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Chapter I - Intro.

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Electric Power - Chapter 1 - Introduction - 1971

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CHAPTER I - INTRODUCTION

I. Purpose of Report

1.01 The Bank Group has lent more for electric power development than for any other purpose; more than US\$ 5 billion had been committed by the end of 1970. Power lending has accounted for some 30% of total Bank Group lending, almost as much as the share devoted to all forms of transportation development, the other major traditional field of Bank Group activity.

1.02 The purpose of the present report is to review a fairly large sample of this lending for electric power in order to see whether it has been effective, and learn whatever lessons may be drawn from experience. Effectiveness may be understood in many different ways, and in few is it easy to judge. The Bank Group's loans for electric power have tended to contain a variety of objectives, but in broad terms their purpose has been to enable the expansion, in line with demand, of a service considered vital for economic growth. In this framework the immediate objective has been the timely and efficient construction of the necessary plants, procured at the lowest possible costs. Related to this were many arrangements designed to ensure competitive costs, sufficient cash flow to avoid delays in construction, and adequate engineering supervision of construction. Improvements in the institutional structures relating to power have also frequently been sought in connection with power loans -- often, even usually, at the level of the individual utility concerned, but also sometimes on a much broader level, affecting the organization and regulation

of the power supply industry for an entire region or a whole country. Such improvements have many dimensions and facets, and various approaches have been used to secure them, ranging from agreements to discuss progress in their achievement, through the appointment of consultants to assist, to firm refusal of further financing pending implementation of the improvements.

1.03 On occasion, it should be noted, the Bank's objectives in direct connection with the granting or refusal of power loans have extended far beyond the power field itself. Such loans have been conditional on adoption by a country's Government of macroeconomic policy measures which the Bank deemed conducive to development. The power sector, with its large requirements for capital goods, of which a high proportion is often imported, is sometimes seen as particularly suitable for receipt of loans which are principally designed to achieve objectives of this much broader type.

1.04 Effectiveness may be judged, then, in relation to the various specific objectives defined by the Bank in the negotiations surrounding its lending for power. But the underlying objective of the Bank has been to promote the development of its member countries, and the corresponding criterion of effectiveness is the contribution of the Bank's power lending to a country's overall development. In the most general terms there is no question electric power is essential to development, particularly of industry -- it is a condition sine qua non. But the question is how much, where, to what degree of reliability, and supplied by whom? According to an old view, probably never shared by the World Bank, an

ample public supply of cheap electricity could induce rapid industrial development. In reality, except in a few very special situations, such as the aluminum industries of Iceland and Ghana, it is unlikely that the availability of electric power has ever made a critical difference in the decision to establish or not to establish an industry in a country: electricity generally represents too insignificant a part of total costs, and the alternative of installing a power plant within the industrial enterprises is too easy. Electricity may play a more important role, in actually inducing development, in connection with small industry or agriculture, although here too it is only a substitute for other forms of energy (such as diesel fuel for a pump), with some superiority in flexibility and convenience.

1.05 The Bank's contribution to development through its power lending is not to be sought, then, in any resultant massive industrial expansion, but rather in the answer to more modest and intricate questions such as whether what opportunities there were for inducing broader development through improved power supply were taken advantage of, and whether electricity supply was expanded reasonably in line with all the other services and facilities that are essential to development. Were the most important demands met first, and was the path followed in expansion of the power supply system itself well balanced, for instance regionally, between different components of the system (generation, transmission and distribution) and in terms of the different types of generating equipment used? Was the electricity supply system efficiently and economically run and operated? At these levels the specific objectives adopted by the Bank in connection

with a power loan -- such as the construction of certain facilities in a given region, attainment of certain targets of financial performance, introduction of organizational or institutional reforms -- themselves come into question. Were these specific objectives correct, and, closely related to this, was any effect that the Bank had on project composition and design, or on the source from which the facilities were obtained, desirable?

1.06 And there is still another broader set of questions that may be asked, about the effect of the Bank's loans for power (as for other purposes) on such macroeconomic parameters as the levels of investment and saving in the country and the return to expenditures at the margin in the economy as a whole. For instance, did the Bank loan substitute for, or complement, domestic savings efforts? Did the return at the margin to expenditures on development change significantly as a result of the extra resources made available?

1.07 In this report we largely leave aside these important questions of macroeconomic performance and macroeconomic lending conditions, in order to concentrate fully on the effectiveness of the Bank Group's activities in the power field as such. But within the power field we are concerned both with the question of whether the specific objectives adopted by the Bank in connection with its loans were effectively achieved, and also the question of whether they were the right objectives. The report which follows is actually the combined outcome of two independent approaches adopted early in 1971. On the one hand, we initiated a brief comparative performance review of a number of utilities in

different countries which had been major borrowers from the Bank; the review was designed to concentrate entirely on the question of whether the Bank's specific objectives, as presented in the official documents of the Bank, had been achieved, but it was in fact able to go a little beyond this to touch on the more basic question of the validity of these specific objectives. On the other hand, we undertook, as part of a much larger study of all the Bank's past operations in Colombia, a more thorough review of lending to the principal power utilities in that country. In that study we explicitly attempted to go beyond mere assessment of performance under the loans, to raise and try to answer some of the more fundamental questions about the Bank's role. Most aspects of utility performance were treated more fully in the Colombia study. Certain matters which had largely to be neglected in the rapid cross-country review -- such as the economic validity of projects in light of alternatives for system expansion, and of tariff structures in light of system costs -- could be studied in some depth. Bank advice on policy and institutions in the power sector could be studied more thoroughly, and generally a better feel could be obtained for what might have occurred in the absence of Bank participation. Underlying these differences is a crucial difference between the perspectives of the two approaches: mainly confined to the utility itself in the brief cross-country performance review but extending to the country as a whole in the Colombia study.

1.08 IBRD performance in the power sector, as visible from the sample of companies covered in the two studies is, then, the subject of this report. The sample is far from random but it covers a fairly large

proportion of the countries in which the Bank has been particularly heavily involved in electric power, as will be explained below. Hence, it is considered reasonable to draw conclusions and recommendations relevant to the Bank's work in power as a whole, although it must be remembered that they are based on a rather select sample, with most of the sample reviewed rapidly rather than in depth.

II. Growth of Electricity Supply in the Developing Countries

2.01 Production of electricity has increased very rapidly in the developing countries over the last two decades. UN estimates indicate that whereas the total world supply of electricity increased at an average annual rate somewhat over 8% through the 1950s and 1960s, the rate of growth in the developing countries averaged nearly 11%. Many individual countries have had far higher rates of growth, and even in those countries where income has grown very slowly electricity production has generally increased at some 5-6% p.a. Increasing electricity production has been intimately connected with urbanization, and most of the electricity produced has gone to serve household demand and industrial requirements in the cities. In most developing countries the electricity service outside the towns and cities remains quite limited, except in a few areas -- such as parts of the Punjab in Pakistan and Tamil Nadu in India -- where electricity service has generally come in connection with the production requirements of agriculture (principally irrigation) and industry.

2.02 Electricity is often produced on a relatively small scale by industrialists for their own use, either because of unreliability in the

public supply or because the technical characteristics of the industrial production processes used make it cheaper to meet all or part of their own electricity requirements. But the large majority of electricity production is by public utility organizations serving all classes of consumer. In the developing countries these public utilities are now principally owned by Government of one level or another -- Central or Federal, State or Departmental, County or Municipal.

2.03 The following Table 1.1 summarizes the growth of public utility electricity generation in the 87 developing member countries of the Bank with more than one million inhabitants in 1968. Country detail is given in Appendix Tables 1.1 through 1.4 at the end of this Chapter.

Table 1.1

Growth of Public Electricity Generation 1950-68
in Developing Member Countries of Bank Group

	<u>No. of Countries</u>	<u>Electricity Generation (Gwh)</u>			<u>Annual Rate of Growth 1950-68</u>
		<u>1950</u>	<u>1960</u>	<u>1968</u>	
Africa	33	2,277	7,344	20,686	13.0
America	21	20,489	48,627	95,781	8.9
Asia	27	10,235	36,221	102,538	13.7
Europe	<u>6</u>	<u>11,136</u>	<u>34,752</u>	<u>85,917</u>	12.0
TOTAL	87	44,137	126,944	304,922	11.3

The table shows that, among developing countries, growth in production of electricity has been particularly rapid in Africa and Asia. In these two

continents, growth accelerated somewhat in the 1960s compared with the 1950s, whereas in America (principally Latin America) and Europe, growth, already proceeding at a slower pace, slowed slightly between these two periods.

2.04 Utility generating capacity in these 87 countries, which was less than 14,000 MW in 1950, reached over 80,000 MW by 1968 and probably exceeded 100,000 MW by the end of 1970. A reasonable figure for the combined capital costs of generation, transmission, and distribution is about US\$ 450 per kw installed. This would mean that the total investment in power utilities in the developing countries over the past twenty years has approximated US\$ 40 billion. Because growth of electricity supply and overall rates of investment have varied considerably among countries, the share of total investment devoted to electricity has differed between countries, but in most countries in most years it has been in the range of 3-10%; in relation to public sector investment the figure is naturally higher, normally in the range of 5-20%. Adequate statistics are not available to permit being more specific with any certainty, but it is probable that modal figures are about 6% for power as a proportion of total investment and 15% for power as a proportion of total public investment.

III. The IBRD's Global Contribution to Financing Power Expansion

3.01 Bank Group commitments for electric power projects amounted to nearly US\$ 5.4 billion by the end of 1970. They have traditionally covered mainly the foreign exchange component of power generation projects,

although provisions have often been included for related transmission and sometimes for distribution system expansion. A few loans have been made for transmission or distribution alone, and these are becoming more important. Nevertheless, it is reasonable to indicate the size and distribution of the Bank Group's participation in power expansion not only in dollar terms but also in terms of generating capacity financed, as shown in the following table.

Table 1.2

Bank Group Commitments for Electric Power Through 12/31/70^{a/}

	Total No. of Loans & Credits	Total Amount of Loans/Credits (\$ mln.)	Generating Capacity Provided (MW)
<u>The 87 Developing Countries</u>			
Africa	20	418.0	2,415
America	98	2,492.1	21,368
Asia	49	1,272.5	6,506
Europe	14	200.0	1,458
Sub-Total	181	4,382.6	31,747
<u>Small Developing Countries</u>			
(less than 1 million inhabitants) ^{b/}	8	52.8	181
<u>Other Countries^{c/}</u>	43	958.4	12,878
Total	232	5,393.8	44,806

^{a/} Including appropriate shares of loans partially for power and partially for other purposes.

^{b/} i.e., Botswana, Cyprus, Malta, Mauritius and Swaziland.

^{c/} i.e., Australia, Austria, Belgium, Denmark, Finland, Iceland, Italy, Japan, New Zealand, Norway, South Africa and Southern Rhodesia.

The table shows that more than 80% of the total financing for power and more than 70% of the generating capacity so financed, has gone to the developing countries, which are also the recipients of further power loans now being made or planned.

3.02 For the 87 developing countries of more than one million population, electric power accounts for as much as one-third of total Bank Group disbursements to date, which is very high compared with the approximate share of power in total investment (6%) and total public investment (15%) in these countries cited above (para. 2.04).

Table 1.3

Bank Group Loan and Credit Disbursements to Developing Countries for All Purposes and for Power Through 12/31/70

	Total 1968 <u>Population</u>	Bank Group Disbursements (\$ mln)		Power as % of <u>Total</u>
		<u>Electric Power</u>	<u>Total</u>	
Africa	292.8	291.3	1197.6	24.3
America	253.8	1757.5	3075.1	57.1
Asia	1047.2	809.9	4082.9	19.8
Europe	<u>107.6</u>	<u>164.0</u>	<u>718.1</u>	<u>22.8</u>
	1701.4	3022.7	9073.7	33.3

It is the figure of \$ 3.023 billion (plus \$ 0.039 billion disbursed to the five smaller developing countries identified in Table 1.2) which represents the Bank Group's direct share of the estimated \$ 40 billion invested in power in developing countries between 1950 and 1970 (para.

2.04). Power lending has been particularly heavily concentrated in the American continent, where there are only three developing countries (Haiti, Dominican Republic and Paraguay) which have not received Bank Group loans or credits for power, and where power accounts for as much as two-thirds or more of total disbursements to date in seven countries (see Table 1.4). In other continents power lending has covered a much smaller proportion of the countries as well as generally accounting for a smaller share of total lending to each country.

3.03 The importance of the Bank Group's role in electric power, especially in the American continent, is very apparent from comparisons made between the amount of generating capacity which the Bank has helped to finance, and the total increase in generating capacity. As mentioned earlier, the installed generating capacity of utilities in the 87 developing countries has increased from less than 14,000 MW in 1950 to more than 100,000 MW in 1970; of the 86,000 MW increase, some 19,000 MW or nearly 25% was partially financed by the Bank Group. Another 12,500 MW of Bank-financed capacity are now under construction, 9,000 MW of it in the American continent. The latest figures available on a national basis are for 1968, by which time Bank-financed installed capacity was about 15,000 MW spread among continents in the manner indicated in Table 1.5. Country detail is again given in Table 1.4, which shows that only in 8 out of the 21 countries on the American continent has the Bank financed less than one third of the net increase in generating capacity between 1950 and 1968; in the other continents the Bank financed more than one third of the net increase in capacity

only in the following 8 countries: Ghana, Zambia, and Sierra Leone in Africa; Philippines, Thailand, Ceylon, Malaysia and Singapore in Asia; and none in Europe. In 11 countries the Bank has financed two-thirds or more of the net increase in generating capacity: Mexico, Colombia, Chile, El Salvador, Uruguay, Jamaica and Nicaragua in America; Ghana and Zambia in Africa; Ceylon and Malaysia in Asia.

Table 1.5

Public Utility Generating Capacity in Developing Countries
in 1968 and Bank-financed Share

	Total Capacity 1968 (MW)	Increased in Capacity 1950-68 (MW)	Bank- financed Capacity Installed (MW)	Bank-financed capa- city as % of 1968 Total	Increase 1950-68
Africa	6,857	5,896	1,044	15.7	17.7
America	24,283	18,793	9,498	39.1	50.5
Asia	27,317	23,981	3,552	13.0	14.8
Europe	<u>24,076</u>	<u>20,440</u>	<u>823</u>	<u>3.4</u>	<u>4.0</u>
	82,533	69,110	14,917	18.0	21.5

3.04 There is no simple explanation of these differences among countries in the extent of the Bank's role. As indicated, for instance, the Bank's role has been largest in the Latin American continent where growth of generation has also been slowest. Some of the principal factors accounting for the differences among countries are as follows: lack

of need to borrow abroad (e.g. Libya and Saudi Arabia), ineligibility for borrowing from the Bank Group due to lack of creditworthiness and/or poor economic policies (e.g. Indonesia and Egypt), availability of other sources of financing (e.g. Korea and China), ability to meet principal equipment needs domestically (e.g. India and Spain). On the other hand, where expansion of the power system has been large in scale and especially where it has involved major hydroelectric projects with their large initial capital requirements, there has been a strong tendency for the Bank to be requested to provide financial support.

3.05 What the tables make clear is that the Bank's role has been major. Table 1.4 shows that public generating capacity expanded by more than 100 MW between 1950 and 1968 in 55 out of the 87 countries covered. In 36 of those 55 countries, or about two-thirds, the Bank has been involved in the power sector. The Bank has in fact been the predominant institutional source of foreign financing for electric power development in the developing countries, as will be discussed more fully in Chapter XVII below.

IV. The Bank's Approach to Power Lending

4.01 The Bank made its first power loan in 1948, to Chile, and power projects have always been seen as suitable for Bank lending. Traditionally the Bank stressed the productive nature of such projects, related to the fact that a relatively large proportion of public utility electricity supply in developing countries generally goes to meet

the needs of industry. Power companies are often quite efficient compared to other organizations in a country, and, with their large capital requirements, they seemed a relatively good channel for funds designed to result in projects that would contribute to development. From the point of view of the recipient companies and countries, Bank loans for electric power had the advantage that they were available on fairly long terms commensurate with the long lives of generating stations, in large and fairly flexible amounts related to total foreign exchange costs, and in freely transferable currency such that bids could be obtained on a competitive international basis with consequent costs savings.

4.02 Loans for electric power development have generally originated with a request from a power company for assistance with a particular project. The Bank has relatively seldom taken initiative in trying to identify or generate projects in this field, though it has helped sometimes in the 1960s in sponsoring large-scale planning studies. The actual nature of the project covered by a loan has depended significantly on the institutional set-up of the power sector -- whether the company had regional or national responsibilities, for instance -- but the Bank has always been concerned to obtain confirmation from the national planning authorities of the priority of the project proposed, relative to other needs, in the power sector and in other fields.

4.03 The typical power loan to a developing country has been to

cover the direct foreign exchange costs of an individual project, for instance a hydroelectric scheme, or of a utility's overall expansion program (including generation, transmission and distribution) over a two-three year period. Loans have sometimes been made for multipurpose dams which were parts of larger schemes covering several sectors, and often they have been made for individual projects forming parts of national power development schemes; but loans have not generally been made for the larger schemes themselves, and the attention of the Bank has been mainly concentrated on the individual projects. In this sense the loans to the Mexican national power authority (CFE), which are discussed in this volume, are rather exceptional since they have always included contributions for many component projects and in the last decade have been largely sector program loans, with funds designated for the authority's expansion program as a whole rather than for individual projects, and with performance being checked at the national level rather than in connection with individual construction projects.

4.04 Once initiated, the relationship with a utility has often been maintained by further loans in support of further expansion. There are a number of companies with which the Bank has been associated more or less continuously since the early 1950s or even earlier, such as CFE in Mexico, KESC in Pakistan, CHIDRAL in Colombia, ENDESA in Chile and CEMIG in Brazil, and there are numerous companies with which fairly continuous relationships have been maintained since the late 1950s or early 1960s. Interruptions in the Bank's series of loans to such

companies, where they have occurred, have generally resulted from delays by the company or, more often, the Government authorities in taking certain steps -- for instance to increase electricity tariffs -- upon which the Bank insisted. Other interruptions have resulted from deteriorations in the country's economic situation or economic policies, which caused the temporary cessation of all Bank lending to that country, or from the availability of funds from other sources to finance an expansion program (e.g. U.S. AID for KESC and IDB for CHIDRAL).

4.05 Justification of power projects for Bank financing has always been principally by means of establishing some rough relationship between the expected growth of peak demand for power in the market area served by the borrowing company, and the amount of system generating capacity required to meet that demand. The Bank and its borrowers have tended to plan on the premise that no kilowatt-hour is more expensive than the one that is not available, and hence, that all demand in the existing service area must be met. The borrowers or their consultants have prepared load growth forecasts, normally on the basis of past trends or of experience in other countries, sometimes with special adjustments for any backlog of unmet demand or for major new industrial loads expected to arise in the near future. In a very few instances, as in Turkey in 1957 and Pakistan in 1966, the Bank has made a detailed study of load growth, but normally its staff has simply made some rough judgments as to the adequacy of the load forecast and accepted the borrower's projection, possibly with minor amendments.

Capacity installation has generally been planned in such a way as to meet the projected demand plus some simple but conservative reserve criterion as insurance against shortage -- e.g. 10 - 15% of system capacity, 'largest unit out,' or, for hydroelectric systems, use of lowest recorded flow year for capacity planning.

4.06 To the extent that economic considerations have entered explicitly into the analysis of electric power projects, they have been heavily concentrated on the matter of comparisons between alternative means of meeting the projected load growth -- particularly comparisons between hydroelectric and thermal plants. Increasingly, since the late 1950s the Bank has required that hydroelectric projects be justified by showing that the operating (mainly fuel) cost savings that result from meeting the projected load with the proposed hydroelectric plant rather than a thermal plant, yield a reasonable rate of return to the extra initial investment required to build the hydroelectric plant rather than the thermal alternative. In some cases, especially in Latin America, available hydroelectric sites are so favorable that the unit cost of capacity is no greater, or even less, than that of thermal capacity; then, provided transmission distances are not too great and river flows are sufficient to provide a reasonable capacity factor, there is not much question about the economic superiority of the hydroelectric scheme for meeting system load growth. But in other cases the choice is not so clear, and a number of crucial decisions have in fact hung on a comparison of the type described. The Bank has

generally not been prepared to finance hydroelectric projects where the yield to the incremental investment was expected to be less than 6 or 7%, and somewhat more in recent years.

4.07 In project appraisal and project supervision alike, financial aspects of power projects have normally received much more attention than economic ones and have indeed often been the prime focus -- mainly with a view to ensuring that the utility company would have sufficient funds to execute the generation/transmission project for which the Bank loan was made without delays, to carry out the expansion of the distribution system required in order to ensure sale of the power to be produced, and to meet debt service obligations. Covenants relating to injections of additional equity into the utility or Government budgetary contributions, maximum permissible debt-equity ratios, limitations on incurrence of further debt, and minimum tariff levels have been regular features of Bank loans for power. Tariff covenants have probably been in practice the most important; they have generally been phrased in such a way as to require that the borrowing utility earn a surplus sufficient to finance a part of its own further investment requirements, sometimes a specified part, or to yield a certain rate of return on total net fixed assets in operation, sometimes revalued to allow for inflation.

4.08 A standard condition of Bank loans for power since the late 1950s has been to require an annual external audit of the borrowing utility's books, and submission of audited financial statements to the

Bank. But the Bank has also frequently gone much beyond this to require introduction of improvements in utility billing and inventory control and in accounting systems, including satisfactory records and classification of fixed assets and use of depreciation allowances related to plant life.

4.09 Attention has always been given to the capability of the borrowing utility to execute and maintain the planned expansion project and to market its services. Efficiency, defined largely in company financial terms, has been the guiding objective. The Bank has often been concerned with trying to ensure insulation of the utility from political considerations and insulation of operations from day-to-day interference by the utility's Board, particularly in regard to matters such as staffing and contracting. Covenants requiring Bank approval of appointments to senior positions in the utility have been quite frequent features of Bank loans. Pressure has been exerted in many cases for establishment or strengthening of certain departments (especially financial) or for hiring of consultant engineers and management consultants to assist on project design, construction supervision, or operational reorganization. In recent years increased attention has been given to staff training requirements and, in some instances, provisions have been included in the loan to cover part of the cost of this.

4.10 In some cases, principally in Latin America -- where the Bank has been so heavily involved in power and where the institutional

structure of the power sector is typically rather complex and fractionalized -- the Bank has played an important role by taking a rather broader view of power development than the individual borrowing company. Through studies, advice, loan conditions and lending itself, it has sought to bring about changes in the sector's institutional structure or in Government policies toward the industry, which would enable the power sector to expand more quickly and at lower unit cost than would otherwise be the case.

4.11 Traditionally, as pointed out earlier, the Bank has not given much attention to the economic aspects of electric power development other than hydro-thermal comparisons. However, in the last few years, a number of economists with experience in electric power have been added to the staff of the Bank. Their work has barely affected the projects reviewed here, since the loans for the large majority of them date from earlier years, but it has begun to affect the Bank's more recent lending for power. Efforts have been undertaken on a few aspects of load forecasting and system planning, utility policies for connection of new consumers, tariff structures and load control devices. Some work has also begun on developing comprehensive energy surveys as a basis for power planning and on defining criteria to be used for designing and appraising village electrification programs.

V. The Companies Selected for Review

5.01 As pointed out, the present report results from two separate studies following rather different approaches -- a summary performance

review of selected utilities and power projects in various countries and a more comprehensive analysis of the Bank's contribution to development through its power lending in Colombia.

5.02 For the cross-country project performance review utilities were selected from among those with which the Bank has been closely involved, in such a way as to give a reasonable diversity in types of company, problem, country, and level of national development. The following eight companies were initially selected.

Table 1.6

The Eight Companies Originally Selected for Review

<u>Continent</u>	<u>Country</u>	1968 GNP per Capita US\$ ^{1/}	<u>Company</u>	<u>Responsi- bility</u>	<u>Number of Loans</u>	<u>Date of First Loan</u>	<u>Number of Loans fully or Nearly fully Disbursed</u>
America	Argentina	820	SEGBA	Regional	3	1962	2
America	Brazil	250	FURNAS	Regional	5	1958	2
America	Mexico	530	CFE	National	7	1949	6
Asia	Singapore	700	PUB	National	4	1963	3
Asia	Malaysia	330	NEB	National	5	1958	3
Asia	Pakistan	100	KESC	Regional	4	1955	4
Africa	Ghana	170	VRA	National	2	1962	1
Africa	Ethiopia	70	EELPA	National	2	1964	1

^{1/} IBRD, World Bank Atlas (September 1970).

In all of these countries the Bank, through its lending to these and other companies, had contributed toward financing at least 25% of the additions to power generating capacity made between 1950 and 1968, and

in many cases much more. Equally, electric power has accounted for some 25% or more of total Bank Group disbursements to each of these countries (see Table 1.4).

5.03 Some of the data required for the study were available in the Bank but most of it had to be collected from the companies themselves during brief visits that were made to discuss with them their experience with the Bank, and to assess their evolution and present situation. Because it was not possible to visit Pakistan during the Spring of 1971, KESC had unfortunately to be dropped from the review although preliminary study and conversation with the Chairman and the General Manager had already taken place in Washington.

5.04 In Colombia the Bank has been involved in electric power development since 1948, when the Government authorities first requested financial assistance from the Bank for power projects; loans for these projects were made in 1950 and 1951 and, meantime, in 1949 the Bank also sponsored a major study of development in Colombia which made important recommendations regarding the power sector. Since 1950 seventeen loans have been made to the seven utilities principally responsible for supplying power to the seven largest cities (except for Barranquilla, on the north coast). More than \$ 190 million, or 85% of total disbursements for power in Colombia, have gone to the companies mainly responsible for serving the three largest cities -- Bogota, Medellin and Cali. This study has concentrated principally on these loans, but has considered them in a national context. Attention

was also given to the Bank's role in creation of the interconnection company, Interconexion, S. A., which is completing a transmission tie between these cities. Two loans have been made to this company but neither has yet been fully disbursed. Leaving aside these loans, the following table summarizes Bank Group lending to the ten companies -- 7 from the cross-country review and 3 in Colombia -- which form the basis of this report.

Table 1.7

Bank Lending to the Ten Companies Reviewed in this Report

Company	<u>All Loans Committed</u>			<u>Loans Fully Disbursed or Nearly Fully Disbursed</u>	
	<u>Number of Loans</u>	<u>Amount Net of Cancel. (US\$ mln)</u>	<u>Amount Disbursed as of 12/31/70 (US\$ mln)</u>	<u>Number of Loans</u>	<u>Amount Disbursed as of 12/31/70 (US\$ mln)</u>
CFE (Mexico)	7	542.80	448.13	6	410.99
SEGBA (Argentina)	3	204.35	151.64	2	144.35
FURNAS (Brazil)	5	271.30	126.96	2	125.23
NEB (Malaysia)	5	142.74	108.62	3	105.44
PUB (Singapore)	4	59.44	49.03	3	37.57
VRA (Ghana)	2	53.00	47.05	1	47.00
EELPA (Ethiopia)	2	46.60	27.34	1	23.46
<u>Colombia</u>					
EEEEB	3	85.60	78.06	2	67.60
EPM	3	73.00	67.94	2	34.00
CVC /CHIDRAL	<u>5</u>	<u>44.63</u>	<u>44.63</u>	<u>5</u>	<u>44.63</u>
	39	1,523.46	1,149.40	27	1,040.27

These ten companies account for about 20% of the total number of Bank Group loans to developing countries for electric power, but for nearly 40% of total disbursements for power to the developing countries. The average size of the loans under review is considerably larger than the average size for all Bank Group loans to developing countries for power.

VI. Design of the Study

6.01 As mentioned previously, the cross-country review was designed essentially to focus on the question of whether the purposes for which the Bank had approved the granting of a loan had been achieved on schedule. Institutional purposes -- the development of effective institutions in the electric power sector of member countries -- were to be covered as well as physical purposes -- construction of plant and equipment. To show whether and when, relative to original schedules, the principal direct objectives of Bank loans had been achieved, and to give some comparative indicators of utility performance, the summary comparative review was designed to prepare for each utility a standard set of tables to serve as a common basis for analysis; these tables were also used for the Colombia study. The tables are as follows:

1. The Utility. This table, giving a basic quantitative description of the historical development of the utility with respect to its capacity, production, sales, costs, revenues, investments, management, and economic significance within its country, was to be completed

through the year 1970 and preferably starting about five years before the first loan was made.

- 2a. Utility Load, Sales and Returns. This table, comparing forecast (as in the Bank's original project appraisal reports) and actual figures for load, sales, and return on assets, was to be prepared for each loan fully or nearly fully disbursed.
- 2b. Utility Investment Program Partly financed by Loan. This table, giving the forecast and actual cost and sources of financing for the expansion program of which the Bank project formed a part, was to be prepared for each loan to the utility already disbursed.
3. IBRD Project Implementation. This table, which briefly describes the main components of the projects and gives the forecast and actual costs and commissioning dates, as well as forecast and actual loan disbursement patterns, was to be completed for each loan to the utility already disbursed.

These standard tables are presented for each of the ten utilities in the chapters which follow.

6.02 The present report is divided into three parts. Part I (Chapters 2 - 8) contains a chapter on each of the companies covered in the cross-country review. Each of these chapters contains, in addition to an introductory section, a brief description of the relations between the Bank and the utility and of the broad objectives of each

loan, technical, financial and institutional, as described in the project appraisal report and loan documents. In most cases a special section is devoted to discussion of the major problems with which the Bank was concerned. Comparisons are then presented between the Bank's forecasts and actual developments for the load, the investment program financing, project costs, and construction periods. Next, a brief analysis of the institutional development and management of the utility is given. Concluding comments generally include, besides a brief overall assessment, also an indication of the utility's view of its own future and of the Bank's actions and procedures.

6.03 Part II of the Report (Chapters 9 - 13) relates entirely to Colombia. First, there is a chapter on the power sector as a whole in Colombia, its development and the problems faced. Then a chapter is presented on each of the three largest power companies in the country, following broadly the lines sketched above for the other companies, but going somewhat more into depth and covering a few additional aspects -- in particular the economic validity of important decisions about expansion of the bulk supply system. The last chapter of this section covers both institutional and technical aspects of the Interconnection Company and the Bank's role in its creation.

6.04 Part III of the Report (Chapters 14 - 19) compares performance under the loans reviewed, treats certain important topics of Bank policy in power lending, draws the overall conclusions of the study, and finally presents some recommendations, emerging from the study about the Bank's future action in regard to power.

TABLE I

		MEXICO - COMISION FEDERAL DE ELECTRICIDAD																			Average Annual Increase Rate (%)					
		1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1950/60	1960/70	1950/70	
OPERATIONS																										
1.	Installed Capacity of CFE	MW	94	164	164	175	252	358	359	506	516	641	727	734	901	953	1,198	1,608	1,941	2,198	2,196	2,917	2,915	22.7	14.9	18.7
	Hydro	MW	53	80	115	156	183	196	211	224	255	251	297	340	424	453	1,109	1,186	1,184	1,540	1,610	1,715	2,030	18.8	21.2	20.0
	Thermal	MW	20	41	43	44	44	49	62	72	97	84	78	101	111	136	168	178	178	237	323	359	456	14.6	19.3	16.9
	Diesel	MW	167	285	322	375	479	603	632	802	868	976	1,102	1,175	1,436	2,042	2,475	2,972	3,303	3,975	4,129	4,991	5,400	20.8	17.2	19.0
	Total	MW	78	123	123	123	173	217	217	352	352	352	352	352	456	710	710	1,070	1,410	1,410	1,410	1,410	1,560			
	of which at 50 Hz	MW	13.5	19.8	20.5	22.0	25.9	31.3	30.5	35.3	33.9	35.6	36.5	35.9	40.3	48.1	50.6	56.0	57.9	68.5	64.7	72.4	72.0			
	Total as % in country ^{a/}	%																								
2.	Installed Capacity in Country ^{b/}	MW									1,960	2,090	2,310	2,435	2,720	3,370	4,010	4,480	4,790	4,880	5,370	5,790	6,290		10.5	
3.	Peak Demand in Country ^{c/}	MW									1,550	1,680	1,840	2,010	2,170	2,400	2,700	2,950	3,230	3,530	3,870	4,450	5,010		10.5	
4.	Gross Reserves in Country (2-3)	MW									410	410	470	425	550	970	1,310	1,530	1,560	1,350	1,500	1,340	1,280		10.5	
5.	Gross Reserves as % of Peak Demand	%									26	24	26	21	25	40	49	52	48	38	39	30	26			
6.	Gross Generation of CFE		438	750	1,088	1,422	1,502	2,025	2,592	2,851	3,391	4,149	4,228	4,196	5,119	6,281	8,640	10,380	11,902	15,810	17,923	20,095	22,914	25.4	18.4	22.2
7.	Generation Sent-Out		417	724	1,048	1,369	1,435	1,951	2,507	2,762	3,283	4,046	4,123	4,075	4,965	6,128	8,430	10,126	11,612	15,324	17,395	19,943	22,647			
8.	Total Sales of CFE	Gwh	388	525	996	1,341	1,401	1,896	2,418	2,694	3,154	3,961	4,065	3,962	4,828	6,023	8,173	9,800	11,177	13,990	15,899	17,857	20,095	26.7	17.8	22.0
	of which: to direct consumers	%	6	11	11	13	16	17	18	22	21	21	25	30	28	34	31	30	30	62	62	67	67			
	to other utilities (bulk)	%	94	89	89	87	84	83	82	78	79	79	75	70	72	66	69	70	70	37	38	33	33			
9.	Customers of CFE	000's	42	82	99	115	118	177	232	278	331	386	455	527	669	810	930	1,019	1,100	2,557	2,808	3,363	3,822	26.9	23.7	25.3
10.	Number of Employees	no.	n.a.					3,045	3,675	4,050	4,770	4,970	5,620	7,510	8,359	8,069	9,196	9,606	10,266	16,880	16,920	17,945	18,500	13.0	12.6	12.8
FINANCES																										
11.	Sales Revenues ^{d/}	Ps. mln	28.7	37.3	65.5	79.9	105.7	158.4	208.5	319.4	389.8	420.6	552.2	665.9	852.4	1,109.5	1,413.0	1,665.3	1,979.3	3,273.5	3,516.0	4,017.4	4,486.4	32.2	23.3	28.6
12.	Operating Costs (non corrected) ^{e/}	Ps. mln	18.0	31.1	48.4	66.5	86.2	114.0	148.6	211.4	256.5	296.7	328.9	359.0	485.6	684.5	902.7	983.4	1,115.4	1,896.4	1,987.8	2,430.5	2,737.0	33.8	23.6	28.6
13.	Average Revenue/Kwh Sold	Ps c	7.40	7.1	6.6	5.9	7.5	8.3	8.6	11.8	12.3	10.6	13.6	16.8	17.6	18.4	17.3	17.0	17.7	23.4	22.1	22.5	22.3	4.5	5.1	5.1
14.	Average Cost/Kwh Sold	Ps c	4.6	5.9	4.9	4.9	6.1	6.0	6.1	7.8	8.1	7.5	8.1	9.1	10.0	11.4	11.0	10.0	10.0	13.5	12.5	13.6	13.6	5.8	5.3	5.6
15.	Exchange Rate	US\$ 1 = Mex. Ps.	8.65	8.65	8.65	8.65	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5			
16.	Average Revenue/Kwh Sold	US c	0.86	0.82	0.76	0.69	0.60	0.67	0.69	0.95	0.99	0.85	1.09	1.34	1.41	1.47	1.38	1.36	1.42	1.87	1.77	1.80	1.79	0.7	5.1	5.1
17.	Average Cost/Kwh Sold	US c	0.54	0.68	0.56	0.57	0.49	0.48	0.49	0.63	0.65	0.60	0.65	0.72	0.80	0.91	0.88	0.80	0.80	1.08	1.0	1.10	1.09	1.9	5.3	3.6
18.	Net Revenues (11-12)	Ps. mln	10.7	6.2	17.1	13.4	19.5	44.4	59.9	108.0	133.3	123.9	223.3	306.9	366.8	425.0	510.3	681.9	863.9	1,377.1	1,528.2	1,586.9	1,749.4	29.4	22.8	28.6
19.	Gross Fixed Investments	Ps. mln	n.a.							n.a.	474.0	600.0	973.0	1,314.4	2,361.2	2,225.7	2,013.5	1,139.7	1,096.6	1,970.1	2,518.8	2,924.2	3,719.2		14.4	
20.	Av. Net Fixed Assets in Service	Ps. mln	235.5	286.5	460.0	710.5	964.8	1,348.2	1,643.8	1,860.0	2,159.8	2,600.0	3,084.4	3,561.0	4,483.6	6,256.2	9,335.6	11,199.0	11,578.1	13,531.2	15,050.9	16,776.2	19,579.6	29.3	20.3	24.8
21.	Operating Costs (corrected for depreciation) ^{f/}	Ps. mln	23.6	37.4	60.2	83.7	111.5	149.8	184.9	257.2	308.0	363.9	416.0	454.7	566.9	804.7	1,064.2	1,150.2	1,270.3	2,086.8	2,170.9	2,626.6	2,970.1	33.2	21.8	27.4
22.	Average Cost/Kwh Sold (Corrected) ^{g/}	US c	0.70	0.82	0.70	0.72	0.64	0.63	0.61	0.76	0.78	0.74	0.82	0.92	0.94	1.07	1.04	0.94	0.91	1.19	1.09	1.18	1.18	1.6	3.7	2.7
23.	Av. Net Fixed Assets (Corrected) ^{h/}	Ps. mln	189.1	217.3	356.6	566.9	792.1	1,117.3	1,373.8	1,633.1	1,945.4	2,326.2	2,830.6	3,225.5	3,959.8	5,636.4	8,559.0	10,242.2	10,478.0	12,258.5	13,591.5	15,179.1	17,798.5	31.1	20.2	25.5
24.	Net Revenues (Corrected) ^{i/}	Ps. mln	5.2	(-0.1)	5.3	(-3.8)	(-5.8)	8.6	23.6	62.2	81.6	56.6	136.2	211.2	285.5	304.8	348.8	515.1	709.0	1,186.8	1,345.1	1,390.8	1,516.4	26.5	27.2	27.2
MANAGEMENT INDICATORS																										
25.	Rate of Return (Non corrected)	%	4.5	2.2	3.7	1.9	2.0	3.3	3.6	5.8	6.2	4.8	7.2	8.6	8.2	6.8	5.5	6.1	7.5	10.2	10.2	9.5	8.9			
26.	Rate of Return (After correction) ^{j/}	%	2.8	0	1.5	()	()	0.8	1.7	3.8	4.2	2.4	4.8	6.5	7.2	5.4	4.1	5.0	6.8	9.7	9.9	9.2	8.5			
27.	Financial Rate of Return ^{k/}	%	3.8	1.3	3.0	1.3	1.6	2.8	3.1	5.3	6.1	5.3	4.7	6.2	5.7	4.5	3.7	3.9	4.9	7.1	6.5	6.8	6.5			
28.	Self-financing Rate ^{l/}	%	n.a.	n.a.	n.a.	-	-	-	-	7.4	7.3	7.7	12.2	7.9	9.8	10.2	-	2.8	3.5	5.6	8.5	-	-			
29.	Debt-Service Coverage ^{m/}	Times	n.a.	n.a.	n.a.	0.32	0.40	1.04	0.76	1.03	1.32	1.42	1.53	1.86	1.44	1.81	1.86	0.30	1.02	1.09	1.11	1.19	0.99			
30.	Debt/Equity Ratio	./.	37/63	30/70	30/70	27/73	30/70	28/72	27/73	24/76	24/76	24/76	22/78	25/75	35/65	36/64	42/58	40/60	43/57	51/49	52/48	51/48	53/47	3.0	4.1	3.8
31.	Energy Sales per Employee	MMWh	n.a.	n.a.	n.a.	n.a.	n.a.	623	658	665	661	792	723	527	577	746	889	1,020	1,089	829	940	995	1,086			
32.	Distribution Losses	%	7.0	27.5	5.0	2.0	2.4	2.8	3.6	2.5	3.9	2.1	1.4	2.8	2.7	1.7	3.0	3.2	3.7	8.7	8.6	10.4	11.2			
33.	CFE Investments in Distribution as % of Total Investments	%	n.a.									n.a.	15.0	5.4	20.6	9.9	26.6	10.2	1.5	8.7	33.7	19.7	29.8			
34.	Current Ratio ^{n/}	No.	n.a.	n.a.	n.a.	3.3	3.1	2.3	2.9	n.a.	n.a.	3.7	1.8	1.03	n.a.	0.78	0.66	0.86	2.4	1.7	1.29	n.a.	n.a.			
POWER AND ECONOMIC DEVELOPMENTS																										
35.	Average Revenue of Power Sector/kwh Sold (incl. Power Tax)	USc													2.21	2.25	2.31	2.31	2.36	2.37	2.30	2.31	2.24			
36.	Average Cost of Power Sector/kwh Sold	USc													1.50	1.55	1.60	1.53	1.51	1.47	1.42	1.42				
37.	Self-financing Rate of Power Sector	%													()	()	()	()	()	6.6	17.9	5.0				
38.	Consumers of Power Sector	'000s													2450	2743	3032	3278	3541	3823	4163	4706	5370		10.2	
39.	Total G.D.P.	1960 Ps. mln	86,973	93,034	96,095	100,866	106,118	114,049	120,432	129,250	134,654	139,979	150,111	157,931	165,310	178,516	199,390	212,320	227,037	241,272	260,901	277,400	298,700		5.6	7.1
40.	G.D.P. from electricity	1960 Ps. mln	462	547	622	679	752	845	994	1,089	1,210	1,384	1,502	1,609	1,753	2,170	2,529	2,769	3,157	3,533	4,228	4,812	5,341	12.5	7.1	6.4
41.	Ind. G.D.P.	1960 Ps. mln	16,526	17,509	18,589	18,905	20,313	22,268	22,169	25,391	26,041	28,792	30,394	32,092	33,643	36,996	43,416	47,530	52,147	55,874	61,869	67,099	73,375	6.3	13.5	13.0
42.	G.D.P. from Electrical Manufacturing Equipment	1960 Ps. mln	362	394	396	409	434	545	627	754	736	853	896	1,057	1,068	1,262	1,745	1,954	2,313	2,248	n.a.	n.a.	n.a.		9.2	7.7
43.	G.D.P. Agriculture	1960 Ps. mln	15,442	15,768	15,814	16,819	18,861	20,163	20,222	21,546	22															

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LOAN 194-ME

	1957	1958	1959	1960	1961	1962	1963	1964	1965	AVERAGE ANNUAL INCREASE RATE (%) (1957/1962)
LOAD FORECASTS (Mw)										
1. Central System: Effective Capacity		892	892	975	975	1120				
Annual Peak Demand		732	806	886	974	1072				11.0
2. Oriental System: Installed Capacity		185	293	293	293	293				
Annual Peak Demand		154	184	211	236	262				21.5
3. Occidental System: Installed Capacity		218	218	218	218	292				
Annual Peak Demand		169	174	182	192	202				8.8
4. North West System: Installed Capacity		69	88	88	106	106				
Annual Peak Demand		63	73	84	97	105				16.0
ACTUAL LOAD (MW)										
5. Central System: Effective Capacity	858	940	940	1023	1023	1133				
Peak Demand	636	712	774	812	884	952				8.0
6. Oriental System: Installed Capacity	115	149	264	303	303	342				
Peak Demand	99	118	162	185	192	211				16.4
7. Occidental System: Installed Capacity	218	251	254	254	254	321				
Peak Demand	166	185	181	207	223	237				7.4
8. North West System: Installed Capacity	49	59	69	109	109	112				
Peak Demand	50	55	57	70	86	105				16.0
LOAD FORECAST ACCURACY %										
9. Peak Demand: Central System		103	104	109	110	113				
Oriental System		131	111	116	123	124				
Occidental System		91	96	88	86	95				
North West System		115	128	120	113	100				
SALES FORECAST (MWh)										
10. Total Sales of CFE		3721	3935	4249	5074	5673	6184	6740	7347	15.4
ACTUAL SALES (MWh)										
11. Sales: Residential	107	131	157	187	188	376	488	624	997	
Commercial	88	86	104	122	140	353	431	586	860	
Industrial	265	308	415	533	591	1012	1349	1873	2815	
Peak Sales to other utilities	211	248.4	313	304.6	2785	2476	3152	4270	3936	
Others	123	115	152	177	258	611	603	820	1172	
Total	2694	3154	3961	4065	3922	4928	6023	8173	9800	17.5
SALES FORECAST ACCURACY %										
12. Total Sales		118	99	104	128	115	103	82	75	
REVENUE FORECAST (Ps million)										
13. Revenues ^{b/}		401.1	441.8	493.8	588.9	674.1	742.2	809.2	890.6	13.7
14. Less: Operating Costs ^{c/}		235.7	259.0	281.7	323.1	343.6	379.2	422.1	469.9	10.4
15. Operating Income		165.4	182.8	212.1	255.8	330.5	363.0	387.1	420.7	15.7
16. Financial Rate of Return (%) ^{d/}		5.8	5.3	5.2	5.5	6.1	6.1	5.9	5.8	
ACTUAL REVENUE (Ps million)										
17. Revenues ^{b/}	319.7	389.5	435.1	450.8	584.5	758.1	992.5	1278.5	1456.4	20.9
18. Less: Operating Costs ^{c/}	213.0	257.6	297.6	334.7	364.4	503.5	708.9	935.8	1021.3	21.6
19. Operating Income	106.7	131.9	137.5	115.3	220.1	254.6	283.6	342.7	435.1	19.2
20. Financial Rate of Return (%) ^{d/}	5.7	6.1	5.3	4.7	6.2	5.7	4.5	3.7	3.9	

a/ Defined by the ratio Forecast/Actual, in %.
 b/ Total revenues excluding indirect taxes on Power Consumption.
 c/ Including depreciation and direct taxation on utility, but excluding interest.
 d/ Operating income after taxes as per cent of average net fixed assets in operation.

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LOAN 310-EE

TABLE II-A.2

		1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	AVERAGE ANNUAL INCREASE RATE(%) (1961/1970)
LOAD FORECAST (MW)												
1.	Central System:											8.5
	Effective Capacity		1127	1351	1351	1915	1915	1915	1915	2065	2300	
	Firm Capacity		1045	1201	1201	1765	1765	1765	1765	1915	2150	
	Peak Demand		964	1051	1106	1240	1310	1450	1570	1700	1840	
2.	Oriental System:											11.8
	Installed Capacity		378	417	417	457	502	547	547	547	587	
	Firm Capacity		335	377	377	417	457	502	502	502	547	
	Peak Demand		239	324	362	397	448	440	455	494	523	
3.	Occidental System:											9.5
	Installed Capacity		325	325	385	385	460	535	535	535	735	
	Firm Capacity		288	288	348	348	398	460	460	460	660	
	Peak Demand		260	286	307	335	364	394	428	465	504	
4.	North System:											5.5
	Installed Capacity		169	235	235	268	301	301	301	334	334	
	Firm Capacity		125	179	179	212	245	245	245	278	278	
	Peak Demand		117	155	165	173	192	191	200	210	221	
5.	North West System:											12.8
	Installed Capacity		175	220	265	265	265	265	265	305	338	
	Firm Capacity		130	170	220	220	220	220	220	258	258	
	Peak Demand		111	126	143	157	173	190	209	230	253	
6.	North East System:											16.7
	Installed Capacity		251	356	469	469	469	544	544	544	619	
	Firm Capacity		190	281	394	394	394	469	469	469	544	
	Peak Demand		128	153	272	299	329	361	397	437	480	
7.	ACTUAL LOAD (MW)											
7.	Central System:											9.1
	Effective Capacity	1023	1133	1353	1408	1763	2099	2044	1946	2099	2099	
	Peak Demand	884	952	1038	1159	1270	1365	1459	1584	1738	1935	
8.	Oriental System:											18.1
	Installed Capacity	303	342	418	421	476	494	595	595	620	670	
	Peak Demand	192	211	280	308	349	427	488	568	695	860	
9.	Occidental System:											14.3
	Installed Capacity	254	321	326	391	407	459	606	606	609	659	
	Peak Demand	223	237	261	305	348	382	465	510	577	711	
10.	North System:											7.8
	Installed Capacity	201	201	201	267	267	303	341	341	341	341	
	Peak Demand	137	149	143	169	185	202	223	232	257	290	
11.	North West System:											13.0
	Installed Capacity	109	112	149	266	241	241	250	291	291	332	
	Peak Demand	86	105	110	131	148	161	179	196	230	259	
12.	North East System:											16.0
	Installed Capacity	168	155	305	362	474	474	474	474	474	516	
	Peak Demand	120	132	145	189	221	248	293	334	399	458	
LOAD FORECAST ACCURACY %												
13.	Central System:		101	101	99	98	98	99	99	98	96	
	Oriental System		113	116	118	111	98	90	82	71	61	
	Occidental System		110	110	101	96	95	87	84	78	68	
	North System		99	108	198	194	90	86	86	82	76	
	North West System		106	115	107	106	107	106	107	96	98	
	North East System		97	106	144	135	133	123	119	110	105	
SALES FORECAST (GMH)												
14.	Total Sales:		3850	4240	4690	4960	5360	5790	6250	6750	7290	
	Central System		939	1174	1174	1883	1971	2065	2166	2280	2403	
	Oriental System		930	1026	1104	1198	1300	1410	1530	1660	1800	
	Occidental System		788	809	834	884	937	993	1052	1115	1181	
	North System		406	486	585	645	709	780	858	944	1038	
	North West System		659	850	1205	1325	1458	1603	1764	1940	2135	
	North East System		1952	7346	10508	11719	13044	13949	14768	15380	16135	18.6
15.	ACTUAL SALES (GMH)											
	Total Sales:		3891	4164	4625	5085	5673	6218	6831	7463	8135	
	Central System		896	1157	1446	1679	1886	2106	2377	2677	3001	
	Oriental System		973	1052	1171	1379	1527	1746	2061	2401	2781	
	Occidental System		750	778	817	811	952	1009	1063	1121	1181	
	North System		443	496	587	642	704	771	843	916	991	
	North West System		603	608	760	934	1058	1282	1546	1846	2191	
	North East System		1952	7346	10508	11719	13044	13949	14768	15380	16135	18.6
16.	ACTUAL SALES (GMH)											
	Total Sales:		3891	4164	4625	5085	5673	6218	6831	7463	8135	
	Central System		896	1157	1446	1679	1886	2106	2377	2677	3001	
	Oriental System		973	1052	1171	1379	1527	1746	2061	2401	2781	
	Occidental System		750	778	817	811	952	1009	1063	1121	1181	
	North System		443	496	587	642	704	771	843	916	991	
	North West System		603	608	760	934	1058	1282	1546	1846	2191	
	North East System		1952	7346	10508	11719	13044	13949	14768	15380	16135	18.6
17.	GRS SALES :											
	Residential	188	376	488	624	997	1101	1535	1719	1958	2253	
	Commercial	140	353	431	586	880	971	1263	1371	1531	1669	
	Industrial	591	1012	1349	1873	2815	3174	4407	5136	6329	7339	
	Rail	2785	2476	3152	4270	3936	4701	5201	5990	5931	6541	
	Others	258	611	603	820	1172	1230	1584	1680	2108	2293	
	Total	3962	4828	6023	8173	9800	11177	13990	15899	17857	20095	19.8
SALES FORECAST ACCURACY %												
18.	Total Sales:		99	101	99	98	94	93	91	91	92	
	Central System		105	127	119	112	105	90	81	81	81	
	Oriental System		96	98	94	87	85	81	74	74	74	
	Occidental System		104	104	98	97	98	98	99	99	99	
	North System		92	98	100	100	101	101	102	102	102	
	North West System		111	140	159	142	138	125	114	114	114	
	North East System		103	122	129	120	116	103	93	92	92	
RETURN FORECASTS (Ps million)												
20.	Revenues ^{a/}		784.1	1130.6	1528.4	1779.4	1929.8	2077.2	2217.8	2447.7	2731.1	18.7
21.	Less: Operating Costs ^{b/}		511.1	707.5	908.0	1028.9	1144.7	1260.2	1363.0	1522.8	1623.8	
22.	Operating Income		273.0	423.1	620.4	750.5	785.1	817.0	854.8	924.9	1107.3	
23.	Financial rate of return (%) ^{c/}		6.1	6.4	7.0	7.3	6.9	6.9	7.0	7.3	8.4	
ACTUAL RETURN (Ps million)												
24.	Revenues ^{a/}		758.1	992.5	1278.5	1456.4	1727.4	2920.3	3036.8	3643.1	4090.1	24.2
25.	Less: Operating Costs ^{b/}		503.5	708.9	935.8	1021.3	1159.0	1956.1	2952.2	2501.7	2818.1	
26.	Operating Income		254.6	283.6	342.7	435.1	568.4	964.2	984.6	1141.4	1272.0	
27.	Financial rate of return (%) ^{c/}		5.7	4.5	3.7	3.9	4.9	7.1	6.5	6.8	6.5	
28.	Rate of return including power ^{d/}		10.1	8.1	6.3	6.4	8.0	13.2	9.6	9.8	9.8	

a/ Defined by ratio Forecast/Actual, in %.
b/ Total revenues excluding indirect taxes on power consumption.
c/ Including depreciation and direct taxation on utility, but excluding interest.
d/ Operating income after taxes as per cent of average net fixed assets in operation.

MEXICO: COMISION FEDERAL DE ELECTRICIDAD
LOAN 436-ME

TABLE II-A.3

		1965	1966	1967	1968	1969	1970	Average Annual Increase Rate (%) (1964/1970)
LOAD FORECAST (MW)								
1. Central System:	Installed Capacity	1,858	1,619	1,547	1,547	1,273	917	
	Peak Demand	1,217	1,258	1,276	1,200	895	640	-25.8 after 1967
2. Interconnected System:								
	Installed Capacity	551	834	1,656	2,016	2,290	2,926	
	Peak Demand	396	557	1,160	1,426	1,905	2,344	
	Occidental:	385	393					
	Peak Demand	331	395					
3. Of Which Central System 60 Cycles Demand			45	141	330	757	1,146	
4. North System:	Installed Capacity	281	281	319	334	324	334	
	Firm Capacity	196	196	226	241	241	241	
	Peak Demand	162	157	181	197	206	212	3.8
5. North West System:	Installed Capacity	265	265	330	330	370	370	
	Firm Capacity	165	165	230	230	270	270	
	Peak Demand	152	197	206	222	239	261	11.8
6. North East System:	Installed Capacity	461	461	461	461	461	501	
	Firm Capacity	386	386	386	386	386	386	
	Peak Demand	225	266	302	330	364	402	13.4
ACTUAL LOAD (MW)								
7. Central System:	Installed Capacity	1,757	2,117	2,065	1,975	2,117	2,267	
	Peak Demand	1,270	1,356	1,459	1,584	1,738	1,935	8.75
8. Interconnected System:	Installed							
	Installed Capacity	476	476	953	1,201	1,770	1,929	
	Peak Demand	349	427	938	1,273	1,285	1,593	
	Occidental	407	407					
	Peak Demand	348	382					
9. North System	Installed Capacity	267	300	341	341	341	341	
	Peak Demand	185	202	223	232	257	290	9.45
10. North West System:	Installed Capacity	241	241	250	291	291	332	
	Peak Demand	148	161	179	196	239	259	10.2
11. North East System:	Installed Capacity	474	474	474	474	474	516	
	Peak Demand	221	248	293	334	399	458	18.1
LOAD FORECAST ACCURACY ^{a/}								
12. Peak Demand:	Central System	96	97	97	97	95	92	
13. Interconnected:	Occidental System	113	120					
	Occidental System	95	103	109	103	92	79	
	North System	88	83	81	85	87	79	
	North West System	103	122	115	113	100	101	
	North East System	102	107	103	99	91	88	
SALES FORECAST (Gwh)								
14. Total Sales	Central System	4,923	5,318	5,740	6,204	6,700	7,235	
15. Interconnected:	Occidental System	1,827	2,529					
	Occidental System	1,272	1,511	4,832	5,219	5,510	5,783	
	North System	883	910	990	1,076	1,122	1,155	
	North West System	667	761	921	985	1,045	1,125	
	North East System	964	1,235	1,389	1,543	1,699	1,879	
16. Total Sales of CFE and IEMSA ^{b/}		10,398	11,900	13,875	14,900	16,436	18,135	
17. Final Sales of Power Sector		12,054	13,796	15,417	16,653	17,840	19,120	
ACTUAL SALES (Gwh)								
18. Total Sales:	Central System	5,085	5,673	6,218	6,834			
19. Interconnected:	Occidental System	1,679	1,886	4,052	4,738			Not Available
	Occidental System	1,379	1,527					
	North System	911	952	1,009	1,063			
	North West System	642	704	771	843			
	North East System	934	1,058	1,282	1,546			
20. Total Sales of CFE		9,800	11,177	13,990	15,899	17,857	20,095	16.2
21. Final Sales of Power Sector		12,117	13,389	14,933	16,675	19,213	21,683	11.9
SALES FORECAST ACCURACY ^{a/}								
22. Total Sales:	Central System	97	94	92	91			
23. Interconnected:	Occidental System	109	134					
	Occidental System	92	101	119	110			
	North System	97	96	98	101			
	North West System	104	108	119	117			
	North East System	103	117	108	100			
24. Total Sales of CFE		106	106	99	94	92	90	
25. Final Sales of Power Sector		99	103	103	100	93	88	
POWER SECTOR RETURN FORECAST (Ps. million)								
26. Revenues (excl. Power Tax) ^{c/}		3,040.9	3,386.3	3,678.4	3,970.0	4,248.1	4,575.1	7.6
27. Less: Operating Costs ^{d/}		2,295.9	2,425.0	2,619.1	2,726.1	2,833.4	2,981.6	
28. Net Income		745.0	961.3	1,059.3	1,243.9	1,414.7	1,593.5	
29. Financial Rate of Return (%) ^{e/}		4.7	5.7	5.8	6.3	6.9	7.4	
30. Rate of Return Incl. Power Tax								
ACTUAL RETURN (Ps. million)								
31. Revenues (excl. Power Tax) ^{e/}		3,212.1	3,589.4	3,996.8	4,325.4	5,031.7	n.a.	11.2 until 1969
32. Less: Operating Costs ^{d/}		2,389.4	2,599.6	2,835.4	3,047.6	3,609.2	n.a.	
33. Net Income		822.7	989.8	1,161.4	1,277.8	1,422.5	n.a.	
34. Financial Rate of Return (%) ^{e/}		5.0	5.8	6.5	7.0	7.0	n.a.	
35. Rate of Return Incl. Power Tax (%)		6.7	7.9	8.9	9.6	9.5	n.a.	

a/ Defined by the ratio Forecast/Actual, in %.
b/ IEMSA Sales included after 1967 when it was absorbed by CFE.
c/ Total Revenues excluding indirect taxes on Power Consumption.
d/ Including depreciation and direct taxation on utility, but excluding interest.
e/ Operating income after taxes as percent of average net fixed assets in operation.

MEXICO - COMISION FEDERAL DE ELECTRICIDAD
INVESTMENT PROGRAMS PARTLY FINANCED BY IBRD (US\$ million)

SOURCES OF FUNDS	COMISION FEDERAL DE ELECTRICIDAD								MEXICAN POWER SECTOR							
	LOAN 194-ME (1958) PERIOD 1958 - 1962				LOAN 316-ME (1962) PERIOD 1962 - 1965				LOAN 436-ME (1965) PERIOD 1965 - 1966				LOAN 544-ME (1968) PERIOD 1968 - 1969			
	FORECAST	ACTUAL	FORECAST	ACTUAL	FORECAST	ACTUAL	FORECAST	ACTUAL	FORECAST	ACTUAL	FORECAST	ACTUAL				
Total	% of Total	Total	% of Total	Total	% of Total	Total	% of Total	Total	% of Total	Total	% of Total	Total	% of Total			
Gross Internal Cash Generation	96.0		91.3		228.0		166.8		200.1		201.0		331.7			
Less: non-refinanced Debt Service	45.8		53.7		215.8		115.6 ^{d/}		200.1 ^{e/}		201.0 ^{e/}		200.2 ^{h/}			
1. Net Internal Cash Generation (Net Internal Cash Generation+Power Tax)	50.2	20	37.6	9	12.2	3	51.2 ^{d/}	8	- ^{e/}	-	- ^{e/}	-	131.5 ^{h/}	26		
2. Domestic Contribution:	(111.9)	45	(98.9)	23	(95.8)	21	(127.3)	20	(-)	(-)	(18.2)	5	(213.6)	43		
from private sector:	5.2	2	54.4 ^{a/}	13	23.3	5	73.0	11	31.7	10	44.5	13	14.4 ^{h/}	3		
from public sector:																
power consumption tax	61.7	25	61.3	14	83.6	19	76.1 ^{e/}	12	46.5 ^{e/}	15	51.4	15	82.1	16		
NAFINSA loans and appropriations	53.2	22	205.8 ^{b/}	48	193.1 ^{c/}	43	220.1 ^{c/ d/}	34	40.1 ^{e/}	13	41.6 ^{e/}	12	59.5	12		
sub-total public	114.9	47	267.1	62	276.7	62	296.2	46	86.6	28	93.0	27	141.6	28		
Total	120.1	49	321.5	75	300.0	57	369.2	57	118.3	38	137.5	40	156.0	31		
3. Foreign Borrowing:																
Suppliers Credits	-						22.8	4	21.3	7	23.6	7	5.3	1		
Foreign Bond Issues	-						26.3	4	- ^{e/}	8	27.2 ^{e/}	8	15.0 ^{h/}	3		
Foreign Private Loans	-		19.3	4			39.7	6	57.0 ^{e/ f/}	19	100.4 ^{e/}	29	23.4 ^{h/ i/}	5		
I.B.R.D.	76.8	31	51.6	12	135.7	30	135.7	21	111.2	36	57.0	16	169.9	34		
Total	76.8	31	70.9	16	135.7	30	224.5	35	189.5	62	208.2	60	213.6	43		
4. Total Sources	247.1	100	430.0	100	447.9	100	644.9	100	307.8	100	345.7	100	501.1	100		
APPLICATION OF FUNDS																
5. Investments	236.7	96	468.7	109	434.8	97	656.8	102	292.0	95	331.0	96	477.0	95		
6. Working Capital and cash	10.4	4	-38.7	-9	13.1	3	-11.9	-2	15.8	5	14.7	4	24.1	5		
7. Total Applications	247.1	100	430.0	100	447.9	100	644.9	100	307.8	100	345.7	100	501.1	100		
8. Total Debt Service	45.8		53.7		215.8		227.4		403.8		376.7		266.8			

- a/ Mainly loans from local Banks made in 1960 and 1962.
- b/ Includes US\$ 123 million of suppliers' credits incurred for C.F.E. by NAFINSA on behalf of the Government.
- c/ Includes US\$ 132 million of which US\$ 68 million for 1962 of suppliers' credits incurred for C.F.E. by NAFINSA on behalf of the Government.
- d/ Does not take into account US\$ 111.8 million debt service which was refinanced in 1965 by the National Development Bank (NAFINSA).
- e/ The debt service does not include the expected refinancing by NAFINSA of US\$ 152 million of short and medium term debt (15 years, 8%), it does not include either the reimbursement in 1966 of US \$ 47 million of a short-term debt incurred in 1965. Also the debt service does not include the US\$ 47.5 million receipts of 2 foreign bond issues expected to be used to pay off a part of the outstanding medium-term debt, nor US\$ 4.2 million withdrawn for debt servicing from private foreign loans which are indicated here net of this withdrawal.
- f/ Includes US\$ 35 million of joint loans to be obtained from suppliers' countries.
- g/ Does not take into account US\$ 142.5 million which were refinanced in 1965/66 by NAFINSA, nor US\$ 33.2 million which were refinanced from the proceeds of foreign bonds issued in 1965/66. The actual figure shown for foreign bonds is net of these US\$ 33.2 million.
- h/ Does not include US\$ 66.6 million of local commercial bank credit maturities to be rolled over.
- i/ Includes US\$ 22.3 million of joint loans to be obtained from suppliers' countries.
- j/ Does not include US\$ 18.8 million which were refinanced by NAFINSA in 1968.
- k/ Includes US\$ 1.9 million in 1968 from 436-ME joint loans and US\$ 10.6 million in 1969 from 544-ME joint loans.

Terms of Loans and Suppliers Credits:

	LOAN 194-ME		LOAN 316-ME		LOAN 436-ME		LOAN 544-ME	
	Interest (%)	Amortization (yrs)	Interest (%)	Amortization (yrs)	Interest (%)	Amortization (yrs)	Interest (%)	Amortization (yrs)
Suppliers Credits	-	-	5 3/4 - 7	5 - 15	6 - 7 1/2	5 - 10	6 1/2 - 7	4 - 5
Foreign Bond Issues	-	-	6 1/2	14	6 1/2 - 7	14 - 20	7.1 - 8.4	10 - 15
Foreign Private Loans	-	-	6 1/2	3 - 8	6 1/2 - 7 1/2	5 - 12	6 3/4 - 7.5	4 - 10
Joint Loans	-	-	-	-	5 3/4 - 6	10 - 15	5 1/2 - 7	9 - 12
Nafinsa Loans	6 - 6 1/2	5 - 16	6 3/4 - 8	5 - 15	7 2/3 - 9	15	8 - 9	5 - 25
Local Bank Loans	9	10	7	5	7 - 12	5 - 10	7 - 8	2 - 10

MEXICO - COMISION FEDERAL DE ELECTRICIDAD
PROJECTS IMPLEMENTATION

TABLE III.1

		Start Const.	Commiss. Date	Const. Period (months)	Project Scope ^{a/}	CONSTRUCTION COST (US\$ million)			COST/KW US\$		
						L.C.	F.X.	TOTAL			
LOAN 12-ME (US\$ 24.1 million) (signed Jan. 1949)											
1.	Miguel Aleman System	Forecast	1947	End 1953	About 78	155 MW	Hydro	13.06	6.84	19.90	128
	Associated transmission	Forecast	-	-	-	n.a.	n.a.	3.59	1.88	5.47	
	Miguel Aleman System:										
	- Santa Barbara plant	Actual	Jan. 1947	Apr. 1951	51	67.6 MW	Hydro	5.56	2.05	7.61	112
	Associated transmission	"	Jan. 1948	Feb. 1951	37	20 km	75 MVA	0.46	0.85	1.31	
	- San Bartolo I plant	Actual	Jan. 1950	Sept. 1955	68	25.2 MW	Hydro	4.47	1.28	5.75	228
	Associated transmission	"	May 1954	June 1955	13	20 km	28 MVA	0.07	0.17	0.24	
	- El Durazno plant	Actual	May 1947	Nov. 1955	102	18 MW	Hydro	1.89	1.28	3.17	176
	Associated transmission	"	Jan. 1951	May 1955	52	-	20 MVA	0.13	0.19	0.32	
	- Ixtapantango plant	Actual	Jan. 1952	Oct. 1954	33	50 MW	Hydro	0.50	1.44	1.94	117 ^{c/}
	Rivers diversions	"	Jan. 1948	Sept. 1956	104	-	-	21.02	0.47	21.49	
	Transmission system	Actual	March 1950	Jan. 1956	70	236 km	140 MVA	1.15	2.74	3.89	
	- Total system: generation	Actual				160.8 MW	Hydro	33.44	6.52	39.96	248
	transmission	Actual				276 km	313 MVA	1.81	3.95	5.76	
2.	Puebla-Veracruz System	Forecast	1947	End 1952	About 66	35.3 MW	Hydro	1.02	0.97	1.99	56
	Associated transmission	Forecast	-	-	-	n.a.	n.a.	0.92	0.87	1.79	
	Puebla-Veracruz System:										
	- Tepazolco plant	Actual	Apr. 1949	March 1953	47	10.9 MW	Hydro	1.01	0.53	1.54	141
	Associated transmission	"	Jan. 1952	Oct. 1952	9	-	15 MVA	0.08	0.16	0.24	
	- El Encanto plant	Actual	Jan. 1947	Oct. 1951	57	10 MW	Hydro	1.26	0.44	1.70	170
	Associated transmission	"	Jan. 1948	Aug. 1951	43	-	12 MVA	0.07	0.07	0.14	
	- Minas I plant	Actual	June 1947	Dec. 1951	54	9.6 MW	Hydro	1.21	0.06	1.27	132
	Transmission system	"	Jan. 1950	Oct. 1953	45	456 km	47 MVA	0.77	1.70	2.47	
	- Total system: generation	Actual				30.5 MW	Hydro	3.48	1.03	4.51	148
	transmission	"				456 km	74 MVA	0.92	1.93	2.85	
3.	Sonora System	Forecast	n.a.	n.a.	n.a.	40 MW	Thermal	2.88	2.66	5.54	139
	Sonora System:										
	- Ciudad Obregon plant	Actual	May 1949	Feb. 1951	21	3 X 5 MW	Thermal	0.96	1.98	2.94	196
	Associated transmission	Actual	Sept. 1949	March 1953	42	(2 X 12.5 MW	Thermal)	2.61	4.41	7.02	253 ^{d/}
	- Total:	Actual	May 1950	July 1953	38	40 MW	30 MVA	3.57	6.39	9.96	
4.	Juarez power plant	Forecast	Sept. 1948	1953	About 57	1 X 5 MW	Thermal	0.61	0.76	1.37	274
	Associated transmission	Actual	Sept. 1948	Sept. 1950	24	3 X 5 MW	Thermal	0.75	1.99	2.74	183
5.	Bombana plant	Forecast	Jan. 1947	1953	About 78	(2.6 MW	Hydro)	0.43	0.10	0.53	204
	and Associated transmission	Actual	Jan. 1947	March 1951	50	(45 km	3 MVA)	1.04	0.16	1.20	377
6.	Chihuahua plant	Forecast	n.a.	1954	n.a.	2 X 25 MW	Thermal	2.00	3.57	5.57	111
	Chihuahua plant	Actual	June 1950	Oct. 1953	40	3 X 15 MW	Thermal	3.67	3.72	7.39	164
	Associated transmission	"	Oct. 1951	May 1953	19	40 km	51 MVA	0.84	0.54	1.38	
7.	Aldama plant	Forecast	n.a.	1954	n.a.	6 MW	Thermal	0.35	1.07	1.42	237
	replaced by Ciudad Victoria	Actual	Apr. 1951	Jan. 1954	33	2 X 1 MW	Thermal	0.37	0.26	0.63	315
8.	Small diesel plants	Forecast	n.a.	1954	n.a.	16.9 MW	Diesel	7.25	3.88	11.13	
	(incl. rural electrification)	Actual	Feb. 1949	July 1954	65	12.6 MW Diesel	25 MVA	1.53	2.99	4.52	
9.	Various transmission extensions	Actual	Feb. 1950	July 1956	77	465 km	15 MVA	1.08	1.96	3.04	
10.	Distribution expansion	Actual	-	-	-	5,575 connections	-	0.49	0.55	1.04	
LOAN 56-ME (US\$ 29.7 million) (signed Jan. 1952)											
1.	Tingambato plant	Forecast	Jan. 1952	Oct. 1955	45	150 MW	Hydro	9.21	7.63	16.84	112
	Tingambato transmission	Actual	July 1952	Dec. 1957	65	135 MW	Hydro	19.28	5.93	25.21	187
		Forecast	-	-	n.a.	300 km	336 MVA	1.21	6.11	7.32	
		Actual	Oct. 1955	Dec. 1957	26	300 km	306 MVA	1.23	2.76	3.99	
2.	El Cobano plant ^{b/}	Forecast	Dec. 1950	Dec. 1953	36	55 MW	Hydro	6.66	1.69	8.35	152
	El Cobano transmission	Forecast	Dec. 1950	Nov. 1955	59	52 MW	Hydro	8.04	1.74	9.78	188 ^{b/}
		Actual	Apr. 1953	Dec. 1955	32	450 km	118 MVA	1.48	5.11	6.59	
		Actual				314 km	113 MVA	1.75	2.44	4.19	
3.	Monterrey I plant	Forecast	Apr. 1951	Feb. 1953	22	2 X 15 MW	Thermal	0.78	2.84	3.62	121
	Monterrey transmission	Actual	June 1951	Nov. 1953	29	2 X 15 MW	Thermal	2.11	2.82	4.93	164
		Forecast	Jan. 1952	Jan. 1954	24	218 km	45 MVA	0.67	0.99	1.66	
		Actual				187 km	25 MVA	0.65	0.86	1.51	
4.	Veracruz plant	Forecast	Apr. 1952	March 1954	23	1 X 10 MW	Thermal	0.46	1.37	1.83	183
	Veracruz transmission	Actual	May 1952	July 1954	26	1 X 10 MW	Thermal	1.50	1.43	2.93	293
		Forecast	July 1953	July 1954	12	57 km	19 MVA	0.19	0.40	0.59	
		Actual				42 km	13 MVA	0.18	0.27	0.45	
5.	Sonora transmission	Forecast	Jan. 1952	Dec. 1953	23	430 km	37 MVA	0.81	1.87	2.68	
	and distribution	Actual	Jan. 1952	July 1955	42	490 km	32 MVA	0.54	1.87	2.41	
6.	Motul and La Paz plants	Forecast	Apr. 1952	Mar-Dec. 1953	11-20	2 X 2 MW, 1 X 2.5 MW	Thermal	1.00	1.62	2.62	403
	replaced by:										
	- Oviachic plant ^{b/}	Actual	Feb. 1955	Jan. 1958	35	19.2 MW	Hydro	2.00	0.74	2.74	143 ^{b/}
	Associated transmission	"	1953	July 1957	48	40 km	20 MVA	0.36	0.38	0.74	
	- Mocuzari plant ^{b/}	Actual	Feb. 1956	March 1959	37	9.6 MW	Hydro	1.35	0.36	1.71	178 ^{b/}
	Associated transmission	"	Feb. 1956	Oct. 1957	20	40 km	12 MVA	0.23	0.37	0.60	
	- El Fuerte plant ^{b/} (2 first units, 40 MW)	Actual	July 1956	Nov. 1960	52	40 MW	Hydro	4.56	1.42	5.98	150 ^{b/}
	Associated transmission	"	Nov. 1956	Dec. 1960	49	450 km	76 MVA	2.18	1.92	4.10	
	- Merida plant	Actual	May 1953	Sept. 1955	28	1 X 6.25 MW	Thermal	0.61	0.67	1.28	205 ^{d/}
	Associated transmission	"	1957	n.a.	n.a.	116 km	7 MVA	0.72	0.19	0.91	
	- Villahermosa plant	Actual	Dec. 1957	Nov. 1959	23	2 X 2.25 MW	Thermal	0.73	0.43	1.16	258
	Associated transmission	"	n.a.	1957	n.a.	223 km	7.7 MVA	0.70	0.04	0.74	
	- La Laguna plant (1 unit, 33 MW)	Actual	June 1956	June 1958	24	1 X 33 MW	Thermal	2.43	2.40	4.83	146 ^{d/}
	- Ciudad Victoria plant (extension)	Actual	Jan. 1953	Aug. 1954	19	1 X 2.5 MW	Thermal	0.19	0.42	0.61	244
	Total system: generation	Actual				82 MW Hydro and	Thermal	11.80	6.24	18.04	
	transmission	"				869 km	100 MVA	4.19	2.90	7.09	
7.	Distribution expansion	Actual	-	-	-	10,210 connections	-	1.78	1.18	2.96	

LOAN DISBURSEMENT PATTERN

		1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959
LOAN 12-ME:	Forecast: Amount (US\$ mln)	7.80	10.99	5.31								
	% of total	32.4	45.6	22.0								
	Cumulative %	32.4	78.0	100								
	Actual: Amount (US\$ mln)	2.21	7.24	3.70	4.83	2.99	1.41	1.23	0.49			
	% of total	9.2	30.0	15.4	20.0	12.4	5.9	5.1	2.0			
	Cumulative %	9.2	39.2	54.6	74.6	87.0	92.9	98.0	100			
LOAN 56-ME:	Forecast: Amount (US\$ mln)				14.95	10.35	4.40					
	% of total				50.3	34.9	14.8					
	Cumulative %				50.3	85.2	100					
	Actual: Amount (US\$ mln)				6.17	6.21	3.57	3.85	4.36	2.28	2.59	0.67
	% of total				20.8	20.9	12.0	13.0	14.7	7.7	8.7	2.2
	Cumulative %				20.8	41.7	53.7	66.7	81.4	89.1	97.8	100

a/ Project Scope for generation is megawatts of installed capacity and source of energy; for transmission components, kilometers of line erected; for distribution components, number of connections made.

b/ Plants built in connection with irrigation dams previously constructed by the Department of Hydraulic Resources. Costs refer to power additions only.

c/ Extension to plant.

d/ These unit costs cannot be used for comparison purposes because they correspond to plants partially completed.

MEXICO - COMISION FEDERAL DE ELECTRICIDAD
PROJECTS IMPLEMENTATION

TABLE III.2

		Start Const.	Commiss. Date	Const. Period (months)	Project Scope ^{a/}	CONSTRUCTION COST (US\$ million)			COST/KW US\$		
						L.C.	F.X.	TOTAL			
<u>LOAN 194-ME (US\$ 34 million)</u> (signed May 1958)											
1.	Mazatepec plant	Forecast	Jan. 1957	End of 1961	59	156 MW	Hydro	17.95	5.41	23.36	150
		<u>Actual</u>	Jan. 1957	March 1963	74	156 MW	Hydro	45.82	11.89	57.71	370
	Associated transmission	Forecast		1964	n.a.	400 km (220 kv)		1.29	7.58	8.87	
		<u>Actual</u>	April 1958	June 1962	50	460 km (250 kv)	334 MVA	4.78	5.87	10.65	
2.	Temaxcal plant ^{b/}	Forecast	Oct. 1954	Oct. 1958	48	154 MW	Hydro	7.76	5.42	13.18	85
		<u>Actual</u>	Oct. 1954	March 1960	65	154 MW	Hydro	17.07	3.41	20.48	133
	Associated transmission	Forecast	Jan. 1958	Dec. 1958	11	430 km (115 kv)	56 MVA	0.63	3.18	3.81	
		<u>Actual</u>	Jan. 1958	Sept. 1959	20	260 km (115 kv)	235 MVA	3.65	2.64	6.29	
3.	Cupatitzio plant	Forecast	April 1957	Nov. 1961	55	73.6 MW	Hydro	5.77	3.53	9.30	126
		<u>Actual</u>	April 1957	Sept. 1962	65	63 MW	Hydro	18.16	4.72	22.88	363
	Associated transmission	Forecast	n.a.	n.a.	n.a.	370 km (161 kv)	81 MVA	1.38	5.11	6.49	
		<u>Actual</u>	April 1961	Sept. 1962	17	370 km (161 kv)	188 MVA	3.77	2.02	5.79	
4.	Guaymas plant extension	Forecast	n.a.	Dec. 1960	n.a.	1 X 30 MW	Thermal	1.50	2.93	4.43	148
		<u>Actual</u>	Feb. 1959	June 1962	40	1 X 33 MW	Thermal	2.14	2.27	4.41	134
	Associated transmission	Forecast	n.a.	n.a.	n.a.	400 km (14, 115 kv)		0.56	2.11	2.67	
		<u>Actual</u>	Feb. 1959	June 1961	28	465 km (115 kv)	16 MVA	0.55	1.18	1.73	

LOAN DISBURSEMENT PATTERN

	1958	1959	1960	1961	1962	1963
<u>LOAN 194-ME: Forecast:</u> Amount (US\$ mln)	5.44	10.19	9.81	8.56		
% of total	16	30	28.8	25.2		
Cumulative %	16	46	74.8	100		
<u>Actual</u> : Amount (US\$ mln)	5.41	4.19	7.21	11.53	5.65	0.01
% of total	15.9	12.3	21.2	34.0	16.6	-
Cumulative %	15.9	28.2	49.4	83.4	100	

^{a/} Project Scope for generation is megawatts of installed capacity and source of energy; for transmission components, kilometers of line erected; for distribution components, number of connections made.

^{b/} Plant built in connection with a flood protection dam previously constructed.

Loan 316-ME (US\$130 million) (signed June 1962)		Scope of the Program (Facilities scheduled or completed over 1962-1965)	Total Cost of Program (US\$ million)		Total Investments Made in 1962/65 (US\$ Million)		
			Generation	Transmission & Distribution	On facilities of program	On others	Total
Investment program 1962-1965 in:							
- Central system	Forecast Actual	978 MW (828H + 1 x 150T) 739 MW (565H + 1 x 150T)	160.69 183.35	- 21.78	78.62 132.51	4.16 n.a.	82.78 n.a.
- Oriental system	Forecast Actual	157 MW (3 x 39 + 1 x 40T) 117 MW (3 x 39) Thermal	19.63 22.17	6.50 3.42	8.94 13.18	19.78 n.a.	28.72 n.a.
- Occidental system	Forecast Actual	134 MW Hydro 123 MW Hydro	30.45 42.71	8.23 6.95	21.76 32.74	3.92 n.a.	25.68 n.a.
- North system	Forecast Actual	99 MW (3 x 33 T) 99 MW (3 x 33) Thermal	13.51 18.78	2.63 0.46	13.84 16.94	1.2 n.a.	15.04 n.a.
- North West system	Forecast Actual	157 MW (124H + 1 x 33T) 157 MW (124H + 1 x 33T)	38.57 47.99	5.82 3.49	31.40 38.48	- n.a.	31.40 n.a.
- North East system	Forecast Actual	337 MW (3 x 75 + 3 x 37T) 337 MW (3 x 75 + 3 x 37T)	43.33 55.24	24.51 4.56	51.66 47.38	- n.a.	51.66 n.a.
- Other systems (Incl. small systems)	Forecast Actual	544 MW (84H+4x75+3x40+1x15+4x6.25 T) ^{a/} 326 MW (48H+3x75+2x14+4x6.25 T)	80.65 71.24	15.63 5.21	80.02 64.22	22.42 n.a.	102.44 n.a.
- Sub-total: all systems	Forecast Actual	2,406 MW ^{b/} (1,170H + 1,236 T) 1,874 MW ^{b/} (860H + 1,014 T)	386.83 441.48	63.42 45.87	286.24 345.45	51.48 148.23	337.72 493.68
- Expansion of distribution and rural electrification	Forecast ^{c/} Actual			67.20 125.53	67.20 125.53	-	67.20 125.53
- Total Program	Forecast Actual	1978 MW + 3,400 km.	386.83 441.48	130.62 171.40	353.44 470.98	51.48 148.23	404.92 ^{d/} 619.21 ^{e/}

Loan 436-ME (US\$110 million) (signed December 1965)		Scope of the Program ^{f/} (Facilities scheduled or completed over 1965-1966)	Actual Cost of Programmed Works Completed during 1968-1970 (US\$ million)		Total Investments Made in 1965/66 (US\$ million)		
			Generation	Transmission & Distribution	CFE	Others	
Investment program 1965-1966 of CFE in:							
- Central system	Forecast Actual	644 MW H + 660 km + 1,260 MVA 336 MW H + 355 MW ^{g/} + 660 km + 1210 MVA	87.44 115.79	35.58 53.76	5.00 n.a.	4.27 n.a.	
- Oriental system	Forecast Actual	46 MW (18H + 2 x 14 T) + low volt. tran. 46 MW ^{g/}	6.01 8.50	39.49 1.14	60.75	3.70	
- Occidental system	Forecast Actual	Lower voltage transmission - n.a. -	-	26.03 n.a.	11.84 n.a.	9.49 n.a.	
- North system	Forecast Actual	3 x 30 MW + 1 x 38 MW T 74 MW T + 66 MW ^{g/} + 40 MVA	20.76 27.45	4.94 1.04	7.50 n.a.	2.32 n.a.	
- North West system	Forecast Actual	1 x 40 MW T (1 x 41 MW ^{h/})	6.52 (10.51) ^{h/}	7.30 n.a.	12.51 n.a.	0.24 n.a.	
- North East system	Forecast Actual	1 x 38 MW T + 370 km + 110 MVA 1 x 38 MW ^{g/} + 350 km + 110 MVA	8.42 13.34	8.09 9.50	3.88 n.a.	- n.a.	
- Other systems	Forecast Actual	169 MW (69H + 1 x 82 + 2 x 9 T) ^{i/} 39 MW H + 30 MW ^{g/} (+ 100 MW ^{g/}) + 250 MVA	43.95 34.90 (+17.05 ^{j/})	6.71 4.72	31.08 n.a.	2.59 n.a.	
- Expansion of distribution and rural electrification	Forecast Actual			120.40 69.19	41.36 ^{k/} 20.88	79.01 ^{l/} 48.31	
Total	Forecast Actual	1115 MW + 2900 km 449 MW + 535 MW ^{g/} (+141 MW ^{g/}) + + 1,020 km + 1610 MVA	173.10 199.98	248.54 139.35	173.92 ^{k/} 178.90 ^{l/}	100.59 ^{m/} 65.65 ^{n/}	

Loan 544-ME (US\$90 million) (signed June 1968)		Scope of the Program ^{f/} (Facilities scheduled or completed over 1968-1970)	Actual Cost of Programmed Works Completed during 1968-1970 (US\$ million)		Total Investments Made in 1968/70 (US\$ million)	
			Generation	Transmission & Distribution	CFE	Centro
- Central system	Forecast Actual	2 x 150 MW T + 290 km + 700 MVA 1 x 150 MW T + 230 km + 200 MVA	n.a. n.a.	n.a. 11.69	n.a.	35.30 23.65
- Oriental system	Forecast Actual	720 MW H + 1x14 MW T + 1780 km + 1925 MVA 720 MW H + 1x14 MW T + 1830 km + 2590 MVA	n.a. 82.29	n.a. 134.94	n.a.	n.a.
- Occidental system	Forecast Actual	2x150 MW + 1x14 MW T + 1,020 km + 1,031 MVA 1x150 MW + 3x14 MW T + 840 km + 770 MVA	n.a. 22.42	n.a. 18.76	n.a.	n.a.
- North system	Forecast Actual	-	-	-	222.62 281.03	-
- North West system	Forecast Actual	2 x 41 MW T + 70 km 2 x 41 MW T + 40 MW	n.a. 23.66	n.a. 0.89	n.a.	n.a.
- North East system	Forecast Actual	1 x 75 MW T + 365 km + 354 MVA 0 MW	n.a. -	n.a.	n.a.	n.a.
- Other systems	Forecast ^{o/} Actual	1x82 MW + 2x22 MW + 3x14 MW T + 18 MWD + 2x30 MW ^{g/} + 150 km + 140 MVA 1x82 MW + 2x14 MW T + 18 MW D + 170 km + 300 MVA	n.a. 20.87	n.a. 6.58	n.a.	n.a.
- Expansion of distribution and rural electrification	Forecast Actual			174.34 194.82	124.84 ^{p/} 154.41	49.50 40.41
Total	Forecast Actual	1,793 MW + 3,680 km + 4,150 MVA 1,286 MW + 3,070 km + 3,900 MVA	n.a. 148.64	n.a. 357.68	347.46 ^{p/} 435.44 ^{q/}	84.80 64.06 ^{r/}

		LOAN DISBURSEMENT PATTERN									
		1962	1963	1964	1965	1966	1967	1968	1969	1970	Undisbursed 12/31/70
Loan 316-ME: Forecast: Amount (US\$ million)	69.36	60.64									
	% of Total	53.4	46.6								
	Cumulative %	53.4	100								
	Actual: Amount (US\$ million)	14.31	50.35	54.03	1.31						
Loan 436-ME: Forecast: Amount (US\$ million)	11.0	46.4	41.6	1.0							
	% of Total	11.0	57.4	99.0	100						
	Cumulative %	11.0	57.4	99.0	100						
	Actual: Amount (US\$ million)			40.00	70.00						
Loan 544-ME: Forecast: Amount (US\$ million)			36.4	63.6							
	% of Total		36.4	100							
	Cumulative %		36.4	100							
	Actual: Amount (US\$ million)				55.67	38.75	15.58				
Loan 544-ME: Forecast: Amount (US\$ million)					50.6	35.2	14.2				
	% of Total				50.6	85.8	100				
	Cumulative %				50.6	85.8	100				
	Actual: Amount (US\$ million)					60.00	22.00	8.00			
Loan 544-ME: Forecast: Amount (US\$ million)					66.7	24.4	8.9				
	% of Total				66.7	91.1	100				
	Cumulative %				66.7	91.1	100				
	Actual: Amount (US\$ million)				19.91	54.36	8.91		6.82		
Loan 544-ME: Forecast: Amount (US\$ million)					22.1	60.4	9.9		7.6		
	% of Total				22.1	82.5	92.4				
	Cumulative %				22.1	82.5	92.4				
	Actual: Amount (US\$ million)										

- a/ Does not include 114 MW and miscellaneous transmission facilities to be installed in the small systems over 1962-1970 with an estimated total cost of US\$29.7 million, of which US\$15.18 million would have been invested during 1962-1965 (included in the US\$22.42 million investments planned for "others"). About 104 MW were installed in the small systems during 1962-1965.
- b/ Includes 219 MW of hydro capacity and 33 MW of thermal capacity completed after January 1962 but recorded also in Table III.1 under Loan 194-ME (156 MW for the Guaymas plant of the North West system).
- c/ Including US\$29.28 million forecast for rural electrification.
- d/ Does not include US\$29.9 million of Central Office overhead and other investments.
- e/ Does not include US\$37.6 million of "other" investments, mainly re-lending.
- f/ Generating stations, MVA capacity of substations in 400 or 230 kv only, transmission lines of 400 or 230 kv only.
- g/ Completed before 1966 and thus included in Loan 316-ME.
- h/ Completed after 1966 and thus included in Loan 544-ME.
- i/ This does not include 50 MW programmed to be installed before 1967 in the small systems. About 5 MW were actually installed in these systems.
- j/ Includes US\$2.48 million special equipment, US\$0.72 million for frequency change and US\$18.40 million for rural electrification.
- k/ Does not include US\$16.48 million of Central Office overhead chargeable to construction.
- l/ Does not include US\$25.73 million of "other" investments.
- m/ Includes US\$1.04 million for frequency change.
- n/ Does not include US\$60.69 million of "other" investments.
- o/ Does not include 30 MW diesel to be installed in small systems.
- p/ Includes US\$32.4 million for rural electrification.
- q/ Does not include US\$44.74 million for consultants, buildings, office overheads, etc.
- r/ Does not include US\$30.44 million for other investments, mainly financial.
- s/ Does not include US\$5.74 million for other investments.

MEXICO: COMISION FEDERAL DE ELECTRICIDAD
IMPLEMENTATION OF PROJECTS IN CFE PROGRAMS

ANNEX TO TABLE III.3

	End of Construction		Actual		Construction Cost Total (US\$ million)		Cost/KW US\$	
	Forecast	Actual	Project	Scope	Forecast	Actual	Forecast	Actual
<u>LOAN 316-ME (US\$ 130 million) ^{a/}</u> (signed June 1962)								
1. Mazatepec 4th Unit	March 1962	Sept. 1964	52 MW	Hydro	6.58	8.53	127	164 ^{d/}
2. San Bartolo II Associated transmission	Aug. 1963	March 1965	19 MW 132 kv trans	Hydro 25 MVA	2.90	4.61 0.61	145	243
3. Infiernillo 2 Units Associated transmission	June 1964 (4 units)	June 1965	336 MW -	Hydro 450 MVA	-	95.42 9.02	-	318 ^{d/}
4. Valle de Mexico (1st Unit) Associated transmission	Jan. 1963	March 1963	1 x 150 MW -	Thermal 200 MVA	13.62	17.91 0.68	91	119
5. Poza Rica Associated transmission	Nov. 1962	April 1963	3 x 39 MW ? km	Thermal 160 MVA	15.07	22.17 3.42	129	189
6. Santa Rosa Associated transmission	Jan. 1964	Sept. 1964	60 MW ? km	Hydro 80 MVA	14.67	19.83 1.16	245	331
7. Delicias (2 Units) Associated transmission	Nov. 1963 (3 units)	Dec. 1964	2 x 33 MW -	Thermal 72 MVA	-	18.32 0.45	-	278 ^{d/}
8. Sanalona Associated transmission	June 1962	Oct. 1964	14 MW 34 km (115 kv)	Hydro 21 MVA	1.96	2.26 0.62	140	161
9. El Fuerte (3rd Unit) Associated transmission	Nov. 1962	Aug. 1964	20 MW -	Hydro 25 MVA	1.02	1.10 0.21	51	55 ^{d/}
10. El Novillo Associated transmission	Dec. 1963	Oct. 1964	90 MW Distribution	Hydro 120 MVA	30.41	40.22 0.93	338	447 ^{d/}
11. Monterrey II Associated transmission	Nov. 1962	July 1965	3 x 75 MW -	Thermal 252 MVA	27.13	31.18 2.56	121	139
12. Rio Bravo Associated transmission	Dec. 1963	Aug. 1964	2 x 37.5 MW -	Thermal 84 MVA	9.20	10.72 1.00	123	143
13. Nava Associated transmission	Dec. 1963	Dec. 1965	1 x 37.5 MW -	Thermal 42 MVA	7.00	13.34 1.00	187	356
14. La Venta Associated transmission	April 1963	May 1965	30 MW -	Hydro 37.5 MVA	10.54	17.76 0.60	351	592
15. Tijuana Associated transmission	June 1963 (4 units)	Jan. 1964	3 x 75 MW -	Thermal 250 MVA	28.65	36.82 3.18	127	164 ^{d/}
16. Chilpan Associated transmission	June 1963	Dec. 1965	18 MW -	Hydro 22 MVA	1.89	3.91 0.33	105	217 ^{d/}
17. Juchitan Associated transmission	June 1962 (3 units)	End 1965	2 x 6.25 MW -	Thermal 12.5 MVA	3.79	4.16 0.29	303	333
18. Pajaritos (Minatitlan) Associated transmission	Jan. 1964	Dec. 1965	2 x 14 MW -	Gas turbine 33 MVA	3.34	4.59 0.81	119	164
19. Merida (2 Units)	June 1962	Nov. 1962	2 x 6.25 MW	Thermal	3.02	4.00	242	320 ^{d/}
<u>LOAN 436-ME (US\$ 110 million) ^{b/}</u> (signed December 1965)								
20. Infiernillo (2 Units) Associated transmission	Dec. 1965	March 1966	336 MW 100 km (132 kv)	Hydro 450 MVA	-	15.76 1.50	-	47 ^{d/}
21. La Laguna 4th Unit Associated transmission	Jan. 1966	Dec. 1967	1 x 41 MW -	Thermal 45 MVA	5.76	8.67 0.58	144	211 ^{d/}
22. Delicias 3rd Unit	May 1965	March 1966	1 x 33 MW	Thermal	-	0.46	-	14 ^{d/}
23. El Retiro Associated transmission	Jan. 1964	1966	21 MW 12 km (69 kv)	Hydro 30 MVA	4.90	11.60 0.90	348	552
24. El Salto Associated transmission	Dec. 1963	1966	18 MW -	Hydro 20 MVA	3.14	5.54 0.62	174	308
<u>LOAN 544-ME (US\$ 90 million) ^{c/}</u> (signed June 1968)								
25. Malpaso Associated transmission	1967, 1968	June 1969	720 MW -	Hydro 975 MVA	31.02	80.22 13.43	43	115 ^{d/}
26. Tampico	1968	Aug. 1968	1 x 14 MW	Gas turbine	-	2.07	-	148
27. Guadalajara extension	1968	Nov. 1968	2 x 14 MW	Gas turbine	-	2.85	-	102 ^{d/}
28. Salamanca I Associated transmission	1968	Sept. 1968	1 x 14 MW -	Gas turbine 15 MVA	-	1.48 0.06	-	106
29. Salamanca II	1969	Aug. 1970	1 x 150 MW	Thermal	-	18.10	-	121
30. Topolobampo Associated transmission	1968	Oct. 1968	1 x 41 MW -	Thermal 42 MVA	6.52	10.51 0.89	163	256
31. Guaymas 4th Unit	1968	March 1970	1 x 41 MW	Thermal	6.52	13.15	163	321 ^{d/}
32. Tijuana 4th Unit Associated transmission	1968	March 1969	1 x 82 MW -	Thermal 90 MVA	10.4	10.57 0.37	127	129 ^{d/}
33. Merida 4th Unit Associated transmission	1968	Jan. 1969	1 x 14 MW -	Gas turbine 15 MVA	-	1.65 0.05	-	118 ^{d/}
34. Merida Diesel Station	1968	Dec. 1968	2 x 9 MW	Diesel	-	6.48	-	360
35. Acapulco (Las Cruces)	1968	May 1970	1 x 14 MW	Gas turbine	-	1.57	-	112 ^{d/}

PLANTS BUILT OR EXPANDED OVER SEVERAL LOANS

- Guaymas I (12, 194, 544 - ME)	2 x 12.5, 1 x 33, 1 x 41 MW 590 km	Thermal 46 MVA	24.58	1.73	248
- Ciudad Victoria (12, 56 - ME)	2 x 1 MW + 1 x 2.5 MW	Thermal	1.24	-	276
- La Laguna (56, 436 - ME)	1 x 33 + 1 x 41 MW	Thermal 45 MVA	14.50 0.58	-	196
- Merida (56, 316, 544 - ME)	3 x 6.25 + 1 x 14 MW 116 km	Thermal 36 MVA	6.93 0.96	-	212
- Delicias (316-436 - ME)	3 x 33 MW	Thermal 108 MVA	13.51	18.78 0.46	136 190
- Tijuana (316-544 - ME)	3 x 75 + 1 x 82 MW	Thermal 340 MVA	47.39 3.55	-	154
- El Fuerte (56, 316 - ME)	60 MW 450 km	Hydro 101 MVA	7.08 4.34	-	118
- Mazatepec (194, 316 - ME)	208 MW 460 km	Hydro 334 MVA	65.41 11.48	-	314
- Infiernillo (316, 436 - ME)	672 MW 100 km	Hydro 900 MVA	82.42	111.18 10.52	137 165
- El Novillo, Monterrey II and Salamanca II will be expanded under Loan 659-ME					

^{a/}- Does not include: Dos Bocas extension never made, Cupatitlan put under 194-ME, La Laguna extension put under 436-ME, Guaymas put under 194-ME, Progreso never made, El Salto and El Retiro put under 436-ME.

^{b/}- Does include following plants completed during 1965 but put under 316-ME: San Bartolo II, Chilpan, Pajaritos, Nava, La Venta, Infiernillo 2 first units, Delicias 2 first units. Does not include Tijuana 4th unit, Merida extension, Malpaso and Topolobampo initiated under 436-ME but put and completed under 544-ME.

^{c/}- Does not include Valle de Mexico 2nd unit - cost not available, Salamanca II 2nd unit under 659-ME, Acapulco gas turbine put under 659-ME.

^{d/}- These unit costs cannot be used for comparison purposes because they correspond to plants partially completed or to the power part of hydro schemes which had been previously built for irrigation or flood control purposes.

MEXICO: COVENANTS AND SIDE LETTERS OF LOAN AND GUARANTEE AGREEMENTS
BETWEEN BANK AND CFE - NAFINSA.

Appendix Table 7.1

	LOAN 12-ME (Jan. 1949)	LOAN 56-ME (Jan. 1952)	LOAN 194-ME (May 1958)	LOAN 316-ME (June 1962)	LOAN 436-ME ^{c/} (Dec. 1965)	LOAN 544-ME ^{c/} (June 1968)
- Rates adjustments to provide a return ^{a/} of			9%	Self financing ^{b/} 33%	8% Loan cancelled if rates not adjusted before Feb. 1966.	8%
- Incurrence of long-term debt = Int. cash generation ^{a/} /debt service \geq	1.5	1.5	1.5	1.5	1.4 Current ratio = 1 end 1966.	1.4 Current ratio = 1
- No incurrence of debt by Nafinsa.				X	X	X
- Guarantee for local funds	X	X	X	X	X Refinance short- term debt.	X
- Local procurement with international bidding	X		X	X	X	X
- Retroactive financing			As from Aug. 1957	As from Jan. 1962	As from Jan. 1965	As from April 1968
- External Financing Auditing				X	X	X
- CFE's internal organization and management			- Review financial and budgetary procedures. - Review operations, procedures and manuals.	- Acceptance tests. - Review internal organization and administration. - Training program for new plants operating staff. - Annual revisions of Financing Plan and Expansion Program.	- Acceptance tests.	- Review of depreciation rates. - Acceptance tests for new equipment. - Annual Revision of CFE Expansion Program. - Review of budgetary procedures.
- Power Sector Policies.			- Review Government policy on adjust- ment of rates. - Consolidate small systems into uniform tariff zones. - Coordination with connected Companies on operations and investment programs.	- Coordination with connected Companies on operations and investment programs.	- Establish one dispatch control in each system. - Initiate frequency unification programs. - Sector coordination on operations, invest- ment planning and budgetary control.	- Initiate Frequency unification.
- Consultants			- Construction and design of major hydro plants. - Advise on CFE review of operating procedures. - Advise on CFE review of financial procedures.	- Organization of training program for operating staff. - Review the revisions of the Expansion Program. - Board of Consultants on hydro plants. - Consultants for thermal plants and all equipment.	- Assistance on frequency unification. - Review annual Sector investment programs. - Review of Mexlight Investment Program. - Board of Consultants on hydro plants. - Consultants for thermal plants and all equip- ment.	- Board of international consultants on hydro projects. - Design and Supervision of construction of major new steam plants. - Assistance on frequency unification.
- Obtention of joint financing					US\$ 35 million	US\$ 22 million

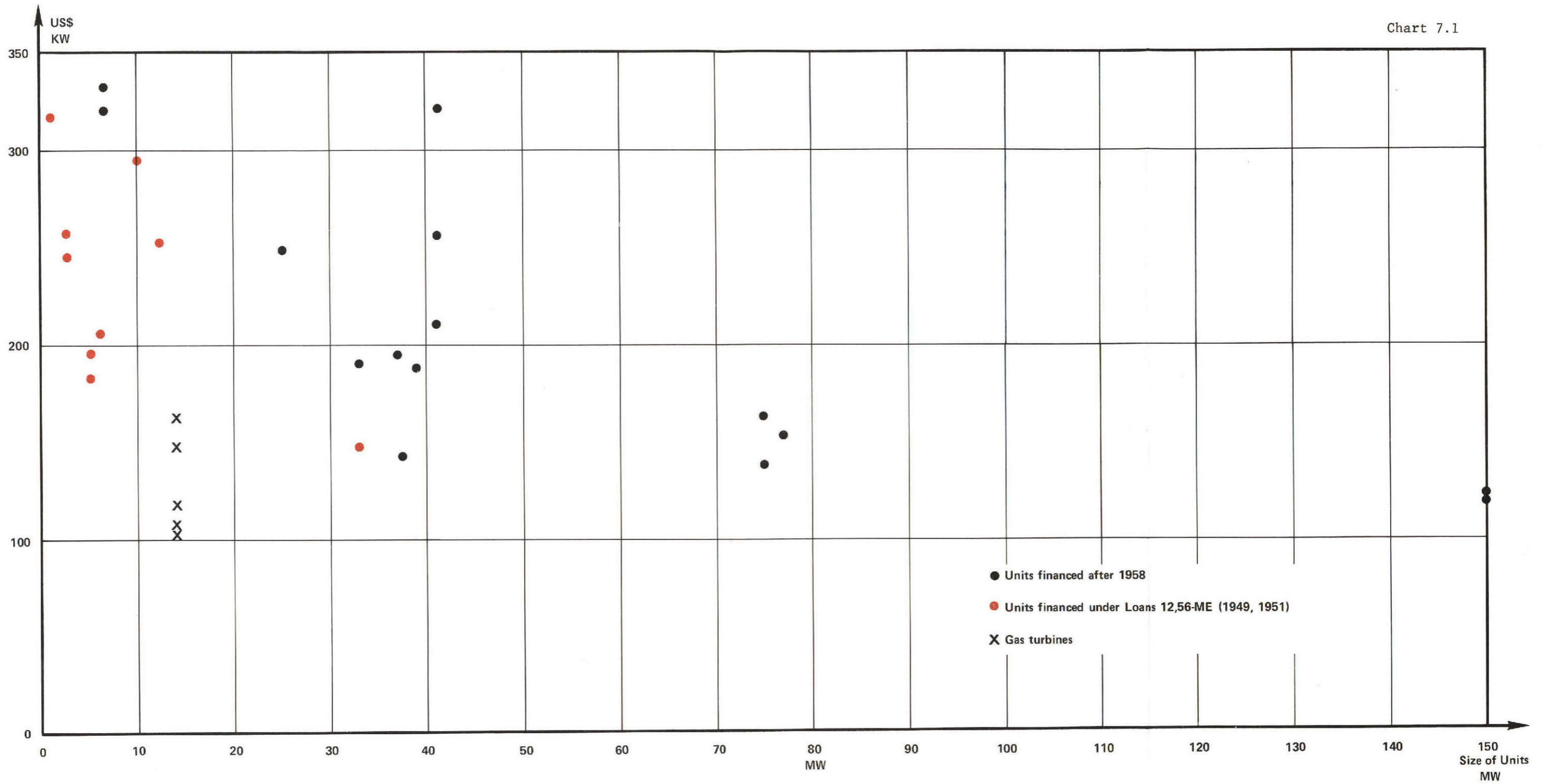
a/ For the last three Loans 316, 436 and 544-ME, in the computation of the return and of the internal cash generation, the earnings of CFE were to include the proceeds of the Power Consumption Tax.

b/ Expressed in a Side Letter.

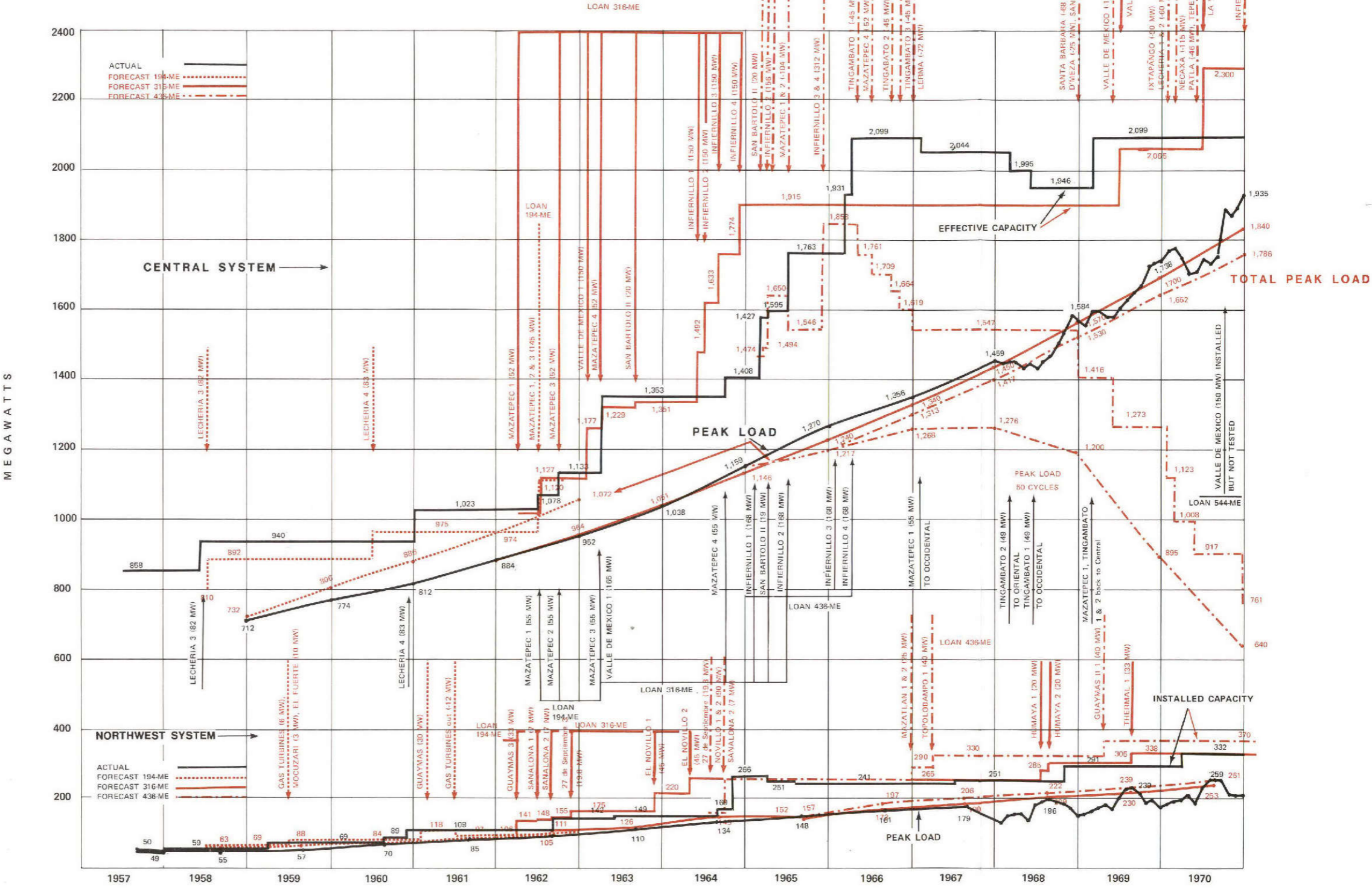
c/ Covenants and Side Letters of Loans 436 and 544-ME apply to the Power Sector.

COSTS PER KW INSTALLED OF THERMAL GENERATING UNITS IN MEXICO

Chart 7.1



MEXICO: CENTRAL AND NORTHWEST SYSTEMS LOAD AND CAPACITY DEVELOPMENT ACTUAL AND FORECASTS



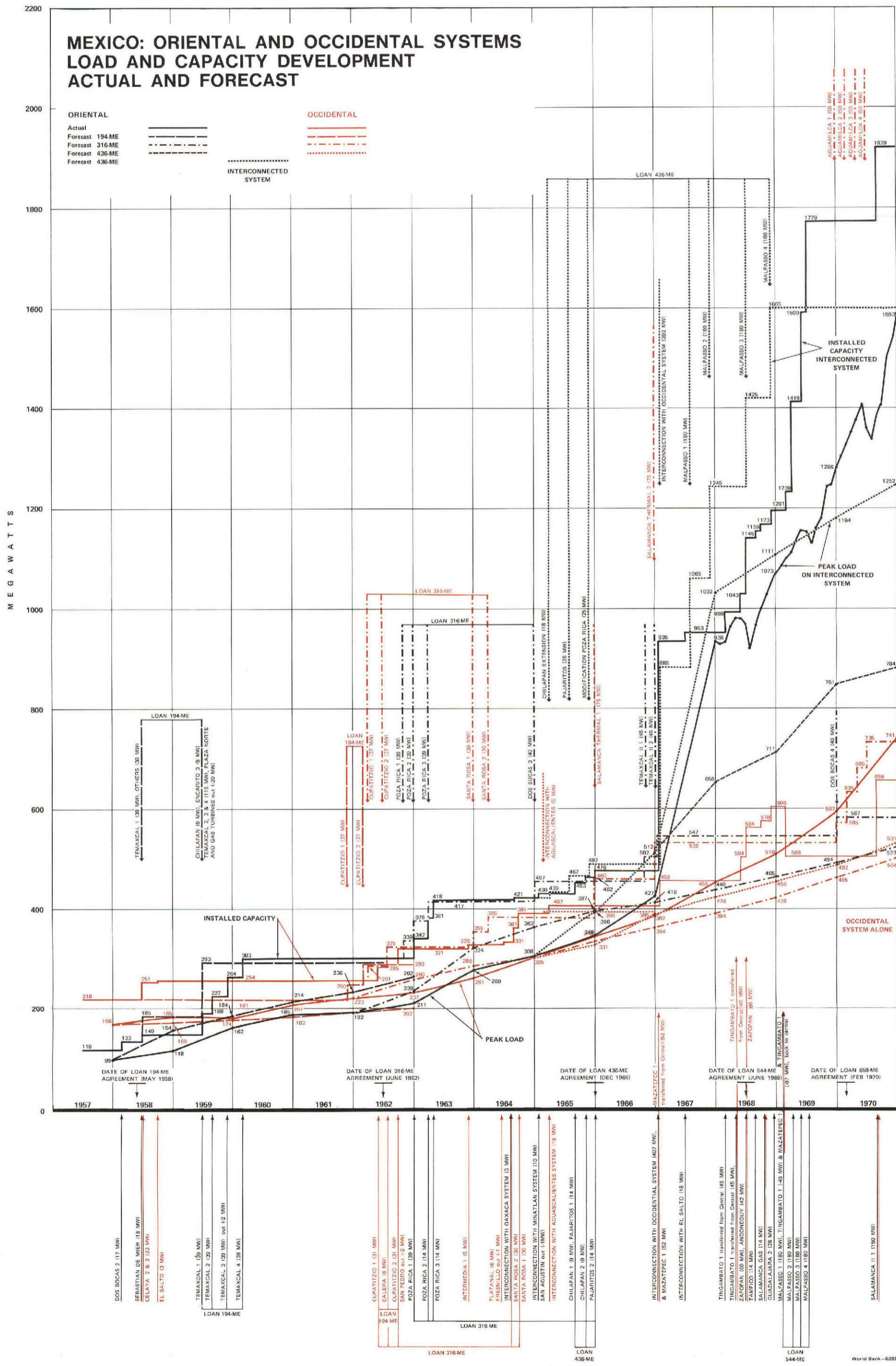
DATE OF LOAN 194-ME AGREEMENT (MAY 1958)

DATE OF LOAN 316-ME AGREEMENT (JUNE 1962)

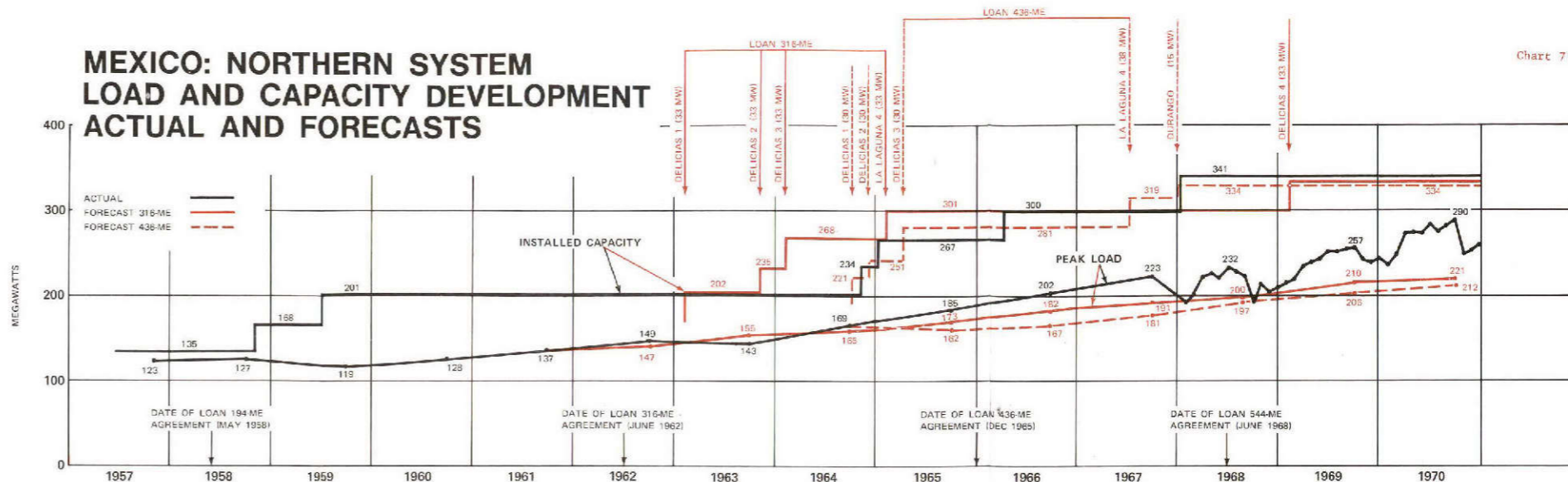
DATE OF LOAN 436-ME AGREEMENT (DEC 1955)

DATE OF LOAN 544-ME AGREEMENT (JUNE 1968)

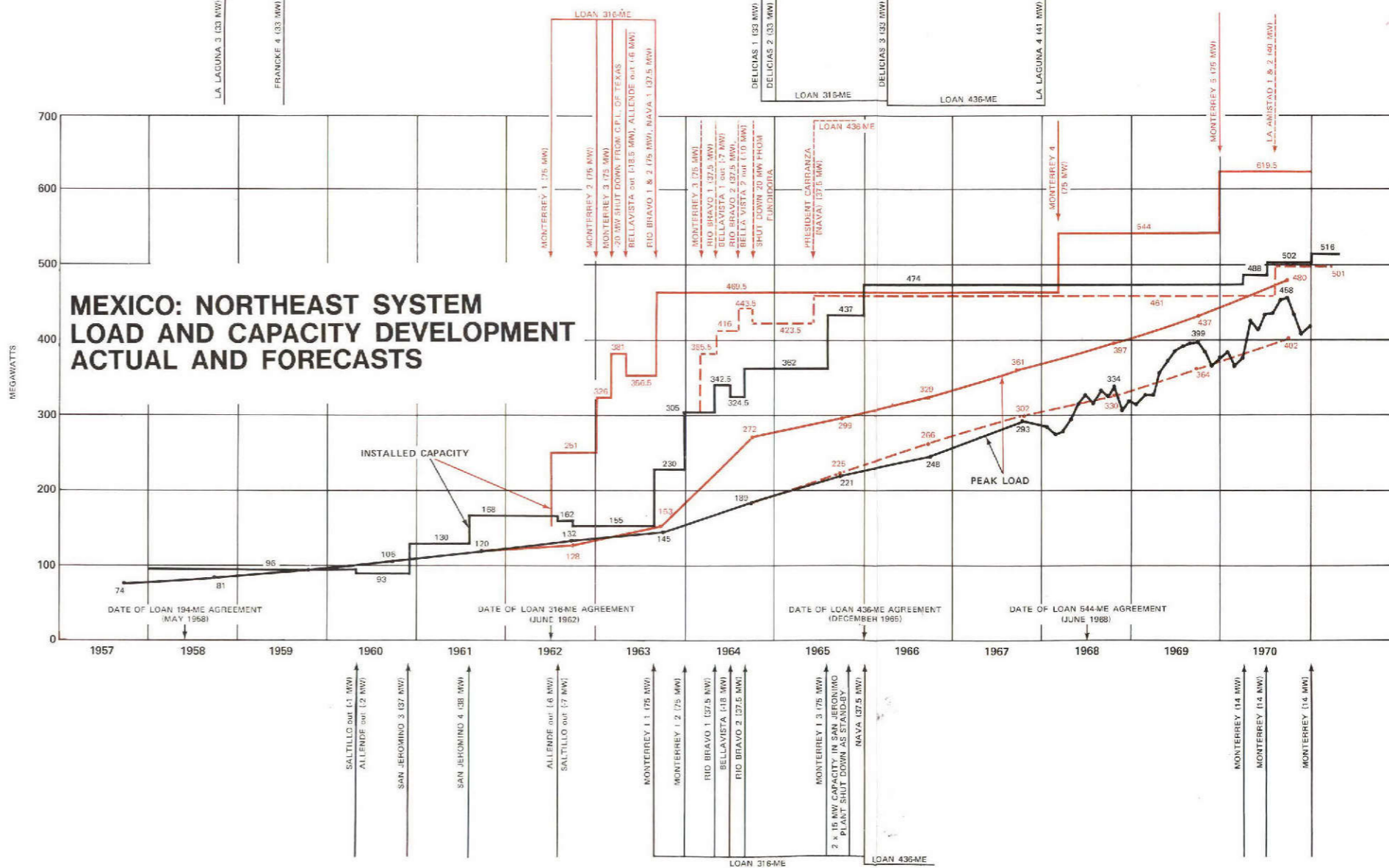
DATE OF LOAN 658-ME AGREEMENT (FEB 1970)



MEXICO: NORTHERN SYSTEM LOAD AND CAPACITY DEVELOPMENT ACTUAL AND FORECASTS



MEXICO: NORTHEAST SYSTEM LOAD AND CAPACITY DEVELOPMENT ACTUAL AND FORECASTS



SINGAPORE PUBLIC UTILITY BOARD-ELECTRICITY DEPARTMENT

TABLE I

	UNIT	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	Av. an. inc. rate(%) 1958-1963 1963-1970	
OPERATIONS																
1. Installed Capacity (year-end)																
Thermal	MW	150	150	150	150	175	197	197	317	437	437	437	557	617		
Diesel	MW	--	--	27	27	27	27	27	27	27	27	27	27	27		
Total	MW	150	150	177	177	202	224	224	344	464	464	464	584	644	8.3	16.3
Total as % Total in Country ^{a/}	%	98.7	98.7	99.4	97.8	98.1	98.2	98.2	98.8	99.1	99.1	99.1	99.2	99.3		
2. Peak Demand	MW	106	113	118	128	139	151	169	192	223	248	283	320	377	7.3	14.0
3. Gross Reserves	MW	44	37	59	49	63	73	55	152	241	216	181	264	267	10.6	20.4
4. Reserves as % of Peak Demand	%	41.5	32.7	50.0	38.3	45.3	48.3	32.5	79.2	108.1	87.1	64.0	82.5	70.8		
5. Effective-Peak Spare Capacity	MW	9	1	40	33	35	20	39	44	78	72	101	80	109	17.3	27.4
6. Gross Generation	GWh	571	616	659	720	794	823	914	1047	1236	1424	1639	1876	2206	7.6	15.1
7. Generation Sent-out	GWh	536	576	624	684	749	784	870	993	1166	1346	1553	1774	2077	7.9	14.9
8. Total Sales	GWh	492	525	578	637	691	730	828	912	1075	1238	1447	1653	1942	8.2	15.0
9. Number of Customers	000's	86.6	93.1	98.2	106.5	118.7	133.1	146.5	169.3	186.0	202.3	218.8	244.4	267.6	9.0	10.5
10. Number of Employees	No.	2220	2190	2450	2633	2721	2963	3119	3304	3648	3750	3855	4237	4650	5.9	6.6
FINANCES																
11. Sales Revenues ^{b/}	S\$mIn	37.06	39.45	42.17	47.19	50.29	53.74	59.84	64.69	75.16	88.82	101.30	122.72	141.50	7.7	14.8
12. Operating Costs ^{c/}	S\$mIn	25.94	25.99	29.12	32.09	32.41	33.89	38.40	47.56	50.99	54.11	55.31	59.93	61.52	5.5	8.9
13. Average Revenue/kwh Sold	S¢	7.53	7.51	7.31	7.41	7.29	7.36	7.23	7.09	6.99	7.17	7.00	6.87	6.71	-0.4	-1.3
14. Average Cost/kwh Sold	S¢	5.27	4.95	5.04	5.04	4.69	4.64	4.64	5.21	4.74	4.37	3.82	3.62	3.17	-2.6	-5.6
15. Average Revenue/kwh Sold ^{e/}	US¢	2.46	2.45	2.39	2.42	2.38	2.41	2.39	2.32	2.28	2.34	2.29	2.25	2.19		
16. Average Cost/kwh Sold ^{e/}	US¢	1.76	1.65	1.68	1.68	1.56	1.52	1.52	1.70	1.55	1.43	1.25	1.21	1.04		
17. Net Revenues (11 - 12)	S\$mIn	11.12	13.46	13.05	15.10	17.88	19.85	21.44	17.13	24.17	34.71	45.99	62.79	79.98	12.3	22.0
18. Gross Fixed Investments	S\$mIn	16.71	20.83	9.38	15.27	18.98	35.87	67.11	53.22	49.09	40.88	80.56	56.40	84.29	11.5	13.0
19. Av. Net Fixed Assets in Operation	S\$	145.00	155.70	161.30	163.65	162.12	171.48	198.94	246.10	297.57	315.98	324.17	374.64	422.28	3.4	13.7
MANAGEMENT INDICATORS																
20. Rate of Return (17 as % of 19)	%	7.7	8.6	8.1	9.2	11.0	11.6	10.8	7.0	8.1	11.0	14.2	16.8	18.9		
21. Financial Rate of Return ^{d/}	%	8.2	9.2	8.7	9.1	11.8	12.1	11.3	6.1	7.2	9.3	12.4	12.8	14.5		
22. Financial Rate of Return of PUB	%				8.9	10.6	9.3	9.6	4.9	7.4	9.2	11.6	11.5			
23. Self-financing Rate ^{e/}	%	30.6	67.6	83.2	87.3	67.7	92.4	32.7	28.8	23.5	45.7	35.5	57.9	38.0		
24. Debt Service Coverage ^{f/}	times	1.6	1.7	1.8	2.0	2.3	2.9	2.8	1.8	2.1	2.0	2.1	2.3	2.1		
25. Debt/Equity Ratio	./.	n.a.	n.a.	n.a.	63/37	56/44	48/52	52/48	55/45	57/43	56/44	56/44	52/48	53/47		
26. Energy Sales per Employee	MWh	221.6	239.7	235.9	241.9	253.9	246.4	265.5	276.0	294.7	330.1	375.3	390.1	417.6	2.1	7.8
27. Residential Customers as % of Households	%	28.8	30.6	31.8	34.1	37.6	41.6	45.2	51.6	56.0	58.9	61.6	66.5	70.4		
28. Distribution Losses (7-8/7)	%	8.3	8.9	7.4	6.9	7.8	6.9	4.8	8.1	7.8	8.0	6.8	6.8	6.5		
29. Average Capacity Out of Service as % of Installed Capacity	%	16.5	17.8	13.1	9.4	10.3	12.2	8.4	7.6	11.0	24.9	15.5	20.7	18.8		
30. PUB's Investments in Distribution as % of Total	%	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	45.5	57.0	41.7	52.3	34.2	55.2	65.7 ^{h/}		
31. PUB's Investment as % of Total Investments in Country	%	n.a.	n.a.	6.6	6.5	7.2	11.0	15.9	11.2	10.4	7.9	11.3	5.7	6.0		

a/ Includes captive plants.

b/ Revenues from sales of electric power only, including indirect taxes starting in 1969.

c/ Including depreciation, but excluding interest and direct taxation on utility.

d/ Net revenues after taxes as % of average net fixed assets in operation.

e/ Net internal cash generation as % of total applications of funds. See tables II-B.

f/ Times debt service was covered by operating income (including non-power revenues) and depreciation.

g/ Constant exchange rate US \$ 1 = S \$ 3.

h/ Provisional.

SINGAPORE PUBLIC UTILITY BOARD - ELECTRICITY DEPARTMENT

TABLE II-A.1

LOAN 337-SI (May, 1963)

	1962	1963	1964	1965	1966	1967	1968	Av. an. inc. rate-% 1963-68
<u>LOAD FORECASTS (MW)</u>								
1. Installed Capacity		197	224	334	334	334	405	15.5
2. Firm Capacity ^{a/}		172	172	257	257	257	317	13.0
3. Annual Peak Demand		156	165	183	194	237	249	9.8
4. Spare Capacity (2-3)		16	7	74	63	20	68	33.0
<u>ACTUAL LOAD (MW)</u>								
5. Installed Capacity	202	224	224	344	464	464	464	15.7
6. Average available capacity	181	197	205	318	413	349	392	14.7
7. Annual Peak Demand	139	151	169	192	223	248	283	13.4
8. Average spare capacity (6-7)	42	46	36	126	190	101	109	21.0
9. Effective-Peak Capacity ^{b/}	171	170	207	221	286	310	367	16.6
10. Effective-Peak Demand ^{b/}	136	150	168	177	208	238	266	12.1
11. Effective-Peak Spare Capacity (9-10)	35	20	39	44	78	72	101	38.0
<u>LOAD FORECAST ACCURACY</u>								
12. Firm Capacity		87	84	81	62	74	81	
13. Annual Peak Demand		103	98	95	87	96	88	
14. Spare Capacity		35	19	59	33	20	62	
<u>SALES FORECASTS (Gwh)</u>								
15. Gross Generation		900	945	1038	1135	1438	1510	9.0
16. Sales: Residential ^{d/}		366	391	417	443	469	496	5.2
Public Lighting		14	15	15	16	17	18	4.3
Industrial Use ^{e/}		402	416	470	528	765	798	12.1
Total		782	822	902	987	1251	1312	10.9
<u>ACTUAL SALES (Gwh)</u>								
17. Gross Generation	794	823	914	1047	1236	1424	1639	14.8
18. Sales: Residential ^{d/}	345	382	436	424	471	496	518	6.3
Public Lighting	13	14	15	18	21	23	26	13.2
Industrial Use ^{e/}	n.a.	334	377	470	583	720	903	22.0
Total	689	730	828	912	1075	1239	1447	14.7
<u>SALES FORECAST ACCURACY^{c/}</u>								
19. Gross Generation		109	103	99	92	101	92	
20. Sales: Residential		96	90	98	94	94	96	
Industrial Use		120	110	100	91	106	88	
Total		107	99	99	92	101	91	
<u>RETURN FORECAST (S \$ mln)</u>								
21. Operating Revenues ^{f/}		58.3	60.7	65.5	70.4	80.8	85.1	7.8
22. less: Operating Costs ^{g/}		36.9	40.0	42.5	45.7	50.9	51.9	7.1
23. Operating Income		21.4	20.7	23.0	24.7	29.9	33.2	9.2
24. Financial Rate of Return on Average Net Fixed Assets in Operation (%)		11.7	10.7	10.4	10.2	12.1	13.1	
<u>ACTUAL RETURN (S \$ mln)</u>								
25. Operating Revenues ^{f/}	53.3	56.5	62.6	67.6	76.6	89.6	102.6	12.7
26. less: Operating Costs ^{g/}	34.2	35.7	40.2	53.7	53.9	60.3	62.3	11.8
27. Operating Income	19.1	20.8	22.4	13.9	22.7	29.3	40.3	14.1
28. Financial Rate of Return on Average Net Fixed Assets in Operation (%)	11.8	12.1	11.3	6.1	7.2	9.3	12.4	
<u>RETURN FORECAST ACCURACY^{c/}</u>								
29. Operating Revenues		103	97	97	92	90	83	
30. Operating Costs		103	100	79	85	84	83	
31. Operating Income		103	92	165	109	102	82	

^{a/} Installed capacity less 25, 52, 87 MW allowed as standby in 1963, 1964 and 1965 onwards respectively. Planning concept used in projections.

^{b/} Effective Peak: critical time in year when margin between demand and available capacity was least or load shedding greatest (excluding short-term outages).

^{c/} Defined by the ratio: Forecast/Actual.

^{d/} Lighting and Fans and Domestic Power.

^{e/} Commercial and Industrial and Large Industrial Power.

^{f/} Total Revenues of the Department, not including indirect taxes.

^{g/} Including depreciation and direct taxation on utility, but excluding interest.

SINGAPORE PUBLIC UTILITY BOARD - ELECTRICITY DEPARTMENT

TABLE II-A.2

LOAN 473-SI (Nov. 1966)

	1965	1966	1967	1968	1969	1970	Av.An.Inc. Rate (%) 1966-1970
<u>LOAD FORECASTS (MW)</u>							
1. Installed Capacity		464	464	584	584	644	8.5
2. Firm Capacity a/		379	379	499	499	559	10.2
3. Annual Peak Demand		240	287	359	418	481	19.0
4. Spare Capacity (2-3)		139	92	140	81	78	-15.5
<u>ACTUAL LOAD (MW)</u>							
5. Installed Capacity	344	464	464	464	584	644	8.5
6. Average available capacity	318	413	349	392	463	523	6.1
7. Annual Peak Demand	192	223	248	283	320	377	14.0
8. Average spare capacity (6-7)	126	190	101	109	143	146	-6.8
9. Effective-Peak Capacity b/	221	286	310	367	379	455	12.3
10. Effective-Peak Demand b/	177	208	238	266	299	346	13.6
11. Effective-Peak Spare Capacity (9-10)	44	78	72	101	80	109	8.7
<u>LOAD FORECAST ACCURACY c/</u>							
12. Firm Capacity		92	108	127	108	107	
13. Annual Peak Demand		108	116	127	131	128	
14. Spare Capacity		73	91	128	57	53	
<u>SALES FORECASTS (Gwh)</u>							
15. Gross Generation		1207	1374	1642	1911	2123	15.1
16. Sales: Residential d/		451	478	505	534	565	5.8
17. Public Lighting		20	22	23	25	26	6.8
Industrial Use e/		586	702	909	1113	1267	21.3
Total		1057	1202	1437	1672	1858	15.1
<u>ACTUAL SALES (Gwh)</u>							
17. Gross Generation	1047	1236	1424	1639	1876	2206	15.6
18. Sales: Residential d/	424	471	496	518	567	638	7.9
Public Lighting	18	21	23	26	28	31	10.2
Industrial Use e/	470	583	720	903	1058	1273	21.6
Total	912	1075	1239	1447	1653	1942	15.9
<u>SALES FORECAST ACCURACY c/</u>							
19. Gross Generation		98	96	100	102	96	
20. Sales: Residential		96	96	97	94	89	
Industrial Use		101	97	101	105	100	
Total		98	97	99	101	96	
<u>RETURN FORECAST (\$ \$ mln)</u>							
21. Operating Revenues f/	75.8	88.6	100.7	113.1	123.0		12.9
22. less: Operating Costs g/	56.9	59.2	66.0	74.8	81.8		9.5
23. Operating Income	18.9	29.4	34.7	38.3	41.2		21.0
24. Financial Rate of Return on Average Net Fixed Assets in Operation (%)		6.1	8.4	8.8	8.6	8.8	
<u>ACTUAL RETURN (\$ \$ mln)</u>							
25. Operating Revenues f/	67.6	76.6	89.6	102.6	115.1	131.9	14.6
26. less: Operating Costs g/	53.7	53.9	60.3	62.3	67.3	70.5	6.9
27. Operating Income	13.9	22.7	29.3	40.3	47.8	61.4	28.0
28. Financial Rate of Return on Average Net Fixed Assets in Operation (%)	6.1	7.2	9.3	12.4	12.8	14.5	
<u>RETURN FORECAST ACCURACY c/</u>							
29. Operating Revenues		99	99	98	98	93	
30. Operating Costs		105	98	106	111	116	
31. Operating Income		83	100	86	80	67	

- a/ Installed capacity less 1-60 MW and 1-25 MW units out of commission for inspection and overhaul.
- b/ Effective Peak: critical time in year when margin between demand and available capacity was least or load shedding greatest (excluding short-term outages).
- c/ Defined by the ratio: Forecast/Actual.
- d/ Lighting and fans, and domestic power.
- e/ Commercial and Industrial, and Large Industrial power.
- f/ Total Revenues of the Department, not including indirect taxes.
- g/ Including depreciation and direct taxation on utility, but excluding interest.

SINGAPORE PUBLIC UTILITY BOARD - ELECTRICITY DEPARTMENT

TABLE II-A.3

LOAN 503-SI (July, 1967)

	1965	1966	1967	1968	1969	1970	1966-1970
<u>LOAD FORECASTS (MW)</u>							
1. Installed Capacity		464	464	584	557	617	7.4
2. Firm Capacity ^{a/}		379	379	499	472	532	8.8
3. Annual Peak Demand		223	281	331	383	440	18.4
4. Spare Capacity (2-3)		156	98	168	89	92	-14.1
<u>ACTUAL LOAD (MW)</u>							
5. Installed Capacity	344	464	464	464	584	644	8.5
6. Average available capacity	318	413	349	392	463	523	6.1
7. Annual Peak Demand	192	223	248	283	320	377	14.1
8. Average spare Capacity (6-7)	126	190	101	109	143	146	-6.8
9. Effective-Peak Capacity ^{b/}	221	286	310	367	379	455	12.3
10. Effective-Peak Demand ^{b/}	177	208	238	266	299	346	13.6
11. Effective-Peak Spare Capacity (9-10)	44	78	72	101	80	109	8.7
<u>LOAD FORECAST ACCURACY^{c/}</u>							
12. Firm Capacity		92	108	127	102	102	
13. Annual Peak Demand		100	113	117	120	117	
14. Spare Capacity		82	97	154	62	63	
<u>SALES FORECASTS (GWh)</u>							
15. Gross Generation	1223	1394	1668	1919	2153		15.2
16. Sales: Residential ^{d/}	470	501	534	570	608		6.7
Public Lighting	21	23	25	26	28		7.5
Industrial Use ^{e/}	580	702	909	1093	1259		21.0
Total	1071	1227	1468	1689	1895		15.3
<u>ACTUAL SALES (GWh)</u>							
17. Gross Generation	1047	1236	1424	1639	1876	2206	15.6
18. Sales: Residential ^{d/}	424	471	496	518	567	638	7.9
Public Lighting	18	21	23	26	28	31	10.2
Industrial Use ^{e/}	470	583	720	903	1058	1273	21.6
Total	912	1075	1239	1447	1653	1942	15.9
<u>SALES FORECAST ACCURACY^{c/}</u>							
19. Gross Generation		99	98	102	102	98	
20. Sales: Residential		100	101	103	100	95	
Industrial Use		99	97	101	103	99	
Total		100	99	101	102	98	
<u>RETURN FORECAST (S \$ mln)</u>							
21. Operating Revenues ^{f/}		77.7	91.4	104.7	117.3	129.1	13.5
22. less: Operating Costs ^{g/}		52.4	59.5	67.9	75.6	85.6	13.1
23. Operating Income		25.3	31.9	36.8	41.7	43.5	14.5
24. Financial Rate of Return on Average Net Fixed Assets in Operation (%)		8.2	9.0	9.8	9.7	8.9	
<u>ACTUAL RETURN (S \$ mln)</u>							
25. Operating Revenues ^{f/}	67.6	76.6	89.6	102.6	115.1	131.9	14.6
26. less: Operating Costs ^{g/}	53.7	53.9	60.3	62.3	67.3	70.5	6.9
27. Operating Income	13.9	22.7	29.3	40.3	47.8	61.4	28.0
28. Financial Rate of Return on Average Net Fixed Assets in Operation (%)	6.1	7.2	9.3	12.4	12.8	14.5	
<u>RETURN FORECAST ACCURACY^{c/}</u>							
29. Operating Revenues		101	102	102	102	98	
30. Operating Costs		97	99	109	112	121	
31. Operating Income		111	109	91	87	71	

a/ Installed Capacity less 1-60 MW and 1-25 MW units out of commission for inspection and overhaul.

b/ Effective Peak: the critical time in year when margin between demand and available capacity was least or load shedding greatest (excluding short-term outages).

c/ Defined by the ratio: Forecast/Actual.

d/ Lighting and fans, and domestic power.

e/ Commercial and Industrial, and Large Industrial Power.

f/ Total Revenues of the Department, excluding indirect taxes.

g/ Including depreciation and direct taxation on utility, but excluding interest.

SINGAPORE PUBLIC UTILITY BOARD - ELECTRICITY DEPARTMENT
UTILITY INVESTMENT PROGRAMS PARTLY FINANCED BY IBRD (U.S. \$ Million)

TABLE II-B

	LOAN 337-SI (1963) PERIOD 1963-1966				LOAN 473-SI (1966) PERIOD 1966-1970				LOAN 503-SI (1967) PERIOD 1967-1970			
	FORECAST		ACTUAL		FORECAST		ACTUAL		FORECAST		ACTUAL	
	Total	% of total	Total	% of total	Total	% of total	Total	% of total	Total	% of total	Total	% of total
<u>SOURCES OF FUNDS</u>												
1. Net Internal Cash Generation	28.50	64	23.20	35	45.17	43	50.18	39	35.49	37	45.36	43
2. Domestic Contribution:												
from public sector ^{a/}	-		19.63	31	35.30	34	10.66	8	29.33	31	5.66	5
from private sector	.80	2	1.61	2	2.02	2	3.23	3	1.23	1	2.71	3
Total	.80	2	21.24	33	37.32	36	13.89	11	30.56	32	8.37	8
3. Foreign Borrowing:												
Suppliers Credits ^{b/}	-		.03	-	7.83	8	22.33	18	10.10	11	22.30	21
IBRD	15.01	34	20.70	32	13.49	13	40.79	32	18.78	20	30.57	26
Total	15.01	34	20.73	32	21.32	21	63.12	50	28.88	31	52.97	49
4. Total Sources	44.31	100	65.17	100	103.81	100	127.19	100	94.93	100	106.70	100
<u>APPLICATIONS OF FUNDS</u>												
5. Total Fixed Investments	43.30	98	68.43	105	98.99	95	103.74	82	89.45	94	87.38	82
6. Changes in Working Capital and Net Cash Accrual	1.01	2	-3.26	5	4.82	5	23.45	18	5.48	6	19.32	18
7. Total Applications	44.31	100	65.17	100	103.81	100	127.19	100	94.93	100	106.70	100
8. Debt Service	16.57		18.06		41.62		48.85		43.09		42.61	

	Terms of Loans:	Interest (%)	Amortization (yrs)
a/	Government loans	5 3/4	20
b/	Suppliers credits	6	3 - 15

SINGAPORE PUBLIC UTILITY BOARD-ELECTRICITY DEPARTMENT
I.B.R.D. PROJECTS IMPLEMENTATION

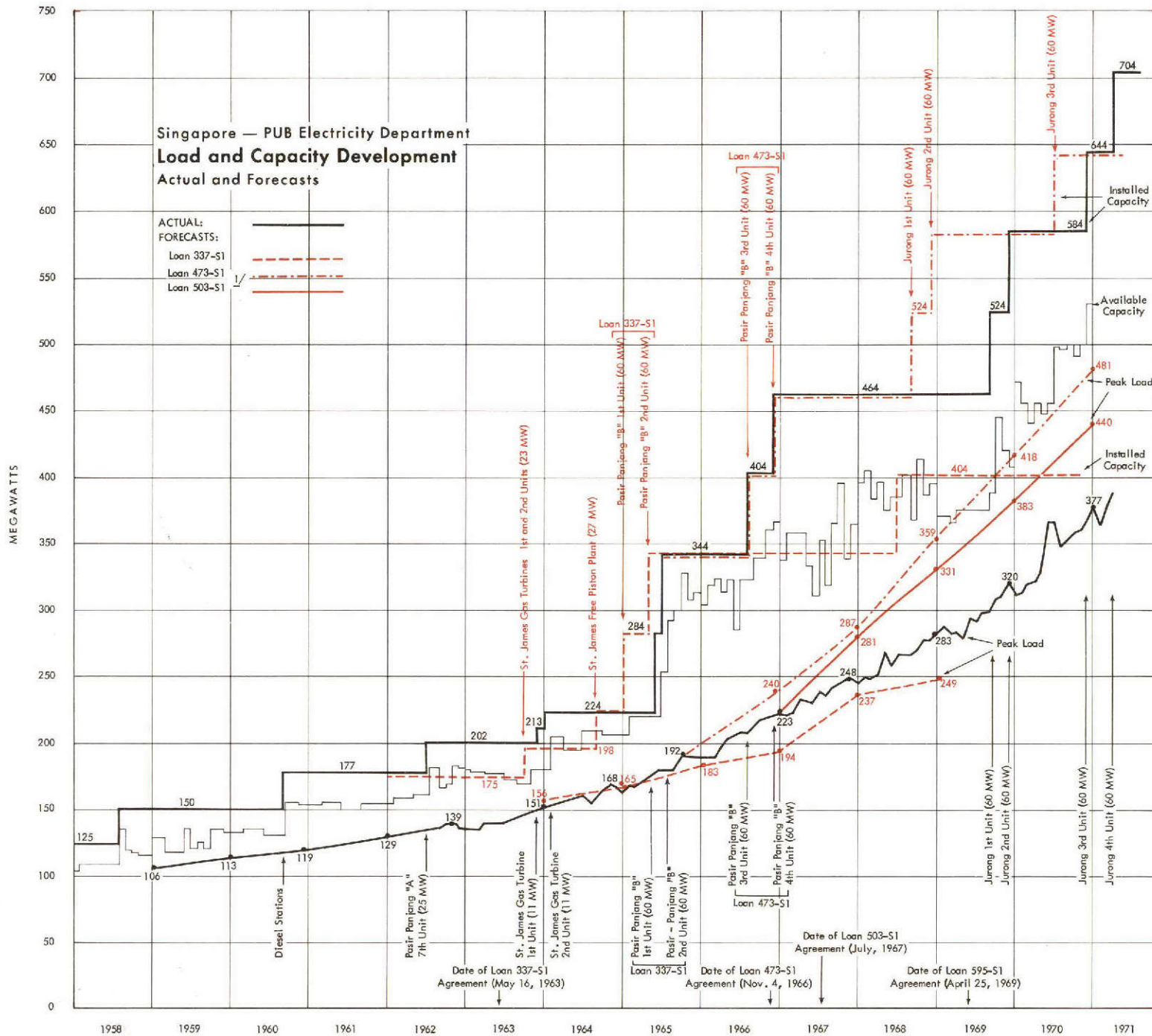
TABLE III

		Start Construct.	Commis-sioning Date	Construct. Period (months)	Project Scope	CONSTRUCTION COST (US\$ million)			COST/KV. US\$
						L.C.	F.X.	Total	
<u>LOAN 337-SI (US\$ 15 million)</u> (Signed May 1963)									
Pasir Panjang "B" Station 1st Stage	Forecast	Jan. 1963	May 1965	29	2x60 MW Thermal	6.48	15.08	21.56	179.7
	Actual	Jan. 1963	Jul. 1965	31	2x60 MW	6.57	13.59	20.16	168.0
<u>LOAN 473-SI (US\$ 10 million)</u> (Signed Nov. 1966)									
Pasir Panjang "B" Station 2nd Stage	Forecast	Oct. 1964	Oct. 1966	24	2x60 MW Thermal	3.00	10.00	13.00	108.3
	Actual	Oct. 1964	Dec. 1966	26	2x60 MW	3.30	9.56	12.86	107.2
<u>LOANS 337-SI & 473-SI</u> (US\$ 15 mln and US\$ 10 mln)									
Total Pasir Panjang "B" Station	Forecast	Jan. 1963	Oct. 1966	46	4x60 MW Thermal	9.48	25.08	34.56	144.0
	Actual	Jan. 1963	Dec. 1966	48	4x60 MW	9.47	23.55	33.02	137.5
<u>LOAN 503-SI (US\$ 23 million)</u> (Signed July 1967)									
Distribution System Expansion	Forecast	1967-1968	program	24	232 km & 430MVA	10.0	14.30	24.30	
	Actual	1968-1969	program	24	315 km & 432MVA	6.06	13.08	19.14	
<u>PROJECTS NOT COVERED BY IBRD LOANS 2/</u>									
Jurong Thermal Station	Actual	Sept. 1967	Apr. 1971	40	4x60 MW Thermal	11.92	24.09	36.01	150.0

LOAN DISBURSEMENT PATTERN

LOAN			1963	1964	1965	1966	1967	1968	1969	1970	Undisbursed 12/31/70
<u>LOAN 337-SI</u>	Forecast:	Amount (US\$ mln)	2.13	10.31	2.15	.41					
		% of Total	14.2	68.8	14.3	2.7					
		Cumulative %	14.2	83.0	97.3	100.0					
	Actual:	Amount (US\$ mln)	.24	7.91	2.19	2.68	1.38				
		% of Total	1.7	54.9	15.2	18.6	9.6				
		Cumulative %	1.7	56.6	71.8	90.4	100.0				.6 3/
<u>LOAN 473-SI</u>	Forecast:	Amount (US\$ mln)			9.39	.61					
		% of Total			93.9	6.1					
		Cumulative %			93.9	100.0					
	Actual:	Amount (US\$ mln)			7.57	1.59	.84				
		% of Total			75.7	15.9	8.4				
		Cumulative %			75.7	91.6	100.0				
<u>LOAN 503-SI</u>	Forecast:	Amount (US\$ mln)				5.94	7.37	1.70			
		% of Total				39.6	49.1	11.3			
		Cumulative %				39.6	88.7	100.0			
	Actual:	Amount (US\$ mln)				4.87	4.34	4.42			1.37
		% of Total				32.5	28.9	29.5			9.1
		Cumulative %				32.5	61.4	90.9			

1/ Project scope is Megawatts (MW) of installed capacity and source of energy in the case of Generation projects, and kilometers of lines erected (6.6 kv, 22 kv, 66 kv) and MVA capacity of substations in the case of distribution items.
2/ For comparative purposes only.
3/ Canceled.



✓ The Loan 503-S1 forecast for installed capacity is virtually identical to that of the Loan 473-S1 forecast and therefore has not been separately indicated.

Chart 8.1

