10.39	6.02	8.49	17.84	10.75	5.53	9.00	6.02	8.49	17.84			
24. Net Fixed Assets in Operation	TT\$ mln	19.63	23.81	27.66	29.57	37.73	47.15	54.31	61.69	70.96	96.97	98.91	99.71	114.25	118.55	117.10	118.20	98.91	99.71	114.25			
25. Average Net Fixed Assets in Operation	TT\$ mln	18.27	21.72	25.74	28.62	33.65	42.44	50.73	58.00	66.32	83.96	97.94	99.31	106.98	116.40	117.82	117.65	97.94	99.31	106.98			
<b>Management Indicators</b>																							
26. Rate of Return (22 + 25)	%	4.5	3.4	4.4	5.4	5.8	4.4	6.1	4.4	7.8	8.0	8.2	8.1	10.0	12.0	8.1	9.4	8.1	9.4	9.4			
27. Operating Ratio <sup>e/</sup>	%	82.3	86.1	81.5	78.4	76.6	82.1	75.6	80.8	70.1	66.1	64.3	65.6	60.2	55.0	68.6	67.2	65.6	60.2	55.0			
28. Debt Service Coverage: <sup>f/</sup>																							
Including interest on permanent government advances	times	n.a.	n.a.	n.a.	n.a.	n.a.	2.4	2.3	2.7	3.6	1.5	1.4	1.5	2.0	2.0	1.6	2.0	1.5	1.4	1.5			
Excluding interest on permanent government advances	times	n.a.	n.a.	n.a.	n.a.	n.a.	3.4	2.8	3.5	4.6	2.0	1.8	2.0	2.8	2.6	2.1	2.2	1.8	1.6	1.7			
29. Debt/Equity Ratio:																							
Treating Government advances as debt	+/-	94/6	95/5	95/5	94/6	88/12	89/11	89/11	91/9	90/10	88/12	86/14	84/16	81/19	76/24	74/26	73/27	86/14	84/16	81/19			
Treating Government advances as capital	+/-	42/58	38/62	32/68	26/74	25/75	22/78	27/73	38/62	45/55	45/55	43/57	44/56	44/56	42/58	40/60	37/63	43/57	44/56	44/56			
30. Self-Financing Rate <sup>g/</sup>	%	n.a.	n.a.	n.a.	n.a.	n.a.	40.3	33.4	14.0	24.4	34.9	53.5	54.3	38.9	74.7	73.7	83.0	53.5	54.3	38.9			
31. Energy Sales per Employee	Mwh	111	122	127	133	150	110	133	166	223	251	294	308	349	388	n.a.	n.a.	294	308	349			
32. Distribution Losses <sup>(10 - 11)</sup>	%	6.3	6.4	9.2	10.6	8.6	14.1	13.5	14.8	10.2	9.3	7.5	9.1	8.1	7.1	10.9	8.9	9.1	8.1	7.1			
33. Investments in Transmission and Distribution as % of Total	%	n.a.	n.a.	n.a.	n.a.	45	62	61	22	29	46	60	52	29	43	66	62	52	29	43			
34. T&TEC's Investment as % of Total Investment in Country	%	3.7	2.5	2.6	3.0	2.9	3.2	2.6	7.2	6.9	3.2	2.1	3.0	5.9	3.1	1.3	1.6	3.0	5.9	3.1			
35. Residential Customers as % of Households	%	n.a.	n.a.	n.a.	n.a.	n.a.	51	54	56	57	59	61	62	63	64	65	66	59	61	62			

<sup>a/</sup> Installed capacity less single largest unit out for maintenance or repairs.  
<sup>b/</sup> Revenues from sales of electric power only (There is no indirect tax on sale of electricity).  
<sup>c/</sup> Including depreciation, but excluding interest (T&TEC pays no direct taxes).  
<sup>d/</sup> Exchange rate: US\$ 1 = TT\$ 1.71 from 1956-1967; US\$ 1 = TT\$ 2.0 from 1968-1971.  
<sup>e/</sup> Operating costs as a % of operating revenue.  
<sup>f/</sup> Times debt service was covered by operating income and depreciation.  
<sup>g/</sup> Net internal cash generation as % of total sources of funds.  
<sup>h/</sup> Increase rate for 1961-1969.  
<sup>i/</sup> Increase rate for 1966-1969.

NOTE: Data from 1956 to 1960 reflect T&TEC operations before its takeover in 1961 of the assets of the Port-of-Spain Corporation Electricity Board and the San Fernando Borough Council Electricity Department.

TRINIDAD AND TOBAGO-TRINIDAD AND TOBAGO ELECTRICITY COMMISSION (T&TEC)  
LOAN 293-TR (August 1961)

TABLE II-A

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	Average Annual Increase Rate (%) 1961-1970
<u>LOAD FORECASTS (MW)</u>												
1. Installed Capacity		100.0	100.0	100.0	150.0	200.0	200.0	200.0	200.0	200.0	260.0	11.2
2. Firm Capacity a/		80.0	80.0	80.0	100.0	150.0	150.0	150.0	150.0	150.0	200.0	10.7
3. Annual Peak Demand		60.3	68.0	76.0	85.0	94.5	105.0	115.5	126.5	137.5	149.0	10.6
4. Gross Spare Capacity (1 - 3)		39.7	32.0	24.0	65.0	105.5	95.0	84.5	73.5	62.5	110.0	12.0
5. Firm Spare Capacity (2 - 3)		20.3	12.0	4.0	15.0	55.5	45.0	34.5	23.5	12.5	60.0	12.8
6. Load Factor		60	59	59	59	59	58	58	58	58	57	
<u>ACTUAL LOAD</u>												
7. Installed Capacity	80.2	81.2	101.2	102.2	177.2	225.0	208.1	207.9	202.9	282.9	284.3	14.9
8. Firm Capacity b/	60.9	61.2	81.2	82.2	127.2	175.0	158.1	157.9	152.9	202.9	204.3	14.3
9. Annual Peak Demand	46.9	52.5	59.9	65.0	96.7	105.0	121.8	117.5	129.1	142.8	141.7	11.7
10. Gross Spare Capacity (7 - 9)	34.0	28.7	41.3	37.2	80.5	120.0	86.3	90.4	73.8	140.1	142.6	19.5
11. Firm Spare Capacity (8 - 9)	14.0	8.7	21.3	17.2	30.5	70.0	36.3	40.4	23.8	60.1	62.6	24.3
12. Load Factor	64	63	63	65	64	66	66	71	71	71	73	
<u>LOAD FORECAST ACCURACY b/</u>												
13. Firm Capacity		131	99	97	79	86	95	95	98	74	98	
14. Annual Peak Demand		115	114	117	88	90	86	98	98	96	105	
15. Firm Spare Capacity		233	56	23	49	79	124	85	99	21	96	
<u>SALES FORECASTS (Gwh)</u>												
16. Gross Generation		315	354	394	437	485	535	586	641	690	741	10.0
17. Sales: Domestic		60	69	78	88	99	111	124	138	153	169	12.2
Commercial		31	35	40	45	51	57	64	72	79	87	12.2
Industrial		158	189	207	229	251	273	297	321	339	359	9.6
Street Lighting		5	5	6	6	7	8	8	9	10	10	8.0
Total		254	298	331	368	408	449	493	540	581	625	10.5
<u>ACTUAL SALES (Gwh)</u>												
18. Gross Generation	262	290	335	371	540	609	701	731	806	892	908	13.5
19. Sales: Domestic	52	57	69	78	88	98	112	116	124	146	137	10.2
Commercial	27	30	37	40	48	56	63	61	65	77	71	10.1
Industrial	131	140	159	170	317	364	433	445	506	551	544	16.3
Street Lighting	4	4	4	6	6	6	7	7	8	8	8	8.0
Total	223	231	269	294	459	524	614	629	702	782	760	14.2
<u>SALES FORECAST ACCURACY b/</u>												
20. Gross Generation		109	106	106	81	80	76	80	80	77	82	
21. Sales: Domestic		105	100	100	100	101	99	107	111	105	123	
Commercial		103	95	100	94	91	90	105	111	103	123	
Industrial		113	119	122	72	69	63	67	63	62	66	
Total		113	111	113	80	78	73	78	77	74	82	
<u>RETURN FORECAST (TT\$ mln)</u>												
22. Operating Income c/		11.29	12.71	14.21	15.84	17.60	18.84	20.30	21.80	23.14	24.66	9.1
23. Less: Operating Costs d/		8.56	9.25	9.89	10.55	12.30	13.49	14.31	15.15	16.14	17.00	7.9
24. Net Operating Income		2.73	3.46	4.32	5.29	5.30	5.35	5.99	6.65	7.00	7.66	12.1
25. Rate of Return on Average Net Fixed Assets in Operation (%)		6.5	8.0	9.0	5.9	5.3	5.6	6.4	7.2	7.8	6.8	
26. Operating Ratio: Annual (%)		75.8	72.8	69.6	66.6	69.9	71.6	70.5	69.5	69.7	68.9	
3 Year Moving Average (%)					69.4	68.7	69.5	70.7	70.5	69.9	69.4	
<u>ACTUAL RETURN (TT\$ mln)</u>												
27. Operating Income c/	8.36	10.47	12.72	13.38	17.40	19.71	22.52	23.46	27.00	31.14	30.51	12.6
28. Less: Operating Costs d/	6.40	8.60	9.62	10.81	12.20	13.02	14.49	15.38	16.25	17.14	20.93	10.4
29. Net Operating Income	1.96	1.87	3.10	2.57	5.20	6.69	8.03	8.08	10.75	14.00	9.58	19.9
30. Rate of Return on Average Net Fixed Assets in Operation (%)	5.8	4.4	6.1	4.4	7.8	8.0	8.2	8.1	10.0	12.0	8.1	
31. Operating Ratio: Annual (%)	76.6	82.1	75.6	80.8	70.1	66.1	71.3	65.6	60.2	55.0	68.6	
3 Year Moving Average (%)				79.4	75.0	71.4	66.6	65.3	63.2	59.8	61.3	
<u>RETURN FORECAST ACCURACY b/</u>												
32. Operating Income		108	100	106	91	89	84	87	81	74	81	
33. Operating Cost		99	96	91	86	94	93	93	93	94	81	
34. Net Operating Income		146	73	148	102	79	67	74	62	50	80	

a/ Installed capacity less single largest unit out for maintenance or repairs.

b/ Defined by the ratio: Forecast/Actual.

c/ Revenues from electricity operations only (There are no indirect taxes on the sale of electricity).

d/ Including depreciation, but excluding interest (T&TEC pays no direct tax).

TRINIDAD AND TOBAGO-TRINIDAD AND TOBAGO ELECTRICITY COMMISSION (T&TEC)  
SOURCES AND APPLICATIONS OF FUNDS 1961-1970  
(in TT\$ million)

TABLE II-B

<u>SOURCES OF FUNDS</u>	LOAN 293-TR (1961)							
	Period 1961-1965				Period 1961-1970			
	Forecast		Actual		Forecast		Actual	
	Total	% of Total	Total	% of Total	Total	% of Total	Total	% of Total
1. Net Internal Cash Generation	18.49	27.2	16.39	25.7	43.33	38.2	48.38	40.1
2. Borrowings								
Domestic:								
Government Advances	4.80	7.1	6.05	9.5	4.80	4.2	6.05	5.0
Sub-total	<u>4.80</u>	<u>7.1</u>	<u>6.05</u>	<u>9.5</u>	<u>4.80</u>	<u>4.2</u>	<u>6.05</u>	<u>5.0</u>
Foreign:								
IBRD 293-TR	39.95	58.9	29.99	47.2	39.95	35.2	36.98	30.5
IBRD 601-TR							1.64	1.4
Future Foreign Loan					20.40	18.0		
Canadian Development Loans							2.88	2.4
Export/Import Bank							13.17	10.9
Private Banks			6.0	9.4			6.0	5.0
Sub-total	<u>39.95</u>	<u>58.9</u>	<u>35.99</u>	<u>56.6</u>	<u>60.35</u>	<u>53.2</u>	<u>60.67</u>	<u>50.2</u>
3. Other								
Customer Contribution	0.42		1.56		0.82		2.02	
Sale of Assets	1.00		0.17		1.00		0.17	
Short-term Bank Credit	3.20		3.50		3.20		3.50	
Sub-total	<u>4.62</u>	<u>6.8</u>	<u>5.23</u>	<u>8.2</u>	<u>5.02</u>	<u>4.4</u>	<u>5.69</u>	<u>4.7</u>
4. Total Sources of Funds	<u>67.86</u>	<u>100.0</u>	<u>63.66</u>	<u>100.0</u>	<u>113.50</u>	<u>100.0</u>	<u>120.79</u>	<u>100.0</u>
<u>APPLICATIONS OF FUNDS</u>								
5. Construction Expenditures (excluding interest during construction)	63.89		63.72		110.32		112.35	
6. Increase or Decrease in Net Current Assets other than Cash			0.68				0.68	
7. Total Applications of Funds	<u>63.89</u>		<u>64.40</u>		<u>110.32</u>		<u>113.03</u>	
8. Net Cash Surplus (Deficit)	3.97		(0.74)		3.18		7.76	
9. Debt Service	20.35		18.57		58.40		65.16	

TRINIDAD AND TOBAGO-TRINIDAD AND TOBAGO ELECTRICITY COMMISSION  
PROJECT IMPLEMENTATION

TABLE III

		<u>Start Construction</u>	<u>Commissioning Date</u>	<u>Construction Period (months)</u>	<u>Project Scope</u>		<u>CONSTRUCTION COST <sup>a/</sup></u> (US\$ million)		
							<u>L.C.</u>	<u>F.X.</u>	<u>Total</u>
<u>LOAN 293-TR (US\$ 23.5 million)</u>									
Civil Works	Forecast	Aug., 1961	Sept., 1965	49			3.34	0.62	3.96
	<u>Actual</u>	Aug., 1961	Jan., 1965	41			5.53	1.46	6.99
Generating Plant	Forecast	Jan., 1963	Dec., 1965	35	2 x 50 MW	Thermal	0.69	10.29	10.98
	<u>Actual</u>	Jan., 1963	March, 1965	26	2 x 50 MW	Thermal	1.40	9.30	10.70
Gas Pipeline	Forecast	July, 1961	June, 1963	23	16" diameter	41 miles	1.32	2.23	3.55
	<u>Actual</u>	July, 1961	Sept., 1963	26	16" diameter	41 miles	0.94	1.72	2.66
Transmission, Distribution and System Control	Forecast	Jan., 1961	Dec., 1965	59	62 miles	66 kv	3.91	9.53	13.44
	<u>Actual</u>	Jan., 1961	Dec., 1967	83	73 miles	33 kv	9.87	7.99	17.86
Engineering and Administration	Forecast						0.88	0.83	1.71
	<u>Actual</u>						1.62	1.02	2.64
Sub-totals	Forecast						10.14	23.50	33.64
	<u>Actual</u>						19.36	21.49	40.85
Interest During Construction	Forecast							4.05	4.05
	<u>Actual</u>							2.94	2.94
Total:	Forecast						10.14	27.55	37.69
	<u>Actual</u>						19.36	24.43	43.79

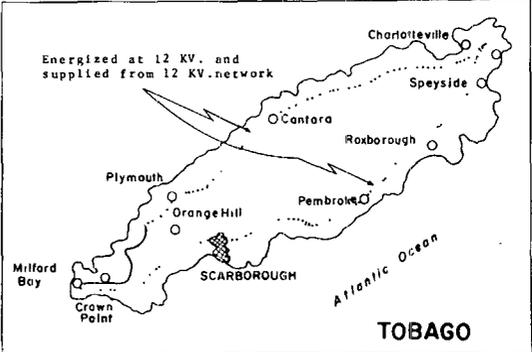
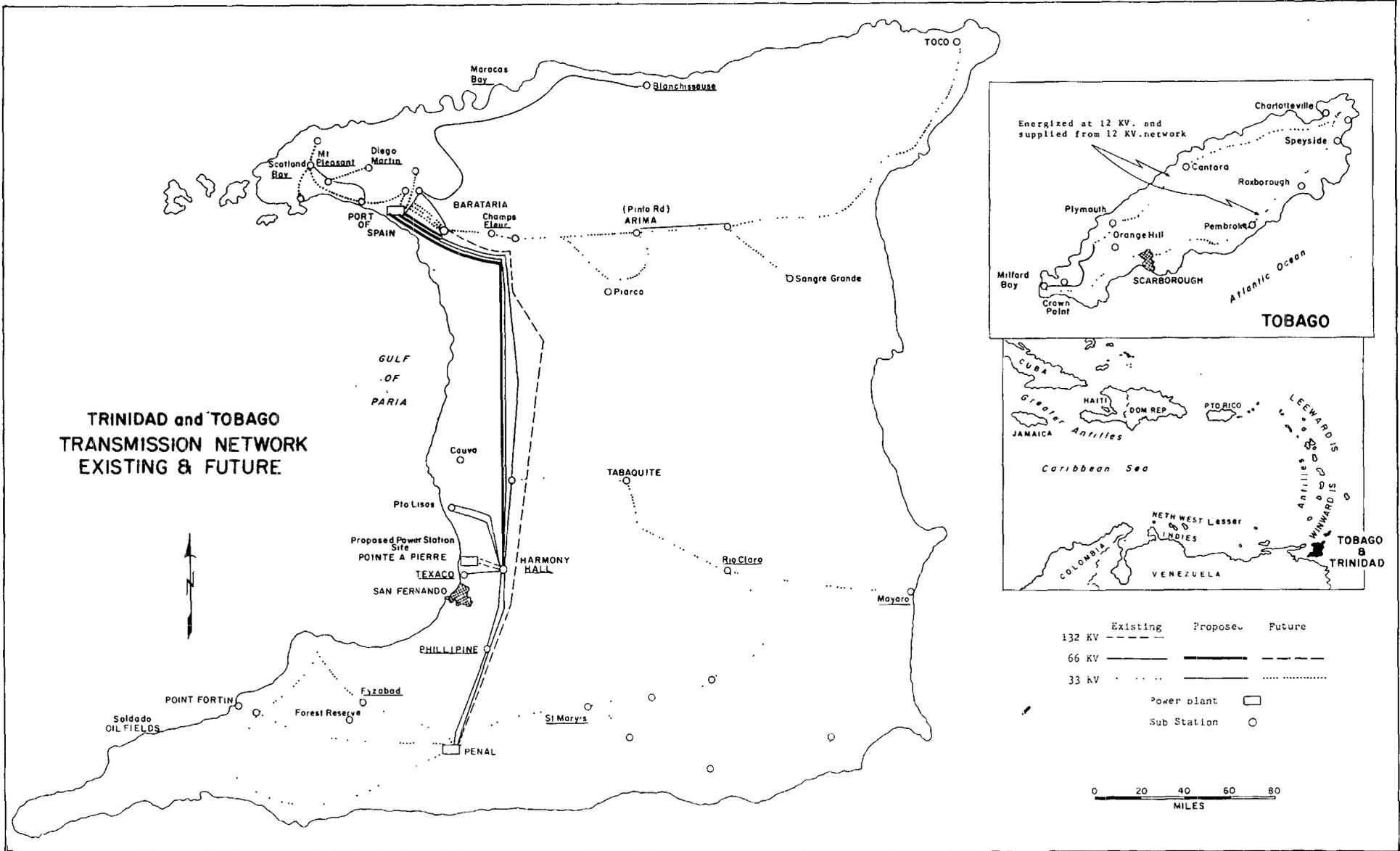
LOAN DISBURSEMENT PATTERN

<u>LOAN 293-TR</u>		<u>1961</u>	<u>1962</u>	<u>1963</u>	<u>1964</u>	<u>1965</u>	<u>1966</u>	<u>1967</u>	<u>1968</u>
Forecast:	Amount (US\$ mln)	4.55	6.87	5.14	4.38	2.56			
	% of total	19	29	22	19	11			
	Cumulative %	19	48	70	89	100			
<u>Actual:</u> <sup>b/</sup>	Amount (US\$ mln)		2.15	7.29	4.99	3.04	1.31	1.87	0.74
	% of total		9	31	21	13	6	8	3
	Cumulative %		9	40	61	74	80	88	91

<sup>a/</sup> Forecast figures include contingencies calculated as follows, for a total of US\$ 2.06 for foreign exchange and US\$ 1.03 for local costs:  
 Civil works 10% on foreign, 15% on local costs  
 Mechanical and electrical works 10% on foreign and local costs  
 Gas pipeline 10% on foreign, 15% on local costs  
 Transmission 10% on foreign and local costs  
 Distribution 10% on foreign and local costs  
 Total 9.6% on foreign and 11.3% on local costs.

<sup>b/</sup> US\$ 2.11 million was canceled as of March, 1968.

# TRINIDAD and TOBAGO TRANSMISSION NETWORK EXISTING & FUTURE



Existing	Proposed	Future
132 KV - - - - -	—————	- - - - -
66 KV —————	—————	- - - - -
33 KV ······	—————	- - - - -

- Power plant □
- Sub Station ○

