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STAFF APPRAISAL REPORT

BRAZIL

SOUTH-SOUTHEAST POWER DISTRIBUTION PROJECT

March 10, 1978

Projects Department
Latin America and the Caribbean Regional Office

CURRENCY EQUIVALENTS[1/]

Currency Unit	=	Brazilian Cruzeiro (Cr$)
Cr$1.00 = 100 centavos	=	US$0.0697
Cr$1,000,000	=	US$69,700
US$1.00	=	Cr$14.35
US$1,000,000	=	Cr$14,350,000

ABBREVIATIONS AND ACRONYMS

CELESC	=	Centrais Eletricas de Santa Catarina
CEMIG	=	Centrais Eletricas de Minas Gerais
DNAEE	=	Departamento Nacional de Aguas y Energia Eletrica
ELETROBRAS	=	Centrais Eletricas Brasileiras S.A.
ESCELSA	=	Espirito Santo Centrais Eletricas S.A.
ELETROSUL	=	Centrais Eletricas do Sul do Brasil S.A.
FURNAS	=	Furnas Centrais Eletricas S.A.
GCOI	=	Grupo Coordenador para Operação Interligada
IDB	=	Inter-American Development Bank
LIGHT	=	LIGHT - Serviços de Eletricidade S. A.
MME	=	Ministry of Mines and Energy
NDF	=	National Development Fund

MEASURES AND EQUIVALENTS

kW	=	Kilowatt
MW	=	Megawatt (1,000 kW)
kWh	=	Kilowatt hour
GWh	=	Gigawatt hour (million kWh)
kV	=	Kilovolt (1,000 volts)
kVA	=	Kilovolt - ampere
MVA	=	Megavolt - ampere (1,000 kVA)
km	=	kilometer (0.6214 mile)
average MW	=	average Megawatt (8.76 x avg. MW = GWh).

FISCAL YEAR

January 1 to December 31

1/ The exchange rate on June 30, 1977 was used to compute currency equivalents in this report.

BRAZIL

STAFF APPRAISAL REPORT ON THE SOUTH-SOUTHEAST POWER DISTRIBUTION PROJECT

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This report is based on the findings of an appraisal mission which visited Brazil during July 1977. The mission comprised Messrs. Rafael A. Moscote, Sergio Contreras, Alain Barbu and Alejandro Perez.

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CHAPTER 1

THE SECTOR

Energy Resources

1.01 The principal source of energy in Brazil is petroleum, which in 1976 accounted for about 44% of total energy consumption, estimated to be 105×10^{13} kcal; 29% of consumption was in the form of wood products and wastes, 24% was of hydraulic origin and about 3% was in the form of coal and natural gas.

1.02 Brazil's proven oil reserves are limited. Present domestic production of crude covers only 18% of the country's oil requirements. The country's main producing fields of oil and natural gas are located in the Northeast region. To increase domestic production, the Government is accelerating exploration. To this end, the Government is seeking to attract the participation of foreign firms in the exploration and possible exploitation of the oil reserves in certain areas and has already signed several risk contracts.

1.03 Bituminous and sub-bituminous coal reserves, which are located in the South, are estimated at 3200 million tons. Coal extraction is rather costly because shaft mining is predominantly required. This notwithstanding, coal has played an important role in the South, providing base generation to the power system.

1.04 Brazil is endowed with one of the largest hydro potentials in the world, estimated at about 150,000 MW of which only about 18,400 MW have already been utilized and 30,000 MW more are under construction or are planned to be installed by 1990. Approximately 50% of the potential is located in the Southern, Southeastern and Northeastern regions, and has been surveyed in some detail. The remainder, which has been estimated on the basis of topographical characteristics, stream flow, and rainfall is located in the Amazon region. The hydro potential remaining to be used in the South and Southeast is relatively costly since most of the cheap potential in those areas has already been used or is in the process of being tapped. Further economic utilization of these resources would require construction of long transmission lines and a proportion of non-hydro generating capacity to firm up existing hydroelectric generating capacity.

1.05 Brazil has a high ratio of electricity consumption to consumption of commercial fuel. This high ratio is partly due to its warm climate which eliminates the need for space heating. Another reason is the scarcity and high price of petroleum products and availability of cheap hydroelectric power. Brazil's ratio 1/ of 2.0, compared to 1.2 for Argentina, 1.0 for Mexico, and 0.9 for Venezuela, displays the importance of primary electricity

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1/ In kWh of electricity per kg of oil equivalent of all commercial fuels, excluding that used for power generation.

in supplying the energy requirements of the country. Production of electric energy, which in 1976 was 88,381 GWh, has increased at a rate of 12.2% p.a. from 1970 to 1976; per capita consumption increased during the same period from 481 to 705 kWh. These data compare with those pertaining to Mexico (10.5% p.a. growth and 764 kWh per capita in 1976) and Argentina (8% p.a. growth from 1970 to 1976 and 1,156 kWh per capita in 1975).

1.06 Nuclear power is expected to play a major role in power generation after 1990. By 1985, about 3,000 MW of nuclear generating capacity is expected to be in operation in the Southeastern region, the largest demand center of the country. The first unit of 600 MW, constructed by Westinghouse (USA), is expected to be in operation in 1979. An additional 2400 MW have been contracted for under the Brazil-West Germany Nuclear Agreement of June 27, 1975 which also gives Brazil an option to purchase six additional 1200 MW units.

1.07 Other fuels used include firewood, charcoal and sugar cane bagasse. Firewood is used only in some small industries and for domestic consumption in rural areas. Charcoal is used domestically and in blast furnaces and small steel mills. Sugar cane bagasse is used as fuel to produce steam for the processing of sugar. The above three fuels now contribute about a quarter of Brazil's energy but their usage is expected to remain stable and thus they will represent a rapidly decreasing proportion of the total.

1.08 Other types of energy are of insignificant importance at the moment. Known reserves of natural gas are modest, the main producing fields and utilization being located in the Northeast. Few sites for tidal energy can be found along the Brazilian coast and there are no known sources of geothermal energy.

Energy Use in the Southern and Southeastern Regions

1.09 The Southern region, with 18% of Brazil's population, accounted for about 12% of the total electric energy consumption of the country in 1976. The Southeastern region, with 42% of the country's population consumed 74% of the total electric energy in 1976. The two regions, where most of the country's economic and industrial activities are located have 60% of the population, and consumed in 1976 about 78% of all energy and 86% of electric energy. Electric energy consumption in the Southern region has grown at a rate of 15.2% p.a. in the last five years, while the annual consumption per capita was about 650 kWh in 1976. The region's consumption is expected to grow at an average rate of 12.7% p.a. through 1985 and the per capita consumption should reach 1,375 kWh by that year. In the Southeastern region, consumption has been growing at a rate of 11.2% p.a. in the last 5 years, and consumption per capita was about 1,650 kWh in 1976. Consumption there is expected to grow at 9.6% p.a. and per capita consumption is expected to reach 2,700 kWh in 1985.

The Role of the Sector in the Economy

1.10 The provision of an adequate and reliable electric service is essential for the development of the country's industries, which in 1975 used 55% of all electric energy consumed while accounting for about 39%

of Brazil's GDP, contributing about 35% of export earnings and providing for about 33% of all non-agricultural employment. The growth of the energy sector in general, and its rapidly growing power subsector in particular, have more than kept pace with Brazil's dynamic economic development. Since 1962 a very good correlation has existed between electric energy consumption and GDP; the rate of growth of electricity consumption was 1.2 times that of GDP for the period 1962-1975 while from 1970 to 1975, it was 1.28 times that of GDP. From 1974 through 1977, electricity consumption grew at about 12% p.a. while GDP grew at 7% p.a., reflecting a ratio of growth of electricity consumption to GDP growth of 1.7, and a trend for its substitution for other forms of energy.

History of Bank Group Involvement with Sector

1.11 Since 1949, the Bank has made 30 loans to the Brazilian power sector, mostly for hydroelectric generation projects in the Southern and Southeastern regions. This lending has helped strengthen sector organization and planning, contributed to the building of efficient power enterprises and facilitated foreign capital inflows to the sector. Bank lending has assisted the Government in its efforts to maintain tariff policies that have enabled the sector to generate a substantial proportion of the funds needed to meet its investment requirements. Project performance audit reports have been distributed to the Executive Directors on both power distribution 1/ and generation projects. 2/ These reports conclude that, despite delays and cost overruns in their execution, the projects supported by Bank loans were basically successful.

1.12 The Bank's most recent involvement in financing distribution investment in Brazil was in the Northeast Power Distribution Project (Loan 1300-BR). That project consisted of the distribution program of three State-owned Northeastern utilities. The US$50 million loan was made to Centrais Eletricas Brasileiras S. A. (ELETROBRAS) and relent by that entity to the three utilities. Besides providing financial support, the project is helping strengthen the management and planning of the companies.

1.13 The proposed loan, which would be the second operation in the Bank with ELETROBRAS for the distribution subsector, would seek much the same objectives as the previous one with respect to the two smaller beneficiaries - Centrais Eletricas de Santa Catarina S. A. (CELESC) and Espirito Santo Centrais Eletricas S. A. (ESCELSA) - and would provide valuable financial support to the larger one - Centrais Eletricas de Minas Gerais S. A. (CEMIG).

Sector Organization and Regulation

1.14 The Brazilian power sector, though large and complex, is well organized and its policies are well designed and implemented. The legal, technical and

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1/ Loans 475/476/477/478-BR (Sec M 75-646 of September 4, 1975).

2/ Loan 404-BR (Sec M 77-532 of June 28, 1977); Loans 442-BR and 566-BR (Sec M 78-34 of January 13, 1978).

administrative foundations of the present sector organization were established by Decree 68,204 dated June 7, 1967. According to this degree, the structure consists of the National Department of Water and Electric Energy (DNAEE), ELETROBRAS and the various federal, state, municipal and private concessionaires all under the jurisdiction of the Ministry of Mines and Energy (MME).

1.15 DNAEE performs the regulatory functions. It is a powerful instrument for implementation of national policy as it grants licenses for hydroelectric sites, assigns concession areas, sets tariffs and approves expansion plans. However, until recently DNAEE had played a relatively passive role. In February 1974, through a Ministerial decision, the structure of DNAEE was expanded for the purposes of allowing it to take a more aggressive and positive regulatory role. The principal responsibilities of DNAEE remain the same but the specific activities undertaken by it in meeting those responsibilities have now been considerably enhanced. Some positive results are already in evidence through its efforts to promote operating and administrative efficiency when determining which operating costs are recognized as such for tariff-setting purposes.

1.16 ELETROBRAS (see paras. 2.01-2.09) performs the function of: (a) a holding company for those utilities in which the Federal Government has acquired financial control, (b) a financial institution administering and allocating public funds among its subsidiaries and electric utilities owned by state governments and coordinating sector borrowings from abroad, and (c) a coordinating and consulting group with planning functions which assists the development of the country's electrification programs by providing technical, managerial and training services.

1.17 In accordance with government policy, the construction and operation of the majority of new power generation facilities is entrusted to ELETROBRAS' four principal subsidiaries. These bulk suppliers are Centrais Eletricas do Norte do Brasil (ELETRONORTE) covering the North and part of the Center-West; Companhia Hidro Eletrica do São Francisco (CHESF) covering the Northeast; Furnas - Centrais Eletricas (FURNAS) covering the Southeast and part of the Center-West; and Centrais Eletricas do Sul do Brasil (ELETROSUL) covering the South. A joint Brazilian-Paraguayan entity, Itaipu Binacional, is responsible for the Itaipu hydroelectric project located on the Parana river on the border with Paraguay.

1.18 The transmission function in Brazil is presently shared between the federally-owned bulk suppliers and state-owned utilities. Extra high voltage transmission (500 kV and above) is for the most part the responsibility of the federal utilities, medium voltage subtransmission (69 to 138 kV) is largely handled by the state utilities, while responsibility for high voltage transmission (230 kV) is shared.

1.19 To maximize the economic benefits to the country from operation of the generating and transmission facilities and to attain the maximum operating and financial efficiency for the system as a whole, the Federal Government established in November 1973, regional coordinating groups (Grupos Coordenadores para Operação Interligada-GCOI), in which ELETROBRAS and the

operating utilities participate. The GCOI were charged with coordinating and directing the operations of the individual generating plants and transmission systems. There are now two such groups: a large and very well organized group for the Southeastern and Southern regions (which has become very successful in directing the operations of the interconnected system) and a smaller group for the Northeastern region.

1.20 In accordance with government policy, the power distribution function at the state level is carried out mainly by utilities controlled by the state governments. In line with this policy, there have been in recent years a number of acquisitions and mergers of smaller municipally- and privately-owned distribution companies by state-owned utilities as well as transfers to them of some of ELETROBRAS' subsidiaries engaged in distribution. Today, with the exception of the Rio de Janeiro and São Paulo areas which are served principally by Light - Serviços de Eletricidade, S. A. (LIGHT), a privately-owned enterprise, most of the power distribution is made through one company in each state. The main distribution companies (those with annual sales over 500 GWh p.a.) are: CESP and CPFL in São Paulo, CEMIG (Minas Gerais), LIGHT (Rio de Janeiro and São Paulo), ESCELSA (Espirito Santo), CBEE/CELF (Rio de Janeiro), CELG (Goias) and CEB (Brasilia) in the Southeastern region; COPEL (Parana), CELESC (Santa Catarina) and CEEE (Rio Grande do Sul) in the Southern region; CELPA (Para) in the Northern region; and COELBA (Bahia), COELCE (Ceara) and CELPE (Pernambuco) in the Northeastern region.

Power Tariffs

1.21 Bills rendered to consumers of electricity include the following charges:

A. The basic tariffs (shown in Annex B, T-1 for CEMIG, CELESC and ESCELSA). On a nation-wide basis, basic tariffs provide 77% of the revenues collected from consumers. According to law, these basic charges should be set at levels which cover:

(a) operating, maintenance and administrative expenses;

(b) taxes other than on income (mainly property taxes);

(c) foreign exchange losses arising from the service of borrowings in foreign exchange;

(d) straight line depreciation of estimated average gross fixed assets in operation (land excluded);

(e) reversion, which is a tax levied by the Federal Government of up to 5% of assets in operation to secure funds to: (i) lend to the concessionaries for expansion of their respective services; (ii) compensate private concessionaires for the purchase of assets; and (iii) finance the Global Guarantee Fund (para. 1.22);

(f) a legal return (normally between 10 and 12%) on remunerable investment. The latter consists of net average utility plant in service plus an allowance for working capital.

B. The sole tax (imposto unico) on residential and commercial electricity consumption, which provides 12% of the revenues, imposed since 1954 at different rates for different levels of consumption and types of consumers to provide additional financial resources to the sector. 40% of the proceeds from this tax goes to Federal agencies (ELETROBRAS, DNAEE, MME and the NDF), 50% to the states and federal district, and 10% to the municipalities; and

C. The Compulsory Loan (10% of the revenues), which is a forced investment scheme through which industrial consumers with monthly consumption in excess of 2,000 kWh are required to purchase ELETROBRAS' 20-year, 6% interest bearing bonds which are subject to monetary correction.

1.22 In 1973, the tariff authorities began implementing a government policy intended to reduce regional inequalities and to promote geographically balanced economic growth. In 1976, the average tariff level to final consumers was equalized for the whole country, with minor exceptions. Thus, returns on remunerable assets for the utilities with relatively higher costs may be below the 10% minumum established by law. The Global Guarantee Fund is a redistributive mechanism established to harmonize the rate equalization effort with the service at cost principle. It is financed by a surcharge of up to 2% on assets in operation of the financially more efficient utilities (those earning more than the maximum allowed to them by DNAEE). These funds are then channelled to those utilities which achieve a return of less than 10% in order to compensate for their shortfalls.

1.23 The beneficiaries have agreed to maintaining their earnings (including transfers from the Global Guarantee Fund) at levels consistent with sound financial and public utility practices and in accordance with existing legislation. They have also agreed that, in the event they require transfers from the Fund, they will attain targets established by DNAEE. The Federal Government has agreed that DNAEE will take timely action on the beneficiaries' requests for tariff adjustment and transfers. Finally, the Federal Government has confirmed the Bank's understanding that DNAEE will exercise its statutory powers to allow the beneficiaries a return on remunerable assets of at least 10%. Any change in legislation which would materially and adversely affect the beneficiaries' financial position, would be an event of default.

1.24 The tariff <u>levels</u> dictated by the system summarized in the preceeding paragraphs, have up to now been adequate for allowing a reasonable return on invested capital and sector contributions to capital investments. The question whether this will continue to be so in the future is currently under study by DNAEE (para. 1.36). Several characteristics of present tariff <u>structures</u>, such as the lack of differentiation between consumption during peak and off-peak hours, and the rate equalization effort require examination. The tariff structure does contain generally desirable features such as separate demand and energy charges for industrial and commercial consumers, discounts to encourage large industrial consumers to accept supply at higher voltages, and a special treatment for low income consumers based on social considerations. A study is now being undertaken under the direction of DNAEE, with

assistance from Electricite de France to analyze, inter alia, the above features and to provide additional information for evaluating the economic impact of pricing policy. Under Loan 1300-BR, the Government agreed to present the results of this study (expected to be completed by mid-1979) to the Bank.

Electricity Consumption

1.25 Electricity consumption is linked with essential economic activity in the country; consumption by industry, which accounted for about 57% of the total in 1977 is the fastest growing category. Below is a summary of electricity consumption since 1965:

REGION	GWh 1965	1970	1975	1976	1977 a/b/ GWh	%
Category of Consumer						
NORTH						
Residential	64	137	279	315	349	30
Commercial	27	80	186	280	284	24
Industrial	36	68	337	294	267	23
Others	33	61	196	250	274	23
Total	160	346	998	1,139	1,174	100
NORTHEAST						
Residential	432	868	1,431	1,610	1,674	19
Commercial	201	453	852	940	1,072	13
Industrial	725	1,552	4,227	5,009	5,985	54
Others	308	532	1,090	1,260	1,276	14
Total	1,666	3,405	7,600	8,819	10,007	100
SOUTHEAST AND CENTER WEST						
Residential	4,058	6,470	10,133	10,884	11,799	20
Commercial	2,677	4,116	6,693	7,425	8,168	13
Industrial	9,656	16,228	28,720	33,318	32,941	56
Others	2,654	3,693	6,238	6,543	7,164	22
Total	19,045	30,507	51,784	58,170	60,072	100
SOUTH						
Residential	612	1,047	1,793	1,960	2,030	22
Commercial	352	638	1,422	1,500	1,560	16
Industrial	1,119	1,764	3,637	4,823	4,728	48
Others	361	603	1,015	1,220	1,420	14
Total	2,444	4,052	7,867	9,503	9,738	100
ALL BRAZIL						
Residential	5,166	8,522	13,636	14,769	16,983	19
Commercial	3,257	5,287	9,153	10,145	10,590	12
Industrial	11,536	19,612	36,921	43,444	49,529	57
Others	3,356	4,889	8,539	9,273	10,214	12
Total	23,315	38,310	68,249	77,631	87,316	100

a/ Preliminary figures.

b/ Regional figures refer to the largest utilities in each region - 23 for the country - which accounted for about 97% of all sales of electricity and about 92% of all consumption.

Existing Facilities

1.26 Total installed generating capacity as of the end of 1976 was about 21,800 MW, of which 84% or 18,400 MW was hydro. In 1975, 95% of the total installed capacity was devoted to the public service. The following table indicates the existing capacity in the country by type and by ownership:

	PUBLIC SERVICE						SELF-PRODUCERS			TYPE			
	ELETROBRAS' subsidiaries		State and Municipal		Private					Hydro		Thermal	
Year	MW	% of Total	MW	% of Total	MW	% of Total	MW	% of Total	Total MW	MW	% of Total	MW	% of Total
1965	---------- not available ----------								7,411	5,391	72	2,020	28
1970	3,812	34	4,138	38	2,333	21	950	8	11,233	8,828	78	2,405	22
1975	7,629	39	8,594	44	2,333	12	1,022	5	19,578	16,193	82	3,385	18
1976	9,034	41	8,692	40	2,119	10	1,951	9	21,796	18,411	84	3,385	16
1977[a/]	---------- not available ----------								22,797	19,198	84	3,599	16

Of the 3,385 MW of thermal generating capacity in 1976, 34% is oil-fired steam units, 51% is diesel and the remainder (15%) is coal-fired steam units.

1.27 The transmission system consists of about 25,000 km of lines at 230 kV and above, linking power stations and load centers as well as the systems of various utilities. Interregional transfers are, as yet, limited. The following table illustrates the development of the transmission systems over the last years.

(in circuit km)

	1970	1971	1972	1973	1974	1975	1976
230 kV	11,316	11,429	11,493	12,005	12,725	13,409	14,714
345 kV	2,681	3,300	3,456	4,081	4,431	4,962	5,301
440 kV	1,096	1,096	1,096	2,329	2,708	2,982	3,225
500 kV	-	-	-	-	360	360	1,693
TOTAL	15,093	15,825	16,045	18,415	20,224	21,713	24,933

a/ Preliminary figures.

Access to Service

1.28 It is estimated that virtually 100% of the urban population of the country has access to electric service while some 80% of the total urban population in Brazil and about 87% of the urban population of the Southern and Southeastern regions are actually receiving electric service. Service in rural areas (with 41% of the total population) appears to be extremely low, judging from partial data from the Northeastern region in which 98% of the farmers and a large proportion of the villages are without electricity. The Government expects to further increase the provision of electric service both in urban and rural areas. The proposed programs of the beneficiaries would directly assist the implementation of this policy by expanding the capacity of lines and substations that would feed rural areas and low income urban areas (see paras. 4.07 and 4.08).

Rural Electrification

1.29 Rural electrification on a national level was started in 1970 when the Instituto Nacional de Colonizacao e Reforma Agraria, a self-governing agency attached to the Ministry of Agriculture, was made responsible for the planning, promotion and control of rural electrification. Progress, however, was slow (4 to 5 thousand customers/year) and in 1974, ELETROBRAS created a rural electrification department to complement the activities carried out by the Ministry of Agriculture. ELETROBRAS' approach to rural electrification has been that of financing distribution networks in rural areas close to existing lines. It does not finance household wiring or connection fees. ELETROBRAS provides 50-80% of the cost of individual rural electrification projects (the overall average for 1976 was 58%), with the rest being supplied by the utilities. ELETROBRAS' loan terms are 15 years, including 5 years grace, and 12% interest on the principal (which is not subject to monetary correction).

1.30 About 17,000 rural customers (defined as rural cooperatives, or agricultural or agro-industrial producers) were connected in 1976 through ELETROBRAS-assisted programs, with a total cost of about US$40 million. Of these new customers, 5826 were located in the Southeastern region and 7856 in the Southern region. Over the period 1978-1980, ELETROBRAS expects to participate in projects costing a total of about US$540 million, or close to half of the total planned investments for distribution and connect about 200,000 rural consumers. About 1% of these connections would be in the North, 15% in the Northeast, 50% in the Southeast, 29% in the South and 5% in the Center West.

Sector Investment Program

1.31 Power sector investments for 1971-75 (actual) and for 1976-80 (projected) are shown as follows:

	(in 10^6Cr$ - mid-1975 prices) 1971-1975 Cr$	1971-1975 % of Total	1976-1980 Cr$	1976-1980 % of Total
Generation	46,267	56	78,373	53
Transmission	20,339	25	44,579	30
Distribution	10,596	13	15,537	11
Administration	4,888	6	8,839	6
Total	82,090	100	147,328	100

1.32 An increasing proportion of investments are being carried out at the federal level, through ELETROBRAS and its subsidiaries, as illustrated below (in 10^6Cr$ at mid-1975 prices).

	1970 (actual)		1975 (actual)		1980	
Entity	Cr$	%	Cr$	%	Cr$	%
Federal level	2,954	31	8,903	42	15,516	64
State level	5,662	59	10,085	48	5,780	24
Others	944	10	2,012	10	2,870	12
Total	9,560	100	21,000	100	24,166	100

Sector Manpower

1.33 In general, the sector is well staffed with qualified persons in responsible positions. 126,638 persons were employed in the sector at the end of 1976, of which 67,893 (54%) were in the Southeastern region and 22,641 (18%) in the Southern region. Training and development of the staff, at all levels, is accomplished by ELETROBRAS and the utilities in 27 training centers. About US$12 million were spent to train 41,000 people (32% of the total employees of the sector) in 1976. The training programs have been judged by the Bank to be comprehensive, well-managed and effective. Through a US$15.4 million program (of which US$4.3 million is being financed by the Bank under Loan 1343-BR), ELETROBRAS expects to meet the advanced, specialized training requirements of the sector during the next four years.

Constraints on Sector Development

1.34 There are no organizational constraints that might impede sector development. The high level of investment required in the power sector, about 8 to 9% of gross capital formation, and the Government's present policy of limiting public sector investment as a part of its program to control inflation, may result in insufficient availability of funds in the future. The proposed master plan (para. 2.09) should reveal any problems in this area in time for corrective action to be taken.

1.35 The Government has been moving away from the previous automatic reinvestment in the power sector of funds generated by the sector. A growing proportion of sector funds are now channelled through the National Development Fund (NDF). The NDF mechanism is potentially effective in assisting the Federal Government to exercise control over sectoral investment programs. However, for the power sector, the NDF implies a curtailment of ELETROBRAS' role in allocating resources. Since the sector's net cash generation is unlikely to exceed its minimum net financial requirements (at least through completion of Itaipu in the late 1980s), NDF's intervention may simply result in additional administrative complications. Any constraints for the power sector, however, are likely to be offset by the benefits obtained in the economy as a whole as a result of the discipline associated with NDF review of investments.

1.36 More serious constraints could originate in the long run from the inability of key utilities (including CEMIG, one of the beneficiaries of the proposed project) to generate sufficient funds internally to make a reasonable contribution to the financing of their expansion programs. This concern has prompted DNAEE to undertake a review of sector financial requirements and the adequacy of tariff levels. This study is currently under way, together with a review of tariff structure previously agreed with the Bank (para. 1.24). DNAEE intends to present the results of its review (including a financial forecast for the sector as a whole through 1985) to the Bank by December 30, 1979.

CHAPTER 2

THE BORROWER AND THE BENEFICIARIES

The Borrower

2.01 The borrower is ELETROBRAS (paras. 1.14, 1.16), an open stock corporation established in 1961 and almost entirely (99.6% as of December 31, 1976) owned by the Federal Government.

2.02 ELETROBRAS acts as the Government's financing agency for the electric power sector in Brazil and may be compared to a development bank in allocating and channelling the funds necessary to support the sector's growth. It channels funds to various parts of the sector by means of loans, investment in additional shares of common stock of the recipients and direct grants. In allocating funds, ELETROBRAS maintains tight financial and technical control and borrowers are required to present detailed financial and engineering information on any project for which financing is sought.

2.03 ELETROBRAS' role in the project consists of coordinating its development locally, and serving as a channel for on-lending the proceeds of the proposed Bank loan to the beneficiaries. ELETROBRAS has also agreed to review on a regular basis progress of the project during construction and start of operations and on the beneficiaries' performance and submit reports to the Bank every six months. ELETROBRAS would provide part of the local currency financing for the project through its normal loan and equity channels.

2.04 The proposed Bank loan of US$130 million is not large in relation to ELETROBRAS' total gross assets, which at year-end 1976 amounted to about Cr$67 billion (US$5.4 billion). Since the financial appraisal shows that the beneficiaries will be in a generally sound condition and should not encounter difficulty in servicing their portion of the proposed loan, it was not considered necessary, as under loan 1300-BR, to conduct an appraisal of ELETROBRAS' future finances. ELETROBRAS' financial statements are summarized in Annex A. As shown therein, ELETROBRAS' outstanding capital amounted to Cr$22 billion at year-end 1976. Its resources consist of net internal cash generation (dividends received, interest on its loan portfolio, loan amortization receipts and miscellaneous other income, less debt service and less net dividend payments) which in the period 1971-76 averaged 34% of total resources; sole tax (para. 1.21), 8%; reversion reserve (para. 1.21), 22%; compulsory loans (para. 1.21), 21%; federal budgetary appropriations, 3%; and borrowings, 12%. Outstanding long-term borrowings (45% of long-term capitalization) at year-end 1976 totalled Cr$ 28.3 billion (about US$2.3 billion equivalent), of which 40% was in the form of debentures arising from the compulsory loans, 29% represented reversion accruals to the Federal Government, 20% came from foreign borrowings (IDB, bilateral agencies, commercial banks and utility holding companies) and 11% from domestic loans. ELETROBRAS' large and growing sources of funds constitute a broad base for expanding its borrowings, and it is becoming increasingly active in foreign financial markets.

2.05 ELETROBRAS is managed by a Board and an Executive Directorate. The Board is composed of a Chairman appointed by the President of the Republic, five Directors and two to four Advisers appointed by the Shareholders' General Assembly for a three-year term, and two Advisers appointed by those shareholders which are also legal entities. The Executive Directorate is composed of the Chairman and five Directors. The Board has been entrusted with the responsibility for devising fundamental policies. The Executive Directorate has all top-level management functions according to the Board's general guidelines.

2.06 In its role as the planning and coordinating agency for the electric power sector, ELETROBRAS is responsible for carrying out the policy established by the MME for the sector's long-term development. In this role ELETROBRAS is also involved in coordinating regional development plans and undertaking studies for joint development projects with neighboring countries.

2.07 In establishing development plans ELETROBRAS relies principally on five-year budgets which it prepares in conjunction with other sector entities. These budgets have the purpose of assisting ELETROBRAS and the Government in selecting those projects which will meet projected power demand and in providing adequate financial support. The budgets are updated and revised annually; however ELETROBRAS has not been entirely successful in this function and the 1976-1981 budget was not issued until December 1977.

2.08 ELETROBRAS has built up a large, competent organization with a staff of about 1,600. Through the leverage obtained from its financing role, ELETROBRAS has been able to supervise operations of the utilities for economical and orderly sector growth. Among its coordinating responsibilities, ELETROBRAS assists in the transfer of hydroelectric power among the country's regions to minimize operation of thermal plants, and will gradually increase its involvement in power allocation between utilities as the national grid system becomes fully developed by the mid-eighties.

2.09 With the expected completion of the interconnection of the South, Southeast, North and Northeast in the early-eighties, inter-regional transfers would take place throughout almost the entire country. This requires that the development of the country's power sources and the system expansion plans be based on an integrated perspective of the country's long-term power requirements and available power resources. Such an overall country analysis would enable power sector expansion plans to be based on the least cost alternative program. Moreover, such an analysis should examine a 20 to 25-year horizon. Present planning methods, while reasonably satisfactory for the relatively short-term regional exercises conducted in the past (covering 11 years in the case of the South-Southeast and 6 years in that of the Northeast) are not suitable to meet the need outlined above. The Bank has offered to assist ELETROBRAS in developing improved planning methods. ELETROBRAS has indicated that by December 31, 1979 it will prepare a master plan for power sector expansion for the whole country through the year 2000. ELETROBRAS would exchange views with the Bank regarding the methodology, scope of work and terms of reference to be followed in such planning and would make available the plan to the Bank as and when needed in support of the appraisal of future power projects in Brazil.

The Beneficiaries

Centrais Eletricas de Minas Gerais S. A. (CEMIG)

2.10 CEMIG was created on May 22, 1952 and is governed by Minas Gerais State Law No. 828 of December 14, 1951. CEMIG is managed by its ten member-Board elected by the Shareholders' meeting for a 3 year period. The Executive Directorate, composed of seven directors, is appointed by the Shareholders' Meeting for a 3 year period; the meeting also chooses from among the Executive Directors, one President and two Vice Presidents. The President is the Chief Executive Officer. The organizational structure shown in Annex B, C-1 is well designed and the company is capably staffed. CEMIG's staff numbers 8600 and staff relations are good. The utility serves 1.1 million customers (about 131 customers per employee which is adequate considering the characteristics of its service area). CEMIG's paid in capital as of December 31, 1976 amounted to Cr$4.1 billion of which 68% was owned by the State of Minas Gerais, 16% by ELETROBRAS and 16% by others (mostly private shareholders).

2.11 CEMIG has received four previous Bank loans for a total of US$142.9 million equivalent. The first three projects have been completed; the two most important of these, the Jaguara and the Volta Grande hydroelectric schemes, for which the Bank made loans in 1966 and 1968, were completed 5-1/2 years and nine months, respectively, later than the appraisal estimate, with cost over-runs amounting to US$61.4 million equivalent (68% of appraisal estimate) and US$123.6 million equivalent (130% of appraisal estimate), respectively. The cost overruns were due to local and foreign costs higher than expected at appraisal which resulted from foundation problems, inflation and increasing lag between rising local construction costs and exchange rate readjustments. The fourth (the 1,000 MW São Simao hydroelectric project, financed under loan 829-BR of June 14, 1972) is well advanced and the first units have started operation about three months before the date estimated at the time of appraisal. Costs, now estimated at about US$750 million, are about 90% over the appraisal estimate of US$396 million, due mostly to higher than expected inflation, although changes in the number and size of the units and more excavation than expected have also contributed to the overrun. The overruns did not affect the feasibility of the projects as fuel prices increased even more than the projects.

2.12 CEMIG has established a fully owned subsidiary - Eletrificaçao Rural de Minas Gerais, S. A. (ERMIG) with a paid-in capital, as of the end of 1976, of Cr$ 80.4 million. Its purpose is to build rural electrification facilities financed by state rural cooperatives and other rural customers; once the facilities are built, operating responsibilities are sometimes entrusted to ERMIG under contracts with the cooperatives.

Training

2.13 CEMIG maintains a training center considered as one of the best in the Latin American and Caribbean region. It provides training in the areas of operation and maintenance of electrical systems to medium-level technical personnel of CEMIG's own staff and to staff from other Brazilian electricity companies. CEMIG's annual training expenditures amounted to Cr$ 21 million in 1976, 3.5% of annual gross payroll.

Management Systems

2.14 CEMIG has very sophisticated financial systems for planning and budgeting purposes. Annual budgets are prepared by the Financial Planning Department which puts together all budgets and financial forecasts and projections, all of which are updated periodically. Management reports are satisfactory.

Accounting and Audit

2.15 CEMIG's accounting system is satisfactory and well suited to the utility's needs. Internal control functions are vested in the Internal Audit Department which reports to the Financial Director. This arrangement, while unusual, functions very well for CEMIG. Internal Audit carries out an adequate program of financial and operational audits and follow-up on past recommendations.

2.16 CEMIG employs as its external auditors the international accounting firm Arthur Andersen and Co., which is acceptable to the Bank. In addition, the Fiscal Council, appointed by the Shareholders' Meeting, carries out external control duties in accordance with Brazilian legislation.

Billings and Collections

2.17 CEMIG's billings are carried out by its data processing system, and collections by the banking system. In case of non-payment, the service is suspended between 15 and 30 days after due date; the suspension is triggered by a control system which signals the date at which suspension of service becomes economical; actual enforcement is very good.

Risk Management

2.18 CEMIG's assets have been insured against most common risks such as fire, accident and civil liability, in accordance with accepted public utility practices. Insurance is well administered.

Centrais Eletricas de Santa Catarina S.A. (CELESC)

2.19 CELESC was created on December 9, 1955, by Santa Catarina State Decree No. 22. The company is managed by the General Assembly which appoints, for a four year period, a Directorate composed of a President and four Directors and which is in charge of the day-to-day management functions; responsibility for objectives, policies, organization and direction of the company is vested in the President. CELESC has about 3900 employees and serves about 420,000 customers (a ratio of 107 customers per employee which is adequate considering the characteristics of its service area).

2.20 The organizational structure (shown in Annex B, C-2) is well designed. However, the company lacks effective coordination between departments and has agreed to engage satisfactory consultants, under terms of reference acceptable to the Bank, to make recommendations by June 30, 1979, for improving coordination as well as reporting, budgeting (para. 2.23), auditing, accounting (para 2.24) and assisting in training (para. 2.22). CELESC has agreed to present to

the Bank by June 30, 1979 the consultants' recommendations and CELESC's proposal for their implementation. CELESC should implement such of its consultant's recommendations as shall be acceptable to the Bank and to CELESC in accordance with a timetable to be agreed with the Bank. The engagement of these consultants is a condition of disbursement of CELESC's portion of the loan.

2.21 CELESC's paid-in capital as of December 31, 1976 amounted to Cr$617 million of which 80% was owned by the Government of the State of Santa Catarina and its agencies, 14% by ELETROBRAS, 3% by the municipalities and 3% by private shareholders.

Training

2.22 CELESC maintains a training center for technical personnel in operation and maintenance of electrical systems; it also provides training for similar personnel from other Brazilian electricity companies. It has recently lost several key members of its professional staff and is actively recruiting new staff. It has, however, been forced to assign to these new staff members responsibilities beyond their capabilities. It has agreed to prepare with the assistance of the consultants mentioned in para. 2.20, by June 30, 1979, a training program for its professional staff to enable it to adequately carry out its tasks, and to implement such program as agreed with the Bank.

Management Systems

2.23 CELESC's management systems are weak. An annual operating budgeting system has recently been designed and is in the process of implementation; although the system design appears adequate for the company's needs, its operation lacks the necessary basic managerial orientation. Financial forecasts and projections are prepared without much regard for coordination among the various areas that should be involved in the process. CELESC's reporting system is weak and top management is inadequately apprised of developments in most areas. To at least partly compensate for this deficiency and mainly to improve communications, management has recently started a program of executive meetings at various levels. The organizational consultants to be contracted are also expected to make recommendations regarding the reporting system and budgeting controls.

Accounting and Audit

2.24 Accounting is discharged without the proper coordination with the needs of other departments of the utility and without the required knowledge of existing sector rules and regulations. Internal audit, which reports directly to the President of the company, is weak. The organizational consultants to be contracted should also make recommendations regarding accounting and auditing. The external auditors' report on internal control points to a large number of trouble spots, some at the policy level. CELESC's accounts have been audited by the firm of independent accountants MABAL, which are acceptable to the Bank, and, in addition, in accordance with Brazilian legislation, external control duties are carried out by the Fiscal Council, appointed by the Shareholders' Meeting.

Billing and Collections

2.25 CELESC's procedures in this area are appropriate to the utility's needs; reporting on billings and collections is adequate. Collection is carried out through the banking system.

Risk Management

2.26 CELESC has insured its assets against most common risks such as fire, accident and civil liability, in accordance with accepted public utility practices. Insurance is well administered.

Espirito Santo Centrais Eletricas S.A. (ESCELSA)

2.27 ESCELSA was created in July 1, 1968, by merger of Companhia Central Brasileira de Força Eletrica (CCBFE), previously acquired by ELETROBRAS from American Foreign Power, with Espirito Santo Centrais Eletricas S.A. - ESCELSA, the state-owned utility. The company is managed by a Board of Directors appointed for a 3 year period by the Shareholders' Assembly; the Board is composed of a President and five Directors who are in charge of the day-to-day operations of the company. ESCELSA has about 1800 employees and serves 174,000 customers (87 customers per employee which is adequate considering the characteristics of its service area).

2.28 The organizational structure (shown in Annex B, C-3) is well designed. However, the company lacks effective coordination between departments and would engage satisfactory consultants, under terms of reference acceptable to the Bank to make recommendations by June 30, 1979, for improving coordination as well as budgeting (para. 2.31), accounting and auditing (Para. 2.32), and assisting in training (para. 2.30). ESCELSA has agreed to present to the Bank by June 30, 1979 the consultants recommendations and ESCELSA's proposal for their implementation. ESCELSA should implement such of its consultant's recommendations as shall be acceptable to the Bank and to ESCELSA in accordance with a timetable to be agreed with the Bank. The engagement of these consultants is a condition of disbursement of ESCELSA's portion of the loan.

2.29 ESCELSA's paid in capital as of December 31, 1976, amounted to Cr$488 million of which 92% were owned by ELETROBRAS, 6% by the Government of the State of Espirito Santo, and 2% by the municipalities and other minority shareholders.

Training

2.30 ESCELSA does not have a training center of its own but it provides, internally as well as externally, courses in the technical and administrative areas. It does not have enough qualified, experienced professional staff and is actively recruiting new staff. It has, therefore, been forced to assign to staff members responsibilities beyond their capabilities. It has agreed to prepare with the assistance of the consultants mentioned in para. 2.28, by June 30, 1979 a training program for its professional staff to enable it to adequately carry out its tasks, and to implement such programs as agreed with the Bank.

Management Systems

2.31 Preparation and control of ESCELSA's annual budgets are entrusted to the Economic-Financial Directorate. The budgeting system has been improved over the last several years but further improvements are required. Financial forecasting is new to ESCELSA and the company should improve its staff's knowledg of the available techniques. The organization consultants should also make recom mendations concerning budgeting and financial forecasting (para. 2.28).

Accounting and Audit

2.32 ESCELSA's Internal Auditor, who reports directly to the President, is currently developing appropriate auditing programs and manuals. The internal control report of the external auditors calls the attention to deficiencies in the accounting and internal control systems and the organizational consultants to be contracted should also make recommendations regarding accounting and auditing (para. 2.28).

2.33 ESCELSA contracts the services of the independent external auditing firm Boucinhas, Campos, Claro S/C Ltda., which are acceptable to the Bank. In addition, because of the Federal Government's interests (through ELETROBRAS) in ESCELSA, the Tribunal de Contas da Uniao of the Ministry of Mines and Energy carries out periodic audits of ESCELSA's accounts. The Fiscal Council appointed by the Shareholders' Meeting, also carries out external control duties in accordance with Brazilian legislation.

Billings and Collections

2.34 ESCELSA's billings and collections seem very efficient since the company has less than 40 days' billings outstanding. Some of the meters are read by an outside company; collections are carried out through the banking system. After ten days' delay in payment of bills, ESCELSA starts charging penalty interest.

Risk Management

2.35 ESCELSA insures its assets against most common risks such as fire, accident and civil liability, in accordance with accepted public utility practices. The utility hires the risk management consulting services of Servicos Tecnicos de Levantamento e Inspeçao Ltda (SERTEC), a privately-owned consulting company. In accordance with Brazilian Government practices, ESCELSA insures its assets with the insurance company designated annually, by drawing, by the Instituto do Reaseguros do Brasil (IRB), the Brazilian Government agency which regulates insurance.

CHAPTER 3

THE MARKET AND THE MEANS TO MEET IT

Historical Market

3.01 Public-service electricity consumption in the areas served by CEMIG, CELESC and ESCELSA grew at an average annual rate of about 14, 23 and 22%, respectively, during the period 1972-1976. The growth in the average consumption per customer was about 6, 11 and 7% and in the number of customers, about 8, 12 and 14%. As may be seen in Table 3-1, the power market of all three companies has been increasingly dominated by the industrial market (76, 59 and 67% of all sales to the ultimate consumers in 1976, up from 72, 52 and 61% in 1972).

The Forecast

3.02 The forecast of energy sales to the industrial sector is based on a detailed analysis made by the companies and reviewed by ELETROBRAS, regarding the status of implementation of major industrial projects. In most cases, these major industries commit themselves contractually to purchase energy by a certain date, or pay demand charges even if their need for power is postponed. The utilities' analyses cover both these firmly committed loads and other, generally smaller prospective customers. All three companies update their analyses periodically and generally keep abreast of events which may affect their forecasts. The lesser industries as well as the residential, rural and commercial sectors have been forecast on the basis of the recent trends. The resulting forecasts (Table 3-1) indicate that the three power markets will maintain high average growth rates through the project construction period. The average annual rate of growth of sales from 1976 to 1982 is forecast to be 16.5% for CEMIG, 17.3% for CELESC and 29% for ESCELSA.

3.03 The 1978-1981 construction program of the three beneficiaries, of which the project is part, would be instrumental in increasing both the absolute and relative numbers of households served with public service electricity. It is expected that the emphasis placed on connecting low income consumers (see para. 4.07) will contribute to achieving this goal (See Annex B, T-2).

The Energy and Capacity Balance

3.04 The requirements for electricity generation by the beneficiaries and energy purchases by them from FURNAS and ELETROSUL, the regional bulk-suppliers, have been forecast under the assumption that the beneficiaries would be able to maintain their losses and unaccounted-for usage of electricity at their present value of about 9% or less. The three utilities would be capable of meeting their energy and power requirements on the basis of their own plants plus purchases from FURNAS or ELETROSUL under average hydrological conditions (see Annex B, T-3 and T-4). Both bulk suppliers are aware of the projected demands by their customers and are willing to enter into contractual arrangements to supply their requirements. However, the capacity of FURNAS and

ELETROSUL to meet their contractual commitments or of the utilities to increase their purchases from these suppliers or neighboring utilities depends upon the combined behavior of the system which serves the Southern and Southeastern region of the country and which are expected to be fully interconnected by 1981. It is therefore necessary to analyze the system's requirements and availabilities as a whole. ELETROBRAS, jointly with all of the utilities operating in the region, performed this analysis (see Annex B, T-5) in early 1977 on the basis of late 1976 projections. In the case of CEMIG, CELESC and ESCELSA, these are between 11 and 15% higher than those resulting from the present forecast (Table 3-1). It may be seen that if generating stations now under construction are not unreasonably delayed, the system will, in general, be capable of supplying the requirements throughout the project construction period even under adverse hydrological conditions. It may also be seen that if Itaipu and/or the next unit at Angra are delayed and if adverse hydrological conditions occur in 1982 or 1983, there may be curtailments in the supply. This analysis, however, is somewhat outdated as after these studies were carried out, a new, lower energy requirements forecast has been prepared and the installation program for new generating units has changed (i.e., CEMIG now plans to install Nova Ponte and Igarapava - para. 4.03 - and Salto da Divisa and Itapebi have been postponed beyond 1987). ELETROBRAS is currently making a new analysis based on the revised forecast and program. ELETROBRAS and the utilities normally review and update these studies every year and are thus likely to anticipate the possible consequences of a coincidence of delays and adverse hydrological conditions so that they may mitigate the effects of such occurrences.

TABLE 3-1

Actual and Forecast Power Market

	ACTUAL								(Est.)		FORECAST								AVERAGE GROWTH (%)	
	1972		1973		1974		1975		1976		1977		1978		1979		1980		1981		1982		1976/1972	1982/1976
I. SALES (GWh)		%		%		%		%		%		%		%		%		%		%		%		
CEMIG:																								
Residential	697.2	13.0	750.5	13.0	818.5	12.4	902.8	11.8	1038.5	11.6	1187.0	11.3	1315.3	10.7	1453.0	9.9	1599.4	9.3	1752.6	8.7	1914.9	8.5	10.5	10.5
Commercial[a]	661.9	12.6	717.1	12.4	829.2	12.6	920.8	12.1	1027.1	11.5	1088.1	10.5	1232.6	10.0	1395.1	9.5	1547.8	9.0	1704.3	8.5	1824.9	8.1	11.6	10.0
Industrial	3790.0	72.1	4207.0	72.7	4868.0	73.7	5686.3	74.5	6762.9	75.6	7934.2	76.4	9512.7	77.4	11580.9	79.0	13712.2	80.1	16278.5	81.3	18137.5	80.4	15.6	17.8
Rural[b]	39.7	0.7	45.1	0.8	51.7	0.8	57.4	0.8	54.3	0.6	70.0	0.6	75.9	0.6	87.6	0.6	101.1	0.6	116.8	0.6	134.3	0.6	9.4	16.5
Other	66.6	1.3	64.0	1.1	35.9	0.5	61.5	0.8	60.6	0.7	105.3	1.2	157.9	1.3	146.8	1.0	168.3	1.0	180.2	0.9	556.3[e]	2.4	8.0	45.0
Total to use	5255.4	100.0	5783.7	100.0	6603.3	100.0	7628.8	100.0	8943.4	100.0	10384.6	100.0	12294.4	100.0	14863.4	100.0	17128.8	100.0	20032.4	100.0	22567.9	100.0	14.5	16.5
Other utilities	96.6		118.3		184.2		210.2		236.3		277.0		791.7		344.5		1360.5		1153.9		613.3			
TOTAL	5352.0		5902.0		6787.5		7839.0		9179.7		10661.6		13086.1		15907.9		18489.3		21186.3		23181.2			
CELESC:																								
Residential	161.1	21.3	193.2	20.7	222.9	19.2	255.3	18.4	288.8	16.2	339.3	16.1	394.6	15.7	459.0	15.6	535.1	15.5	623.2	15.6	726.4	15.9	15.7	16.5
Commercial	96.7	12.8	115.4	12.7	140.5	12.0	172.1	12.3	197.3	11.1	240.2	11.4	278.8	11.1	319.4	10.8	364.0	10.6	413.4	10.4	463.8	10.1	19.5	15.5
Industrial	394.1	52.3	495.2	54.6	674.6	57.8	807.2	57.8	1046.2	58.9	1248.9	59.1	1504.7	59.9	1780.1	60.4	2093.4	60.8	2431.1	61.0	2794.9	61.0	27.6	17.8
Rural[b]	15.0	12.0	15.6	1.7	21.0	1.8	31.0	2.2	91.8	5.2	118.5	5.6	146.7	5.8	179.2	6.1	216.5	6.3	259.4	6.5	307.7	6.7	26.7	22.5
Other[c]	87.7	11.6	93.2	10.3	107.6	9.2	130.2	9.3	152.6	8.6	166.3	7.8	188.2	7.5	211.0	7.1	234.9	6.8	260.5	6.5	287.2	6.3	16.0	11.2
Total to users	754.6	100.0	907.6	100.0	1166.6	100.0	1395.8	100.0	1776.7	100.0	2113.2	100.0	2513.0	100.0	2948.7	100.0	3443.9	100.0	3987.6	100.0	4580.0	100.0	23.1	17.3
Other utilities	3.1		94.1		107.2		126.6		101.2		118.8		136.7		155.4		174.8		198.5		224.7			
TOTAL	757.7		1001.7		1273.8		1522.4		1877.9		2232.0		2649.7		3104.1		3618.7		4186.1		4804.7			
ESCELSA:																								
Residential	77.9	18.2	91.9	15.1	105.8	14.1	123.5	14.8	146.7	15.3	158.3	11.1	180.2	9.4	205.0	8.1	233.3	7.7	265.6	6.6	302.4	7.1	17.1	12.8
Commercial	42.6	9.9	51.1	8.4	61.1	8.2	74.8	9.0	84.8	8.9	102.0	7.1	120.7	6.3	142.7	5.6	168.9	5.6	199.8	4.9	236.4	5.5	18.8	18.6
Industrial	260.1	60.6	413.3	67.8	520.1	69.5	558.5	67.1	642.3	67.0	1075.7	75.1	1505.6	78.6	2064.5	81.4	2474.1	81.9	3174.6	78.4	3278.4	77.2	25.4	32.7
Rural[b]	1.4	0.3	1.7	8.3	2.9	0.4	3.9	0.5	5.5	0.6	5.8	0.4	7.2	0.4	8.9	0.4	11.0	0.4	13.7	0.3	17.1	0.4	40.8	21.0
Other[c]	47.2	11.0	51.6	8.4	58.7	7.8	71.6	8.6	78.8	8.2	90.2	6.3	102.3	5.3	115.9	4.5	131.7	0.4	397.3[e]	9.8	414.7	9.8	13.7	43.5
Total to users	429.2	100.0	609.6	100.0	748.6	100.0	832.3	100.0	958.1	100.0	1432.0	100.0	1916.0	100.0	2537.0	100.0	3019.0	100.0	4051.0	100.0	4249.0	100.0	22.2	29.0
Other utilities	32.6		30.1		28.3		35.7		48.3		59.0		73.0		89.0		108.0		131.0		157.0			
TOTAL	461.8		639.7		776.9		868.0		1006.4		1491.0		1989.0		2626.0		3127.0		4182.0		4406.0			
II. CUSTOMERS (average)																								
CEMIG:																								
Residential	621049		665396		710696		787212		867329		950351		1035700		1123722		1213536		1304964		1397765		8.7	8.3
Commercial[a]	82844		89357		94513		105045		113636		124000		134353		144966		155862		166905		177935		8.3	7.8
Industrial	10898		11740		13059		15142		17287		19348		21489		23688		25934		27780		29752		9.5	9.5
Rural[c]	23717		26493		29317		16586		16662		19460		23117		27219		31796		34790		36821		-9.0	14.0
Other	9383		9966		10084		10774		10861		11272		11779		12340		12946		13849		14794		4.0	5.3
TOTAL	747891		802952		857669		934859		1025775		1124431		1226438		1331930		1440074		1547688		1656867		8.2	8.2
CELESC:																								
Residential[b]	185781		205722		228520		251447		277831		313062		347940		387695		432591		479520		533705		10.8	11.5
Commercial[a]	25785		30231		34737		37934		40801		49729		56456		65522		73693		83564		94344		12.1	15.0
Industrial	3521		3869		4729		5191		5779		7005		7952		9229		10380		11771		14683		13.5	16.7
Rural[c]	17582		20675		28641		34356		38411		46000		52224		60638		68216		77336		86592		21.8	14.5
Other	3093		3260		3525		3861		4172		5040		5702		6594		7397		8360		10381		7.8	16.6
TOTAL	235762		263757		300112		332789		366994		420836		470274		529678		592277		660551		739705		11.9	12.3
ESCELSA:																								
Residential[a]	80374		96739		105527		116127		135753		146423		161115		177227		194950		214445		235889		14.0	9.6
Commercial[a]	10225		12666		13830		15281		17288		18844		20749		22847		25158		27702		30472		14.2	9.9
Industrial	1591		2186		2529		2888		3336		3942		4549		5249		6057		6981		8028		20.7	15.8
Rural[c]	242		582		749		943		1887		2358		2947		3684		4605		5756		7195		73.8	25.0
Other	1437		1666		1935		2010		2264		2636		2979		3376		3837		4363		4931		12.1	13.9
TOTAL	93869		113839		124563		137249		160528		174203		192339		212383		234607		259247		286515		14.4	10.1
III. Average use (kWh/customer - year)																								
Residential:																								
CEMIG	1123		1128		1152		1147		1197		1249		1270		1293		1318		1343		1370		1.6	2.3
CELESC	867		915		975		1015		1039		1084		1134		1184		1237		1300		1361		4.6	4.6
ESCELSA	969		950		1003		1063		1081		1081		1118		1157		1196		1239		1282		2.8	2.9
All Customers[d]																								
CEMIG	7027		7203		7700		8160		8719		9235		10024		11009		11894		12943		13621		5.6	7.8
CELESC	3173		3451		3887		4195		4695		5021		5344		5567		5814		5992		6192		10.8	4.8
ESCELSA	4572		5355		6013		6073		5968		8220		9962		11945		12868		15626		14829		6.4	16.9

a/ This classification includes consumption by commercial customers, street lighting, government offices and small water suppliers.
b/ After 1976 the rural classification refers only to customers engaged in agro-industrial activities or to rural cooperatives.
c/ This classification includes consumption by street lighting and government offices.
d/ Excluding sales to other utilities.
e/ Proposed electric traction starts.

CHAPTER 4

PROGRAM AND PROJECT

Background and Objectives

4.01 CEMIG, CELESC and ESCELSA are faced with a prospective rapid growth in electricity demands in their respective service areas. Their construction program through 1981, of which the project is part, proposes to provide the facilities required to serve the anticipated loads, mostly related to industrial growth. Failure to provide these facilities would lead to excessively costly curtailments of supply or installation of fuel-based captive generation. The program would also be instrumental in making public service electricity available to low-income customers and for rural electrification.

Generation

4.02 Of the three project beneficiaries, only CEMIG has a program for installing generating facilities. The program to be executed during the project construction period has, for the most part, been carefully studied by CEMIG and has been properly coordinated with ELETROBRAS and neighboring utilities to ensure that the soon to be interconnected system is expanded and operated in an optimum manner. CEMIG's program through 1981 includes the completion, in 1979, of the first phase (1800 MW) of the São Simão hydro station (partially financed by Loan 829-BR) and the start of construction of the 1,000 MW Emborcação hydro station (partially financed by IDB), the first units of which are expected to be commissioned by late 1981.

4.03 CEMIG's program also includes the start of construction of hydro stations at Igarapava (150 MW) and Nova Ponte (320 MW), to be commissioned by 1983. However, CEMIG is now considering deferring their commissioning until about 1987 or 1988. CEMIG has not yet demonstrated that capacity additions of this magnitude would be the least cost solution to the problem of adding capacity to the interconnected system, either in 1983 or in the latter dates. The Bank would have an opportunity to review the justification of Igarapava and Nova Ponte under the limitation on major expansion projects (para. 5.09).

Transmission

4.04 The proposed expansion plans for transmission lines and substations would allow the utilities to transmit the energy to be generated by existing and future plants to meet their anticipated load growth without reducing the quality of their services. Between the beginning of 1978 and the end of 1981, CEMIG is expected to increase the total length of its lines (34.5 kV to 500 kV) from about 12,500 km to 16,700 km and its substation capacity from about 7,000 MVA to about 12,600 MVA; CELESC would increase its lines (34.5 to 138 kV) from about 2,900 km to 3,500 km and its substation capacity from about 800 MVA to about 1,600 MVA while ESCELSA would increase its lines (34.5 to 138 kV) from 1,700 km to about 1,940 km and its substation capacity from about 275 MVA to 440 MVA.

4.05 The most important lines and substations included in the program are the following:

Transmission Lines	Substations
CEMIG:	
São Simão-Usina Jaguara: 500 kV, 350 km	Neves: 500 kV, 1,400 MVA
Jaguara-Neves: 500 kV, 350 km	Terminal Sul: 500 kV, 1,000 MVA
Neves-Ipatinga III: 500 kV, 185 km	Ipatinga III: 500 kV, 800 MVA
São Simão-Agua Vermelha: 500 kV, 95 km	
Itumbiara-Jaguara: 500 kV, 300 km	
Emborcaçao-Neves: 500 kV, 455 km	
Neves-Terminal Sul: 500 kV, 120 km	
Neves-SE Taquaril: 345 kV, 50 km	
Taquaril-Barbacena-Juiz de Fora: 345 kV, 220 km	
Tres Marias-Montes Claros: 345 kV, 50 km	
Poços de Caldas-Pouso Alegre II: 345 kV, 220 km	
Barbacena-Liberdade: 345 kV, 100 km	
Juiz de Fora-Liberdade: 345 kV, 100 km	
Pouso Alegre-Tres Coracoes II: 345 kV, 115 km	
CELESC:	
Mafra-Canoinhas: 138 kV, 65 km	Rio do Sul: 138 kV, 85 MVA
Blumenau-Ibirama: 138 kV, 58 km	Imbituba: 138 kV, 50 MVA
Modelo-São Miquel: 138 kV, 58 km	Trindade: 138 kV, 50 MVA
Lages-Otacilio Costa: 138 kV, 40 km	Trindade: 69 kV, 40 MVA
Enseada de Brito-Trindade: 69 kV, 40 km	
Otacilio-Ponte Alta II: 69 kV, 28 km	
Xanxere-Chapeco: 69 kV, 35 km	
Imbituba-Laguna: 69 kV, 29 km	
ESCELSA:	
Mascarenhas-Nova Venecia: 138 kV, 120 km	Ibes: 138 kV, 50 MVA
Branch Line to Marataizes: 138 kV, 25 km	Vitoria: 138 kV, 50 MVA
São Mateus-Petro Canario: 69 kV, 40 km	

Distribution

4.06 The distribution expansion programs to be carried out by the utilities during the period 1978-81 focus on the following objectives:

(a) providing adequate capacity at appropriate points of the system for the expected increases in loads;

(b) ensuring the continued high reliability of service to all customers; and

(c) expanding service to low-income and rural areas of the respective states.

In order to meet these objectives, the utilities' programs include the following items:

	CEMIG		CELESC		ESCELSA	
	Quantity	Increase Over Existing	Quantity	Increase Over Existing	Quantity	Increase Over Existing
Circuit km of urban lines at 13 kV and below	10,000	37%	6,430	not available	4,000	40%
MVA of distribution transformers	866	57%	143	52%	84	52%
Meters	450,000	45%	226,000	54%	85,000	49%

4.07 During the project construction period the utilities will give emphasis to the connection of low income households, particularly to those who at the present time have access to service by virtue of being near existing distribution lines but are not connected to the system. These prospective customers can be connected with a minimum of investment. The three utilities will be offering such consumers the financing, over a period of at least 18 months, of the household wiring and other items necessary for connection. The monthly payments, which would include the cost of 30 kWh of electricity, are not likely to exceed the equivalent of US$5.00 in CEMIG's area, US$3.50 in CELESC's area and US$3.00 in ESCELSA's area. These amounts are expected not to exceed 5% of the average total monthly household income of the lower 40% income group in the respective states. On this basis, the utilities expect to be able to connect between 1978 and 1981 a total of about 60,000 low income customers, of which, 30,000 would be CEMIG's, 20,000 CELESC's and 10,000 ESCELSA's.

4.08 In addition to the expansion of the urban systems, the utilities have on-going rural electrification projects being carried out with financial assistance from ELETROBRAS (para. 1.29). These projects envisage the installation of about 25,700 circuit km of lines by CEMIG and 3,000 each by CELESC and ESCELSA as well as the respective connection of about 15,000, 30,000 and 3,400 new rural customers, between 1978 and 1981, which are realistic goals.

Miscellaneous Items

4.09 The utilities' programs also includes purchase of laboratory, shop, control, communication and transportation equipment.

Program Costs

4.10 The investment costs of the 1978-1981 expansion program appear in Table 4-1 and are summarized below.

	10^6Cr$	10^6US$
CEMIG:		
Generation (including associated transmission)	13,235.1	922.3
Transmission system expansion	3,954.3	275.6
Rural electrification	1,600.7	109.2
Other distribution system expansion	2,863.7	201.9
General property	1,703.7	118.7
	23,357.5	1,627.7
CELESC:		
Generation	-	-
Transmission system expansion	972.0	67.7
Rural electrification	292.7	20.4
Other distribution system expansion	1,484.7	103.5
General property	120.6	8.4
	2,870.0	200.0
ESCELSA:		
Generation	12.5	0.9
Transmission system expansion	710.6	49.6
Rural electrification	293.5	20.5
Other distribution system expansion	845.5	58.8
General property	188.5	13.1
	2,050.6	142.9

These costs (which do not include price contingencies) were estimated by each utility on the basis of generally prevailing prices as of mid-1977 and are considered reasonable by the Bank.

The Project

4.11 The project to be financed by the proposed loan consists of items which:

(i) have been identified as of high priority;

(ii) are scheduled to be started not earlier than July 1, 1978, and finished not later than December 31, 1981;

(iii) already have the required technical and economic justification; and

(iv) are to be built at voltages no higher than 230 kV.

The project will consequently be focused on the subtransmission-distribution subsector. In the case of CEMIG, acquisition of communications and control equipment will also be included. The subtransmission-distribution subsector is characterized by special difficulties in the process of identification of individual projects and therefore the beneficiaries have not obtained and are not likely to obtain alternate financing on reasonable terms.

4.12 The individual project components are indicated in Annex B, T-6 and are summarized below:

(i) Subtransmission

Lines (circuit-km)	CEMIG	CELESC	ESCELSA	Total
230 kV	14	-	-	14
138 kV	779	329	172	1280
69 kV	159	270	58	487
34.5 kV	-	-	6	6

(ii) Substations (MVA)

230 kV	/a	-	-	-
138 kV	666	353	150	1169
69 kV	234	427	14	675
34.5 kV	5	-	- /a	5

(iii) Distribution

The project includes the equivalent of about half of CEMIG's distribution program, and CELESC's and ESCELSA's full four-year program. CEMIG will have to arrange financing for the balance of its distribution program by the end of 1979. The sources of this financing would be identified in the proposed mid-1979 review of CEMIG's finances (para. 5.12). The distribution component of the project includes the following:

	CEMIG	CELESC	ESCELSA	TOTAL
MVA of distribution transformers	433	143	84	660
Circuit km of urban lines (up to 13 kV)	5000	6430	4000	15430
kWh meters (thousands)	200	226	85	511

/a The planned improvements do not include capacity additions.

Project Cost Estimate

4.13 The project cost estimate is summarized below; the estimated annual expenditures appear in Table 4-2 while the detailed estimate is shown in Annex B, T-6.

	CEMIG		CELESC		ESCELSA		TOTAL	
	10^3Cr$	10^3US$	10^3Cr$	10^3US$	10^3Cr$	10^3US$	10^3Cr$	10^3US$
Subtransmission Lines:								
34 kV	-	-	-	-	628	44	628	44
69 kV	43,638	3,041	138,661	9,663	13,320	928	195,619	13,632
138 kV	460,984	32,123	113,705	7,923	172,570	12,026	747,259	52,072
230 kV	25,960	1,809	-	-	-	-	25,960	1,809
Substations:								
34.5 kV	2,518	245	-	-	13,321	928	16,839	1,173
69 kV	137,705	9,595	192,429	13,410	23,121	1,612	353,255	24,617
138 kV	407,083	28,370	162,196	11,303	156,865	11,698	737,144	51,371
230 kV	17,838	1,243	-	-	-	-	17,838	1,243
Miscellaneous Improvements	97,022	6,761	-	-	-	-	97,022	6,761
Distribution	613,100	42,725	852,300	59,393	510,000	35,540	1,975,400	137,658
Miscellaneous Equipment	87,591	6,104	38,000	2,648	25,000	1,742	150,591	10,494
Total Direct Costs	1,894,439	132,016	1,497,291	104,340	925,825	64,518	4,317,555	300,874
Physical Contingencies	187,043	13,035	180,165	12,555	151,788	10,577	518,996	36,167
Price Contingencies	575,679	40,117	453,589	31,609	260,998	18,188	1,290,266	89,914
TOTAL ESTIMATED COSTS	2,657,161	185,168	2,131,045	148,504	1,338,611	93,283	6,126,817	426,955
Of which: Foreign costs	831,898	57,972	628,775	43,817	402,503	28,049	1,863,176	129,838
Local costs	1,825,263	127,196	1,502,270	104,687	936,108	65,234	4,263,641	297,117

The base costs were estimated by each utility on the basis of generally prevailing prices as of mid-1977 and found reasonable by the Bank. The engineering and administration costs for the project as well as applicable taxes and duties, estimated at about 10% of total base costs are included in the base estimates. The cost of consulting services to be required by CELESC and ESCELSA (para. 4.14) has been estimated on the basis of about 80 man-months each at a cost of US$6,000 per man-month, excluding subsistence and travel expenses and is included as part of the cost of the 138 kV facilities. Physical contingencies have been estimated as 8 to 20% of the base estimates of the individual components of the program, depending on the status of the engineering; the overall average is about 12%. The price contingencies have been calculated on the basis of assumed annual rates of inflation of 7.5% from 1977 to 1979 and 7% thereafter for foreign costs and 9% from 1977 to 1980 and 8% thereafter for local costs, assuming a constant exchange rate. The latter were estimated on the basis of the projected construction cost indexes for Brazil which in the past, have provided a suitable basis for estimating such costs. The proposed Bank loan of US$130 million equivalent would finance the estimated foreign component of the project, of which US$58.1, 43.8, and 28.1 million correspond to CEMIG, CELESC and ESCELSA, respectively. The remainder of the project, together with the rest of the beneficiaries' programs would be financed as detailed in para. 5.05.

Implementation

4.14 The utilities' own staff will carry out most of the necessary engineering and supervision of construction for the project. This is acceptable as the utilities have proven experience in similar works completed recently or still under construction. However, CELESC and ESCELSA have staff limitations and will require assistance for engineering and supervision of construction for 138 kV facilities and have therefore agreed to employ consultants satisfactory to the Bank for these purposes. In view of the limited experience of these two utilities with international procurement, consultants should also assist them in the preparation of the general contract documents and evaluation procedures. It is most likely that these consultants will be Brazilian consultants. The utilities' staff personnel would install the distribution equipment and build short distribution extensions. Local contractors are expected to install substations and build all 230, 138 and 69 kV lines and major distribution lines.

4.15 The project implementation schedule envisages completion by December 31, 1981, which is reasonable. The detailed schedule (Annex B, T-7) would be used to monitor progress during the project construction period.

Procurement

4.16 Procurement of the equipment to be financed by the Bank will be through international competitive bidding (ICB) in accordance with the Bank's guidelines. Manufacturers of equipment financed by the proposed loan, whose bids contain components manufactured in Brazil equal to at least 50% of the value of the bid would be given a margin of preference of 15%, or the applicable import duties, whichever is lower. Brazilian suppliers of the items included in the project are reasonably competitive. Foreign cost estimates assume that: (i) about US$130 million equivalent of equipment and materials will be acquired through ICB in accordance with Bank guidelines, under the proposed loan; and (ii) Brazilian suppliers would be awarded up to two-thirds of the value of the contracts placed through such bidding.

4.17 Any equipment and materials to be used in the project which would not be financed under the proposed loan, such as line supports and low voltage equipment, will be procured locally under the beneficiaries' normal procedures as Brazilian legislation precludes ICB for items that can be produced locally and that are not financed by long-term foreign loans. However, as noted above, such locally produced items are reasonably competitive in price with imported products and project cost should not increase significantly over the estimate as a result of these restrictions.

Disbursement

4.18 Disbursements from the loan account would be made for 100% of foreign expenditures for imported equipment and materials or the ex-factory cost of locally manufactured equipment and materials. The following table shows estimated loan disbursements, assuming loan effectiveness to be June 30, 1978:

Estimated Loan Disbursements

IBRD Fiscal Year	Semester Ending	in 10^6 US$ During Semester	Cumulative at End of Semester
1979:	December 31, 1978	4	4
	June 30, 1979	15	19
1980:	December 31, 1979	22	41
	June 30, 1980	29	70
1981:	December 31, 1980	26	96
	June 30, 1981	18	114
1982:	December 31, 1981	11	125
	June 30, 1982	5	130

Disbursements will be fully documented. The closing date would be December 31, 1982 to allow for the payment of retentions.

Environment

4.19 The utilities intend to route their lines, most of which will be overhead, and locate their substations so as to minimize their visual impact in a manner consistent with economic and financial considerations.

Project Risks

4.20 The project faces no major risks, other than those resulting from the relative weakness of two of the beneficiary utilities. The construction schedule assumed for the project is reasonable and takes into consideration normal engineering, administrative and construction procedures but it contains no provision for unusual delays. CEMIG is not expected to have any difficulties in meeting the schedules. However, timely completion of the project by CELESC and ESCELSA will depend greatly on the appropriate use of consultants to assist them with the 138 kV facilities and in the preparation of the contract documents for ICB. A condition of disbursement of the respective portion of the loan for which CELESC and ESCELSA are the beneficiaries, is the hiring by these utilities of consultants for those services on terms and conditions acceptable to the Bank to minimize the risks of not meeting the schedule and/or the project objectives.

TABLE 4-1

1978-1981 Investment Program

	3 10 Cr$					3 10 US$				
	1978	1979	1980	1981	TOTAL	1978	1979	1980	1981	TOTAL
CEMIG										
Generation:										
Sao Simao hydro station	944,220	276,205	36,210	-	1,256,635	65,799	19,248	2,523	-	87,570
Sao Simao transmission	976,100	313,256	98,765	-	1,388,121	68,021	21,830	6,883	-	96,734
Igarape steam plant	17,323	-	-	-	17,323	1,207	-	-	-	1,207
Emboracacao hydro station	1,824,804	2,145,519	1,403,880	443,058	5,817,261	127,164	149,514	97,832	30,875	405,385
Emboracacao transmission	128,238	388,202	642,032	661,159	1,819,631	8,936	27,052	44,741	46,074	126,803
Nova Ponte hydro station	8,541	267,664	1,033,121	849,185	2,158,511	595	18,653	71,994	59,177	150,419
Nova Ponte Transmission	-	-	29,714	82,885	112,599	-	-	2,070	5,776	7,846
Igarapava hydro station	-	-	51,367	578,514	629,881	-	-	3,580	40,315	43,895
Igarapava transmission	-	-	7,218	27,909	35,127	-	-	503	1,945	2,448
Subtotal	3,899,226	3,390,846	3,302,307	2,642,710	13,235,089	271,772	236,297	230,126	184,162	922,307
IBRD Project:										
Transmission system expansion	13,058	343,539	491,359	464,194	1,312,150	910	23,940	34,241	32,348	91,439
Distribution system expansion	95,355	170,507	189,305	217,891	673,058	6,645	11,882	13,192	15,184	46,903
Miscellaneous equipment	4,995	18,626	41,500	31,153	96,274	348	1,298	2,892	2,171	6,709
Subtotal	113,408	532,672	722,164	713,238	2,081,482	7,903	37,120	50,325	49,703	145,051
Rural electrification	347,900	361,620	414,715	476,420	1,600,655	21,900	25,200	28,900	33,200	109,200
Other transmission works	913,154	735,499	544,550	448,969	2,642,172	63,634	51,254	37,948	31,287	184,123
Other distribution works	537,797	554,826	563,930	534,142	2,190,695	39,821	38,664	39,298	37,222	155,005
Other misc. equipment & general property	587,180	750,017	162,199	108,006	1,607,402	40,920	52,265	11,303	7,526	112,014
TOTAL[a]	6,398,665	6,325,480	5,709,865	4,923,485	23,357,495	445,900	440,800	397,900	343,100	1,627,700
CELESC										
IBRD Project:										
Transmission system expansion	30,130	146,210	261,150	242,340	679,830	2,099	10,189	18,198	16,888	47,374
Distribution system expansion	18,158	244,825	288,693	302,900	954,576	8,234	17,061	20,118	21,108	66,521
Miscellaneous equipment	4,305	18,655	10,045	10,045	43,050	300	1,300	700	700	3,000
Subtotal	152,593	409,690	559,888	555,285	1,677,456	10,633	28,550	39,016	38,696	116,895
Rural electrification	60,158	69,025	77,892	85,613	292,688	4,192	4,810	5,429	5,966	20,397
Other transmission works	202,449	88,255	1,463	-	292,167	14,108	6,150	103	-	20,361
Other distribution works	175,911	94,682	129,476	130,026	530,095	12,259	6,598	9,024	9,061	36,942
Other misc. equipment & general property	15,894	4,188	16,181	41,286	77,549	1,108	292	1,128	2,877	5,405
TOTAL[a]	607,005	665,840	784,900	812,210	2,869,955	42,300	46,400	54,700	56,600	200,000
ESCELSA										
IBRD Project:										
Transmission system expansion	72,612	196,925	107,509	60,701	437,747	5,060	13,723	7,492	4,230	30,505
Distribution system expansion & improvement	84,521	156,329	169,588	200,728	611,166	5,890	10,894	11,818	13,988	42,590
Miscellaneous equipment	-	4,534	14,322	9,844	28,700	-	316	998	686	2,000
Subtotal	157,133	357,788	291,419	271,273	1,077,613	10,950	24,933	20,308	18,904	75,095
Improvements in generation	2,021	2,694	3,503	4,311	12,529	141	188	244	300	873
Rural electrification	69,252	73,492	73,492	77,166	293,402	4,826	5,121	5,121	5,378	20,446
Other transmission works	61,462	39,038	82,557	89,792	272,849	4,283	2,720	5,754	6,257	19,014
Other distribution works	87,017	40,507	48,103	58,748	234,375	6,064	2,823	3,352	4,094	16,333
Other misc. equipment & general property	72,270	26,041	29,006	32,530	159,847	5,036	1,815	2,021	2,267	11,139
TOTAL[a]	449,155	539,560	528,080	533,820	2,050,615	31,300	37,600	36,800	37,200	142,900

a/ Includes physical but not price contingencies.

TABLE 4-2

Project Annual Expenditure Estimate

	10^3 Cr$					10^3 US$					Percentages of:	
	1978	1979	1980	1981	TOTAL	1978	1979	1980	1981	TOTAL	Utility's Project ($)	Total Project ($)
CEMIG												
Transmission Lines:												
69 kV	-	12,700	12,140	23,132	47,972	-	885	846	1,612	3,343		
138 kV	6,701	129,322	218,121	152,598	506,742	467	9,012	15,200	10,634	35,313		
230 kV	-	28,542	-	-	28,542	-	1,989	-	-	1,989		
Subtotal	6,701	170,564	230,261	175,730	583,256	467	11,886	16,046	12,246	40,645	28.0	
Substations:												
34.5 kV	2,526	-	-	1,349	3,875	176	-	-	94	270		
69 kV	-	79,729	34,225	37,396	151,350	-	5,556	2,385	2,606	10,547		
138 kV	3,831	93,246	207,271	143,084	447,432	267	6,498	14,444	9,971	31,180		
230 kV	-	-	19,602	-	19,602	-	-	1,366	-	1,366		
Miscellaneous improvements	-	-	-	106,635	106,635	-	-	-	7,431	7,431		
Subtotal	6,357	172,975	261,098	288,464	728,894	443	12,054	18,195	20,102	50,794	35.0	
Total Transmission	13,058	343,539	491,359	464,194	1,312,150	910	23,940	34,241	32,348	91,439	63.0	
Distribution system expansion	95,355	163,820	182,216	210,314	651,705	6,645	11,416	12,698	14,656	45,415	31.3	
Distribution equipment	-	6,687	7,089	7,577	21,353	-	466	494	528	1,488	1.0	
Total Distribution	95,355	170,507	189,305	217,891	673,058	6,645	11,882	13,192	15,184	46,903	32.3	
Miscellaneous equipment	4,995	18,626	41,500	31,153	96,274	348	1,298	2,892	2,171	6,709	4.7	
Total base costs & physical contingencies	113,408	532,672	722,164	713,238	2,081,482	7,903	37,120	50,325	49,703	145,051	100.0	
of which - foreign costs	34,124	223,917	325,917	98,957	682,915	2,378	15,604	22,712	6,882	47,576	32.8	
- local costs	79,284	308,755	396,247	614,481	1,398,767	5,525	21,516	27,613	42,821	97,475	67.2	
Price Contingencies	9,686	94,480	193,137	278,376	575,679	675	6,584	13,459	19,399	40,117		
of which - foreign contingencies	2,554	35,818	78,222	32,589	149,183	178	2,496	5,451	2,271	10,396		
- local contingencies	7,132	58,662	114,915	245,787	426,496	497	4,088	8,008	17,128	29,721		
Total estimated costs	123,094	627,152	915,301	991,614	2,657,161	8,578	43,704	63,784	69,102	185,168	100.0	43.4
of which - foreign costs	36,678	259,735	404,139	131,546	831,898	2,556	18,100	28,163	9,153	57,972	31.3	
- local costs	86,416	367,417	511,162	860,268	1,825,263	6,022	25,604	35,621	59,949	127,196	68.7	
CELESC												
Transmission Lines												
69 kV	9,190	51,080	53,160	41,870	155,300	640	3,560	3,704	2,918	10,822		
138 kV	-	24,640	69,370	33,340	127,350	-	1,717	4,834	2,323	8,874		
Subtotal	9,190	75,720	122,530	75,210	282,650	640	5,277	8,538	5,241	19,696	16.9	
Substations:												
69 kV	11,510	45,590	76,950	78,970	213,020	802	3,177	5,362	5,503	14,844		
138 kV	9,430	24,900	61,670	88,160	184,160	657	1,735	4,298	6,144	12,834		
Subtotal	20,940	70,490	138,620	167,130	397,180	1,459	4,912	9,660	11,647	27,678	23.7	
Total Transmission	30,130	146,210	261,150	242,340	679,830	2,099	10,189	18,198	16,888	47,374	40.6	
Distribution system expansion	105,645	232,312	276,180	290,387	904,524	7,362	16,189	19,246	20,236	63,033	53.9	
Distribution equipment	12,513	12,513	12,513	12,513	50,052	872	872	872	872	3,488	3.0	
Total Distribution	118,158	244,825	288,693	302,900	954,576	8,234	17,061	20,118	21,108	66,521	56.9	
Miscellaneous equipment	4,305	18,655	10,045	10,045	43,050	300	1,300	700	700	3,000	2.5	
Total base costs & physical contingencies	152,593	409,690	559,888	555,285	1,677,456	10,633	28,550	39,016	38,696	116,895	100.0	
of which - foreign costs	41,314	184,814	207,515	84,691	518,337	2,879	12,879	14,461	5,902	36,121	30.9	
- local costs	111,279	224,876	352,373	470,591	1,159,119	7,754	15,671	24,555	32,794	80,774	69.1	
Price Contingencies	13,116	72,295	151,995	216,183	453,589	914	5,038	10,592	15,065	31,609		
of which - foreign contingencies	3,100	29,575	49,809	27,954	110,438	216	2,061	3,471	1,948	7,696		
- local contingencies	10,016	42,720	102,186	188,229	343,151	698	2,977	7,121	13,117	23,913		
Total estimated costs	165,709	481,985	711,883	771,468	2,131,045	11,547	33,588	49,608	53,761	148,504	100.0	34.8
of which - foreign costs	44,414	214,389	257,324	112,648	628,775	3,095	14,940	17,932	7,850	43,817	29.5	
- local costs	121,295	267,596	454,559	658,820	1,502,270	8,452	18,648	31,676	45,911	104,687	70.5	
ESCELSA												
Transmission Lines:												
138 kV	37,984	107,051	31,742	16,531	193,308	2,647	7,460	2,212	1,152	13,471		
69 kV	-	2,970	5,955	5,970	14,895	-	207	415	416	1,038		
34 kV	560	144	-	-	704	39	10	-	-	49		
Subtotal	38,544	110,165	37,697	22,501	208,907	2,686	7,677	2,627	1,568	14,558	19.4	
Substations:												
138 kV	31,786	76,844	52,277	27,122	188,029	2,215	5,355	3,643	1,890	13,103		
69 kV	-	3,889	11,652	10,346	25,887	-	271	812	721	1,804		
34 kV	2,282	6,027	5,883	732	14,924	159	420	410	51	1,040		
Subtotal	34,068	86,760	69,812	38,200	228,840	2,374	6,046	4,865	2,662	15,947	21.2	
Total Transmission	72,612	196,925	107,509	60,701	437,747	5,060	13,723	7,492	4,230	30,505	40.6	
Distribution system expansion & improvement	79,728	149,154	155,238	193,553	577,673	5,556	10,394	10,818	13,488	40,256	53.6	
Distribution equipment	4,793	7,175	14,350	7,175	33,493	334	500	1,000	500	2,334	3.1	
Total Distribution	84,521	156,329	169,588	200,728	611,166	5,890	10,894	11,818	13,988	42,590	56.7	
Miscellaneous equipment	-	4,534	14,322	9,844	28,700	-	316	998	686	2,000	2.7	
Total base costs & physical contingencies	157,133	357,788	291,419	271,273	1,077,613	10,950	24,933	20,308	18,904	75,095	100.0	
of which - foreign costs	34,627	117,225	128,905	52,220	332,977	2,413	8,166	8,983	3,639	23,201	30.9	
- local costs	122,506	240,563	162,514	219,053	744,636	8,537	16,764	11,325	15,265	51,891	69.1	
Price contingencies	13,619	64,460	78,064	104,855	260,998	949	4,492	5,440	7,307	18,188		
of which - foreign contingencies	2,598	18,755	30,939	17,234	69,526	181	1,307	2,156	1,201	4,845		
- local contingencies	11,021	45,705	47,125	87,621	191,472	768	3,185	3,284	6,106	13,343		
Total estimated costs	170,752	422,248	369,483	376,128	1,338,611	11,899	29,425	25,748	26,211	93,283	100.0	21.8
of which - foreign costs	37,225	135,980	159,844	69,454	402,503	2,594	9,476	11,139	4,840	28,049	30.0	
- local costs	133,527	286,268	209,639	306,674	936,108	9,305	19,949	14,609	21,371	65,234	70.0	
COMPLETE PROJECT												
Total base costs and physical contingencies	423,134	1,300,153	1,573,463	1,539,796	4,836,538	29,486	90,603	109,649	107,303	337,041	100.0	
of which - foreign costs	110,064	525,956	662,339	235,870	1,534,029	7,670	36,652	46,156	16,423	106,901	31.7	
- local costs	313,060	774,197	911,124	1,304,128	3,302,509	21,816	53,951	63,493	90,880	230,140	68.3	
Price contingencies	36,420	231,236	423,196	599,414	1,290,266	2,538	16,114	29,491	41,771	89,914		
of which - foreign contingencies	8,251	84,149	158,969	77,777	329,146	575	5,864	11,078	5,420	22,937		
- local contingencies	28,169	147,087	264,227	521,637	961,120	1,963	10,250	18,413	36,351	66,977		
Total estimated costs	459,555	1,531,385	1,996,667	2,139,210	6,126,817	32,024	106,717	139,140	149,074	426,955		100.0
of which - foreign costs	118,315	610,105	821,308	313,647	1,863,176	8,245	42,516	57,234	21,843	129,838		30.4
- local costs	341,240	921,280	1,175,359	1,825,763	4,263,641	23,779	64,201	81,906	127,231	297,117		69.6

CHAPTER 5

FINANCIAL ANALYSIS

Summary

5.01 The beneficiaries are quite different as to size of operations, financial performance and management sophistication. CEMIG's performance has in the past been very good; however, its finances have deteriorated as a result of the high rate of growth of its market and the consequent large investment requirements. It is expected that this negative trend will be reversed as a result of the upcoming review of CEMIG's finances (para. 5.12). CELESC's performance has been rather unsatisfactory reflecting mainly faulty financial decisions but its financial position should improve as a result of improved management and increased capital contributions from the State Government. ESCELSA has in the past been a net recipient of funds from the tariff equalization scheme and has been undercapitalized; it has, therefore, experienced some financial tightness which should be overcome by increased equity capital investments from ELETROBRAS. The Government, ELETROBRAS and the beneficiaries have agreed to financial provisions which would allow continued monitoring of the financial viability of the beneficiaries. The financial experience of the beneficiaries over the last several years and their estimated future finances are shown in Tables 5-1 through 5-3.

Earnings History and Financial Position

5.02 CEMIG earned a rate of return on its remunerable investment (para. 1.21) of about 10.5% on average in 1974-76 which was equivalent to a financial rate of return 1/ of about 17% (Table 5-1). These returns have allowed CEMIG to comfortably cover its operating expenses (49% average operating ratio for 1974-76), and to generate internally funds which covered its net debt service with an acceptable margin (1.7 times average for 1974-76). CEMIG's construction outlays in real terms during 1974-76 were on average twice as high as those of the previous six years. This increase coupled with the long construction period of the projects resulted in a decrease in the proportion of construction expenditures which were financed with internally generated funds. Consequently, debt financing of CEMIG's investments increased from an average 56% for 1968-73 to 78% in 1974-76 2/. As a consequence of the increased reliance on borrowing, CEMIG's debt service coverage has declined from 1.8 in 1974 to 1.6 in 1976 and the proportion of debt in its capital structure increased from 48% in 1974 to 55% by the end of 1976. Even though this debt proportion is still acceptable, the short maturity of CEMIG's debt (12 years average repayment period) may cause financial difficulties to the company in the near future.

1/ The financial rate of return excludes receipts from (or payments to) the Global Guarantee Fund and is calculated before deduction of reversion (see paras. 1.21-1.22).

2/ As explained in para. 5.06, a sizeable proportion of the borrowed funds represent resources originating in charges to CEMIG's consumers; these are used by ELETROBRAS to support investments by CEMIG or other utilities as required.

5.03 CELESC earned an average 10.7% return on remunerable investment in 1974-76 which was equivalent to a 16% financial return (Table 5-2). This satisfactory remuneration combined with a relatively low debt service burden enabled CELESC to keep its net internal contribution to investments at an average level of 26% over 1974-1976, which is adequate. CELESC's debt service coverage ratio declined from 3.2 in 1974 to 2.1 in 1976, but remained within an acceptable margin. CELESC's financial management has in the past been deficient and the company is currently negotiating with ELETROBRAS short-term financial assistance that would allow it to settle its overdue payables with ELETROSUL (which amounted to over 5 months' energy purchases at the end of 1976). CELESC's financial projections include the capitalization by end of 1978 of Cr$80.9 million debt due to ELETROBRAS in 1977 and 1978, and of Cr$42.9 million interest due in 1977 to 1981. ELETROBRAS has confirmed its intention to act accordingly.

5.04 ESCELSA earned an average 11% return on remunerable investment in 1974-76. However, in the last two years of this period, it only achieved this return as a result of transfers from the Global Guarantee Fund (Table 5-3, II). As a result, ESCELSA's financial rate of return decreased from 20% in 1974 to to 12% in 1976 (para. 1.22). ESCELSA's indebtedness has been high with a consequent high debt service, which has exceeded the utility's internally generated funds. Despite its deteriorating returns, the utility has been able to (i) increase the coverage of its debt service burden by gross internally generated funds (from 0.7 in 1974 up to 1.0 in 1976); (ii) decrease the proportion of its borrowings to its investments from 117% in 1974 to 77% in 1976; and (iii) decrease the proportion of debt in its capital structure (from 71% in 1974 to 64% in 1976). This improvement has been due mainly to conversion to equity of part of its debt to ELETROBRAS, and ELETROBRAS' additional capital investments. However, ESCELSA's 1976 finances still reflect an unsatisfactory coverage of its debt service with internal cash generation and a relatively low self-financing of its investment expenditures.

Investment and Financing Plans

5.05 The beneficiaries' financing plans for their 1978-81 investment program are reasonable. Total consumer direct contributions (defined as internal cash generation net of debt service, dividends and taxes, plus capital contributions originating from reinvestment of consumer-based resources) would amount to 20% of requirements in the case of CEMIG, 41% for CELESC and 46% for ESCELSA. Existing and proposed loans from ELETROBRAS, IDB, IBRD and other borrowings would provide 76% of CEMIG's requirements, 48% of CELESC's and 54% of ESCELSA's. CEMIG and CELESC would receive a small amount of additional equity contributions (not derived from consumer charges and expected to be mostly from the respective states). The investment programs and financing plans are summarized below and shown in more detail in Tables 5-1, 5-2 and 5-3. Financial projections were prepared in constant June 1977 Cruzeiros to ensure consistency with financial projections made by Brazilian authorities for the electric power sector:

	CEMIG		CELESC		ESCELSA		TOTAL	
	Cr$x10^6	%	Cr$x10^6	%	Cr$x10^6	%	Cr$x10^6	%
Investment Plan								
Construction program:								
Ongoing works	10,299.0 a/	-	-	-	-	-	10,299.0	-
Proposed IBRDD project	2,081.5	-	1,677.4	-	1,077.6	-	4,836.5 b/	-
Other proposed projects	8,041.0	-	1,192.5	-	973.1	-	10,206.6	-
Other future projects c/	2,936.1	-	-	-	-	-	2,936.1	-
Interest during construction	3,044.2	-	108.8	-	165.0	-	3,318.0	-
Total construction program	26,401.8	-	2,978.7	-	2,215.7	-	31,596.2	-
Increase in working capital	1,507.4	-	422.5	-	175.6	-	2,105.5	-
Total Investment Plan	27,909.2	-	3,401.2	-	2,391.3	-	33,701.7	-
Financing Plan								
Gross internal cash generation	16,503.0	-	1,769.8	-	2,269.0 d/		20,541.8	-
Less: net debt service	12,420.1	-	1,123.4	-	1,499.6		15,043.1	-
others	1,382.2	-	125.9	-	51.3		1,559.4	-
Net internal cash generation	2,700.7	10	520.5	15	718.1	30	3,939.4	12
Sector capital investments e/	2,893.0	10	876.9	26	370.2	16	4,140.1	12
Total consumer direct contributions	5,593.7	20	1,397.4	41	1,088.3	46	8,079.4	24
Equity investments f/	1,044.5	4	357.6	11	-	-	1,402.1	4
Borrowings:								
Existing ELETROBRAS loans	2,442.6	9	17.4	1	90.3	4	2,550.3	8
Existing IBRD loan	11.8	-	-	-	-	-	11.8	-
Other existing loans	1,880.1	7	-	-	13.5	-	1,893.6	6
Proposed IBRD loan	663.0	2	496.9	15	315.3	14	1,475.2 g/	4
Proposed ELETROBRAS loans	6,295.2	23	915.3	26	883.9	36	8,094.4	24
Other proposed loans	8,030.3	29	216.6	6	-	-	8,246.9	25
Future ELETROBRAS loans c/	1,026.9	3	-	-	-	-	1,026.9	3
Other future loans c/	921.1	3	-	-	-	-	921.1	2
Total Borrowings	21,271.0	76	1,646.2	48	1,303.0	54	24,220.2	72
Total Financing Plan	27,909.2	100	3,401.2	100	2,391.3	100	33,701.7	100

a/ Includes Cr$7,973.2 million IDB-financed Emborcaçao Project.
b/ Total estimate (Cr$6,1268 million) less price contingencies (Cr$1,290.3 million) equals total base cost estimate shown; similar calculation applies to amount for each company.
c/ Nova Ponte and Igarapava projects; expenditures start in 1978 and 1980, respectively.
d/ Includes Cr$1,959.8 million receipts from the Global Guarantee Fund.
e/ Includes: (i) states and municipalities reinvestment of sole tax proceeds;
(ii) customer contributions in aid of construction, and
(iii) ELETROBRAS' purchases of new shares.
f/ From non-sector sources.
g/ Total loan (Cr$1,363.2 million) less price contingencies to be financed out of loan proceeds (Cr$329.2 million) and less disbursements in 1982 (CEMIG: Cr$20.1 million; CELESC: Cr$21.1 million; ESCELSA: Cr$17.6 million) equal amount shown.

5.06 While a high proportion (72%) of the beneficiaries' total financial requirements would come from borrowings, ELETROBRAS would provide about 49% of these funds, the bulk of which it would collect from power sector consumers. Over the period 1978-81, about one-fourth of ELETROBRAS' loans to the three beneficiaries would be offset by their reversion payments and the balance of ELETROBRAS' loans would be more than offset by the companies' collections from consumers on account of the sole tax and the compulsory loan. The Bank has offered to assist ELETROBRAS in securing additional financing for the project through cofinancing arrangements similar to those already approved for Loan 1343-BR (ELETROSUL project), provided this would result in better terms for ELETROBRAS than it would otherwise obtain.

5.07 The beneficiaries' financing programs also include loan financing by suppliers and financial institutions (46% of borrowings) and drawdowns of the existing IBRD loan to CEMIG and of the proposed loan (5% of borrowings). The proposed US$130 million Bank loan would be made to ELETROBRAS for a term of 15 years including 3 years grace. Of this amount US$58.1 million will be on-lent to CEMIG, US$43.8 million to CELESC and US$28.1 million to ESCELSA. The on-lending conditions provide for the same maturity, grace period and repayment schedule as on the Bank loan; the interest rate to the beneficiaries was assumed in the projections to be 8.5%. ELETROBRAS will charge the beneficiaries a one-time commission of 1/2 of 1% on the loan amounts, and service fees of 1/4 of 1% p.a. on the disbursed amount during the disbursement period and 1/8% of 1% p.a. thereafter 1/. The beneficiaries will assume the foreign exchange risks on the amounts outstanding. These conditions are acceptable to the Bank. The terms assumed for all other borrowings are in line with those customary for Brazilian power utilities (Annex B T-8 to T-22).

5.08 The states of Minas Gerais, Santa Catarina, and Espirito Santo, and their corresponding municipalities are required, by law, to invest in the power sector 100% of the proceeds of the sole tax accruing to them. The states of Santa Catarina and Minas Gerais have agreed to invest these funds in CELESC and CEMIG respectively, while the State of Espirito Santo has agreed to invest 90% of these funds in ESCELSA; in addition, the state of Santa Catarina has agreed to reinvest in CELESC all the dividends it may receive from the utility while the states of Minas Gerais and Espirito Santo to reinvest in CEMIG and ESCELSA, respectively, 90% of the dividends they may receive from the respective utilities. CEMIG's financing plan assumes that a relatively small proportion (4%) of its requirements would be covered by equity contributions by the state government and private investors. CEMIG has had no difficulty in raising equity to finance a similar share of its investments in the past. CELESC is assuming (proportionately) much larger equity investments by the Santa Catarina State government 2/, and the latter has agreed to pay in equal quarterly installments, these equity investments (over and above amounts invested from the proceeds of the sole tax and reinvestment of CELESC dividends). Presentation of evidence that payments from the State have been kept current is

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1/ These fees are included in the assumed interest rate.

2/ Equivalent, in mid-1977 constant prices, to US$9.8, 5.9, 5.9, 3.4 and 1.7 million in 1978, 1979, 1980, 1981 and 1982 respectively.

a condition of the first disbursement of the CELESC portion of the loan. In addition, the States of Minas Gerais and Santa Catarina have agreed that if their respective beneficiary (CEMIG and CELESC) would not have sufficient funds to assure the timely completion of the Bank project, they will provide such funds as may be required in a form satisfactory to the Bank. ELETROBRAS has assumed a similar obligation with regard to ESCELSA. The Federal Government has also agreed to make arrangements satisfactory to the Bank for providing funds to complete the project if the funds available to any of the beneficiaries are insufficient for this purpose.

5.09 The investment programs shown in para. 5.05 include sizeable expenditures for projects which have yet to be justified in detail and for which financing has not yet been obtained. To ensure that the Bank is given an adequate opportunity to review these projects prior to their being firmly committed, the beneficiaries have agreed that they will not undertake any major projects until the completion of the proposed distribution project, unless they have provided evidence satisfactory to the Bank that the project is economically justified; that the beneficiary has adequate financial resources to carry it out and that: (a) in the case of generation and major transmission projects, it is in accordance with plans for power generation and transmission approved by ELETROBRAS for the Southeast and South regions of Brazil; and (b) in other cases, that it has been approved by DNAEE. A major expansion project would be defined as one costing more than 2% of the beneficiary's gross revalued fixed assets in operation plus works in progress in the case of generation and transmission and 1% in the case of distribution.

Financial Outlook

5.10 CEMIG has prepared its financial projections under the conservative assumption of a 10% return on remunerable investment. In the past DNAEE has been responsive to CEMIG's needs and has allowed it to earn average returns above the 10% minimum (12% in 1977). A 10% return is expected to generate revenue levels which will cover comfortably the utility's operating expenses with an improving trend.

5.11 As a result of increasing borrowing needs, CEMIG's debt service load is expected to absorb a growing proportion of its resources; thus, debt service coverage is expected to decline from 1.4 times in 1977 to 1.2 times by 1980. CEMIG's increasing borrowing needs are expected to bring a concurent decrease in equity as a proportion of long-term capitalization, and in net internally generated funds as a proportion of financing requirements. The situation is now expected to be unsatisfactory in 1980-81, when debt service will increase at a much faster rate than gross internal cash generation, largely because of the need to start repaying ELETROBRAS loans for the São Simão project. CEMIG's future finances would improve if DNAEE continues to authorize tariffs designed to provide a 12% return on remunerable assets; another positive factor would be deferral of the Igarapava and Nova Ponte hydro projects (para. 4.03). The trend in CEMIG's financial indicators is a matter of concern and the Bank will continue to monitor closely the utility's financial position over the project construction period. In addition to the review of CEMIG's plans for future capital expenditures

(para. 5.09), CEMIG has agreed to be bound by a debt limitation covenant which provides that the Bank's agreement must be obtained before the utility incurs long-term borrowings whenever its annual internal cash generation is less than 1.5 times its maximum future debt service requirement. In view of the large number of loan contracts entered into annually by CEMIG, the Bank and CEMIG have agreed on a simplified procedure for the administration of this covenant, which provides for the Bank's review and approval of the company's borrowing on an annual basis rather than contract by contract.

5.12 CEMIG has agreed to provide to the Bank for comment by June 30, 1979, a review of its investment and financing plans for the remainder of the project construction period, which will include proposals for achieving an annual debt service coverage of at least 1.5 times in those years. The Federal Government, the State of Minas Gerais and ELETROBRAS have agreed to cooperate in the review. CEMIG, the State and Federal Governments and ELETROBRAS would make their best efforts to implement the proposals developed in the course of the review.

5.13 As in the case of the other beneficiaries, CELESC has prepared its financial projections (Table 5-2) assuming a 10% return on remunerable investment; this implies that CELESC would obtain an average financial return of 15.5% over 1977-81. This return, aided by an increase in the average maturity of its borrowing portfolio (from 8.3 years in 1976 up to 9.6 years by 1982) which results in part from the terms of the proposed Bank loan, would allow CELESC to (i) finance an increasing proportion of its investment program with consumer direct contributions (from 28% in 1977 to 51% by 1981) with a 1977-81 average of 38% which is acceptable, and (ii) decrease the debt portion of its capital from 46% in 1977 to 39% by 1981. The increased internal generation of funds implies an acceptable coverage of debt service which improves from 1.5 in 1977 to 1.7 by 1981. CELESC has agreed to a debt limitation covenant similar to the one described in para. 5.11 for CEMIG.

5.14 The financial forecasts for ESCELSA (Table 5-3) are based on the assumption that ELETROBRAS would convert enough of its existing loans to ESCELSA into equity 1/, to enable the company to achieve an annual debt service coverage ratio of at least 1.5 . ELETROBRAS would furnish to the Bank, as a condition of disbursement on ESCELSA's part of the project a plan of action to enable ESCELSA to achieve this ratio. ELETROBRAS and ESCELSA agreed to take the necessary action to achieve this ratio annually during the project construction period,should the Bank request such action. The action could take the form of additional equity investments and/or conversion of a portion of ESCELSA's debt into equity.

5.15 ESCELSA's forecasts show that it would be able to decrease its reliance on borrowings and by 1981 would be able to finance 36% of its total requirements with internally generated funds, and 52% with consumer direct contributions (a 1977-81 average of 42%). As a result, the proportion of debt in its capitalization would decrease from 72% in 1977 to 53% in 1981. ESCELSA has agreed to a debt limitation covenant similar to the one described in para. 5.11 for CEMIG.

1/ Cr$202 million in 1978-1980 and Cr$145 million in 1982, in prices of June 1977.

Performance Indicators and Reporting

5.16 The 1978-81 investment program is expected to make electricity available to industrial customers as well as rural and low income urban dwellers. The organization studies and training are expected to assist in strengthening CELESC's and ESCELSA's management and to provide them with a solid institutional base to carry out their role in the development of their respective states. The targets indicated in Annex B, T-23 will be used to monitor the utilities' performance toward meeting these objectives during the project construction period.

5.17 ELETROBRAS and the beneficiaries have agreed:

(a) to provide financial statements audited by independent accountants acceptable to the Bank together with a report on the audit, not later than four months after the end of each fiscal year; and

(b) to prepare such other reports as the Bank may reasonably request, including project completion reports.

TABLE 5-1

CEMIG

Financial Statements 1974-1982
(in millions of cruzeiros)

	1974	1975	1976	1977	1978	1979	1980	1981	1982
	-Actual (in current currency)-			----------Forecast (in June 1977 currency)----------					
I - REMUNERABLE INVESTMENT									
Remunerable investment									
Utility plant in service a/	4,541.2	6,969.1	8,663.9	16,833.0	24,497.2	32,532.5	39,027.4	42,568.3	52,967.5
Working capital b/	438.3	355.7	326.1	593.7	847.3	1,120.6	1,216.1	1,453.1	1,779.2
Gross remunerable investment	4,979.5	7,324.8	8,990.0	17,426.7	25,344.5	33,653.1	40,243.5	44,021.4	54,746.7
Less: Accumulated depreciation and amortization a/	638.0	1,010.2	1,322.3	2,135.1	2,848.0	3,794.6	4,930.4	6,169.1	7,710.5
Accumulated contributions and grants	77.8	89.8	92.5	147.4	171.5	195.5	219.5	243.6	267.7
Excess (deficiency) in prior remuneration c/	(77.4)	(29.8)	-	-	-	-	-	-	-
Net remunerable investment	4,341.1	6,254.6	7,575.2	15,144.2	22,325.0	29,663.0	35,093.6	37,608.7	46,768.5
Rate of remuneration d/	10.2	9.5	11.8	12.0	10.0	10.0	10.0	10.0	10.0
Actual/allowable remuneration	443.8	595.9	895.2	1,817.3	2,232.5	2,966.4	3,509.4	3,760.8	4,676.9
Cost of service									
Allowable remuneration	443.8	595.9	895.2	1,817.3	2,232.5	2,966.4	3,509.4	3,760.8	4,676.9
Depreciation e/	103.6	197.8	242.8	489.9	712.9	946.6	1,135.6	1,238.8	1,541.4
Reversion f/	112.5	211.6	314.3	621.1	881.9	1,171.2	1,405.0	1,532.5	1,906.8
Taxes (other than income) and exchange losses	12.0	24.2	79.0	-	-	-	-	-	-
Other operating costs	406.6	653.8	1,030.0	1,608.9	1,640.2	1,706.1	1,933.9	2,126.1	2,152.4
Total cost of service	1,078.5	1,683.3	2,561.3	4,537.2	5,467.5	6,790.3	7,983.9	8,658.2	10,277.5
Less: revenues on energy sales	1,062.4	1,631.9	2,486.4	4,537.2	5,467.5	6,790.3	7,983.9	8,658.2	10,277.5
Other operating revenues	16.1	51.4	74.9	-	-	-	-	-	-
Receipts from Guarantee Fund	-	-	-	-	-	-	-	-	-
Excess (deficiency) in remuneration	-	-	-	-	-	-	-	-	-
Energy sales (GWh) g/	6,787.5	7,839.0	9,179.7	10,661.6	13,086.1	15,907.9	18,489.3	21,186.3	23,181.2
Average revenue per kWh - Cr$cents	15.9	21.5	27.9	42.6	41.8	42.7	43.2	40.9	44.3
II - INCOME STATEMENT									
Net operating revenues	1,078.5	1,683.3	2,561.4	4,537.2	5,467.5	6,790.3	7,983.9	8,658.2	10,277.5
Operating costs									
Purchased energy h/	181.2	235.1	332.7	629.4	485.8	484.9	650.3	782.3	759.0
Depreciation a/	103.6	197.8	242.8	489.9	712.9	946.6	1,135.6	1,238.8	1,541.4
Operating expenses:									
Personnel i/	117.0	213.5	353.0	537.1	594.9	622.7	650.2	675.1	699.8
Materials and supplies j/	76.5	128.1	212.3	307.5	340.6	358.9	377.9	395.1	416.6
Other expenses k/	31.9	77.1	132.0	126.4	139.2	147.7	156.1	163.1	173.7
Fuel l/	-	-	-	8.5	79.7	91.9	99.4	110.5	103.3
Total operating costs	510.2	851.6	1,272.8	2,098.8	2,353.1	2,652.7	3,069.5	3,364.9	3,693.8
Operating income	568.3	831.7	1,288.6	2,438.4	3,114.4	4,137.6	4,914.4	5,293.3	6,583.7
Less: Reversion f/	112.5	211.6	314.3	621.1	881.9	1,171.2	1,405.0	1,532.5	1,906.8
Net non-operating expenses	38.3	(1.0)	48.5	-	-	-	-	-	-
Income before interest and taxes	417.5	621.1	925.8	1,817.3	2,232.5	2,966.4	3,509.4	3,760.8	4,676.9
Interest expense m/	144.7	258.7	665.3	1,372.7	1,704.4	2,107.8	2,414.4	2,668.3	2,742.8
Less: Interest charged to construction n/	82.7	107.1	504.2	989.8	926.3	847.0	885.2	1,155.5	651.8
Net Interest expense	62.0	151.6	161.1	382.9	778.1	1,260.8	1,529.2	1,512.8	2,091.0
Income taxes o/	5.6	32.6	22.0	26.8	31.6	51.5	65.7	65.6	116.0
Net income	349.9	436.9	742.7	1,407.6	1,422.8	1,654.1	1,914.5	2,182.4	1,975.0
III - SOURCES AND APPLICATIONS OF FUNDS									
Sources									
Gross internal cash generation	521.1	818.9	1,168.6	2,307.2	2,945.4	3,913.0	4,645.0	4,999.6	6,218.3
Less: Debt service: amortization p/	193.8	224.6	289.1	771.1	915.5	1,230.2	2,362.7	2,061.0	2,261.0
interest m/	144.7	258.7	653.8	1,372.7	1,704.4	2,107.8	2,414.4	2,668.3	2,742.8
Gross debt service	338.5	483.3	942.9	2,143.8	2,619.9	3,338.0	4,777.1	4,729.3	5,003.8
Less: Interest financed by loans q/	41.5	19.2	199.2	497.3	638.4	885.3	968.3	552.2	708.3
Net debt service	297.0	464.1	743.7	1,646.5	1,981.5	2,452.7	3,808.8	4,177.1	4,295.5
Less: Others r/	92.4	403.1	139.2	180.0	258.8	327.3	375.5	420.6	469.9
Net internal cash generation	131.7	(48.3)	285.7	480.7	705.1	1,133.0	460.7	401.9	1,452.9
Sector capital contributions s/	N.A.	316.0	392.8	752.5	700.3	688.2	721.6	782.9	852.2
Total consumer direct contributions	131.7	267.7	678.5	1,233.2	1,405.4	1,821.2	1,182.3	1,184.8	2,305.1
Borrowings: existing	907.7	1,858.2	2,203.5	3,416.0	2,434.8	1,288.1	651.9	20.0	20.0
proposed IBRD loan t/	-	-	-	-	16.4	195.0	320.6	131.0	20.1
Other proposed and future loans	-	-	-	866.6	3,139.1	4,117.4	4,626.3	4,350.4	2,834.8
Total borrowings u/	907.7	1,858.2	2,203.5	4,282.6	5,590.3	5,580.5	5,598.8	4,501.4	2,874.9
Non-sector capital contributions v/	190.1	80.4	80.0	438.7	261.1	261.2	261.2	261.0	381.4
Total sources	1,229.5	2,206.3	2,962.0	5,954.5	7,256.8	7,662.9	7,042.3	5,947.2	5,561.4
Applications									
Construction program: ongoing works	1,110.1	2,215.3	3,119.3	3,540.9	3,890.7	3,123.2	2,180.9	1,104.2	311.3
proposed distribution project	-	-	-	-	113.4	532.7	722.2	713.2	-
other proposed and future projects	-	-	-	1,762.8	2,394.6	2,669.6	2,806.8	3,106.1	3,888.6
interest during construction	41.5	19.2	199.2	497.3	638.4	885.3	968.3	552.2	708.3
Total construction program w/	1,151.6	2,234.5	3,318.5	5,801.0	7,037.1	7,210.8	6,678.2	5,475.7	4,908.2
Increase in working capital and other applications x/	77.9	(28.2)	(356.5)	153.5	219.7	452.1	364.1	471.5	653.2
Total applications	1,229.5	2,206.3	2,962.0	5,954.5	7,256.8	7,662.9	7,042.3	5,947.2	5,561.4

(cont. on page 40)

a/ Annual average (pro-rata tempore).
b/ Forecast figures represent investment in materials and supplies only.
c/ Up to 1974 CEMIG estimated this amount to reflect the allowable earnings on energy sold in December but billed in the following year. In 1975 the utility changed its recording procedure to the accrual method of accounting; the 1975 figure was presented for comparison purposes.
d/ DNAEE has authorized CEMIG to earn 12% on remunerable investment in 1977; 10% was assumed thereafter.
e/ Computed at 3% average rate based on straight-line method; annual capitalizations considered on a pro-rata tempore basis; for computations, non-depreciable assets were deducted from gross fixed assets.
f/ Reversion was forecast at 3.6%, the rate applied in 1976.
g/ See Table 3-1.
h/ Energy purchased from FURNAS as required assuming an average hydrological year for CEMIG's hydro plants.
i/ A discrete increase in 1978 to take into account the commissioning of the new thermal plant Igarape otherwise projected at about 4% growth rate p.a. See forecast of number of employees in Annex B, T-23
j/ A discrete increase in 1978 to take into account the commissioning of the new thermal plant Igarape otherwise projected at about 5.5% growth rate p.a.
k/ A discrete increase in 1978 to take into account the commissioning of the new thermal plant Igarape otherwise projected at about 6% growth rate p.a.
l/ Do not represent expected fuel expenses but CEMIG's contributions to the common fund-established to pay for all fuel expenses in the region; the figures were computed according to guidelines issued by the GCOI.
m/ See Annex B, T-12.
n/ Interest during construction is added to the fixed asset values at the rate of 10% on construction in progress, according to Decree-Law 1506 (12/23/76).
o/ Computed at 6% on net income before taxes, according to Decree-Law 1506 (12/23/76).
p/ See Annex B, T-11.
q/ Most of ELETROBRAS' loans include financing of interest during construction.
r/ Includes: (i) net dividend payments: dividends are declared every six months at the rate of 12% of end-of-period capital and paid in the next semester; ELETROBRAS reinvests dividends in amounts sufficient to maintain a 16% capital share; the State of Minas Gerais reinvests 90% of its dividends in CEMIG, and 10% in ERMIG, CEMIG's subsidiary; and
(ii) income tax: see note o/; payment is made with one year lag.
s/ Includes: (i) state and municipalities' reinvestment of sole tax proceeds;
(ii) customer contribution in aid of construction; and
(iii) ELETROBRAS' purchases of new shares in amounts sufficient to maintain a 16% capital share when reinvested dividends are insufficient.
t/ In constant June 1977 cruzeiros.
u/ See Annex B, T-10.
v/ Includes State and private investors' purchases of additional capital shares.
w/ See Table 4-1.
x/ See V , next page.

TABLE 5-1

CEMIG

Financial Statements 1974-1982
(in millions of cruzeiros)

	1974	1975	1976	1977	1978	1979	1980	1981	1982
	-Actual (in current currency)-			---------- Forecast (in June 1977 currency) ----------					
IV - BALANCE SHEET									
ASSETS									
Gross plant in service	4,566.9	6,995.0	9,663.6	19,788.3	28,241.7	37,352.8	40,536.4	48,437.1	59,307.5
Less: accumulated depreciation	676.6	1,054.7	1,332.9	2,201.8	2,938.7	3,909.4	5,069.2	6,332.0	7,897.5
Net plant in service	3,890.3	5,940.3	8,330.7	17,586.5	25,303.0	33,443.4	35,467.2	42,105.1	51,410.0
Construction in progress	1,733.3	3,299.6	6,126.3	10,841.7	9,712.5	7,774.4	11,186.2	9,364.4	3,345.7
Net fixed assets y/	5,623.6	9,239.9	14,457.0	28,428.2	35,015.5	41,217.8	46,653.4	51,469.5	54,755.7
Investments z/	59.2	[illegible]	119.5	143.8	143.8	143.8	143.8	143.8	143.8
Cash including marketable securities aa/	98.7	125.7	181.5	201.1	205.0	213.3	241.7	265.8	269.1
Accounts receivables ab/	133.6	327.4	418.8	718.7	876.9	1,056.1	1,216.5	1,306.8	1,541.6
Materials and supplies ac/	169.2	229.2	369.6	593.7	847.3	1,120.6	1,216.1	1,453.1	1,779.2
Other accounts receivable	33.1	220.3	57.5	69.2	69.2	69.2	69.2	69.2	69.2
Total current assets	434.6	902.6	1,027.5	1,582.7	1,998.4	2,459.2	2,743.5	3,094.9	3,659.1
Deferred and other assets	101.1	228.4	197.3	237.4	237.4	237.4	237.4	237.4	237.4
Total assets	6,218.5	10,456.6	15,801.2	30,392.1	37,395.0	44,058.2	49,778.1	54,945.6	58,796.0
LIABILITIES									
Capital and reserves ad/	2,976.2	4,582.2	6,453.1	12,655.9	14,418.4	16,510.6	18,851.7	21,454.7	24,661.5
Long-term debt ae/	2,707.1	4,948.0	8,035.6	15,400.9	20,071.8	24,423.0	27,658.3	30,114.0	30,727.9
Less: maturities within one year	178.4	229.8	506.1	915.5	1,230.2	2,362.7	2,061.0	2,261.0	2,914.0
Net long-term debt	2,528.7	4,718.2	7,529.5	14,485.4	18,841.6	22,060.3	25,597.3	27,853.0	27,813.9
Long-term debt-maturities within one year	178.4	229.8	506.1	915.5	1,230.2	2,362.7	2,061.0	2,261.1	2,914.0
Accounts payable and accruals af/	165.4	270.3	523.5	785.3	976.4	965.3	871.3	751.3	662.6
Other current liabilities	119.0	263.5	395.5	535.5	540.4	560.2	574.4	574.3	574.0
Total current liabilities	462.8	763.6	1,425.1	2,236.3	2,747.0	3,888.2	3,506.7	3,586.7	4,150.6
Deferred and other liabilities ag/	250.8	392.6	393.5	1,014.5	1,388.0	1,599.1	1,822.4	2,051.2	2,170.0
Total liabilities	6,218.5	10,456.6	15,801.2	30,392.1	37,395.0	44,058.2	49,778.1	54,945.6	58,796.0
V - WORKING CAPITAL									
Materials and supplies ac/	169.2	229.2	369.6	593.7	847.3	1,120.6	1,216.1	1,453.1	1,779.2
Accounts receivable ab/	133.6	327.4	418.8	718.7	876.9	1,056.1	1,216.5	1,306.8	1,541.6
Other receivables	33.1	220.3	57.5	69.2	69.2	69.2	69.2	69.2	69.2
Accounts payable af/	(165.4)	(270.3)	(523.5)	(785.3)	(976.4)	(965.3)	(871.3)	(751.3)	(662.6)
Other payables	(119.0)	(263.5)	(395.5)	(535.5)	(540.4)	(560.2)	(574.4)	(574.3)	(574.0)
Total working capital ex-cash	51.5	243.1	(73.1)	60.8	276.6	720.4	1,056.1	1,503.5	2,153.4
Annual change		191.6	(316.2)	133.9	215.8	443.8	335.7	447.4	649.9
Cash balances	98.7	125.7	181.5	201.1	205.0	213.3	241.7	265.8	269.1
Total working capital	150.2	368.8	108.4	261.9	481.6	933.7	1,297.8	1,769.3	2,422.5
Annual change		218.6	(260.4)	153.5	219.7	452.1	364.1	471.5	653.2
VI - FINANCIAL INDICATORS									
Operating									
Operating ratio (%) ah/	47	51	50	46	43	39	38	39	36
Rate of return on remunerable assets (%) ai/	10.2	9.5	11.8	12.0	10.0	10.0	10.0	10.0	10.0
Financial rate of return (%) aj/	16.9	16.9	18.1	18.8	14.5	14.1	14.3	13.6	14.1
Financial									
Times net debt service covered by gross internal cash generation	1.8	1.8	1.6	1.4	1.5	1.6	1.2	1.2	1.4
Debt/equity ratio	48/52	52/48	55/45	55/45	58/42	60/40	59/41	58/42	56/44
Weighted average remaining repayment period of debt outstanding at year-end (years)	N.A.	N.A.	12						
Weighted average interest rate on debt outstanding at year-end (%)	N.A.	N.A.	9						
Annual contribution to investment from net internal resources (excluding sector capital contributions)(%)	11	(2)	10	8	10	15	7	7	26
Annual contribution to investment from net internal resources (including sector capital contributions)(%)	N.A.	12	23	21	19	24	17	20	41

y/ Under the Brazilian system of accounting for monetary correction fixed assets and accumulated depreciation, and debt subject to revaluation, were revalued with a one year lag through 1976; consequently values as of end of a certain year include balances as of the end of the previous year revalued as of that date plus the current year transactions valued at cost. For 1977 and subsequent years a new system will apply, under which the lag in revaluing assets will be eliminated.

z/ Investment in ERMIG, CEMIG's rural electrification subsidiary; consolidated statements are not shown but the impact of consolidation is not significant (ERMIG's total assets were 1.7% of CEMIG's total assets as of December 1976).

aa/ Estimated at 1-1/2 month of annual cash operating costs.

ab/ Computed at 55 days' average annual billings.

ac/ Computed at 3% on year-end gross plant in service.

ad/ Includes: (i) capitalization of dividends (see note r/);
(ii) capitalization of sole tax proceeds (see note s/);
(iii) purchases of additional shares (see note s/); and
(iv) retained earnings.

ae/ See note y/ and Annex B, T-9.

af/ Computed at the historical average of 1.6 months' investment expenditures.

ag/ Includes declared dividends.

ah/ Total operating costs as a percent of operating revenues.

ai/ See I, previous page.

aj/ Operating income as a percent of average net plant in service.

TABLE 5-2

CELESC

Financial Statements 1974-1982
(in millions of cruzeiros)

	1974	1975	1976	1977	1978	1979	1980	1981	1982
	-Actual (in current currency)-			----------Forecast (in June 1977 currency)----------					
I - REMUNERABLE INVESTMENT									
Remunerable investment									
Utility plant in service a/	557.0	851.1	1,092.7	1,885.2	2,487.8	3,073.8	3,782.2	4,643.9	5,539.5
Working capital b/	94.9	8.2	50.3	49.2	252.9	329.3	390.3	447.8	503.0
Gross remunerable investment	651.9	859.3	1,143.0	1,934.4	2,740.7	3,403.1	4,172.5	5,091.7	6,042.5
Less: accumulated depreciation	81.0	110.0	158.4	248.3	322.9	415.1	528.6	667.9	834.1
accumulated contributions and grants	101.9	137.0	186.1	34.2	41.6	49.0	57.7	68.4	79.6
excess (deficiency) in prior remuneration c/	(76.8)	-	-	-	-	-	-	-	-
Net remunerable investment	545.8	612.3	798.5	1,651.9	2,376.2	2,939.0	3,586.2	4,355.4	5,128.8
Rate of remuneration d/	12.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Actual/allowable remuneration	65.5	61.2	79.8	165.2	237.6	293.9	358.6	435.5	512.9
Cost of service									
Allowable remuneration	65.5	61.2	79.8	165.2	237.6	293.9	358.6	435.5	512.9
Depreciation e/	14.8	25.2	34.7	56.6	74.6	92.2	113.5	139.3	166.2
Reversion f/	13.6	19.4	36.6	75.4	99.5	123.0	151.3	185.8	221.6
Taxes (other than income) and exchange losses	-	4.8	0.2	0.1	0.1	0.1	0.1	0.1	0.1
Other operating costs	269.5	386.0	612.8	1,141.8	1,350.1	1,561.7	1,799.2	2,173.5	2,326.2
Total cost of service	363.4	496.6	764.1	1,439.1	1,761.9	2,070.9	2,422.7	2,934.2	3,227.0
Less: revenues on energy sales	327.8	538.6	752.0	1,416.5	1,733.9	2,037.9	2,384.0	2,886.9	3,174.8
other operating revenues	4.6	10.1	19.1	22.6	28.0	33.0	38.7	47.3	52.2
receipts from Guarantee Fund	-	5.6	6.0	-	-	-	-	-	-
Excess (deficiency) in remuneration	(31.0)	57.6	13.0	-	-	-	-	-	-
Energy sales g/	1,273.8	1,522.4	1,877.9	2,232.0	2,649.7	3,104.1	3,618.7	4,186.1	4,804.7
Average revenue per kWh - Cr$cents h/	25.7	35.3	40.0	64.5	66.5	66.7	66.9	70.1	67.2
II - INCOME STATEMENT									
Net Operating revenues	332.4	548.6	771.1	1,439.1	1,761.9	2,070.9	2,422.7	2,934.2	3,227.0
Operating costs									
Purchased energy i/	163.8	226.2	370.7	732.7	902.1	1,085.1	1,292.0	1,639.6	1,767.3
Depreciation e/	14.8	25.2	34.7	56.6	74.6	92.2	113.5	139.3	166.2
Operating expenses:									
Personnel j/	74.7	115.1	184.7	324.3	353.0	370.2	388.1	404.5	424.8
Materials and supplies k/	15.4	18.2	21.0	35.4	39.7	44.6	50.0	54.5	56.5
Other expenses k/	15.3	22.7	27.9	47.0	52.9	59.4	66.7	72.5	75.2
Fuel l/	0.3	3.8	8.5	2.4	2.4	2.4	2.4	2.4	2.4
Total operating costs	284.3	411.2	647.5	1,198.4	1,424.7	1,653.9	1,912.7	2,312.8	2,492.4
Operating income	48.1	137.4	123.6	240.7	337.2	417.0	510.0	621.4	734.6
Plus: receipts from Guarantee Fund	-	5.6	6.0	-	-	-	-	-	-
Less: reversion f/	13.6	19.4	36.6	75.4	99.5	123.0	151.3	185.8	221.6
Net non-operating expenses	(0.8)	2.4	(2.3)	(3.5)	(4.6)	(5.4)	(6.4)	(7.8)	(8.7)
Income before interest and taxes	35.3	121.2	95.3	168.8	242.3	299.4	365.1	443.4	521.7
Interest expense m/	9.9	19.2	41.4	91.0	119.1	130.0	165.6	188.6	204.6
Less: interest charged to construction n/	3.7	8.9	14.1	27.7	21.8	17.6	33.0	36.4	36.4
Net interest expense	6.2	10.3	27.3	63.3	97.3	112.4	132.6	152.2	168.2
Income taxes o/	0.2	5.6	3.7	4.7	7.4	10.2	12.0	15.3	19.1
Net income	28.9	105.3	64.3	100.8	137.6	176.8	220.5	275.9	334.4
III - SOURCES AND APPLICATIONS OF FUNDS									
Sources									
Gross internal cash generation	52.7	149.4	130.0	225.4	316.9	391.6	478.6	582.7	687.9
Less: debt service: amortization p/	10.2	37.8	33.9	95.2	130.8	163.2	173.0	192.5	202.7
interest m/	9.9	19.2	41.4	78.7	110.1	122.4	158.4	181.8	198.2
Gross debt service	20.1	57.0	75.3	173.9	240.9	285.6	331.4	374.3	400.9
Less: interest financed by loans q/	3.7	8.9	14.1	27.7	21.8	17.6	33.0	36.4	36.4
Net debt service	16.4	48.1	61.2	146.2	219.1	268.0	298.4	337.9	364.5
Others r/	4.6	6.0	19.8	18.5	23.1	28.6	33.8	40.4	48.7
Net internal cash generation	31.7	95.3	49.0	60.7	74.7	95.0	146.4	204.4	274.7
Sector capital contributions s/	45.0	56.5	111.8	133.5	160.4	198.8	238.4	279.3	328.2
Total consumer direct contributions	76.7	151.8	160.8	194.2	235.1	293.8	384.8	483.7	602.9
Borrowings: existing	83.5	82.4	123.3	302.1	17.4	-	-	-	-
proposed IBRD loan t/	-	-	-	-	19.9	160.7	203.9	112.4	21.1
other proposed and future loans	-	-	-	269.4	333.3	219.9	228.2	350.5	233.3
Total borrowings u/	83.5	82.4	123.3	571.5	370.6	380.6	432.1	462.9	254.4
Non-sector capital contributions v/	-	-	-	48.1	141.1	84.2	84.2	48.1	24.0
Total sources	160.2	234.2	284.1	813.8	746.8	758.6	901.1	994.7	881.3
Applications									
Construction program: ongoing works	142.2	210.6	443.9	482.6	-	-	-	-	-
proposed distribution project	-	-	-	-	152.6	409.7	559.9	555.2	-
other proposed and future projects	-	-	-	-	454.4	256.1	225.0	257.0	780.2
interest financed by loans	3.7	8.9	14.1	27.7	21.8	17.6	33.0	36.4	36.4
Total construction program w/	145.9	219.5	458.0	510.3	628.8	683.4	817.9	848.6	816.6
Increase in working capital and other applications x/	14.3	14.7	(173.9)	303.5	118.0	75.2	83.2	146.1	64.7
Total applications	160.2	234.2	284.1	813.8	746.8	758.6	901.1	994.7	881.3

(cont. on page 42)

a/ Annual average (*pro rata tempore*) plant in service.

b/ Average working capital; see details under V, next page.

c/ Up to 1974 CELESC estimated this amount to reflect the allowable earnings on energy sold in December but billed in the following year. In 1975 the company changed its recording procedure to the accrual method of accounting.

d/ Forecast conservatively at 10%, the minimum allowable remuneration.

e/ Computed at 3% average rate based on straight-line method; annual capitalizations considered on an average basis.

f/ Reversion was forecast at 4%, the rate applied in 1976.

g/ See Table 3-1.

h/ Includes revenues from energy sales only.

i/ Energy purchased from ELETROSUL as required assuming an average hydrological year for CELESC's hydro plants.

j/ Cost per employee expected to increase at about 3% p.a. in real terms times the expected number of required employees. See forecast of number of employees in Annex B, T-23.

k/ Expected to grow at about the same rate as the number of customers.

l/ Fuel costs computed according to the expected minimum cost fuel dispatch; a portion of this item does not represent expected fuel expenses but CELESC's contributions to the common fund established to pay for all fuel expenses in the region; the figures were computed according to guidelines issued by the GCOI.

m/ See Annex B, T-17.

n/ Interest during construction is added to the fixed asset values at the rate of 10% on construction in progress, according to Decree-Law 1506 (12/23/76).

o/ Computed at 6% on net income before taxes, according to Decree-Law 1506 (12/23/76).

p/ See Annex B, T-16.

q/ Figures for interest financed by loans were not available; interest charged to construction, which is on the conservation side, was used as a proxy.

r/ Includes: (i) net dividend payments: dividends are declared every six months at the rate of 10% on preferred shares and 6% on common shares held on a pro rata tempore basis; for projecting, these rates were applied on the average outstanding shares. The State of Santa Catarina and ELETROBRAS reinvest 100% of their dividends;
(ii) income tax: see note p/; payment is made with one year lag; and
(iii) statutory participation: granted annually by the Shareholders Meeting, projected at 4.6% of personnel expenses, the 1976 authorized expense.

s/ Includes: (i) state and municipalities' reinvestment of sole tax proceeds;
(ii) customer contributions in aid of construction; and
(iii) ELETROBRAS' purchases of new shares.

t/ In constant June 1977 cruzeiros.

u/ See Annex B, T-15.

v/ Includes state's purchases of additional capital shares. The Government of Santa Catarina has communicated to the Bank its intentions to provide these amounts.

w/ See Table 4-1.

x/ See V, next page.

TABLE 5-2

CELESC

Financial Statements 1974-1982
(in millions of cruzeiros)

	1974	1975	1976	1977	1978	1979	1980	1981	1982
	-Actual (in current currency)-			----------Forecast (in June 1977 currency)----------					
IV - BALANCE SHEET									
ASSETS									
Gross plant in service	559.7	854.9	1,103.1	2,196.3	2,779.3	3,368.3	4,196.1	5,091.7	5,987.3
Less: accumulated depreciation	81.0	111.8	158.4	248.3	322.9	415.1	528.6	667.9	834.1
Net plant in service	478.7	743.1	944.7	1,948.0	2,456.4	2,953.2	3,667.5	4,423.8	5,153.2
Construction in progress	130.7	108.7	443.0	430.2	476.0	570.4	560.5	513.5	434.5
Net fixed assets z/	609.4	851.8	1,387.7	2,378.2	2,932.4	3,523.6	4,228.0	4,937.3	5,587.7
Cash including marketable securities aa/	28.8	56.0	53.4	142.7	168.8	195.2	224.9	271.7	290.8
Accounts receivable ab/	56.4	85.4	129.4	239.9	293.7	345.2	403.8	489.0	538.0
Materials and supplies ac/	76.9	88.3	50.3	66.0	83.4	101.0	125.9	152.8	179.6
Other receivables ad/	20.0	59.4	110.4	111.5	137.1	167.6	198.9	224.6	235.5
Total current assets	182.1	289.1	343.5	560.1	683.0	809.0	953.5	1,138.1	1,243.9
Defferred and other assets	29.5	38.0	37.9	42.3	36.3	31.5	31.5	31.5	31.5
Total assets	821.0	1,178.9	1,769.1	2,980.6	3,651.7	4,364.1	5,213.0	6,106.9	6,863.1
LIABILITIES									
Capital and reserves ae/	404.8	495.7	722.6	1,351.4	1,788.8	2,209.0	2,699.5	3,215.8	3,774.9
Long-term debt af/	252.8	390.2	544.5	1,252.3	1,461.8	1,679.2	1,938.3	2,208.7	2,260.4
Less: maturities within one year	15.7	51.8	63.2	161.1	163.2	173.0	192.5	202.7	225.0
Net long-term debt	237.1	338.4	481.3	1,091.2	1,298.6	1,506.2	1,745.8	2,006.0	2,035.4
Long-term debt-maturities within one year	15.7	51.8	63.2	161.1	163.2	173.0	192.5	202.7	225.0
Accounts payable and accruals ag/	103.4	105.1	301.6	197.1	183.0	216.4	257.2	266.1	287.6
Other current liabilities ah/	28.3	46.8	77.4	95.0	114.0	131.4	151.9	181.5	201.1
Total current liabilities	147.4	203.7	442.2	453.2	460.2	520.8	601.6	650.3	713.7
Deferred and other liabilities	31.7	141.1	123.0	84.8	104.1	128.1	166.1	234.8	339.1
Total liabilities	821.0	1,178.9	1,769.1	2,980.6	3,651.7	4,364.1	5,213.0	6,106.9	6,863.1
V - WORKING CAPITAL									
Materials and supplies ac/	76.9	88.3	50.3	66.0	83.4	101.0	125.9	152.8	179.6
Accounts receivable ab/	56.4	85.4	129.4	239.9	293.7	345.2	403.8	489.0	538.0
Other receivables ad/	20.0	59.4	110.4	111.5	137.1	167.6	198.9	224.6	235.5
Accounts payable and accruals ag/	(103.4)	(105.1)	(301.6)	(197.1)	(183.0)	(216.4)	(257.2)	(266.1)	(287.6)
Other current liabilities ah/	(28.3)	(46.8)	(77.4)	(95.0)	(114.0)	(131.4)	(151.9)	(181.5)	(201.1)
Total working capital ex-cash	21.6	81.2	(88.9)	125.3	217.2	266.0	319.5	418.8	464.4
Annual change		59.6	(170.1)	214.2	91.9	48.8	53.5	49.3	45.6
Cash balances aa/	28.8	56.0	53.4	142.7	168.8	195.2	224.9	271.7	290.8
Total working capital	50.4	137.2	(35.5)	268.0	386.0	461.2	544.4	690.5	755.2
Annual change		86.8	(172.7)	303.5	118.0	75.2	83.2	146.1	64.7
VI - FINANCIAL INDICATORS									
Operating									
Operating ratio (%) ai/	86	75	84	83	81	80	79	79	77
Rate of return on remunerable assets (%) aj/	12.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Financial rate of return (%) ak/	11.1	22.5	14.6	16.6	15.3	15.4	15.4	15.4	15.3
Financial									
Times net debt service covered by gross internal cash generation	3.2	3.1	2.1	1.5	1.4	1.5	1.6	1.7	1.9
Debt/equity ratio	38/62	44/56	43/57	46/54	43/57	42/58	41/59	39/61	36/64
Weighted average remaining repayment period of debt outstanding at year end (years)			8.3						9.6
Weighted average interest rate on debt outstanding at year-end (%)			9.3						9.5
Annual contribution to investment from net internal resources (excluding sector capital contributions)(%)	20	41	17	9	10	12	16	22	30
Annual contribution to investment from net internal resources (including sector capital contributions((%)	48	65	57	28	32	38	42	51	66

z/ Under the Brazilian system of accounting for monetary correction, fixed assets, and accumulated depreciation, and debt subject to revaluation, were revalued with a one year lag through 1976; consequently values as of the end of a certain year include balances as of the end of the previous year revalued as of that date plus the current year transactions valued at cost. For 1977 and subsequent years a new system will apply, under which the lag in revaluing assets will be eliminated.

aa/ Computed at 1-1/2 month of annual cash operating costs.

ab/ Computed at 60 days' average annual billings.

ac/ Computed at 3% on year-end gross plant in service.

ad/ Includes advanced payments to suppliers and others; projections based on historical relationships.

ae/ Includes: (i) capitalization of dividends (see note s/);
(ii) capitalization of sole tax proceeds (see note t/);
(iii) purchases of additional shares (see note t/); and
(iv) retained earnings.

af/ See note z/ and Annex 6, T-14.

ag/ Includes credit received on purchases of materials and services, purchased energy, and construction expenditures; projections based on historical relationships: 3% of annual expenses for materials and services, 2 months' energy purchases and 5% of annual investment expenditures. The 1976 figure includes overdue payables on account of energy purchases amounting to Cr$161 million.

ah/ Includes payables on account of social security, taxes including income tax, and others; projections based on historical relationships.

ai/ Operating expenses as a percent of operating revenues.

aj/ See I, previous page.

ak/ Operating income as a percent of average net plant in service.

TABLE 5-3

ESCELSA

Financial Statements 1974-1982
(in millions of cruzeiros)

	1974	1975	1976	1977	1978	1979	1980	1981	1982
	-Actual (in current currency)-			----------Forecast (in June 1977 currency)----------					
I - REMUNERABLE INVESTMENT									
Remunerable investment									
Utility plant in service a/	698.0	1,110.2	1,523.6	2,547.2	3,014.0	3,371.8	3,845.1	4,424.8	4,795.4
Working capital b/	81.9	64.6	87.4	174.9	201.8	219.6	255.9	290.6	335.6
Gross remunerable investment	779.9	1,174.8	1,611.0	2,722.1	3,215.8	3,592.4	4,101.0	4,715.4	5,131.0
Less: accumulated depreciation	46.6	79.0	135.1	219.7	310.1	411.3	526.7	659.4	803.4
accumulated contributions and grants	41.2	57.6	75.5	139.4	157.1	177.8	199.5	222.7	229.5
excess (deficiency) in prior remuneration c/	(1.5)	-	-	-	-	-	-	-	-
Net remunerable investment	693.8	1,038.2	1,400.4	3,061.2	3,683.0	4,180.5	4,827.2	5,597.5	4,098.1
Rate of remuneration d/	11.6	11.7	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Actual/allowable remuneration	80.6	121.1	140.0	308.1	368.3	418.1	482.7	559.8	409.8
Cost of service									
Allowable remuneration	80.6	121.1	140.0	308.1	368.3	418.1	482.7	559.8	409.8
Depreciation e/	11.2	33.2	45.9	76.4	90.4	101.2	115.4	132.7	144.0
Reversion f/	18.1	36.3	67.4	86.6	102.5	114.6	130.7	150.4	163.0
Taxes (other than income) and exchange losses	0.9	1.1	2.4	0.1	0.1	0.1	0.1	0.1	0.1
Other operating costs	50.4	80.9	148.6	309.9	466.3	616.1	828.5	961.4	1,115.9
Total cost of service	161.2	272.6	404.3	781.1	1,027.6	1,250.1	1,557.4	1,804.4	1,832.8
Less: revenues on energy sales	157.0	245.0	359.2	744.0	928.9	1,092.4	1,347.7	1,526.4	1,762.4
other operating revenues	3.0	3.5	5.1	9.6	12.0	14.4	16.8	19.2	21.7
receipts from Guarantee Fund	-	24.4	40.0	27.5	86.7	143.3	192.9	258.8	48.7
Excess (deficiency) in remuneration	1.2	(0.3)	-	-	-	-	-	-	-
Energy sales - GWh g/	776.9	868.0	1,006.4	1,491.0	1,989.0	2,626.0	3,127.0	4,182.0	4,406.0
Average revenue per kWh - Cr$cents h/	20.21	28.22	35.71	49.9	46.7	41.6	43.1	36.1	40.0
II - INCOME STATEMENT									
Net operating revenues	160.0	248.5	364.3	753.6	940.9	1,106.8	1,364.5	1,545.6	1,784.1
Operating costs									
Purchased energy i/	8.3	12.8	31.9	150.0	283.9	406.7	588.3	685.7	799.2
Depreciation e/	11.2	33.2	45.9	76.4	90.4	101.2	115.4	132.7	144.0
Operating expenses:									
Personnel j/	17.4	29.9	63.0	93.1	104.1	116.7	130.8	146.4	168.1
Materials and supplies k/	13.7	20.0	35.2	50.8	60.7	73.2	87.6	105.3	120.9
Other expenses l/	6.9	7.8	13.7	15.0	16.4	18.1	19.9	21.8	25.0
Fuel m/	5.0	13.7	14.1	1.0	1.2	1.4	1.9	2.2	2.7
Total operating costs	62.5	117.4	203.8	386.3	556.7	717.3	943.9	1,094.1	1,259.9
Operating income	97.5	133.4	165.4	367.3	384.2	389.5	420.6	451.5	524.2
Plus: receipts from Guarantee Fund	-	24.4	40.0	27.5	86.7	143.3	192.9	258.8	48.7
Less: reversion f/	18.1	34.0	62.5	86.6	102.5	114.6	130.7	150.4	163.0
Net non-operating expenses	0.8	8.4	2.6	-	-	-	-	-	-
Income before interest and taxes	78.6	113.1	135.4	308.2	368.4	418.2	482.8	559.9	409.9
Interest expense n/	39.2	101.5	105.4	192.2	205.5	206.4	235.9	240.2	253.4
Less: interest charged to construction o/	12.3	45.4	29.7	17.5	16.5	32.9	43.3	43.9	37.0
Net interest expense	26.9	56.1	75.7	174.7	189.0	173.5	192.6	196.3	216.4
Income taxes p/	3.7	2.6	3.4	7.0	9.8	12.7	14.8	19.2	9.4
Net income	48.0	54.4	56.3	126.5	169.6	232.0	275.4	344.4	184.1
III - SOURCES AND APPLICATIONS OF FUNDS									
Sources									
Gross internal cash generation	89.8	146.3	181.3	384.6	458.8	519.4	598.2	692.6	553.9
Less: debt service: amortization q/	111.2	118.1	103.4	154.0	124.9	169.8	219.4	262.7	151.6
interest n/	39.2	101.5	105.4	192.2	205.5	206.4	235.9	240.2	253.4
Gross debt service	150.4	219.6	208.8	346.2	330.4	376.0	455.3	502.9	405.0
Less: interest financed by loans r/	12.3	45.4	29.7	58.2	24.6	29.8	56.5	54.1	37.0
Net debt service	138.1	174.2	179.1	288.0	305.8	346.2	398.8	448.8	368.0
Less: others s/	24.1	(12.2)	50.3	31.0	9.1	9.8	14.9	17.5	41.0
Net internal cash generation	(72.4)	(15.7)	(48.1)	65.6	143.9	163.4	184.5	226.3	144.9
Sector capital contributions t/	47.1	82.6	119.9	75.9	85.2	86.2	94.7	104.1	128.4
Total consumer direct contributions	(25.3)	66.9	71.8	141.5	229.1	249.6	279.2	330.4	273.3
Borrowings: existing	173.8	160.6	235.9	332.0	103.8	-	-	-	-
proposed IBRD loan u/	-	-	-	-	16.8	102.0	121.0	69.5	17.6
other proposed and future loans	-	-	-	-	165.9	249.5	235.2	233.3	173.3
Total borrowings v/	173.8	160.6	235.9	332.0	286.5	351.5	362.2	302.8	190.9
Non-sector capital contributions	-	-	-	-	-	-	-	-	-
Total sources	148.5	227.5	307.7	473.5	515.6	601.1	641.4	633.2	464.2
Applications									
Construction program: ongoing works	114.4	154.8	240.8	382.2	-	-	-	-	-
proposed distribution project	-	-	-	-	157.1	357.8	291.4	271.3	-
other proposed and future projects	-	-	-	-	292.1	161.8	236.7	262.5	370.8
interest during construction	12.3	45.4	29.7	58.2	24.6	29.8	56.5	54.1	37.0
Total construction program w/	126.7	200.2	270.5	440.4	473.8	569.4	584.6	587.9	407.8
Increase in working capital and other applications x/	21.8	27.3	37.2	33.1	41.8	31.7	56.8	45.3	56.4
Total applications	148.5	227.5	307.7	473.5	515.6	601.1	641.4	633.2	464.2

(cont. on page 44)

a/ Annual average (pro rata tempore) plant in service.

b/ See details under V , next page.

c/ Up to 1974, ESCELSA estimated this amount to reflect the allowable earnings on energy sold in December but billed in the following year. In 1975, the utility changed its recording procedure to the accrual meth of accounting.

d/ Forecast conservatively at 10% the minimum allowable remuneration.

e/ Computed at 3% average rate based on straight-line method; annual capitalizations considered on an average basis.

f/ Reversion was forecast at 3.4%, the average rate applied in 1974-76.

g/ See Table 3-1.

h/ Includes revenues from energy sales only.

i/ Energy purchased from FURNAS as required assuming an average hydrologi year for ESCELSA's hydro plants.

j/ Estimated to grow at 12% p.a. including about 4.5% salary increases in real terms. See forecast of number of employees in Annex B, T-23.

k/ Estimated to grow at about the average of the growth rate with number of customers and the growth in energy sales.

l/ Estimated to grow at about the same rate as the rate of growth in the number of customers.

m/ Do not represent expected fuel expenses but ESCELSA's contributions to the common fund established to pay for all fuel expenses in the region; the figures were computed according to guidelines issued by the GCOI.

n/ See Annex B, T-22.

o/ Interest during construction is added to the fixed asset values at the rate of 10% on construction in progress, according to Decree-Law 1506 (12/23/76).

p/ Computed at 6% on net income before taxes, according to Decree-Law 1506 (12/23/76).

q/ See Annex B, T-21.

r/ Most of ELETROBRAS' loans include financing of interest during construction.

s/ Includes: (i) net dividend payments: dividends are declared every six months at the rate of 10% on end-of-period equity; ELETROBRAS reinvests 100% of its dividends; and
(ii) income tax: see note p/; payment is made with one year lag.

t/ Includes: (i) state and municipalities' reinvestment of sole tax proceed; and
(ii) customer contributions in aid of construction.

u/ In constant June 1977 cruzeiros.

v/ See Annex B, T-20.

w/ See Table 4.1.

x/ See V on next page.

ABLE 5-3

ESCELSA

Financial Statements 1974-1982
(in millions of cruzeiros)

	1974	1975	1976	1977	1978	1979	1980	1981	1982
	-Actual (in current currency)-			---------- Forecast (in June 1977 currency)----------					
V - BALANCE SHEET									
ssets									
ross plant in service	698.0	1,239.7	1,693.4	2,826.9	3,201.0	3,542.5	4,147.7	4,701.8	5,119.4
ess: accumulated depreciation	(34.3)	(62.7)	(112.5)	219.7	310.1	411.3	526.7	659.4	803.4
Net plant in service	663.7	1,177.0	1,580.9	2,607.2	2,890.9	3,131.2	3,621.0	4,042.4	4,316.0
onstruction in progress	232.9	133.3	234.3	115.3	215.0	442.9	422.3	456.1	446.3
Net fixed assets y/	896.6	1,310.3	1,815.2	2,722.5	3,105.0	3,574.1	4,043.3	4,498.5	4,762.3
nvestments	0.2	0.3	0.3	0.4	0.3	0.3	0.3	0.3	0.3
ash including marketable securities z/	45.5	48.0	38.5	38.7	58.3	77.0	103.6	120.2	139.5
ccounts receivable aa/	13.2	34.4	42.2	69.8	87.2	102.6	126.6	143.5	162.6
aterials and supplies ab/	21.2	16.1	24.9	38.9	44.5	49.6	58.7	67.1	71.7
ther accounts receivable	1.6	18.5	67.1	80.7	80.7	80.7	80.7	80.7	80.7
Total current assets	81.5	117.0	173.0	228.1	270.7	309.9	369.6	411.5	454.5
eferred and other assets	44.0	44.3	113.8	182.9	187.6	234.5	202.1	166.0	166.0
Total assets	1,022.3	1,471.9	2,102.0	3,133.9	3,563.6	4,188.8	4,615.3	5,076.3	5,383.1
iabilities									
apital and reserves ac/	272.6	473.4	684.1	801.3	1,083.8	1,465.5	1,746.9	2,088.4	2,514.1
ong-term debt ad/	667.0	875.4	1,226.0	2,032.9	2,080.8	2,184.3	2,316.9	2,357.0	2,251.5
ess: maturities within one year	54.2	83.2	91.3	238.7	248.1	241.0	282.1	318.0	300.0
Net long-term debt	612.8	792.2	1,134.7	1,794.2	1,946.5	2,135.5	2,237.2	2,241.4	2,298.7
ong-term debt-maturities within one year	54.2	83.2	91.3	238.7	248.1	241.0	282.1	318.0	300.0
ccounts payable and accruals ae/	3.3	6.9	18.7	36.6	37.4	44.9	44.1	44.3	31.0
ther current liabilities	10.1	14.7	21.7	26.1	26.1	26.1	26.1	26.1	26.1
Total current liabilities	67.6	104.8	131.7	301.4	311.6	312.0	352.3	388.4	357.1
eferred and other liabilities	69.3	101.5	151.5	237.0	335.6	398.1	481.2	560.5	560.5
Total liabilities	1,022.3	1,471.9	2,102.0	3,133.9	3,563.6	4,118.8	4,615.3	5,076.3	5,383.1
- WORKING CAPITAL									
aterials and supplies ab/	21.2	16.1	24.9	38.9	44.5	49.6	58.7	67.1	71.7
ccounts receivable aa/	13.2	34.4	42.2	69.8	87.2	102.6	126.6	143.5	162.6
ther receivables	1.6	18.5	67.1	80.7	80.7	80.7	80.7	80.7	80.7
ccounts payable ae/	(3.3)	(6.9)	(18.7)	(36.6)	(37.4)	(44.9)	(44.1)	(44.3)	(31.0)
ther current liabilities	(10.1)	(14.7)	(21.7)	(26.1)	(26.1)	(26.1)	(26.1)	(26.1)	(26.1)
Total working capital ex-cash	22.6	47.4	93.8	126.7	148.9	161.9	195.8	220.8	257.9
nnual change		24.8	46.4	13.9	22.1	12.9	33.9	25.0	37.1
ash balances z/	45.5	48.0	38.5	38.7	58.3	77.0	103.6	120.2	139.5
Total working capital	68.1	95.4	132.3	165.4	207.2	238.9	299.4	341.0	397.4
nnual change		27.3	36.9	33.1	41.8	31.7	60.5	41.6	56.4
I - FINANCIAL INDICATORS									
perating									
perating ratio (%) af/	34	42	47	31	29	28	26	26	26
ate of return on remunerable assets (%) ag/	11.6	11.7	10.0	10.0	10.0	10.0	10.0	10.0	10.0
inancial rate of return (%) ah/	19.5	14.5	12.0	17.5	14.0	12.9	12.5	11.8	12.5
inancial									
imes net debt service covered by gross internal cash generation	0.7	0.8	1.0	1.3	1.5	1.5	1.5	1.5	1.5
ebt/equity ratio	71/29	65/35	64/36	72/28	66/34	60/40	57/43	53/47	47/53
eighted average remaining repayment period of debt outstanding at year-end (years)			11.9					8.0	
eighted average interest rate on debt outstanding at year-end (%)			10.4					10.1	
nnual contributions to investment from net internal resources (excluding sector capital contributions)(%)	(49)	(7)	(16)	14	28	27	29	36	31
nnual contributions to investment from net internal resources (including sector capital contributions)(%)	(17)	29	23	29	44	42	44	52	59

y/ Under the Brazilian system of accounting for monetary correction, fixed assets, and accumulated depreciation, and debt subject to revaluation, were revalued with a one year lag through 1976; consequently values as of the end of a certain year include balances as of the end of the previous year revalued as of that date plus the current year transactions valued at cost. For 1977 and subsequent years a new system will apply, under which the lag in revaluing assets will be eliminated.

z/ Computed at 1-1/2 month of annual cash operating costs.

aa/ Computed at 34 days' average annual billing.

ab/ Computed at 1.4% on year-end gross plant in service.

ac/ Includes: (i) capitalization of dividends (see note s/);
(ii) capitalization of sole tax proceeds (see note t/); and
(iii) retained earnings.

ad/ See note y/ and Annex B, T-19.

ae/ Computed at one month's investment expenditures.

af/ Operating expenses, excluding purchased energy, as a percent of operating revenues.

ag/ See I on previous page.

ah/ Operating income as a percent of average net plant in service.

CHAPTER 6

ECONOMIC ANALYSIS

Least-Cost Solution

6.01 The expansion program of the subtransmission and distribution facilities is commensurate with the expected growth rate of sales on different parts of the systems, and duly takes into account the concentration of loads, the state of existing facilities and the particular requirements of specific customers. For some of the equipment included in the program, such as transformers or meters, no reasonable alternative exists. Where alternatives do exist, e.g. in routing, sizing or voltage of transmission lines and location and reserve capacities of substations, the utilities have selected the least-cost solution which is compatible with safety and environmental considerations. The use of underground high voltage lines is limited to those cases where urban congestion makes it impractical to build aerial lines. The use of double circuits is limited to feeding the most important substations. Spare capacity at substations is normally limited to about 20% over peak loading.

Return on Investment

6.02 The return on investment was estimated as the discount rate which equates the present values of the benefits and costs stemming from the combined 1978-1981 investment program of the three utilities as well as those of each individual program. Benefits were measured by the forecast revenues from the sales of electricity at the retail levels, using the tariffs in effect as at December 1976 plus the sole tax. CEMIG's investment program for the period is a balanced one and includes sizable investments for generation and transmission. CELESC's and ESCELSA's programs include only distribution items; however, the related generation and transmission investments are included in the cost of energy purchased from their bulk suppliers. The equalizing discount rate for the combined program is about 17% as are the equalizing rates for CEMIG's and ESCELSA's individual programs, while that pertaining to CELESC's program is about 15%. These discount rates compare favorably with the opportunity cost of capital for Brazil, estimated to be 11%. The equalizing rates obtained understate the real economic rate of return of the programs, as revenues from the sales of electricity do not fully measure some of the benefits to society, such as social benefits of residential and public uses, or the indirect benefits to industry and commerce, whose production and employment depend on a reliable electricity supply. Table T-24 of Annex B contains the cost and benefit streams used in the calculations; the underlying assumptions appear as footnotes to the table.

6.03 These results are based on economic efficiency prices for all inputs except labor and foreign exchange. The use of efficiency prices for labor would increase the rate of return. A sensitivity analysis was carried out to determine whether any rate of exchange, other than US$1 = Cr$ 14.35, which was the official rate as of June 30, 1977, would materially change the results. The results of this analysis, reproduced below, indicate that the rate of return is not significantly affected by changes in the foreign exchange rate.

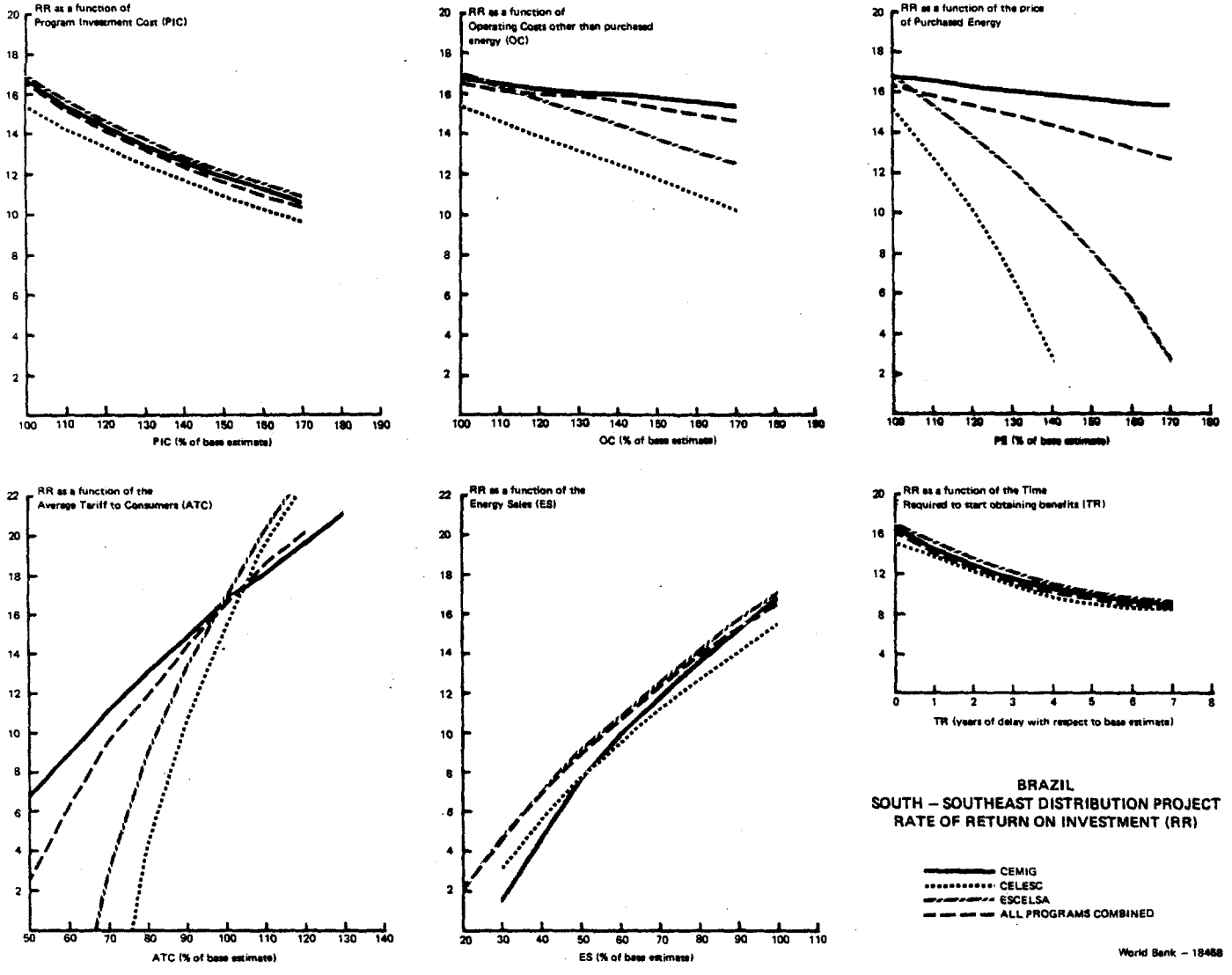
RATE OF RETURN (%)

Exchange Rate (US$1 =)	Relation to Base exchange rate (%)	CEMIG	CELESC	ESCELSA	TOTAL
Cr$ 14.35	100	16.7	15.3	17.0	16.6
Cr$ 17.22	120	16.0	14.7	16.3	15.9
Cr$ 18.66	130	15.6	14.4	16.1	15.5
Cr$ 20.09	140	15.3	14.4	15.8	15.3

6.04 Sensitivity analyses were carried out to determine the effect on the rate of return of variations in the following parameters: (a) the cost of the program; (b) operating costs; (c) time required to start obtaining the expected benefits; (d) average tariff to consumers; and (e) the amount of energy sold due to facilities built under the program--either because of variations in the rate of growth of the market, the number of years in which the new facilities reach their capacity or in the percentage of sales made through these facilities or a combination of these variables. Factors (a), (b) and (c) reflect risks which are, to some extent, subject to control by the beneficiaries, while (d) depends on Government tariff regulation and (e) - and to some extent (c) - is related to the accuracy of demand forecasts. The results, which indicate rates of return which compare favorably with the opportunity cost of capital for all likely variations in these parameters, are shown in the graphs of Figure 6.1. It may be noted, however, that the return on CELESC's and ESCELSA's components of the project is highly sensitive to variations in the price of purchased energy. As noted in Chapter 2 and paras. 4.14 and 4.20, CELESC and ESCELSA will engage consultants to assist with project implementation and with the strengthening of their organization, thus reducing the incidence of risk factors under their control. The other risks are believed to be within acceptable limits. Any increase in the cost of purchased energy would be analyzed by the Brazilian authorities in the context of the applicable legislation and would be most likely offset by corresponding increases in the level of retail rates.

6.05 From all of the above, it may be concluded that the rate of return on investment in the combined program, of which the project is part, and on the individual program of each utility is adequate and that it is not significantly affected by possible misjudgements of the basic parameters which determine it.

igure 6.1
ate of Return



CHAPTER 7

SUMMARY OF AGREEMENTS AND RECOMMENDATIONS

7.01 During negotiations agreements were reached with the Federal and State Governments, ELETROBRAS and the Beneficiaries, as applicable, on the following principal points:

(a) the beneficiaries will maintain their earnings at levels consistent with sound financial and utility practices and in accordance with existing legislation and will maintain their eligibility for transfers from the Global Guarantee Fund; the Federal Government will cause DNAEE to take timely action on the beneficiaries' requests for tariff adjustments and transfers and DNAEE will exercise its statutory powers to allow the beneficiaries a return on remunerable assets of at least 10%; any change in legislation which would materially and adversely affect the beneficiaries' financial position would be an event of default (para. 1.23);

(b) ELETROBRAS will review regularly and report every six months on progress of the project and on the beneficiaries' performance (para. 2.03);

(c) CELESC and ESCELSA will prepare an improvement program, with the assistance of consultants, by June 30, 1979 and implement it thereafter (paras. 2.20 and 2.28);

(d) the beneficiaries will offer financing to low income consumers who have access to service but are not currently connected (para. 4.07);

(e) ELETROBRAS will onlend the proceeds of the loan to the beneficiaries under satisfactory terms and conditions (para. 5.07);

(f) the states of Minas Gerais, Santa Catarina and Espirito Santo will invest, in CEMIG, CELESC and ESCELSA, respectively, at least 90% of the proceeds of the sole tax and reinvest in the beneficiaries at least 90% of the dividends they may receive from the beneficiaries (para. 5.08);

(g) the state of Santa Catarina will make equity contributions to CELESC (para. 5.08);

(h) the states of Minas Gerais and Santa Catarina and ELETROBRAS will provide CEMIG, CELESC and ESCELSA, respectively, with such funds as may be required to assure the timely completion of the project (para. 5.08);

(i) the beneficiaries will not undertake any major project, unless they provide evidence satisfactory to the Bank that such construction is justified technically and economically and that they have secured the necessary financial resources (para. 5.09);

(j) the beneficiaries agreed not to incur any long-term debt without consulting the Bank unless their gross internal cash generation cover their maximum future debt service at least 1.5 times (paras. 5.11, 5.13 and 5.15);

(k) CEMIG will provide to the Bank a review of its investment and financing plans; ELETROBRAS and the Federal and State Governments will participate in this review (para. 5.12); and

(l) ELETROBRAS will, at the Bank's request, maintain ESCELSA's annual debt service coverage at 1.5 (para. 5.14).

7.02 Before declaring the loan effective, the Bank should receive satisfactory evidence that at least one Project Agreement between the Bank and a beneficiary, the related Shareholder Agreement with the State, and the related Subsidiary Loan Agreement between ELETROBRAS and such beneficiary, are effective and legally binding upon the parties thereto.

7.03 The following are disbursement conditions in respect of the several portions of the loan allocated to the respective beneficiary:

(a) receipt of evidence satisfactory to the Bank that the respective Project Agreement, Shareholder Agreement, and Subsidiary Loan Agreement related to each beneficiary is effective and legally binding;

(b) in relation to the CELESC and ESCELSA portions, that they have engaged consultants to conduct studies regarding their respective organizations and to assist them with 138 kV facilities (paras. 2.20, 2.28 and 4.14);

(c) in relation to the CELESC portion, that payments from the State of Santa Catarina of its equity contribution to CELESC have been kept current (para. 5.08); and

(d) in relation to the ESCELSA portion, that ELETROBRAS has furnished the Bank a plan of action satisfactory to the Bank to enable ESCELSA to achieve for 1978 and thereafter, until completion of its portion of the project an annual debt service coverage ratio of 1.5 (para. 5.14).

7.04 With the above agreements, the project constitutes a suitable basis for a Bank loan of US$130 million equivalent. The loan would be paid over a period of 15 years including 3 years of grace.

March 10, 1978

BRAZIL

SOUTH-SOUTHEAST DISTRIBUTION PROJECT

ELETROBRAS' Financial Statements

1. This annex contains the following summarized tables, each covering the years 1971 to 1976:

T-1: Balance Sheets
T-2: Statement of Income
T-3: Sources and Application of Funds

2. On December 31, 1976, ELETROBRAS' share capital was represented by 21,665,120,511 common shares and 334,879,489 preferred shares, with a par value of Cr$1.00 each. The preferred shares have no voting rights and are not convertible into common shares. The preferred shares Class A (subscribed up to June 23, 1969) have the right to a minimum dividend of 2% per year plus the legal rate of remuneration of investments in electricity companies. The preferred shares Class B (subscribed after June 23, 1969) have priority to a minimum dividend of 6% per year. During recent years a 12% dividend has been paid on preferred shares and 9% dividend on common shares based on the par value of Cr$1.00. The Federal Government owns 99.6% of all the shares.

3. The balance sheets (Table 1) indicate a consistently high capital/total debt ratio which, together with a 20-year average remaining repayment period of its debt reflect a satisfactory long-term liquidity situation.

4. The statements of income (Table 2) indicate sustained low operating costs (ranging from 5% to 10% including depreciation and taxes) and a satisfactory interest coverage, which has exceeded five times the annual interest charges over 1971-1975 (4.3 times in 1976). Net income of Cr$4,340 million in 1976 (about US$300 million equivalent 1/) represent a 14.6% return on average equity.

5. The Source and Applications of Funds Statements (Table 3) show a satisfactory debt service coverage. ELETROBRAS' total requirements were covered as follows in the period 1971-1976:

1/ As of June 30, 1977: Cr$14.35 = US$1.

	Cr10^6	%
Net cash generation	15,255	34
Proceeds of energy (sole) tax	3,697	8
Reversion	9,639	22
Compulsory loan	9,307	21
Government transfers	1,202	3
Borrowings	5,711	12
Total	44,811	100

6. ELETROBRAS is supposed to receive a declining proportion of the proceeds of the sole tax (from 36% in 1974 down to 18% in 1979) but is seeking to be permitted to continue to utilize a high proportion of the Federal Government's share of this resource. Its other sources of funds should increase in line with the growth of power sales and are protected against inflation by the provisions of the Brazilian power legislation.

BRAZIL

SOUTH-SOUTHEAST POWER DISTRIBUTION PROJECT

ANNEX A

T-1

CENTRAIS ELETRICAS BRASILEIRAS S. A. (ELETROBRAS)

Balance Sheets a/

(in millions of Cr$)

(As of December 31)	1971	1972	1973	1974	1975	19
ASSETS						
Current Assets						
Cash and deposits	104	152	202	201	255	3
Loans (portion maturing within one year)	755	1,007	1,374	1,527	1,926	3,5
Other current assets	136	209	575	471	35	1,1
Total Current Assets	995	1,368	2,151	2,199	2,216	4,9
Investments						
Loans (portion maturing after one year)	4,808	6,812	9,730	14,601	25,315	38,8
Capital stock						
Subsidiaries	2,988	3,838	4,541	6,502	8,413	14,4
Associated companies	976	1,291	1,836	2,299	4,087	5,1
Other	7	6	4	376 b/	461 b/	6
Advances and other investments	222	376	670	809	863	2,5
Fixed assets	29	39	159	187	309	3
Accumulated depreciation	(3)	(5)	(8)	(15)	(26)	(
Deferred charges and assets	64	178	269	420	72	1
Total Assets	10,086	13,903	19,352	27,378	41,710	67,0
LIABILITIES						
Current Liabilities						
Debt (portion maturing within one year)	39	55	156	121	204	2
Capital stock subscriptions	135	12	20	194	-	-
Other current liabilities	479	565	800	1,308	1,863	3,0
Total Current Liabilities	653	632	976	1,623	2,067	3,2
Long-term debt (portion maturing after one year)						
In domestic currency	2,089	3,428	4,982	7,812	12,927	22,6
In foreign currencies	834	1,080	1,271	1,672	2,140	5,6
Total Long-term debt	2,923	4,508	6,253	9,484	15,067	28,30
Deferred credits and liabilities	969	782	977	926	302	29
Capital						
Share capital	4,705	6,126	8,817	10,980	14,600	22,00
Reserves and retained earnings	836	1,855	2,329	4,365	9,674	13,11
Total Capital	5,541	7,981	11,146	15,345	24,274	35,11
Total Liabilities	10,086	13,903	19,352	27,378	41,710	67,01
Current assets/current liabilities (times)	1.5	2.2	2.2	1.4	1.1	1.5
Total debt/capital ratio	45/55	46/54	42/58	44/56	42/48	48/52

a/ 1971-1975 audited by Messrs. Boucinhas, Campos, Coopers & Lybrand, 1976 by Boucinhas, Campos & Claro S/C Ltda.; minor reclasifications of accounts have been made to achieve consistency.

b/ Largely ELETROBRAS' participation in the Bi-national Itaipu hydroelectric project.

BRAZIL

SOUTH-SOUTHEAST POWER DISTRIBUTION PROJECT

ANNEX A

T-2

CENTRAIS ELETRICAS BRASILEIRAS S.A. (ELETROBRAS)

Statements of Income a/

(in millions of Cr$)

(Year ended December 31)	1971	1972	1973	1974	1975	1976
REVENUES						
From shareholdings	331	452	666	759	1,238	1,253
From loans and financings	501	783	1,056	1,463	3,214	4,245
From government securities	5	17	45	74	(245	(798
Other	3	4	7	16	(	(
Total Revenues	840	1,256	1,774	2,312	4,697	6,296
EXPENSES						
Administrative and general	44	65	88	124	225	392
Depreciation	1	2	3	9	12	16
Taxes	22	22	-	1	179	223
Income before interest	773	1,167	1,683	2,178	4,281	5,665
Interest						
On domestic currency debt	82	107	158	203	341	570
On foreign currency debt	45	48	51	86	265	755
Total Interest	127	155	209	289	606	1,325
Net Income	646	1,012	1,474	1,889	3,675	4,340
Interest coverage (times)	6.1	7.5	8.0	7.5	7.1	4.3

a/ 1971-1975 audited by Messrs. Boucinhas, Campos, Coopers & Lybrand, 1976 by Boucinhas, Campos and Claro S/C Ltda.

BRAZIL

SOUTH-SOUTHEAST POWER DISTRIBUTION PROJECT

ANNEX A

T-3

CENTRAIS ELETRICAS BRASILEIRAS S.A. (ELETROBRAS)

Sources and Applications of Funds Statements [a/]
(in millions of Cr$)

SOURCES	1971	1972	1973	1974	1975	1976
Income before interest	773	1,167	1,683	2,178	4,281	5,665
Less: Non-cash items	102	64	195	184	233	60
Gross cash generation	671	1,103	1,488	1,994	4,048	5,605
Plus Loan amortization receipts	217	443	859	766	1,152	1,816
	888	1,546	2,347	2,760	5,200	7,421
Less: Debt service						
Amortization payments	110	170	260	357	312	832
Interest	127	155	209	289	606	1,157
Total Debt Service	237	325	469	646	918	1,989
Less: Net dividend payments	6	24	40	56	80	117
Net cash generation	645	1,197	1,838	2,058	4,202	5,315
Plus: Electric energy (sole) tax	217	392	501	678	847	1,062
Reversion	-	595	1,228	1,537	2,100	4,179
Compulsory loan	725	793	1,074	1,400	2,021	3,294
Government transfers	50	7	354	280	341	170
Borrowing	-	-	-	-	1,785	3,926
	1,637	2,984	4,995	5,953	11,296	17,946
APPLICATIONS						
Capital stock of subsidiaries and affiliated companies	206	447	612	1,139	1,535	3,193
Long-term loans and advances	1,332	2,267	2,671	4,897	8,822	12,328
Short-term financing (net	-	35	442	(429)	(115)	159
Legal indemnizations	-	-	638	19	659	744
Purchase of transmission systems	-	-	147	104	-	-
Other	78	150	133	292	293	1,416
Working capital increase/(decrease)	21	85	352	(69)	102	106
	1,637	2,984	4,995	5,953	11,296	17,946
Debt service coverage: excluding loan amortization receipts	2.8	3.4	3.2	3.1	4.4	2.8
including loan amortization receipts	3.8	4.8	5.0	4.9	5.7	3.7

a/ 1971-75 figures from Appraisal Report no. 1088b-BR for the Northeast Distribution Project; 1976 figures based on ELETROBRAS 1976 Annual Report.

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SOUTH-SOUTHEAST POWER DISTRIBUTION PROJECT

ANNEX B

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Monthly Electricity Tariffs (1977) [a]

(as approved by DNAEE on December 23, 1976)

	CEMIG	CELESC	ESCELSA
1. Industrial			
(a) Supplies at 88 kV to 138 kV			
-) Demand charge (US$/kW)	4.67	Not applicable	4.67
-) Energy charge (US$/MWh)			
First 9,000 MWh	5.57		5.40
Next 28,000 MWh	5.23		5.40
Excess over 37,000 MWh	4.88		5.40
(b) Supplies at 20 kV to 69 kV			
-) Demand charge (US$/kW)	5.92	5.92	5.92
-) Energy charge (US$/MWh)	7.99	7.99	7.99
(c) Supplies at 2.3 kV to 13.8 kV			
-) Demand charge (US$/kW)	6.27	6.27	6.27
-) Energy charge (US$/MWh)	10.40	10.40	10.40
2. Residential [b] (US$/MWh)	57.14	57.14	57.14
3. Rural [c] [d] (US$/MWh)	37.14	37.14	37.14
4. Non-residential [e] - non-rural (US$/MWh) (commercial and governmental facilities)	61.32	61.32	61.32
5. Street Lighting (US$/MWh)	17.42	17.42	19.51
6. Discounts (%)			
(i) for urban electric traction	75	not applicable	not applicable
(ii) for railroad's electric traction	50		
(iii) water suppliers [d]	40	20	40

---

a/ Translated into US$ at the rate of Cr$14.35 = US$1.

b/ 25% discount if consumption does not exceed 30 kWh/month.

c/ Supply at high voltages has a 10% discount.

d/ Additional discount is given if peak demand does not coincide with suppliers' peak according to $P = \frac{D_f - D_p}{D_f} \times 50$ where P = % discount

D_f = billing demand

D_p = demand at time of system peak.

e/ US$24.39/MWh for bakeries with electric ovens, subject to certain restrictions regarding hours of operations.

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SOUTH-SOUTHEAST POWER DISTRIBUTION PROJECT

ANNEX B

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Access To Service

(figures in thousands)

	1975	1976	1977	1978	1979	1980	1981	198?
CEMIG's Service Area.								
a. Inhabitants - Rural areas	6552	6526	6503	5482	6464	6446	6428	6411
b. Inhabitants - Urban areas	5999	6238	6482	6731	6984	7243	7506	777?
c. Total inhabitants	12551	12764	12985	13213	13448	13689	13934	14184
d. Residential customers	787	867	950	1036	1124	1214	1305	139?
e. Service index (c/d)	15.9	14.7	13.7	12.8	12.0	11.3	10.7	10.1
CELESC's Service Area.								
a. Inhabitants - Rural areas	1778	1808	1837	1862	1892	1921	1952	198?
b. Inhabitants - Urban areas	1574	1643	1716	1797	1877	1960	2032	210?
c. Total inhabitants	3351	3451	3553	3659	3769	3881	3984	409(
d. Residential customers	251	278	313	348	388	433	480	53/
e. Service index (c/d)	13.4	12.4	10.7	10.5	9.7	9.0	8.3	7.7
ESCELSA's Service Area.								
a. Inhabitants - Rural areas	-	-	not available		-	-	-	-
b. Inhabitants - Urban areas	-	-	not available		-	-	-	-
c. Total inhabitants	1725	1750	1776	1804	1831	1860	1889	191?
d. Residential customers	116	136	146	161	177	195	214	23(
e. Service index (c/d)	14.9	12.9	12.1	11.2	10.3	9.5	8.8	8.?

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ANNEX B

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Energy and Peak Demand Balance

	ACTUAL										(Est.)		FORECAST									
	1972		1973		1974		1975		1976		1977		1978		1979		1980		1981		1982	
		%		%		%		%		%		%		%		%		%		%		%
CEMIG																						
Total Sales - GWh	5352		5902		6788		7839		9179		10662		13086		15908		18489		21186		23181	
Losses - % of net generation & purchases	7.2		8.1		8.3		8.8		9.0		9.0		9.0		9.0		9.0		9.0		9.0	
Losses - GWh	423		523		611		757		913		1063		1294		1573		1829		2095		2293	
Energy Required - GWh	5775	100	6425	100	7399	100	8596	100	10092	100	11635	100	14380	100	17481	100	20318	100	23381	100	25474	100
Energy Balance:																						
Net generation from its plants - GWh	5525[a/]	96	5778	90	6745	91	7938	92	7644	76	8899	76	12952	90	15527	89	17532	86	19480	84	21935	86
Purchased energy(from FURNAS) GWh	250	4	647	10	654	9	658	8	2448	24	2736	24	1428	10	1954	11	2786	14	3801	16	3539	14
Load factor (%)	69		68		71		71		71		71		71		71		71		71		71	
Peak demand - MWH/H	949		1070		1195		1386		1628		1870		2312		2811		3267		3743		4096	
Capacity Balance:																						
Generation at time of system peak (MW)	n.a.		934		1006		1246		1236		1498		1862		2361		2567		3003		3356	
Purchases at time of system peak (MW)	n.a.		136		189		140		392		400		450		450		700		740		740	
CELESC																						
Total Sales - GWh	752		1002		1274		1522		1878		2232		2650		3104		3619		4186		4805	
Losses - % of net generation & purchases	13.9		11.6		10.4		9.2		8.0		7.7		7.9		8.0		8.0		8.0		8.0	
Losses - GWh	121		131		148		154		163		187		228		269		315		364		418	
Energy Required - GWh	873	100	1133	100	1422	100	1676	100	2041	100	2419	100	2878	100	3373	100	3934	100	4550	100	5223	100
Energy Balance:																						
Net generation from its plants - GWh	429	49	492	43	398	28	399	24	468	23	433	18	433	15	433	13	433	11	433	9	433	8
Purchased energy (from ELETROSUL) GWh	443	51	641	57	1024	72	1277	76	1573	77	1986	82	2445	85	2940	87	3501	89	4117	91	4790	92
Load factor (%)	56		53		57		59		61		62		62		62		62		62		62	
Peak demand - MWH/H	178		244		285		325		380		446		530		621		724		838		962	
Capacity Balance:																						
Generation at time of system peak (MW)	n.a.		n.a.		n.a.		64		69		69		69		69		69		69		69	
Purchases at time of system peak (MW)	n.a.		n.a.		n.a.		261		311		377		461		552		655		769		893	
ESCELSA																						
Total Sales - GWh	462		640		777		868		1006		1491		1989		2626		3127		4182		4406	
Losses - % of net generation & purchases	10.8		9.7		11.0		9.4		7.0		9.1		9.1		9.1		8.7		8.5		8.5	
Losses - GWh	56		69		97		81		76		149		199		263		298		388		409	
Energy Required - GWh	518	100	709	100	874	100	949	100	1082		1640	100	2188	100	2889	100	3425	100	4570	100	4815	100
Energy Balance:																						
Net generation from its plants - GWh	294	57	376	53	967	111	1117	118	825		987	60	1050	48	1077	37	1066	31	1103	24	1106	23
Purchased energy (from FURNAS) GWh	224	43	333	47	(93)	(11)	(167)	(18)	257		653	40	1138	52	1812	63	2359	69	3467	76	3709	77
Load factor (%)	62		59		66		65				65		65		65		65		65		65	
Peak demand - MWH/H	95		136		151		168		196		288		384		507		601		802		846	
Capacity Balance:																						
Generation at time of system peak (MW)	48		87		171		147		181		176		176		176		176		176		176	
Purchases at time of system peak (MW)	47		49		20		21		15		112		208		331		425		626		670	

a/ Excludes 119 GWh supplied to FURNAS through interchange agreement.

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SOUTH-SOUTHEAST POWER DISTRIBUTION PROJECT

ANNEX 8

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Installed Capacity (MW) and Energy Availability (GWh/year)

	Installed Capacity (MW)	Annual Energy (GWh) Critical hydrological year)	Annual Energy (GWh) (Average hydrological year)
CEMIG			
Existing January 1, 1977			
Hydro:			
Jaguara	425.6	2560	2934
Tres Marias	387.6	1795	2155
Salto Grande	104.0	622	745
Volta Grande	380.0	1542	1848
Itutinga	48.6	210	254
Camargos	45.0	166	201
Piau	18.0		
Gafanhoto	12.9		
Pati	9.4		
Rio de Pedras	9.3		
Poço Fundo	9.2		
Tronqueiras	7.9		
Martins	7.7		
Cajuru	7.2		
16 small plants	35.7	482 a/	578 a/
Sub-total	1508.1	7377	8715
Thermal:			
4 small diesel plants	7.2	40	40
TOTAL	1515.3	7417	8755
Additions during 1977:			
Igarape (Thermal)	125.0	930	930
Sao Simao (hydro)	268.0	2113	2200
TOTAL January 1, 1978	1908.3	10460	11885
Additions during 1978:			
Sao Simao	804.0	6339	6600
TOTAL January 1, 1979	2712.3	16799	18485
Additions during 1979:			
Sao Simao	536.0	133	1554
TOTAL January 1, 1980	3248.3	16932	20039
Additions during 1980:			
None	-	-	-
TOTAL January 1, 1981	3248.3	16932	20039
Additions during 1981:			
Emborcaçao (hydro)	250.0	1971	2000
TOTAL January 1, 1982	3498.3	18903	22039
Addition during 1982:			
Emborcaçao	750.0	1989	2748
Nova Ponte (hydro)	160.0	1261	NA
Igarapava (hydro)	50.0	394	NA
TOTAL January 1983	4458.3	22547	NA
CELESC			
Existing January 1, 1977			
Hydro:			
Palmeiras	17.5		
Bracinho	16.5		
Garcia	8.6		
Cedros	7.0		
Salto Welsebach	6.3		
7 small plants	13.4		
Sub-total	69.3	200	398
Thermal:			
2 small diesel plants	6.0	35	35
TOTAL	75.3	235	433
No additions planned in 1977-1982			
ESCELSA			
Existing January 1, 1977			
Hydro:			
Mascarenhas	120.0		
Suiça	30.6		
Rio Bonito	15.0		
Several small plants	15.2		
TOTAL	180.8	900	1100
No additions planned in 1977			
TOTAL January 1, 1979	180.8		
Additions during 1978:			
retirement of two small plants	(4.4)		
TOTAL January 1, 1979	176.4	880	1080
No additions planned in 1979-1982			

a/ includes availability of all hydro plants other than the ones specifically mentioned above.

NA - Not Available

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SOUTH-SOUTHEAST POWER DISTRIBUTION PROJECT

ANNEX B

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Interconnected System Energy and Peak Demand Balance a/

Static Balance

	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
Southeast and Central-West Regions										
Energy - average MW										
1. Requirements b/	8495	9506	10634	11807	13113	14380	15559	16836	18145	19528
2. Availabilities c/	8974	10176	10869	11504	12244	14173	16278	18435	19881	20122
in region	8974	10176	10869	11504	12244	13153	13743	14403	14523	14603
from Itaipu	-	-	-	-	-	1020 d/	2535	4032	5358	5519
3. Balance	479	670	235	-303 d/	-869 d/	-207 d/	719	1599	1736	594
Peak - MW										
1. Requirements a/	12756	14359	15991	17760	19752	21653	23456	25414	27429	29567
2. Availabilities c/	16605	17808	19422	20554	21102	24307	27558	29187	30765	31725
in region	16605	17808	19422	20554	21102	23197	24803	24803	24803	24803
from Itaipu	-	-	-	-	-	1110	2755	4384	5962	6922
3. Balance	3849	3449	3431	2794	1349	2654	4102	3773	3336	2158
South Region										
Energy - average MW										
1. Requirements b/	1446	1673	1918	2264	2586	2929	3274	3631	3992	4355
2. Availabilities c/	1144	1257	1564	3404	3537	3740	4078	4413	4717	4792
in region	1144	1257	1564	3404	3537	3550	3588	3605	3605	3605
from Itaipu	-	-	-	-	-	190	490	808	1112	1187
3. Balance	-302 e/	-416 e/	-354 f/	1140	951	811	804	782	725	437
Peak - MW										
1. Requirements b/	2363	2710	3114	3735	4249	4793	5338	5901	6467	7032
2. Availabilities c/	2548	2742	4508	5569	5569	5775	6104	6449	6805	7052
in region	2548	2742	4508	5569	5569	5569	5569	5569	5569	5569
from Itaipu	-	-	-	-	-	206	535	880	1236	1483
3. Balance	185	32	1394	1834	1320	982	766	548	338	20

Dynamic Balance

Southeast, Central-West and South Regions										
Energy:										
Requirements - Average MW g/	8495	9506	10634	14071	15699	17309	18833	20467	22137	23883
Minimum stored energy in reservoirs b/ h/										
MW-month	8901	6459	5877	13914	8898	10789	12813	17404	37656	36845
% of maximum storage capacity	21.5	13.5	10.1	16.3	10.2	11.9	14.1	19.2	29.4	28.8
Average thermal generation:										
Nuclear - Average MW	88	309	309	307	314	655	912	1284	1354	1491
Load factor %	14	49.5	49.5	49.1	50.2	35.9	30.2	42.5	44.8	49.3
J. Lacerda - Average MW	0	0	0	131	133	118	88	96	129	170
Load factor %	0	0	0	29.3	29.9	26.4	19.8	21.4	28.9	38.1
Candiota - Average MW	0	0	0	113	128	113	86	80	123	169
Load factor %	0	0	0	26.8	30.5	26.9	20.5	19.1	29.2	40.0
Other coal-fired - Average MW	0	0	0	25	26	20	9	7	12	48
Load factor %	0	0	0	19.3	19.8	15.5	6.8	5.6	9.2	37.0
Oil and gas-fired - Average MW	147	153	162	170	277	237	121	143	162	221
Load factor %	11.1	11.5	12.2	12.6	20.4	17.5	9.0	10.5	12.0	16.3
Deficit - Average MW	0	0	0	0	0	0	0	0	0	0
Peak:										
Requirements - MW b/ g/	12756	14359	15991	21495	24001	26446	28794	31315	33896	36599
Availabilities c/ - MW	17367	18080	18977	26067	26220	30332	33849	36038	39576	40840
hydro	14714	15427	16292	22064	22217	25129	27446	29635	33173	34437
thermal	1955	1955	1955	2976	2976	4176	5376	5376	5376	5376
small plants	698	698	730	1027	1027	1027	1027	1027	1027	1027
Balance	4611	3721	2986	4572	2219	3886	5055	4723	5680	4241

a/ ELETROBRAS and the utilities normally review and update these studies every year and are thus likely to anticipate the possible consequences of a coincidence of delays and adverse hydrological conditions so that they may mitigate the effects of such occurrences.

b/ These requirements have been estimated on the basis of power market studies completed in the last quarter of 1976. New market studies, completed in the last quarter of 1977, have lower forecasts.

c/ The availability of energy and peaking capacity has been estimated on the basis of:

In the Southeast:

(i) hydrological conditions in the **critical year** (1955);

In the South:

(ii) hydrological conditions as per critical year (1944-1945) through 1980 and as per critical year of the Southeast (1955) thereafter in view of the commissioning in 1981 of EHV interconnection;

(iii) the following installation program (in MW)

	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
Ilha Solteira (CESP)	640									
Sao Simao (CEMIG)	1072	536								
Agua Vermelha (CESP)	230	690	460							
Angra (nuclear,FURNAS)	625					1200	1200			
Itauba (CEEE)	375	125								
Jorge Lacerda III	125	125	(thermal, ELETROSUL)							
Itumbiara (FURNAS)			1050	1050						
Foz do Areia (COPEL)				672	336					
Salto Osorio (ELETROSUL)				306						
Salto Santiago (ELETROSUL)				584	584					
Candiota II (coal-fired) (CEEE)				150	150					
Emborcaçao (CEMIG)					750	250				
Rui Barbosa						300				
Itaipu							2100	2100	2100	2100	2100
Salto da Divisa (FURNAS)							720			
Itapebi (FURNAS)							618			

d/ Deficits to be met by transfers from South region.

e/ Deficit to be met by transfers from Southeastern region through existing low capacity 230 kV interconnection.

f/ Deficit to be partially met by transfers from Southeastern region; curtailment may be necessary if critical hydrological year occurs' however, lower demands than used as a basis for these studies may make them unnecessary.

g/ Requirements shown are those of Southeastern/Central-Western region through 1980 and those of the three regions thereafter.

h/ After meeting market in hydrologically critical year, using thermal plants as shown.

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SOUTH-SOUTHEAST POWER DISTRIBUTION PROJECT

ANNEX B

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Detailed Project Cost Estimate

CEMIG	Circuit-km	10^3Cr$	10^3US$
Subtransmission Lines - 34 kV			
Subtotal	-	-	-
Subtransmission Lines-69 kV			
Arcos-Iguatama	20	5,927	413
Arcos-Pains	17	5,038	351
Claudio-Oliveira	34	10,076	702
M.Carmelo-Coromandel	43	11,043	770
Salto Grande-Guanhaes	45	11,554	805
Subtotal	159	43,638	3,041
Subtransmission Lines-138 kV			
Adelaide Du Centro-B.Preto (underground)	5	57,470	4,005
Araxa-Patrocinio	82	33,356	2,324
Arcos-L.Prata	40	15,143	1,055
Bonsucesso-Gutierrez	5	2,260	157
Gafanhoto-Arcos	6	10,372	723
Gafanhoto-B.Despacho	70	23,556	1,642
Gutierrez-Barro Preto (underground)	3	37,930	2,643
Jaguara-Passos	120	48,813	3,402
Juiz de Fora I-Paraibuna	6	6,101	425
Lafaiete-Ponte Nova II	100	40,678	2,835
Neves-Adelaide	19	5,152	359
Neves-Betim II	25	21,354	1,488
Neves-Oeste	19	16,204	1,129
Neves-P.Leopoldo III	23	8,250	575
N.Lima-Sabara Taq.Sabara	4	4,271	298
Patrocinio-Cprm	64	33,843	2,358
Pimenta-Arcos	40	21,152	1,474
Pimenta-Arcos II	40	21,152	1,474
Ponte Nova I-P. Nova II	3	3,533	246
P.Leopoldo III-S.Lagoas	24	14,644	1,020
Taquaril-S.Efigenia	8	3,616	252
US.Embocaçao-Uberlandia	70	28,474	1,984
Varzea da Palma-Italmagnesio	3	3,660	255
Subtotal	779	460,984	32,123
Subtransmission Lines-230 kV			
Ipatinga-G.Valadares (branch to Mesquita)	5	9,273	646
Itabira-Ipatinga (branch to Mesquita)	5	9,273	646
Itabira-Ipatinga (branch to Drumond)	4	7,414	517
Subtotal	14	25,960	1,809
TOTAL-Subtransmission Lines	952	530,582	36,973
Substations - 34.5 kV	MVA		
Sao Ant.Amparo	2.5	2,297	160
US Anil	2.5	1,221	85
Subtotal	5	3,518	245
Substations - 69 kV			
Alfenas	15	4,664	325
Alpinopolis	12.5	3,649	254
Arcos (Bambui)	-	1,672	117
Arcos (Lagoa da Prata)	-	1,672	117
Arcos (Pains)	-	1,672	117
Bambui	-	2,399	167
Betim I	20	8,756	610
B.Despacho	5	4,618	322
Cambuquira	5	3,832	267
Campo Belo	10	5,661	394
Cassia	5	3,432	239
Cid.Ind.S.Luzia	15	5,477	382

(continued on Page 61)

CELESC	Circuit-km	10^3Cr$	10^3US$
Subtransmission Lines - 34 kV			
Subtotal	-	-	-
Subtransmission Lines-69 kV			
Coqueiros-Ilha-Centro (underground)	2	34,375	2,395
Ilha-Centro-Trindade	6	4,089	285
Joinville IV-Tupy	7	1,286	90
Blumenau II-Salto	4	1,777	124
Tubarao-Jaguaruna	19	5,804	404
Trindade-Ilha Norte	15	5,340	372
Enseada de Brito-Trindade	40	27,500	1,916
Salseiros-Camboriu	17	5,143	358
Otalicio-Ponte Alta II	28	10,232	713
Xanxere-Chapeco I	35	12,125	845
Xanxere-Chapeco II	35	11,455	798
Tubarao-Guarda-Azambuja	20	6,080	424
Icara-Morro da Fumaca	13	4,000	280
Imbituba-Laguna	29	9,455	659
Subtotal	270	138,661	9,663
Subtransmission Lines - 138 kV			
Eletrosul-Joinville IV	5	1,500	105
Blumenau II-Blumenau Eletrosul	1	839	58
Mafra-Canoinhas	65	9,893	689
Torre 69-Blumenau Eletrosul	18	12,500	871
Blumenau II-Ibirama	58	23,420	1,633
Ilhota-Blumenau Carcia II	27	5,134	358
Lages-Otacilio Costa II	40	15,589	1,086
Xanxere-Modelo	60	23,375	1,629
Modelo-Sao Miguel	55	21,455	1,494
Subtotal	329	113,705	7,923
Subtransmission Lines-230 kV			
Subtotal	-	-	-
TOTAL-Subtransmission Lines	599	252,366	17,586
Substations - 34.5 kV	MVA		
Subtotal	-	-	-
Substations - 69 kV			
Joinville III	12.5	4,402	307
Jaragua	25	2,571	179
Tupi	-	2,455	171
Brusque	12.5	2,955	206
Piçarras	7.5	2,500	174
Gravatal	2.5	3,741	261
Jaguaruna	2.5	1,857	129
Trindade	40	1,607	112
Coqueiros	30	6,875	479
Ilha Centro	52	36,875	2,570
Ilha Norte	7.5	5,179	361
Joinville V	7.5	2,455	171

ESCELSA	Circuit-km	10^3Cr$	10^3US$
Subtransmission Lines - 34 kV			
Praia-Vila Velha	6	628	44
Subtotal	6	628	44
Subtransmission Lines-69 kV			
Montanha-Mucurici	18	3,770	263
Sao Mateus-Pedro Canario	40	9,550	665
Subtotal	58	13,320	928
Subtransmission Lines-138 kV			
Mascarenhas-Nova Venecia	120	109,117	7,604
Carapina I-Carapina II	4	5,655	394
Line to IBES	15	23,560	1,642
Line to Marataizes	25	13,351	930
Line to Vitoria	8	20,887	1,456
Subtotal	172	172,570	12,026
Subtransmission Lines-230 kV			
Subtotal	-	-	-
TOTAL-Subtrans. Lines	236	186,518	12,998
Substations - 34.5 kV	MVA		
Vila Velha C	-	1,697	118
Campo Grande B	-	3,393	236
Praia C	-	1,697	118
Paul D	-	6,534	456
Subtotal	-	13,321	928
Substations - 69 kV			
Mucurici	7	10,430	727
Pedro Canario	7	10,430	727
Sao Mateus	-	2,261	158

PROJECT (Totals)	Circuit-km	10^3Cr$	10^3US$
	6	628	44
	6	628	44
	487	195,619	13,632
	14	25,960	1,809
	1,787	969,466	67,557
	MVA		
	5	16,839	1,173

BRAZIL

SOUTH-SOUTHEAST POWER DISTRIBUTION PROJECT

ANNEX B

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Detailed Project Cost Estimate

CEMIG	MVA	10^3Cr$	10^3US$
Substations - 69 kV (cont'd.)			
Claudio	5	2,312	161
Claudio (Oliveira)	-	1,686	117
Frutal	5	3,432	239
Guanhaes	-	3,774	263
Ibia	5	3,347	233
Ituiutaba	20	10,576	737
Jampruca	2.5	2,328	162
J.Monlevade	20	7,289	508
L. Preta	12.5	8,398	585
N. Serrana	2.5	1,330	93
Oliveira	10	3,621	252
Oliveira (Claudio)	-	1,079	75
Pains I	5	4,527	315
Para de Minas	13.6	5,187	361
Paraua	-	1,758	123
Piaui I	5	4,221	294
Ponte Nova	10	2,419	169
Resplendor	2.5	2,424	168
S. Gotardo	2.5	2,328	162
S. Lourenco	10	3,814	266
Tres Pontas	10	4,895	340
US.Safanhoto	-	1,759	123
US.Pati	5	2,712	189
US Salto Grande	-	5,013	349
Subtotal	223.0	137,705	9,595
Substations - 138 kV			
Adelaide (Barro Preto)	-	3,494	243
Adelaide (Neves)	-	3,598	251
Araguari II	30	8,305	579
Araguari II (Uberlandia II)	-	3,494	243
Araxa	15	7,599	530
Araxa (Patrocinio)	-	3,598	251
Arcos (Pimenta)	-	7,284	508
Barro Preto (Adelaide)	-	3,494	243
Barro Preto	73	39,755	2,770
Betim II	-	3,598	251
Betim III	25	15,018	1,047
Bonsucesso	-	3,494	243
Centro	-	3,494	243
Cineo	30	13,388	947
Divinopolis II	25	14,319	998
Gutierrez	-	8,276	577
Itajuba	40	19,341	1,348
Itauna	33	3,494	243
Jaguara	-	3,598	251
Joao Pinheiro	-	3,590	251
Juiz de Fora I	-	3,494	243
LaSalete	15	7,255	506
Lafaiete (Ponte Nova)	-	3,598	251
Lavras	15	8,252	575
Maracana	45	7,599	530
Neves (Adelaide)	-	3,598	251
Neves (Betim II)	-	3,598	251
Neves (Oeste)	-	3,598	251
Neves (Sete Lagoas)	-	3,598	251
Oeste	50	23,279	1,622
Paracatu II	15	7,844	547
Passos	-	3,598	250
Patos de Minas	30	16,612	1,158
Patrocinio	15	7,599	530
Patrocinio (Cprm)	-	3,494	243
Patrocinio (Araxa)	-	7,195	501
Pimenta	-	7,195	501
P.Nova II	45	25,186	1,752
Pouso Alegre	-	5,516	384
P.Leopoldo III	15	10,454	729
Rebeca	33	4,330	302
Santa Efigenia (Centro)	-	4,138	288
Santa Efigenia (Itaguari)	-	4,138	288
Sete Lagoas I	-	3,598	251
S.Rita Sapucai	15	8,960	624
Taquaril	-	3,886	271
Uberaba III	15	18,198	1,268
Uberlandia I	-	3,598	251
Uberlandia VI	50	10,200	711
Varginha	15	7,599	530
Varzea da Palma	-	3,494	243
Subtotal	665	407,083	28,370
Substations - 230 kV			
Drummond	-	17,838	1,243
Subtotal	-	17,838	1,243
Miscellaneous Improvements	-	97,022	6,761
TOTAL-Substations	904.6	663,166	46,214
Distribution			
System Expansion & Improvement		593,700	41,373
New Customer Connections			
Equipment		19,400	1,352
TOTAL-Distribution		613,100	42,725
Miscellaneous Equipment			
Supervision and control		87,591	6,104
Other miscellaneous equipment		-	-
TOTAL-Miscellaneous Equipment		87,591	6,104
TOTAL-Direct Costs		1,804,439	132,016
Physical Contingencies		187,043	13,035
TOTAL		2,061,482	145,051

CELESC	MVA	10^3Cr$	10^3US$
Substations - 69 kV (cont'd)			
Sao Francisco	5	3,393	236
Blumenau-Garcia	-	3,488	243
Timbo	7.5	2,589	180
Ibirama	7.5	2,143	149
Palmeiras	10	5,089	355
Salseiros	25	9,107	635
Camboriu	7.5	6,250	436
Pigarras	25	4,211	302
Otacilio Costa	2.5	2,679	187
Boate Alta	2.5	2,455	171
Herval	12.5	3,036	212
Capinzal	7.5	625	44
Xanxere	7.5	12,948	902
Modelo	12.5	11,696	814
Chapeco	-	3,125	218
Concordia	-	1,072	75
Seara	7.5	2,991	208
Subarao	25	7,991	557
Braco do Norte	7.5	1,921	134
Gravatal	2.5	1,259	88
Guarda	7.5	5,804	404
Azambuja	7.5	4,732	330
Laguna	15	4,652	324
Forquilhinha	-	3,420	238
Araranguna	7.5	2,884	201
Tuarn	-	2,321	162
Tera (M de F)	7.5	3,161	220
Morro da Fumaca	7.5	3,223	225
Subtotal	427	198,425	13,810
Substations - 138 kV			
Malfra	12	7,152	498
Sao Bento	16.6	6,786	473
Orindade	40	29,464	2,053
Emaseda de Brito	-	27,946	1,946
Cancinhas	16.6	14,286	995
Rio Negrinho	16.6	6,518	454
Rio do Sul TT	85	25,625	1,788
Lages	33	5,625	392
Otacilio Costa	25	6,786	473
Videira	12.5	6,071	423
Caçador	12.5	5,089	355
Modelo	33	2,500	174
Imbituba	50	18,348	1,279
Subtotal	352.8	162,190	11,303
Substations - 230 kV			
Subtotal	-	-	-
TOTAL-Substations	779.8	354,625	24,713
Distribution		677,700	47,226
		130,000	9,059
		44,600	3,108
TOTAL-Distribution		852,300	59,393
Miscellaneous Equipment		-	-
TOTAL-Miscellaneous Equipment		38,000	2,648
TOTAL-Direct Costs		1,407,291	104,340
Physical Contingencies		180,165	12,555
TOTAL		1,677,456	116,896

ESCELSA	MVA	10^3Cr$	10^3US$
Substations - 69 kV (on Page 1)			
Substations - 138 kV			
Carapina II	-	22,148	1,543
Thea	50	36,441	2,539
Vitoria II	50	65,171	4,542
Marataizes	25	19,854	1,384
Nova Venecia	25	3,644	254
Mascarenhas	-	3,644	254
Guarapari	-	13,822	963
Alto Lage	-	3,141	219
Subtotal	150	167,865	11,698
Substations - 230 kV			
Subtotal	-	-	-
TOTAL-Substations	164	204,307	14,236
Distribution		380,000	26,481
		100,000	6,969
		30,000	2,090
TOTAL-Distribution		510,000	35,540
Miscellaneous Equipment		-	-
TOTAL-Miscellaneous Equipment		25,000	1,742
TOTAL-Direct Costs		925,825	64,518
Physical Contingencies		151,788	10,577
TOTAL		1,077,613	75,095

PROJECT (Totals)	MVA	10^3Cr$	10^3US$
Substations - 69 kV (on Page 1)	574.6	353,255	24,617
Substations - 138 kV	1,848.4	1,222,098	85,165
Substations - 230 kV		17,838	1,243
Miscellaneous Improvements		97,022	6,761
TOTAL-Substations		1,975,400	137,688
Distribution		1,975,400	137,688
Miscellaneous Equipment		87,591	6,104
		63,000	4,390
TOTAL-Miscellaneous Equipment		150,591	10,494
TOTAL-Direct Costs		4,317,555	300,874
Physical Contingencies		519,996	36,167
TOTAL		4,836,551	337,041

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SOUTH-SOUTHEAST POWER DISTRIBUTION PROJECT

ANNEX B

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PROJECT IMPLEMENTATION SCHEDULE

CEMIG	Start preparation of surveys & bidding documents	Complete documents for construction	Receive bids for purchase of materials and/or construction [a/] 1/79 to 6/79	Complete review of bids and make award recommendation [a/] 3/79 to 9/79	Place purchase orders or sign contracts [a/] 6/79 to 12/79	Obtain delivery of materials [a/] 6/79 to 10/81	Start installation or construction	Complete installation or construction
Subtransmission Lines-69 kV								
Arcos-Iguatama	January 1980	December 1980					April 1981	September 1981
Arcos-Pains	November 1980	December 1980					April 1981	September 1981
Claudio-Oliveira	October 1979	September 1980					September 1980	March 1981
M. Carmelo-Coromandel	January 1979	December 1979					April 1980	October 1980
Salto Grande-Guanhaes	January 1977	March 1978					July 1978	March 1979
Subtransmission Lines - 138 kV								
Adelaide Du Centro-B. Preto	October 1978	September 1980					July 1980	June 1981
Araxa-Patrocinio	January 1977	June 1978					September 1978	June 1979
Arcos-L. Prata	January 1979	December 1979					December 1979	June 1980
Bonsucesso-Gutierrez	January 1979	December 1979					January 1980	September 1980
Gafanhoto-Arcos	October 1979	December 1980					January 1981	June 1981
Gafanhoto-B. Despacho	July 1978	September 1979					October 1979	September 1980
Gutierrez-Barro Preto	January 1978	December 1979					October 1979	September 1980
Jaguara-Passos	July 1978	June 1979					November 1979	December 1980
Juiz de Fora I - Paraibuna	July 1977	June 1978					September 1978	December 1978
Lafaiete-Ponte Nova II	April 1978	June 1979					July 1979	June 1980
Neves-Adelaide	January 1980	December 1980					January 1981	June 1981
Neves-Betim II	January 1978	December 1978					May 1979	December 1979
Neves-Oeste	July 1979	December 1980					December 1980	June 1981
Neves-P. Leopoldo III	January 1979	December 1979					January 1980	June 1980
N. Lima - Sabara Taq. Sabara	January 1978	December 1978					April 1979	September 1979
Patrocinio-Cprm	January 1977	March 1978					October 1978	July 1979
Pimenta-Arcos	January 1977	June 1978					January 1979	September 1979
Pimenta-Arcos II	January 1980	December 1980					January 1981	September 1981
Ponte Nova I - P. Nova II	October 1978	September 1979					January 1980	June 1980
P. Leopoldo III-S. Lagoas	July 1978	September 1979					October 1979	June 1980
Taquaril-S. Efigenia	January 1979	December 1979					January 1980	June 1980
Emborcaçao-Uberlandia	July 1979	December 1980					December 1980	September 1981
Varzea da Palma-Italmagnesio	October 1977	September 1978					December 1978	March 1979
Subtransmission Lines - 230 kV								
Ipatinga-G. Valadares (branch to Mesquita)	January 1979	December 1979					April 1980	September 1980
Itabira-Ipatinga (branch to Mesquita)	January 1979	December 1979					April 1980	September 1980
Itabira-Ipatinga (branch to Drumond)	October 1978	September 1979					January 1980	June 1980
Substations - 34.5 kV								
Sao Ant. Amparo	October 1977	June 1978					September 1978	March 1979
US Anil	October 1979	September 1980						
Substations - 69 kV								
Alfenas	July 1978	June 1979					July 1979	December 1979
Alpinopolis	January 1978	December 1978					April 1979	September 1979
Arcos (Bambui)	April 1980	March 1981					April 1981	September 1981
Arcos (Lagoa da Prata)	April 1978	September 1979					January 1980	June 1980
Arcos (pains)	April 1980	March 1981					April 1981	September 1981
Bambui	January 1980	March 1981					April 1981	September 1981
Betim I								
B. Despacho	July 1978	September 1979					January 1980	September 1980
Cambuquira	July 1978	September 1979					April 1980	September 1980
Campo Belo	April 1979	June 1980					April 1981	September 1981
Cassia	July 1978	March 1979					April 1979	September 1979
Cid.Ind.S.Luzia								
Claudio	January 1978	December 1978					January 1979	June 1979
Claudio (Oliveira)	October 1979	September 1980					October 1980	March 1981
Frutal	January 1978	September 1978					January 1979	June 1979
Guanhaes								
Ibia	January 1977	September 1977					January 1979	June 1979
Ituiutaba	July 1977	June 1978					October 1978	March 1979
Jampruca	January 1978	September 1978					January 1980	June 1980
J. Monlevade	July 1979	December 1980					April 1980	September 1981
Prata	April 1978	September 1979					October 1979	June 1980
N. Serrana	July 1978	March 1979					April 1980	September 1980
Oliveira	January 1978	September 1978					January 1979	June 1979
Oliveira (Claudio)								
Pains I	October 1979	December 1980					April 1981	September 1981
Para de Minas	January 1978	December 1978					July 1979	December 1979
Passos								
Pium-I	October 1979	December 1980					April 1981	September 1981
Ponte Nova	July 1977	June 1978					January 1979	June 1979
Resplendor	October 1977	June 1978					October 1978	March 1979
S. Gotardo	January 1978	September 1978					October 1979	March 1980
Tres Pontas	January 1979	December 1979					April 1981	September 1981
US. Cafanhoto	July 1978	September 1979					April 1980	September 1980
US. Peti	January 1978	December 1978					July 1979	December 1979
US. Salto Grande	July 1977	September 1978					October 1978	March 1979

a/ CEMIG intends to invite for a few bids with staggered delivery dates for a group of lines and substations.

(continued on Page 63)

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SOUTH-SOUTHEAST POWER DISTRIBUTION PROJECT

ANNEX B

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PROJECT IMPLEMENTATION SCHEDULE

	Start preparation of surveys & bidding documents	Complete documents for construction	Receive bids for purchases of materials and/or construction	Complete review of bids and make award recommendation	Place purchase orders or sign contracts	Obtain delivery of materials	Start installation or construction	Complete installation or construction
CEMIG (cont'd.)								
Substations - 138 kV								
Adelaide (Barro Preto)	October 1978	September 1980					October 1980	June 1981
Adelaide (Neves)	July 1978	June 1980					October 1980	June 1981
Araguari II	January 1979	December 1980					January 1981	September 1981
Araguari II (Uberlandia II)	January 1979	December 1980					January 1981	September 1981
Araxa (Patrocinio)	April 1977	September 1978					December 1978	June 1979
Araxa	January 1979	December 1980					January 1981	September 1981
Arcos (Pimenta)	Janaury 1977	December 1980					December 1978	September 1981
Barro Preto (Adelaide)	October 1978	September 1980					October 1980	June 1981
Barro Preto	November 1977	March 1979					July 1979	September 1980
Betim II	October 1977	March 1979					April 1979	December 1979
Betim III	October 1978	September 1980					July 1980	September 1981
Bonsucesso	April 1978	December 1979					January 1980	September 1980
Centro	January 1977	March 1978					July 1978	March 1979
Cinco	January 1978	June 1979					June 1979	December 1979
Divinopolis II	July 1978	June 1980					April 1980	June 1981
Gutierrez								
Itajuba	January 1978	December 1979					October 1979	September 1980
Itauna	January 1979	June 1980					October 1980	March 1981
Jaguara	July 1978	March 1980					April 1980	December 1980
Jaoa Pinheiro	January 1978	June 1979					July 1979	March 1980
Juiz de Fora I	April 1977	June 1978					July 1978	December 1978
Lafaiete	April 1978	December 1979					January 1980	September 1980
Lafaiete (Ponte Nova)	January 1978	September 1979					October 1979	June 1980
Lavras	January 1979	September 1980					January 1981	September 1981
Maracana	January 1979	September 1980					October 1980	June 1981
Neves (Adelaide)	July 1978	June 1980					October 1980	June 1981
Neves (Betim II)	January 1977	March 1978					April 1979	December 1979
Neves (Oeste)	October 1978	September 1980					October 1980	June 1981
Neves (Sete Lagoas)	January 1977	March 1978					October 1979	June 1980
Oeste	January 1978	June 1980					April 1980	June 1981
Paracatu II	January 1978	June 1979					April 1979	March 1980
Passos	February 1977	December 1977					April 1979	September 1979
Patos de Minas							October 1978	June 1979
Patrocinio	April 1978	December 1979					January 1980	June 1980
Patrocinio (Cprm)	January 1977	June 1978					October 1978	July 1979
Patrocinio (Araxa)	January 1977	June 1978					October 1978	June 1979
Pimenta	January 1977	December 1980					July 1978	September 1981
P.Nova II	January 1978	September 1979					July 1979	June 1980
Pouso Alegre	April 1978	December 1979					January 1980	September 1980
P.Leopoldo III	April 1977	June 1978					July 1978	March 1979
Sebara	October 1977	December 1978					January 1979	September 1979
Santa Efigenia (Centro)	January 1977	June 1978					July 1978	March 1979
Santo Efigenia (Taquaril)	April 1978	September 1979					October 1979	June 1980
Sete Lagoas I	January 1978	September 1979					October 1979	June 1980
S.Rita Sapucai	April 1978	December 1979					January 1980	September 1980
Taquaril	November 1977	September 1979					October 1979	June 1980
Uberaba III	January 1978	September 1979					July 1979	September 1980
Uberlandia I	January 1979	December 1980					January 1981	September 1981
Uberlandia VI	January 1979	September 1980					October 1980	June 1981
Varginha	July 1978	December 1979					January 1980	September 1980
Varzea da Palma	July 1977	September 1978					September 1978	March 1979
Substations - 230 kV								
Drummond	October 1977	September 1979					July 1979	June 1980
Distribution Expansion	February 1978	December 1978	(March 1979 (to	(June 1979 (to	(August 1979 (to	(February 1980 (to	(January 1980 (to	(June 1980 (to
Miscellaneous Equipment	February 1978	December 1978	(March 1980	(June 1980	(August 1980	(June 1981	(June 1981	(December 1981

(cont. on page 64)

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SOUTH-SOUTHEAST POWER DISTRIBUTION PROJECT

ANNEX B

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PROJECT IMPLEMENTATION SCHEDULE

	Start preparation of surveys & bidding documents	Complete Documents for Construction	Receive bids for purchases of materials and/or construction	Complete review of bids and make award recommendation	Place purchase orders or sign contracts	Obtain delivery of materials	Start installation or construction	Complete installation or construction
			January 1979- June 1980	March 1979- September 1980		June 1979- December 1981		
CELESC								
Subtransmission Lines - 69 kV								
Coqueiros-Ilha-Centro	March 1978	June 1978			June 1979		June 1979	December 1979
Ilha-Centro-Trindade	January 1978	June 1978			March 1979		June 1979	December 1979
Joinville IV-Tupy	June 1978	December 1978			December 1979		January 1980	June 1980
Blumenau II-Salto	January 1979	June 1979			December 1979		January 1980	December 1980
Tubarao-Jaguaruna	January 1979	June 1979			December 1979		January 1980	December 1980
Trindade-Ilha Norte	June 1979	December 1979			June 1980		January 1981	June 1981
Enseada de Brito-Trindade	January 1980	June 1980			December 1980		January 1981	December 1981
Salseiros-Camboriu	January 1980	June 1980			December 1980		January 1981	December 1981
Otalicio-Ponte Alta II	January 1979	June 1979			March 1980		January 1981	December 1980
Xanxere-Chapeco I	October 1979	March 1980			September 1980		June 1980	June 1981
Xanxere-Chapeco II	October 1979	March 1980			September 1980		June 1980	June 1981
Tubarao-Guardo-Azambuja	June 1979	December 1979			June 1980		January 1980	December 1980
Icara-Morro da Fumaca	June 1979	December 1979			June 1980		January 1980	December 1980
Imbituba-Laguna	June 1979	December 1979			June 1980		January 1980	December 1980
Subtransmission Lines - 138 kV								
Eletrosul-Joinville IV	June 1978	December 1978					January 1979	December 1979
Blumenau II-Blumenau Eletrosul	December 1978	June 1979					January 1980	June 1980
Mafra-Canoinhas	December 1979	June 1980					January 1981	December 1981
Torre 69-Blumenau Eletrosul	June 1979	December 1979					June 1980	December 1980
Blumenau II-Ibirama	June 1979	December 1979					June 1980	December 1980
Ilhota-Blumenau Garcia II	June 1979	December 1979					June 1980	December 1980
Lages-Otacilio Costa II	June 1979	December 1979					June 1980	December 1980
Xanxere-Modelo	December 1979	June 1980					January 1981	June 1981
Modelo-Sao Miguel	June 1980	December 1980					June 1981	December 1981
Substations - 69 kV								
Joinville III	June 1978	December 1978					December 1979	June 1980
Jaragua	June 1978	December 1978					June 1979	June 1980
Tupi	January 1978	December 1978					June 1979	December 1979
Brusque	January 1978	December 1978					June 1979	December 1979
Piçarras	June 1978	December 1979					June 1979	June 1980
Gravatal	June 1978	December 1979					June 1979	June 1980
Jaguaruna	June 1978	December 1979					June 1979	June 1980
Trindade	June 1979	December 1980					June 1979	June 1980
Goqueiros	January 1980	December 1980					January 1981	December 1981
Ilha Centro	January 1980	December 1980					January 1981	December 1981
Ilha Norte	June 1979	December 1979					June 1980	June 1981
Joinville V	January 1979	December 1979					January 1980	December 1980
San Francisco	January 1979	December 1979					January 1980	December 1980
Blumenau-Garcia	January 1979	December 1979					December 1979	December 1980
Timbo	June 1979	December 1979					June 1980	June 1981
Ibirama	June 1978	December 1978					June 1979	June 1980
Palmeiras	January 1980	December 1980					January 1981	December 1981
Salseiros	June 1980	December 1980					January 1980	June 1980
Camboriu	June 1979	December 1979					June 1980	December 1981
Piçarras	January 1980	December 1980					January 1981	December 1981
Otacilio Costa	January 1980	December 1980					June 1980	June 1981
Ponte Alta	June 1979	December 1979					January 1980	December 1980
Herval	January 1979	December 1979					January 1980	December 1980
Capinzal	January 1979	December 1979					June 1980	June 1981
Xanxere	June 1979	June 1981					January 1981	December 1981
Modelo	January 1979	June 1980					January 1981	June 1981
Chapeco	June 1979	December 1980					January 1980	December 1980
Concordia	January 1979	December 1979					January 1980	December 1980
Seara	January 1979	June 1980					January 1980	December 1980
Tubarao	January 1979	June 1980					January 1980	December 1980
Braço do Norte	January 1979	June 1980					January 1981	December 1981
Gravatal	January 1980	December 1980					January 1980	December 1980
Guarda	January 1979	June 1980					January 1980	December 1980
Azambuja	January 1979	June 1980					January 1980	December 1980
Laguna	January 1979	June 1980					January 1980	December 1980
Forquilhinha	January 1979	June 1980					January 1981	December 1981
Aranangua	January 1980	June 1981					January 1980	December 1980
Içara	January 1979	December 1979					January 1981	December 1981
Içara (M de F)	January 1980	June 1981					January 1980	December 1980
Morro da Fumaca	January 1979	December 1979						
Substations - 138 kV								
Mafra	January 1978	December 1980					January 1979	December 1981
Sao Bento							January 1979	December 1979
Trindade							January 1981	December 1981
Enseada de Brito							January 1981	June 1981
Canoinhas	January 1979	December 1980					January 1980	December 1981
Rio Negrinho							June 1981	December 1981
Rio do Sul II							June 1980	December 1980
Lages							January 1981	December 1980
Otacilio Costa	January 1980	December 1980					January 1981	December 1981
Videira							January 1981	December 1981
Cacador							January 1981	December 1981
Modelo							January 1981	December 1981
Imbituba	January 1979	December 1980					January 1981	December 1981
Distribution Expansion	February 1978	December 1978	(March 1979 (to (March 1980	(June 1979 (to (June 1980	(August 1979 (to (August 1980	(February 1980 (to (June 1981	(January 1980 (to (June 1981	(June 1980 (to (December 1981
Miscellaneous Equipment	February 1978	December 1978						

(cont'd. on page 65)

BRAZIL

SOUTH-SOUTHEAST POWER DISTRIBUTION PROJECT

ANNEX B

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PROJECT IMPLEMENTATION SCHEDULE

	Start preparation of surveys & bidding documents	Complete documents for construction	Receive bids for purchases of materials and/or construction	Complete review of bids and make award recommendation	Place purchase orders or sign contracts	Obtain delivery of materials	Start installation or construction	Complete installation or construction
ESCELSA								
Subtransmission Lines - 34 kV								
Praia-Vila Velha	started	September 1978	March 1979	June 1979	August 1979	February 1979	January 1980	June 19
Subtransmission Lines - 69 kV								
Montanha-Mucurici	January 1979	September 1979	March 1980	June 1980	August 1980	February 1981	January 1981	December 1981
Sao Mateus-Pedro Canario	January 1979	September 1979	March 1980	June 1980	August 1980	Februar 1981	January 1981	December 1981
Subtransmission Lines - 138 kV								
Mascarenhas-Nova Venecia	March 1978	September 1978	March 1979	June 1979	August 1979	February 1980	January 1980	December 1980
Carapina I - Carapina II	March 1978	September 1978	March 1979	June 1979	August 1979	February 1980	January 1980	June 1980
Line to IBES	January 1979	September 1979	March 1980	June 1980	August 1980	June 1981	May 1981	December 1981
Line to Marataizes	January 1979	September 1979	March 1980	June 1980	August 1980	June 1981	May 1981	December 1981
Line to Vitoria	March 1978	September 1978	March 1979	June 1979	August 1979	February 1980	January 1980	June 1980
Substations - 34.5 kV								
Vila Velha C	March 1978	September 1978	March 1979	June 1979	August 1979	February 1980	January 1980	June 1980
Campo Grande B	March 1978	September 1978	March 1979	June 1979	August 1979	February 1980	January 1980	June 1980
Praia G	March 1978	September 1978	March 1979	June 1979	August 1979	February 1980	January 1980	June 1980
Paul D	January 1979	September 1979	March 1980	June 1980	August 1980	February 1981	January 1981	June 1981
Substations - 69 kV								
Mucurici	January 1979	September 1979	March 1980	June 1980	August 1980	February 1981	January 1981	December 1981
Pedro Canario	January 1979	September 1979	March 1980	June 1980	August 1980	February 1981	January 1981	December 1981
Sao Mateus	January 1979	September 1979	March 1980	June 1980	August 1980	February 1981	January 1981	December 1981
Substations - 138 kV								
Carapina II	March 1978	September 1978	March 1979	June 1979	August 1979	February 1980	January 1980	June 1980
Ibes	January 1979	September 1979	March 1980	June 1980	August 1980	February 1981	January 1981	December 1981
Vitoria II	March 1978	September 1978	March 1979	June 1979	August 1979	February 1980	January 1980	June 1980
Marataizes	January 1979	September 1979	March 1980	June 1980	August 1980	February 1981	January 1981	December 1981
Nova Venecia	March 1978	September 1978	March 1979	June 1979	August 1979	February 1980	January 1980	June 1980
Mascarenhas	March 1978	September 1978	March 1979	June 1979	August 1979	February 1980	January 1980	June 1980
Guarapari	January 1979	September 1979	March 1980	June 1980	August 1980	February 1981	January 1981	June 1981
Alto Lage	January 1979	September 1979	March 1980	June 1980	August 1980	February 1981	January 1981	June 1981
Distribution Expansion	February 1978	December 1978	(March 1979 (to	(June 1979 (to	(August 1979 (to	(February 1980 (to	(January 1980 (to	(June 1980 (to
Miscellaneous Equipment	February 1978	December 1978	(March 1980	(June 1980	(August 1980	(June 1981	(June 1981	(December 1981

BRAZIL

SOUTH-SOUTHEAST POWER DISTRIBUTION PROJECT

ANNEX B

T-8

CEMIG

Actual and Proposed Terms Applicable to Long-term Debt to 1982

Creditor	Purpose	Loan Date	Loan Amount (in million units of applicable currency)	Currency	Grace Period (years and months)	Amortization Period (years and months)	Interest Rate	Commitment Fee
FOREIGN LOANS - EXISTING								
IBRD - 442-BR	Jaguara	1966	49.0	US$ equiv.	5-6	19-6	6.0%	
566-BR	Volta Grande	1968	26.2	"	6-3	18-9	6.5%	
- 829-BR	Sao Simao	1972	60.0	"	7-4	22-8	7.25%	
- 478-BR	System Expansion	1966	6.3	"	5-2	14-10	6.0%	
Bank of America No. 1	Igarapé	1974	20.0	US$	4-0	8-0	LIBOR + 0.75%	
B. of America No.2	Sao Simao	1975	45.0	"	1-6	3-6	LIBOR + 2%	
AID - 512-L-014	System Expansion	1963	5.1	"	4-9	16-3	5.0%	
KFW - DM-16	Tres Marias	1965	16.6	DM	4-5	15-7	5.0%	
CITIBANK No. 4	Sao Simao	1974	20.0	US$	4-0	8-0	LIBOR + 1.5%	
" No. 5	" "	1975	10.0	"	2-0	6-0	LIBOR + 1.875%	
" No. 8	" "	1976	20.0	US$	2-6	5-6	LIBOR + 2.25%	
LIBRA BANK NO. 1	" "	1973	8.0	"	5-0	7-0	LIBOR + 0.875%	
" " No. 2	Igarapé	1973	12.0	"	5-0	10-0	LIBOR + 0.875%	
SKODAEXPORT	"	1973	14.0	SW Fr	4-0	11-0	6.5%	
PARIBAS (BFCE)	Sao Simao	1973	15.0	Fr Fr	5-6	9-6	6.5%	
EXIMBANK OF JAPAN	" "	1973	9.8	¥	5-10	9-2	7.0%	
ELETROBRAS (Repass, several loans)	System Expansion	1965/1973	19.6	US$	0-7/4-5	4-5/16-7	6.0% - 6.5%	
LOCAL LOANS - EXISTING								
ELETROBRAS:								
ECF - 79/69-A/70 & B/71-D/76	Volta Grande	1969	360.9[a]	Cr$	4-11	12-1	10.0%	
- 79-C/73	" "	1973	95.3	"	1-4	11-8	10.0%	
- 102/73-B/76	System Expansion	1973	267.8	"	3-3	16-9	10.0%	
- 121/74	" "	1974	479.5	"	0-1	9-11	10.0%	
- 186-E/76	Sao Simao	1976	1,754.3	"	3-3	9-9	10.0%	
- 187-D/76	" "	1976	1,479.3	"	3-3	9-9	10.0%	
- 253/74-253-B/76	System Expansion	1973	56.9	"	5-6	6-6	10.0%	
- 256/73 - 256-B/76	Sao Simao	1973	100.7	"	4-2	10-10	10.0%	
- 295/74	Volta Grande	1974	63.7	"	1-1	12-11	10.0%	
- 404/76	Igarapé	1974	116.0	"	1-0	11-0	10.0%	
- 307-C/76	System Expansion	1976	734.0	"	3-3	9-9	10.0%	
- 320-74	" "	1974	169.6	"	2-7	9-5	10.0%	
- 328-74	" "	1974	63.4	"	1-9	10-3	10.0%	
- 359-74	" "	1974	80.3	"	0-3	11-9	8.0%	
- 424-76	" "	1976	133.1	"	1-7	7-5	10.0%	
- 458-76	" "	1976	141.7	"	1-4	9-8	10.0%	
- 62/75	Sao Simao	1975	524.9	"	4-3	10-9	7.5%	
BNDE:	Several	1972/5	1,448.9	"	0-1/3-9	7-9/16-9	1 to 9%[b]	
Caixa Economica Federal (PIS)	Volta Grande	1974	50.0	"	2-1	5-11	7.0%	
BDMG - FINAME	System Expansion, Sao Simao	1975/76	1,003.6	"	2-0/2-9	0-0/11-3	9.0%, 8.5%, 1% to 9%[b]	
Others	System Expansion	Several	229.9	"	Several	Several	Several	
FOREIGN LOANS - PROPOSED								
Chase Manhattan Bank	Sao Simao	1977	20.0	US$	3-0	5-0	LIBOR + 2 1/4%	
Brascan	System Expansion	1977	5.0	"	1-3	3-0	" + 2 1/8%	
Proposed IBRD loan	Distribution	1978	58.1	"	3-0	12-0	8.5%	
IDB	Emborcaçao	1978	69.8	"	5-0	15-0	8.35%	
LOCAL LOANS - PROPOSED								
ELETROBRAS	System Expansion & Emborcaçao	1977	5,079.8	Cr$	(3-0 (5-0	(10-0 (10-0	(10% (10%	
BDMG - FINAME	System Expansion	1978	902.5	"	2-0	6-0	8.5%	
" "	Sao Simao	1977	360.0	"	2-0	8-0	8%	
SUPPLIERS-FINAME	Emborcaçao	1978	564.2	"	5-0	10-0	8%	
FINEP	"	1977	206.8	"	3-0	6-0	8%	
ELETROBRAS-Future Loans	Nova Ponte & Igarapava	1979	1,557.3	"	4-0	10-0	10%	
BNDE-FINAME Future Loans [c]	Nova Ponte & Igarapava	1979	1,328.4	"	4-0	10-0	10%	
ELETROBRAS-Future Loans	System Expansion	1978	3,147.9	"	5-0	10-0	10%	
BNDE-FINAME - Future Loans	" "	1978	4,877.6	"	5-0	10-0	9%	

a/ Adjusted for monetary correction to December 1975; b/ Varies according to the degree of national equipment being financed.
c/ Including some foreign loans.

BRAZIL

SOUTH-SOUTHEAST POWER DISTRIBUTION PROJECT

ANNEX B

T-9

CEMIG

Actual and Forecast Long-Term Debt Statements 1976-1982

(in millions of June 1977 cruzeiros)

	1976	1976 (after revaluation)	1977	1978	1979	1980	1981	1982
	--in current Cr$--							
FOREIGN LOANS - EXISTING								
IBRD - 442-BR	444.3	640.8	743.8	707.0	668.0	626.6	582.7	536.1
566-BR	242.1	344.9	402.5	387.7	372.0	355.1	337.2	318.0
829-BR	460.8	642.7	892.0	903.8	895.9	879.2	861.2	842.3
478-BR	54.3	76.0	86.3	79.4	72.2	64.5	56.3	47.5
Bank of America: 1st	181.4	246.9	297.0	262.1	227.2	192.4	157.5	122.6
2nd	408.2	555.5	501.2	334.1	167.0	-	-	-
AID 512-L-014	22.1	30.1	32.0	27.8	23.6	19.4	15.2	11.0
KFW DM-16	30.7	46.2	76.6	83.7	77.2	70.7	64.2	57.7
Citibank No. 4	181.4	246.9	297.0	279.6	244.7	209.8	174.9	140.0
No. 5	90.7	123.5	125.7	102.9	80.0	57.1	34.3	11.4
No. 8	129.6	148.1	267.3	272.2	222.7	173.1	123.5	73.9
Libra Bank No. 1	72.6	95.1	114.4	106.5	90.6	74.7	58.8	42.9
No. 2	115.8	151.8	197.4	273.7	305.7	288.7	271.8	257.7
Skodaexport	121.3	174.9	191.3	160.5	134.4	120.3	104.3	88.3
Paribas (BFCE)	25.0	30.5	154.7	207.2	209.0	186.9	164.9	142.9
Eximbank - Japan	4.0	5.4	156.4	351.0	348.6	312.5	276.4	240.3
ELETROBRAS (Repass):	225.5	270.9	302.7	273.9	223.8	123.2	28.0	-
Total foreign loans-existing	2,809.8	3,830.2	4,838.3	4,813.1	4,362.6	3,754.2	3,311.2	2,932.6
LOCAL LOANS - EXISTING								
ELETROBRAS								
ECF-79/69 - A/70 & B/71-D/76	260.2	311.6	316.9	258.9	207.5	157.6	107.7	57.8
-79-C/73	76.9	92.0	96.5	82.3	68.1	53.9	39.7	25.5
-102/73-B/76	267.8	320.6	354.5	323.4	292.2	261.1	229.9	198.7
-121/74	337.8	404.5	379.0	275.0	183.8	108.7	36.0	-
-186 E/76	1,124.6	1,346.3	2,074.2	2,252.9	2,352.1	1,985.6	1,707.8	1,474.4
-187 D/76	351.5	420.7	914.2	1,449.5	2,091.4	2,420.1	2,246.4	2,072.7
-253/74 - 253-B/76	56.9	68.3	82.2	81.1	63.4	45.7	31.4	18.2
-256/73 - 265-B/76	100.7	120.6	145.0	145.1	145.1	145.1	165.1	185.1
-295/74	54.5	65.2	68.9	59.4	49.9	40.4	30.9	21.4
-404/76	101.5	121.5	140.5	115.1	93.4	71.6	54.5	37.7
-307 - C/76	223.8	267.9	637.9	840.8	930.2	819.8	731.8	643.7
-320 - 74	153.3	183.5	207.6	174.9	145.3	119.0	92.6	66.3
-328-74	57.9	69.3	95.5	104.3	94.1	84.3	74.6	64.9
-359-74	73.0	87.4	100.7	96.6	89.9	83.1	76.4	69.7
-424-76	86.8	103.9	180.7	160.7	140.8	120.8	100.8	80.8
-458-76	82.7	99.0	190.2	173.1	156.0	138.9	121.9	104.8
-62/75	524.9	628.3	755.8	755.8	743.7	687.6	630.2	572.9
BNDE	662.3	683.7	1,243.9	1,495.4	1,303.3	1,111.2	919.1	723.6
Caixa Economica Federal (PIS)	43.7	43.7	42.6	32.6	22.6	12.6	2.6	0.1
BDMG/FINAME	419.6	419.6	1,141.3	1,783.4	1,989.2	1,793.3	1,565.7	1,353.6
Others	165.4	196.5	527.9	596.4	591.9	574.3	556.7	439.7
Total local loans - existing	5,225.8	6,054.1	9,696.0	11,256.7	11,753.9	10,834.7	9,521.8	8,211.6
Total existing loans	8,035.6	9,884.3	14,534.3	16,060.9	16,116.5	14,588.9	12,833.0	11,144.2
FOREIGN LOANS - PROPOSED								
Chase Manhattan Bank			297.0	297.0	297.0	264.0	198.0	132.0
Brascan			74.2	62.3	41.5	20.7	-	-
Proposed IBRD loan			-	16.4	211.4	532.0	640.2	614.8
IDB			-	92.4	504.8	1,067.9	1,460.2	1,525.7
Total foreign loans - proposed			371.2	468.1	1,054.7	1,884.6	2,298.4	2,272.5
LOCAL LOANS - PROPOSED								
ELETROBRAS			432.6	1,541.3	2,662.0	3,590.5	4,351.0	4,702.9
BDMG - FINAME			-	180.5	361.0	511.4	631.7	722.0
BDMG - FINAME			24.1	240.6	337.4	306.0	274.6	243.2
Suppliers - FINAME			-	62.8	169.5	374.1	508.6	564.2
FINEP			38.7	105.1	164.5	199.1	206.8	172.7
ELETROBRAS - Nova Ponte & Igarapava	-	-	-	-	136.3	460.2	1,026.9	1,557.3
BNDE-FINAME - " " "	-	-	-	-	129.8	425.3	921.1	1,328.4
ELETROBRAS - Other Fut. Loans	-	-	-	459.3	1,064.3	1,705.1	2,232.3	3,147.9
BNDE - FINAME " " "	-	-	-	949.3	2,232.0	3,618.1	4,834.6	4,877.6
Total local loans - proposed	-	-	495.4	3,538.9	7,256.8	11,189.8	14,987.6	17,316.2
Total proposed loans	-	-	866.6	4,007.0	8,311.5	13,074.4	17,286.0	19,588.7
Total loans	8,035.6	9,884.3	15,400.9	20,071.8	24,423.0	27,658.3	30,114.0	30,727.9

BRAZIL

SOUTH-SOUTHEAST POWER DISTRIBUTION PROJECT

ANNEX B

T-10

CEMIG

Forecast Long-Term Debt Disbursement Statement 1977-1982

(in millions of June 1977 cruzeiros)

	1977	1978	1979	1980	1981	198
FOREIGN LOANS - EXISTING						
IBRD 829-BR	118.9	11.8	-	-	-	-
KFW DM 16	27.5	13.6	-	-	-	-
Citibank No. 8	89.1	29.7	-	-	-	-
Libra Bank No. 2	14.8	84.7	49.0	-	-	-
Skodaexport	12.6	-	-	-	-	-
Paribas	118.0	52.4	12.8	-	-	-
Eximbank - Japan	149.9	194.6	15.6	-	-	-
Total foreign loans - existing	530.8	386.8	77.4	-	-	-
LOCAL LOANS - EXISTING						
ELETROBRAS						
ECF 186-E/76	454.6	178.6	99.2	25.0	-	-
187-D/76	408.1	535.3	641.9	620.9	-	-
256/73-265-B/76	-	-	-	-	20.0	20.(
404-76	19.7	-	-	-	-	-
307-C/76	315.7	202.8	89.4	6.0	-	-
320-74	19.6	-	-	-	-	-
328-74	24.3	20.9	-	-	-	-
359-74	2.3	2.6	-	-	-	-
424-76	55.7	-	-	-	-	-
458-76	71.1	-	-	-	-	-
BNDE	497.8	347.2	-	-	-	-
BDMG - FINAME	701.8	669.2	307.2	-	-	-
Others	314.5	91.1	13.0	-	-	-
Total local loans - existing	2,885.2	2,047.7	1,150.7	651.9	20.0	20.(
Total existing loans	3,416.0	2,434.5	1,228.1	651.9	20.0	20.'
FOREIGN LOANS - PROPOSED						
Chase Manhattan Bank	297.0	-	-	-	-	-
Brascan	74.2	-	-	-	-	-
Proposed IBRD Loan	-	16.4	195.0	320.6	131.0	20
IDB	-	92.4	412.4	563.1	392.3	118
Total foreign loans - proposed	371.2	108.8	607.4	883.7	523.3	138
LOCAL LOANS - PROPOSED						
ELETROBRAS	432.6	1,112.2	1,124.3	997.2	829.2	584
BDMG - FINAME	-	180.5	180.5	180.5	180.5	180
BDMG - FINAME	24.1	216.5	120.3	-	-	-
Suppliers - FINAME	-	62.8	106.7	204.6	134.5	55
FINEP	38.7	66.4	59.4	34.6	7.7	-
ELETROBRAS - Nova Ponte & Igarapava	-	-	136.3	323.9	566.7	53(
BNDE-FINAME - Nova Ponte & Igarapava	-	-	129.8	295.5	495.8	40'
ELETROBRAS - Other future loans	-	459.3	605.0	640.8	527.2	91!
NDE - FINAME - Other future loans	-	949.3	1,282.7	1,386.1	1,216.5	4'
Total local loans - proposed	495.4	3,047.0	3,745.0	4,063.2	3,958.1	2,71(
Total proposed loans	866.6	3,155.8	4,352.4	4,946.9	4,481.4	2,85(
Total loans	4,282.6	5,590.3	5,580.5	5,598.8	4,501.4	2,87(

BRAZIL

SOUTH-SOUTHEAST POWER DISTRIBUTION PROJECT

ANNEX B

T-11

CEMIG

Forecast Long-Term Debt Amortization Statement 1977-1982
(in millions of June 1977 cruzeiros)

	1977	1978	1979	1980	1981	1982
FOREIGN LOANS - EXISTING						
IBRD 442-BR	27.1	36.8	39.0	41.4	43.9	46.6
566-BR	12.4	14.8	15.8	16.8	17.9	19.2
829-BR	-	-	7.9	16.7	17.9	18.9
478-BR	5.2	6.9	7.2	7.7	8.2	8.8
Bank of America No. 1	-	34.9	34.9	34.9	34.9	34.9
" " " No. 2	167.1	167.1	167.1	167.0	-	-
AID 512-L-014	4.2	4.2	4.2	4.2	4.2	4.2
KFW DM 16	6.5	6.5	6.5	6.5	6.5	6.5
Citibank No. 4	-	17.4	34.9	34.8	34.9	34.9
" No. 5	22.9	22.9	22.9	22.9	22.9	22.9
" No. 8	-	24.8	49.6	49.6	49.6	49.6
Libra Bank No. 1	-	7.9	15.9	15.9	15.9	15.9
" " No. 2	-	8.4	17.0	17.0	17.0	14.1
Skodaexport	31.8	30.8	26.1	14.1	16.0	16.0
Paribas	-	-	10.9	22.0	22.0	22.0
Eximbank - Japan	-	-	18.0	36.1	36.1	36.1
ELETROBRAS (Repass, several loans)	23.2	28.8	50.2	100.6	95.2	28.0
Total Foreign Loans - Existing	300.4	412.2	528.1	608.2	443.1	378.6
LOCAL LOANS - EXISTING						
ELETROBRAS						
ECF 79/69-A/70 and B/71-D/76	58.0	57.9	51.4	49.9	49.9	49.9
79-C/73	14.2	14.2	14.2	14.2	14.2	14.2
102/73-B/76	31.2	31.2	31.2	31.2	31.2	31.2
121/74	106.7	104.9	91.2	75.1	72.8	36.0
186-E/76	-	-	-	391.6	277.8	233.4
187-D/76	-	-	-	292.2	173.7	173.7
253/74-253-B/76	-	1.1	17.7	17.7	14.3	13.2
295/74	9.5	9.5	9.5	9.5	9.5	9.5
404/76	25.4	25.4	21.8	21.8	17.1	16.8
307-C/76	-	-	-	116.3	88.1	88.1
320-74	32.7	32.7	29.6	26.3	26.3	26.3
328-74	12.1	12.2	10.2	9.7	9.7	9.7
359-74	6.7	6.7	6.7	6.7	6.7	6.7
424-76	-	20.0	20.0	20.0	20.0	20.0
458-76	-	17.1	17.1	17.1	17.1	17.1
62/75	-	-	12.2	56.1	57.3	57.3
BNDE	76.4	95.6	192.1	192.1	192.1	195.5
Caixa Economica Federal	10.0	10.0	10.0	10.0	10.0	2.5
BDMG - FINAME	65.9	27.1	101.5	195.8	227.6	212.1
Others	22.9	22.3	17.6	17.6	17.6	117.0
Total Local Loans - Existing	471.7	487.9	654.0	1570.9	1333.0	1,330.2
Total Existing Loans	771.1	900.1	1182.1	2179.1	1776.1	1,708.8
FOREIGN LOANS - PROPOSED						
Chase Manhattan Bank	-	-	-	33.0	66.0	66.0
Brascan	-	11.9	20.8	20.8	20.7	-
Proposed IBRD loan	-	-	-	-	22.8	45.5
IDB	-	-	-	-	-	52.6
Total Foreign Loans - Proposed	-	11.9	20.8	53.8	109.5	164.1
LOCAL LOANS - PROPOSED						
ELETROBRAS	-	3.5	3.6	68.7	68.7	232.4
BDMG - FINAME	-	-	-	30.1	60.2	90.2
" "	-	-	23.5	31.4	31.4	31.4
SUPPLIERS - FINAME	-	-	-	-	-	-
FINEP	-	-	-	-	-	34.1
ELETROBRAS - Nova Ponte & Igarapava	-	-	-	-	-	-
BNDE - FINAME - Nova Ponte & Igarapava	-	-	-	-	-	-
ELETROBRAS - Other future loans	-	-	-	-	-	-
BNDE--FINAME - Other future loans	-	-	-	-	-	-
Total Local Loans - Proposed	-	3.5	37.3	129.8	175.4	388.1
Total Proposed Loans	-	15.4	48.1	183.6	284.9	552.2
Total Loans	771.1	915.5	1230.2	2362.7	2061.0	2261.0

BRAZIL

SOUTH-SOUTHEAST POWER DISTRIBUTION PROJECT

ANNEX B

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CEMIG

Forecast Interest Charges 1977 - 1982
(in millions of June 1977 cruzeiros)

	1977	1978	1979	1980	1981	1982
FOREIGN LOANS - EXISTING						
IBRD - 442-BR	45.7	43.7	41.4	39.0	36.6	33.8
566-BR	26.8	25.9	24.9	23.8	22.7	21.5
829-BR	60.2	65.2	65.7	64.8	63.5	62.3
478-BR	5.4	5.1	4.6	4.1	3.6	3.1
Bank of America No. 1	25.0	24.3	21.4	18.5	15.5	12.5
Bank of America No. 2	57.6	40.8	24.5	8.2	-	-
AID - 512-L-014	2.1	1.8	1.6	1.3	1.1	0.8
KFW-DM-16	2.6	2.4	2.0	1.7	1.4	1.1
CITIBANK No. 4	37.9	37.9	34.5	30.1	25.6	21.2
CITIBANK No. 5	12.6	10.6	8.5	6.6	4.6	2.5
CITIBANK No. 8	21.3	30.3	24.7	20.0	15.3	10.6
LIBRA Bank No. 1	9.5	9.5	8.5	7.2	6.0	4.7
LIBRA Bank No. 2	14.3	14.3	13.2	11.9	10.5	9.1
SKODAEXPORT	28.3	11.8	10.0	8.5	8.5	6.5
PARIBAS (BFCE)	8.4	14.0	10.8	15.3	13.7	11.2
EXIMBANK OF JAPAN	3.0	13.7	24.5	22.7	20.3	17.7
ELETROBRAS (Repass, several loans)	25.0	52.6	62.7	57.9	51.5	1.3
Total foreign loans - existing	385.7	403.9	383.5	341.6	300.4	219.9
LOCAL LOANS - EXISTING						
ELETROBRAS						
ECF - 79/69-A/70 and B/71 and D/76	44.8	38.5	32.2	26.7	21.3	15.9
79-C/73	12.6	11.8	10.2	8.7	7.1	5.5
102/73-B/76	41.9	38.7	35.6	32.5	29.9	26.3
121/74	55.6	44.5	33.2	24.2	16.0	8.1
186-E/76	267.4	305.9	323.7	288.5	251.9	222.2
187-D/76	76.3	131.0	199.9	220.5	192.6	173.5
253/74-253-B/76	10.8	11.3	9.7	7.8	5.9	4.5
256/73-256-B/76	20.0	20.0	20.0	20.0	20.0	20.0
295/74	9.3	8.3	7.2	6.3	5.2	4.1
404/76	19.6	17.7	15.2	12.6	10.6	6.9
307-C/76	44.4	78.4	98.3	91.9	80.4	70.7
320-74	25.6	23.3	19.7	16.7	13.8	10.9
328-74	9.7	8.4	7.1	6.0	4.9	3.8
359-74	9.4	8.9	8.3	7.8	7.3	6.7
424-76	15.5	16.7	14.6	12.4	10.2	7.9
458-76	14.9	18.5	16.1	14.3	12.4	10.6
62/75	47.4	47.4	47.4	44.9	40.7	36.3
BNDE	77.2	96.1	83.8	70.6	57.1	45.8
Caixa Economica Federal (PIS)	3.4	2.6	2.0	1.3	0.6	-
BDMG - FINAME	67.6	112.8	137.3	131.6	115.7	97.1
Others	18.6	18.2	16.1	14.7	12.9	11.5
Total local loans - existing	892.2	1,059.0	1,137.6	1,060.0	916.5	788.3
Total existing loans	1,277.9	1,462.9	1,521.1	1,401.6	1,216.9	1,008.2
FOREIGN LOANS - PROPOSED						
Chase Manhattan Bank	3.8	26.0	26.0	26.0	21.7	15.8
Brascan	2.8	8.2	6.1	3.8	1.4	-
Proposed IBRD loan	-	0.7	9.7	31.6	49.8	53.3
IDB	-	21.1	32.8	66.8	109.2	138.2
Total foreign loans - proposed	6.6	56.0	74.6	128.2	182.1	207.3
LOCAL LOANS - PROPOSED						
ELETROBRAS	87.9	97.4	215.9	334.8	437.8	467.7
BDMG - FINAME	-	5.8	21.2	36.5	49.2	59.4
BDMG - FINAME	-	10.2	24.7	25.0	22.4	17.8
Suppliers - FINAME	-	1.9	8.2	19.7	33.9	42.3
FINEP	0.3	1.8	10.1	14.1	16.1	14.1
ELETROBRAS - Nova Ponte & Igarapava	-	-	6.5	28.4	70.9	123.1
BNDE-FINAME - Nova Ponte & Igarapava	-	-	5.8	25.0	60.6	101.2
ELETROBRAS - Other future loans	-	21.9	74.1	136.7	193.4	264.9
BNDE-FINAME - Other future loans	-	46.5	145.6	264.4	385.0	436.8
Total local loans - proposed	88.2	185.5	512.1	884.6	1,269.3	1,527.3
Total proposed loans	94.8	241.5	586.7	1,012.8	1,451.4	1,734.6
Total loans	1,372.7	1,704.4	2,107.8	2,414.4	2,668.3	2,742.8

BRAZIL

SOUTH-SOUTHEAST POWER DISTRIBUTION PROJECT

ANNEX B

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CELESC

Actual and Proposed Terms Applicable to Long-term Debt to 1982

Creditor	Loan Date	Loan Amount (in million units of applicable currency)	Currency	Grace Period (years and months)	Amortization Period (years and months)	Interest Rate
FOREIGN LOANS - EXISTING						
ELETROBRAS (Repass of IDB loan)	12/68	0.4	US$	0-9	11-6	6%
BESC	7/75	3.4	"	1-0	4-6	2% and 2-1/8% over LIBOR
Unibanco	4/77	5.0	"	1-6	4-6	2-3/8% and 2-1/4% over LIBOR
LOCAL LOANS - EXISTING						
ELETROBRAS:						
ECF - 67/68	8/68	13.9	Cr$	1-9	11-0	10%
166/71	9/71	13.7	"	0-10	10-0	10%
358-A/74	12/74	128.7	"	1-10	10-0	10%
437/76	8/76	260.0	"	1-6	10-0	10%
438/76	8/76	40.0	"	1-6	10-0	10%
416/76	6/76	21.8	"	5-0	10-0	12%
IRDs	1965/67	17.9	"	7-0	20-0	8%
MME	1967/77	54.0	"	7-0	20-0	8%
BNDE	12/73	12.5	"	0-3	10-0	7.5%
BRDE	1973/76	38.6	"	1-0/2-0	1-0/6-0	6/7%
FOREIGN LOANS - PROPOSED						
IBRD	1978	43.8	US$	3-0	15-0	8.5%
Commercial Banks	1977	10.0	US$	2-0	8-0	2% over LIBOR
LOCAL LOANS - PROPOSED						
ELETROBRAS - ECF	1978/1982	700.0	Cr$	2-0	10-0	10%
ELETROBRAS - Rural Electrification	1978/1982	224.8	"	5-0	10-0	12%
FINAME	1978/1982	276.8	"	1-0	6-0	7%

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Actual and Forecast Long-Term Debt Statement 1976-1982
(in millions of June 1977 cruzeiros)

	1976		1977	1978	1979	1980	1981	1982
	Before revaluation	After revaluation						
	---current Cr$---							
FOREIGN LOANS - EXISTING								
ELETROBRAS (Repass of IDB loans)	24.2	37.4	25.8	20.4	14.9	9.0	3.5	-
BESC	32.9	39.6	22.0	11.1	0.3	-	-	-
Unibanco	-	-	74.2	66.0	47.2	28.4	9.6	-
Total foreign loans - existing	57.1	64.0	122.0	97.5	62.4	37.4	13.1	-
LOCAL LOANS - EXISTING								
ELETROBRAS:								
ECF - 67/68	19.4	32.5	24.1	15.6	7.5	1.0	-	-
166/71	14.3	23.9	19.0	14.1	9.6	5.4	1.2	-
358-A/74	153.3	255.2	220.3	189.1	162.8	136.5	110.2	83.9
437/76	101.1	140.0	313.7	288.3	250.2	218.9	187.6	156.3
438/76	9.9	11.9	36.1	32.5	28.9	25.3	21.7	18.1
416/76	8.7	10.5	26.3	26.3	26.3	26.3	24.4	22.5
IRDs	111.7	178.5	127.9	97.6	92.5	87.4	82.3	77.2
Others	19.4	28.9	10.0	5.8	3.5	1.7	0.9	-
MME	-	12.5	17.3	17.3	17.3	17.3	17.3	17.3
BNDE	21.7	33.8	28.7	23.6	18.5	13.4	8.3	3.2
BRDE	27.0	33.0	37.2	31.4	24.3	18.2	12.5	6.8
Others	0.9	1.9	0.3	0.1	0.1	0.1	-	-
Total local loans existing	487.4	763.6	860.9	741.7	641.5	551.5	466.4	385.3
Total existing loans	544.5	826.6	982.9	839.2	703.9	588.9	479.5	385.3
FOREIGN LOANS - PROPOSED								
IBRD	-	-	-	19.9	180.6	384.5	479.7	466.3
Commercial Banks	-	-	143.5	143.5	125.6	107.7	89.8	71.9
Total foreign loans proposed	-	-	143.5	163.4	306.2	492.2	569.5	538.2
LOCAL LOANS - PROPOSED								
ELETROBRAS - ECF	-	-	125.9	363.3	482.0	595.8	827.3	929.5
" - Rural Electrification	-	-	-	35.7	76.7	123.0	173.9	224.8
FINAME	-	-	-	60.2	110.4	138.4	158.5	182.6
Total local loans - proposed	-	-	125.9	459.2	669.1	857.2	1,159.7	1,336.9
Total proposed loans	-	-	269.4	622.6	975.3	1,349.4	1,729.2	1,875.1
Total loans	544.5	826.6	1,252.3	1,461.8	1,679.2	1,938.3	2,208.7	2,260.4

BRAZIL

SOUTH-SOUTHEAST POWER DISTRIBUTION PROJECT

ANNEX B

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CELESC

Forecast Long-Term Debt Disbursement Statement 1977-1982
(in millions of June 1977 cruzeiros)

	1977	1978	1979	1980	1981	1982
FOREIGN LOANS - EXISTING						
Unibanco	74.2	-	-	-	-	-
LOCAL LOANS - EXISTING						
ELETROBRAS:						
ECF - 437/76	173.7	17.4	-	-	-	-
438/76	24.2	-	-	-	-	-
416/76	15.8	-	-	-	-	-
BRDE	9.4	-	-	-	-	-
MME	4.8	-	-	-	-	-
Total local loans - existing	227.9	17.4	-	-	-	-
Total existing loans	302.1	17.4				
FOREIGN LOANS - PROPOSED						
IBRD	-	19.9	160.7	203.9	112.4	21.1
Commercial Banks	143.5	-	-	-	-	-
Total foreign loans - proposed	143.5	19.9	160.7	203.9	112.4	21.1
LOCAL LOANS - PROPOSED						
ELETROBRAS - ECF	125.9	237.4	118.7	133.8	251.5	122.2
" - Rural Electrification	-	35.7	41.0	46.3	50.9	50.9
FINAME	-	60.2	60.2	48.1	48.1	60.2
Total local loans - proposed	125.9	333.3	219.9	228.2	350.5	233.3
Total proposed loans	269.4	353.2	380.6	432.1	462.9	254.4
Total loans	571.5	370.6	380.6	432.1	462.9	254.4

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Forecast Long-Term Debt Amortization Statement 1977-1982
(in millions of June 1977 cruzeiros)

	1977	1978	1979	1980	1981	1982
FOREIGN LOANS - EXISTING						
ELETROBRAS (Repass of IDB Loans)	5.3	5.4	5.5	5.9	5.5	3.5
BESC	10.9	10.9	10.8	0.3	-	-
Unibanco	-	8.2	18.8	18.8	18.8	9.6
Total foreign loans - existing	16.2	24.5	35.1	25.0	24.3	13.1
LOCAL LOANS - EXISTING						
ELETROBRAS:						
ECF - 67/68	8.4	8.5	8.1	6.5	1.0	-
166/71	4.9	4.9	4.5	4.2	4.2	1.2
358-A/74	34.9	31.2	26.3	26.3	26.3	26.3
437/76	-	42.8	38.1	31.3	31.3	31.3
438/76	-	3.6	3.6	3.6	3.6	3.6
416/76	-	-	-	-	1.9	1.9
IRDs	50.6	30.3	5.1	5.1	5.1	5.1
Others	18.9	4.2	2.3	1.8	0.8	0.9
BNDE	5.1	5.1	5.1	5.1	5.1	5.1
BRDE	5.2	5.8	7.1	6.1	5.7	5.7
Others	1.6	0.2	-	-	0.1	-
Total local loans - existing	129.6	136.6	100.2	90.0	85.1	81.1
Total existing loans	145.8	161.1	135.3	115.0	109.4	94.2
To cash flow	95.2	130.8				
To capital a/	50.6	30.3				
FOREIGN LOANS - PROPOSED						
IBRD	-	-	-	-	17.2	34.5
Commercial Banks	-	-	17.9	17.9	17.9	17.9
Total foreign loans - proposed	-	-	17.9	17.9	35.1	52.4
LOCAL LOANS - PROPOSED						
ELETROBRAS - ECF	-	-	-	20.0	20.0	20.0
" Rural Electrification	-	-	-	-	-	-
FINAME	-	-	10.0	20.1	28.0	36.1
Total local loans - proposed	-	-	10.0	40.1	48.0	56.1
Total proposed loans	-	-	27.9	58.0	83.1	108.5
Total loans	145.8	161.1	163.2	173.0	192.5	202.7
To cash flow	95.2	130.8				

a/ CELESC will capitalize these amounts; therefore, they were omitted from the Sources and Applications of Funds Statement.

BRAZIL

SOUTH-SOUTHEAST POWER DISTRIBUTION PROJECT

ANNEX B

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CELESC

Forecast Interest Charges 1977-1982
(in millions of June 1977 cruzeiros)

	1977	1978	1979	1980	1981	1982
FOREIGN LOANS - EXISTING						
ELETROBRAS (Repass of IDB loans)	1.9	1.4	1.1	0.7	0.4	0.1
BESC	3.1	1.7	0.6	-	-	-
Unibanco	3.7	7.0	5.7	3.8	1.9	0.5
Total foreign loans - existing	8.7	10.1	7.4	4.5	2.3	0.6
LOCAL LOANS - EXISTING						
ELETROBRAS:						
ECF - 67/68	2.8	2.0	1.2	0.4	-	-
166/71	2.1	1.7	1.2	0.8	0.3	-
358-A/74	23.8	20.5	17.6	15.0	12.3	9.7
437/76	22.7	30.1	26.9	23.5	20.3	17.2
438/76	2.4	3.4	3.1	2.7	2.4	2.0
416/76	2.2	3.2	3.2	3.2	3.0	2.8
IRDs	12.3	9.0	7.6	7.2	6.8	6.4
Others	1.9	0.8	0.5	0.3	0.1	-
MME	1.2	1.7	1.7	1.7	1.7	1.7
BNDE	2.3	2.0	1.6	1.2	0.8	0.4
BRDE	2.3	2.2	1.8	1.4	1.0	0.6
Others	0.2	-	-	-	-	-
Total local loans - existing	76.2	76.6	66.4	57.4	48.7	40.8
Total existing loans	84.9	86.7	73.8	61.9	51.0	41.4
To cash flow	72.6	77.7	66.2	54.7	44.2	35.0
To capital a/	12.3	9.0	7.6	7.2	6.8	6.4
FOREIGN LOANS - PROPOSED						
IBRD	-	0.8	8.5	24.0	36.7	40.2
Commercial Banks	5.9	14.8	14.4	12.5	10.7	8.8
Total foreign loans - proposed	5.9	15.6	22.9	36.5	47.4	49.0
LOCAL LOANS - PROPOSED						
ELETROBRAS - ECF	0.2	12.0	18.9	43.9	58.8	74.7
ELETROBRAS - Rural Electrification	-	2.2	6.7	12.0	17.8	23.9
FINAME	-	2.6	7.7	11.3	13.6	15.6
Total local loans - proposed	0.2	16.8	33.3	67.2	90.2	114.2
Total proposed loans	6.1	32.4	56.2	103.7	137.6	163.2
Total loans	91.0	119.1	130.0	165.6	188.6	204.6
To cash flow	78.7	110.1	122.4	158.4	181.8	198.2

a/ CELESC will capitalize these amounts; therefore, they were omitted from the Sources and Applications of Funds Statement.

BRAZIL

SOUTH-SOUTHEAST POWER DISTRIBUTION PROJECT

ANNEX B

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ESCELSA

Actual and Proposed Terms Applicable to Long-Term Debt to 1982

Creditor	Loan Date	Loan Amount (in million units of applicable currency)	Currency	Grace Period (years and months)	Amortization Period (years and months)	Interest Rate
FOREIGN LOANS - EXISTING						
USAID - 512-L-062	1966	12.3	US$	8-0	18-0	6.5%
CITIBANK - RES-63	1976	3.0	US$	2-0	4-0	LIBOR + 2%
CITIBANK - 431	1976	2.0	US$	2-0	4-0	LIBOR + 2.125%
Others	1966-1976	1.8	US$	3-0 to 4-0	12-0 to 19-0	5% to 7%
LOCAL LOANS - EXISTING						
AMFORP 1 and 2	1967	26	US$	1-0	25-0	11%
ELETROBRAS:						
ECF -69-A/69	1969	20.2	Cr$	-	10-0	11%
-82/69	1969	37.2	Cr$	4-0	11-0	11%
-83/69	1969	103.5	Cr$	4-0	17-0	11%
-99/69	1969	12.0	Cr$	-	10-0	11%
-83-A/70	1970	47.0	Cr$	4-0	17-0	11%
-82-D/72	1972	17.5	Cr$	2-0	10-0	11%
-83-D/72	1972	58.0	Cr$	2-0	16-0	11%
-83-E/73	1973	56.1	Cr$	1-0	16-0	11%
-202-A/72	1972	31.5	Cr$	-	11-0	11%
-350-74	1974	14.8	Cr$	-	20-0	8%
-335-A/75	1975	608.1	Cr$	1-0	11-0	12%
Others	1969-1975	35.8	Cr$	1-0/2-0	10-0/20-0	6% - 11%
Caixa Economica Federal						
RD's	1975	18.1	Cr$	2-0	7-0	8%
Centro Operativo	1975	22.4	Cr$	2-0	7-0	8%
BANDES	1975	17.0	Cr$	2-0	6-0	7.5%
FINAME						
Special	1975	59.2	Cr$	2-0	8-0	6.5%
Long-term	1975	8.2	Cr$	2-0	7-0	8%
FOREIGN LOANS - PROPOSED						
IBRD	1978	28.1	US$	3-0	12-0	8.5%
LOCAL LOANS - PROPOSED						
ELETROBRAS	1978-1982	1,057.2	Cr$	2-0	10-0	10%

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Actual and Forecast Long-Term Debt Statements 1976-1982
(in millions of June 1977 cruzeiros)

	1976	1976 (including 1976 revaluation)	1977	1978	1979	1980	1981	1982
FOREIGN LOANS - EXISTING								
USAID 512-L-062	138.2	138.2	158.9	151.1	142.9	134.3	125.1	115.6
Citibank RES-63	37.0	37.0	44.5	32.6	20.7	8.8	-	-
" 4131	-	-	22.1	29.7	23.8	17.9	12.0	6.0
Others	2.2	2.2	9.4	7.1	5.4	3.7	3.1	2.6
Total foreign loans - existing	177.4	177.4	234.9	220.5	192.8	164.7	140.2	124.2
LOCAL LOANS - EXISTING								
AMFORP 1 and 2	21.1	27.6	31.6	30.1	28.4	26.7	25.1	23.5
ECF 69-A/69	18.4	25.2	20.1	9.9	-	-	-	-
82/69	59.9	77.9	78.0	62.2	46.4	32.8	19.6	6.6
83/69	181.2	235.8	252.1	223.8	198.6	176.6	157.4	139.4
99/69	11.2	15.3	12.3	6.1	-	-	-	-
83-A/70	76.4	99.4	108.5	97.4	86.4	75.3	64.2	53.1
82-D/72	20.8	27.2	27.3	21.9	17.0	12.2	7.3	2.5
83-D/73	68.8	89.5	97.4	87.2	77.0	66.8	56.5	44.6
83-D/72	81.9	106.6	116.3	104.4	92.5	80.6	68.7	58.5
202-A/72	35.5	46.3	46.0	36.3	27.8	19.2	10.7	2.2
350-74	16.5	21.5	24.3	22.7	21.2	19.6	18.0	16.4
335-A/75	321.0	418.6	731.0	742.1	675.0	601.8	528.7	455.6
Others	39.0	45.8	45.2	36.9	29.9	23.5	17.3	11.0
Caixa Economica Federal								
RDs	18.1	23.5	27.7	25.1	22.1	18.6	14.7	10.2
Centro Operativo	18.2	25.7	41.4	33.8	26.2	18.6	11.1	3.5
BANDES	20.0	26.0	32.7	26.9	18.3	10.0	7.2	4.4
FINAME								
Special	25.9	33.7	75.4	74.9	62.2	48.7	35.2	21.7
Long-term	5.1	6.6	12.2	11.4	9.7	8.1	6.4	4.7
Others	9.5	12.4	18.5	18.5	18.5	18.5	18.5	18.5
Total local loans - existing	1,048.5	1,364.6	1,798.0	1,677.6	1,457.2	1,257.6	1,066.6	876.4
Total existing loans	1,225.9	1,542.0	2,032.9	1,898.1	1,650.0	1,422.3	1,206.8	1,000.6
FOREIGN LOANS - PROPOSED								
IBRD	-	-	-	16.8	118.8	245.8	304.2	299.6
LOCAL LOANS - PROPOSED								
ELETROBRAS	-	-	-	165.9	415.5	648.8	846.0	951.3
Total proposed loans	-	-	-	182.7	534.3	894.6	1,150.2	1,250.9
Total loans	1,225.9	1,542.0	2,032.9	2,080.8	2,184.3	2,316.9	2,357.0	2,251.5

BRAZIL

SOUTH-SOUTHEAST POWER DISTRIBUTION PROJECT

ANNEX B

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ESCELSA

Forecast Long-Term Debt Disbursement Statements 1977-1982

(in millions of June 1977 cruzeiros)

YEAR	1977	1978	1979	1980	1981	1982
FOREIGN LOANS - EXISTING						
Citibank 4131	22.1	7.6				
Others	8.2					
Total foreign loans-existing	30.3	7.6				
LOCAL LOANS - EXISTING						
ECF 335-A/75	245.7	90.3				
Caixa Economica Federal-Centro Operativo	11.1	-				
BANDES	2.0	0.5				
FINAME - Special	35.1	5.4				
Long-term	4.2	-				
Others	3.6	-				
Total local loans-existing	301.7	96.2				
Total existing loans	332.0	103.8				
FOREIGN LOANS - PROPOSED						
IBRD	-	16.8	102.0	127.0	69.5	17.6
LOCAL LOANS - PROPOSED						
ELETROBRAS	-	165.9	249.5	235.2	233.3	173.3
Total proposed loans	-	182.7	351.5	362.2	302.8	190.9
Total loans	332.0	286.5	351.5	362.2	302.8	190.9

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Forecast Long-Term Debt Amortization Statements 1977-1982

(in millions of June 1977 cruzeiros)

	1977	1978	1979	1980	1981	1982
FOREIGN LOANS - EXISTING						
USAID 512-L-062	7.3	7.8	8.2	8.7	9.1	9.5
Citibank RES-63	-	11.9	11.9	11.9	8.8	-
Citibank 4131	-	-	5.9	5.9	5.9	6.0
Others	1.4	2.3	1.7	1.7	0.6	0.5
Total foreign loans - existing	8.7	22.0	27.7	28.2	24.4	16.0
LOCAL LOANS - EXISTING						
AMFORP 1 and 2	1.6	1.6	1.7	1.7	1.6	1.6
ECF 69-A/69	10.2	10.2	9.9	-	-	-
82/69	15.8	15.8	15.8	13.6	13.2	13.0
83/69	31.5	28.4	25.1	22.0	19.2	18.0
99/69	6.1	6.1	6.1	-	-	-
83-A/70	11.1	11.1	11.1	11.1	11.1	11.1
82-D/72	5.4	5.4	4.9	4.8	4.8	4.8
83-D/72	11.9	11.9	11.9	11.9	11.9	11.9
83-E/73	10.2	10.2	10.2	10.2	10.2	10.2
202-A/72	9.7	9.6	8.5	8.5	8.5	8.5
350-74	1.6	1.6	1.6	1.6	1.6	1.6
335-A/75	18.3	73.1	73.1	73.1	73.1	73.1
Others	9.9	8.7	6.7	6.5	6.3	6.3
Caixa Economica Federal						
RDs	0.6	2.5	3.0	3.5	4.0	4.5
Centro operativo	0.6	7.6	7.6	7.6	7.6	7.6
BANDES	0.6	6.3	8.7	8.3	2.8	2.8
FINAME						
Special	0.2	5.9	12.8	13.5	13.5	13.5
Long-term	-	0.7	1.7	1.7	1.7	1.7
Total local loans - existing	145.3	216.7	220.4	199.6	199.1	190.2
Total existing loans	154.0	238.7	248.1	227.8	215.5	206.2
To cash-flow	154.0	124.9	169.6	217.6	215.5	61.4
To capital	-	113.8	78.5	10.2	-	144.8
FOREIGN LOANS - PROPOSED						
IBRD	-	-	-	-	11.1	22.2
LOCAL LOANS - PROPOSED						
ELETROBRAS	-	-	-	1.8	36.1	68.0
Total proposed loans	-	-	-	1.8	47.2	90.2
Total loans	154.0	238.7	248.1	229.6	262.7	296.4
To cash-flow	154.0	124.9	169.6	219.4	262.7	151.6

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SOUTH-SOUTHEAST POWER DISTRIBUTION PROJECT

ANNEX B

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ESCELSA

Forecast Interest Charges 1977-1982
(in millions of June 1977 cruzeiros)

	1977	1978	1979	1980	1981	1982
FOREIGN LOANS - EXISTING						
USAID 512-L-062	9.0	8.7	8.2	7.7	7.2	6.7
CITIBANK RES-63	4.7	4.7	3.7	2.5	1.2	-
CITIBANK 4131	1.2	1.2	2.2	1.7	1.3	0.9
Others	0.5	0.6	0.5	0.4	0.3	0.3
Total foreign loans-existing	15.4	15.2	14.6	12.3	10.0	7.9
LOCAL LOANS - EXISTING						
AMFORP 1 and 2	2.6	2.5	2.4	2.2	2.0	1.8
ECF 69-A/69	2.9	1.8	0.6	-	-	-
82/69	10.1	8.4	6.6	4.9	3.5	0.6
83/69	29.7	29.7	29.7	25.0	24.8	23.5
99/69	1.8	1.1	0.5	-	-	-
83-A/70	13.4	12.2	10.9	9.7	8.4	7.1
82-D/72	3.5	2.9	2.4	1.8	1.3	0.8
83-D/72	14.3	13.1	11.8	10.5	9.1	6.5
83-E/73	12.0	10.9	9.9	8.7	7.6	6.4
202-A/72	6.0	4.9	4.0	3.0	2.0	0.7
350-74	2.2	2.0	1.9	1.8	1.7	1.7
335-A/75	58.2	69.5	61.5	53.5	45.6	38.2
Others	6.3	5.4	4.3	3.8	2.9	1.4
Caixa Economica Federal						
RDs	1.7	1.6	1.3	1.1	0.8	0.5
Centro Operativo	3.6	3.4	2.8	2.2	1.6	0.8
BANDES	1.9	1.7	1.2	0.5	0.1	0.1
FINAME						
Special	4.8	4.5	3.8	2.9	2.2	1.5
Long-term	0.8	0.7	0.7	0.6	0.5	0.4
Others	1.0	0.7	0.7	0.7	0.7	0.7
Total local loans-existing	176.8	177.0	157.0	132.9	114.8	92.7
Total existing loans	192.2	192.2	171.6	145.2	124.8	100.6
FOREIGN LOANS -PROPOSED						
IBRD	-	0.7	5.8	15.5	23.4	25.7
LOCAL LOANS - PROPOSED						
ELETROBRAS	-	12.6	29.0	75.2	92.0	127.1
Total proposed loans	-	13.3	34.8	90.7	115.4	152.8
Total loans	192.2	205.5	206.4	235.9	240.2	253.4

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SOUTH-SOUTHEAST POWER DISTRIBUTION PROJECT

ANNEX B

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Project Performance and Monitoring Indicators

	ACTUAL		Est.	FORECAST				
	1975	1976	1977	1978	1979	1980	1981	1982
CEMIG								
1. Market Penetration								
Energy sold (GWh) - Total to users	7629	8943	10385	12294	14663	17129	20032	22568
- Industrial	5886	6763	7934	9513	11581	13712	16279	18138
- Residential	903	1039	1187	1315	1453	1599	1753	1915
Average number of customers (ooo) - Total	935	1026	1124	1226	1332	1440	1548	1657
- Residential	787	867	950	1036	1124	1214	1305	1398
- Rural	17	17	19	23	27	32	34	37
Inhabitants/residential customer index	15.9	14.7	13.7	12.8	12.0	11.3	10.7	10.1
Low income customers connections financed by utility	-	-		10200	10000	10000	-	-
2. Efficiency								
Number of employees	7626	8095	8593	9122	9684	10280	10917	11590
Customer/employee	123	127	131	134	138	140	142	143
Energy sold (Gwh/employee-year)	1.00	1.10	1.21	1.35	1.51	1.67	1.83	1.95
Losses (% of net generation and purchases)	8.8	9.0	9.0	9.0	9.0	9.0	9.0	9.0
3. Financial Indicators								
Annual debt service coverage a/	1.8	1.6	1.4	1.5	1.6	1.2	1.2	1.4
Self-financing ratio (%) b/	(2)	10	8	10	15	7	7	26
Average revenue/kWh (Cr¢) c/	21.5	27.9	42.2	41.8	42.7	43.2	40.9	44.3
Long-term debt/total fixed assets (%)	54	56	54	57	59	59	59	56
Receivables (in days of billings)	69	60	55	55	55	55	55	55
Depreciation as % of average gross fixed assets	3	3	3	3	3	3	3	3
Accounts payable in months of investment expenditures	1.4	2.0	3.1	1.6	1.6	1.6	1.6	1.6
Average remuneration per employee (Cr$ thousand/year) c/	28.0	43.6	62.5	65.2	64.3	63.2	61.8	60.4
CELESC								
1. Market Penetration								
Energy sold (GWh) - Total to users	1396	1777	2113	2513	2949	3444	3988	4580
- Industrial	807	1046	1249	1505	1780	2093	2431	2795
- Residential	255	289	339	395	459	535	623	726
Average number of customers (ooo) - Total	333	367	421	470	530	592	661	740
- Residential	251	278	313	348	388	433	480	534
- Rural	34	38	46	52	61	68	77	87
Inhabitants /residential customer index	13.4	12.4	10.7	10.5	9.7	9.0	8.3	7.7
Lower income customers connections financed by utility	-	-	2000	5000	7000	8000	-	-
2. Efficiency								
Number of employees	3999	3945	3945	4168	4243	4320	4370	4449
Customer/employee	83	93	107	113	125	137	151	167
Energy sold (GWh/employee-year)	-	-	0.54	0.61	0.70	0.80	0.91	1.03
Losses (% of net generation and purchases)	9.2	8.0	7.7	7.9	8.0	8.0	8.0	8.0
3. Financial Indicators								
Annual debt service coverage a/	3.1	2.1	1.5	1.4	1.5	1.6	1.7	1.9
Self-financing ratio (%) b/	41	17	9	10	12	16	22	30
Average revenue/kWh (Cr¢) c/	35.3	40.0	64.5	66.5	66.7	66.9	70.1	67.2
Long-term debt/total fixed assets (%)	46	39	48	46	45	44	42	38
Receivables (in days of billings)	56	60	60	60	60	60	60	60
Depreciation as % of average gross fixed assets	3	3	3	3	3	3	3	3
Accounts payable (Cr$ millions) d/	105.1	301.6	197.1	183.0	216.4	257.2	266.1	287.6
Average remuneration per employee (Cr$ thousand/year) c/	28.8	46.8	82.2	84.7	87.2	89.8	92.6	95.5
ESCELSA								
1. Market Penetration								
Energy sold (GWh) - Total to users	832	958	1432	1916	2537	3019	4051	4249
- Industrial	559	642	1076	1506	2064	2474	3175	3278
- Residential	124	147	158	180	205	233	266	302
Average number of customers (ooo) - Total	137	160	174	192	212	235	259	287
- Residential	116	136	146	161	179	195	214	236
- Rural	0.9	1.9	2.4	2.9	3.7	4.6	5.8	7.2
Inhabitants/residential customer index	14.9	12.9	12.1	11.2	10.3	9.5	8.8	8.1
Low income customers connections financed by utility	n.a.	2000	5000	2700	1300	3000	3000	-
2. Efficiency								
Number of employees	1558	1695	1847	1976	2114	2262	2420	2589
Customer/employee	88	94	94	97	100	104	107	111
Energy sold (GWh/employee-year)	0.53	0.57	0.78	0.97	1.20	1.33	1.67	1.64
Losses (% of net generation and purchases)	9.4	7.0	9.1	9.1	9.1	8.7	8.5	8.5
3. Financial Indicators e/								
Annual debt service coverage a/	0.8	1.0	1.3	1.5	1.5	1.5	1.5	1.5
Self-financing ratio (%) b/	(7)	(16)	14	28	27	29	36	31
Average revenue/kWh (Cr¢) c/	28.2	35.7	49.9	46.7	41.6	43.1	36.1	40.0
Long-term debt/total fixed assets (%)	67	68	75	67	61	57	52	47
Receivables (in days of billings)	50	42	34	34	34	34	34	34
Depreciation as % of average gross fixed assets	3	3	3	3	3	3	3	3
Accounts payable as % of investment expenditures	3.0	6.1	7.5	8.3	8.3	8.3	8.3	8.3
Average remuneration per employee (Cr$ thousand/year) c/	19.2	37.2	50.4	52.7	55.2	57.8	60.5	64.9

a/ Times that net debt service is covered by gross internal cash generation.
b/ Percent annual contribution to investment from net internal resources excluding sector capital contributions.
c/ In current cruzeiros for 1975 and 1976 and in constant June 1977 cruzeiros for 1977-82.
d/ For basis of computations see note aa/ on Table 5-2.
e/ See para. 5.14

BRAZIL

SOUTH-SOUTHEAST POWER DISTRIBUTION PROJECT

ANNEX B

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Cost and Benefit Streams
Used in the Determination
of the Rate of Return

COSTS (in 10^3US$)

Year	1 1978	2 1979	3 1980	4 1981	5 1982	6 1983	7 1984	8 1985	9 1986	10 1987	11 1988	12 1989	13-32 1990-2009
CEMIG:													
1978-1981 Investment Program: a/													
foreign	106,726	149,214	129,535	39,184	-	-	-	-	-	-	-	-	-
local	324,574	270,446	250,077	299,357	-	-	-	-	-	-	-	-	-
Operation & Maintenance Costs: b/													
payroll	-	1,488	4,396	6,896	9,711	13,060	16,625	19,177	20,835	23,685	24,886	24,886	24,886
materials	-	858	2,554	4,036	5,702	7,848	10,086	11,738	12,869	14,629	15,371	15,371	15,371
miscellaneous expenses	-	353	1,056	1,672	2,411	3,300	4,279	5,016	5,534	6,291	6,610	6,610	6,610
purchased energy c/	-	1,159	4,397	7,991	10,533	12,980	23,673	40,600	58,183	66,141	69,496	69,496	69,496
CELESC:													
1978-1981 Investment Program: a/													
foreign	5,168	18,089	20,673	7,752	-	-	-	-	-	-	-	-	-
local	36,718	25,818	31,200	46,152	-	-	-	-	-	-	-	-	-
Operation & Maintenance Costs: b/													
payroll	-	735	2,163	4,180	6,776	9,651	12,803	15,574	17,863	19,539	20,465	20,465	20,465
materials	-	89	279	563	902	1,285	1,705	2,074	2,379	2,602	2,725	2,725	2,725
miscellaneous expenses	-	118	372	750	1,199	1,708	2,266	2,756	3,161	3,458	3,622	3,622	3,622
purchased energy c/	-	2,155	7,204	16,947	28,192	40,152	53,267	64,795	74,319	81,293	85,144	85,144	85,144
ESCELSA:													
1978-1981 Investment Program: a/													
foreign	3,729	13,051	14,915	5,593	-	-	-	-	-	-	-	-	-
local	27,100	22,730	19,805	30,852	-	-	-	-	-	-	-	-	-
Operation & Maintenance Costs: b/													
payroll	-	380	923	2,264	2,953	4,095	5,349	6,452	7,366	8,034	8,399	8,399	8,399
materials	-	238	619	1,628	2,124	2,946	3,848	4,642	5,300	5,781	6,044	6,044	6,044
miscellaneous expenses	-	59	141	339	442	613	801	966	1,103	1,203	1,258	1,258	1,258
purchased energy c/	-	1,326	4,156	10,611	13,841	19,195	25,071	30,243	34,529	37,661	39,373	39,373	39,373
TOTAL													
1978-1981 Investment Program:													
foreign	115,623	180,354	165,121	52,529	-	-	-	-	-	-	-	-	-
local	388,392	318,994	301,082	376,361	-	-	-	-	-	-	-	-	-
Operation & Maintenance Costs:													
payroll	-	2,603	7,482	13,340	19,440	26,806	34,777	41,203	46,064	51,258	53,750	53,750	53,750
materials	-	1,185	3,452	6,227	8,808	12,079	15,639	18,454	20,548	23,012	24,140	24,140	24,140
miscellaneous expenses	-	530	1,569	2,761	4,052	5,621	7,346	8,738	9,798	10,952	11,490	11,490	11,490
purchased energy	-	4,640	15,757	35,549	52,566	72,327	102,011	135,638	167,031	185,095	194,013	194,013	194,013

BENEFITS

Year	0 1977	1 1978	2 1979	3 1980	4 1981	5 1982	6 1983	7 1984	8 1985	9 1986	10 1987	11 1988	12 1989	13-32 1990-2009
CEMIG:														
Total energy sold (GWh) d/	10,662	13,086	15,908	18,489	21,186	23,181	25,290	27,546	30,182	33,285	36,614	40,275	44,302	
Increase in energy sold over 1977 (GWh)	-	2,348	5,165	7,746	10,443	12,438	14,547	16,803	19,439	22,542	25,871	29,532	33,559	
Increase in energy sold over previous year (GWh)	-	2,343	2,822	2,581	2,697	1,995	2,109	2,256	2,636	3,103	3,329	3,661	4,027	
% of yearly increase due to 1978-81 program e/	-	-	20	40	60	80	100	100	80	60	40	20	-	
Increase in sales due to 1978-81 program (GWh)	-	-	564	1,597	3,220	4,800	6,980	9,170	11,285	13,150	14,480	15,200	15,200	15,200
Revenues from 1978-1981 Investment Program (10^3US$) f/	-	-	18,715	62,341	102,087	165,716	242,616	323,624	391,268	442,797	503,357	528,889	528,889	528,889
CELESC:														
Total energy sold (GWh) d/ g/	2,113	2,513	2,949	3,444	3,988	4,580	5,038	5,542	6,096	6,706	7,376	8,114	8,925	9,818
Increase in energy sold over 1977 (GWh)	-	400	836	1,331	1,875	2,467	2,925	3,429	3,983	4,593	5,263	6,001	6,812	7,705
Increase in energy sold over previous year (GWh)	-	400	436	495	544	592	458	504	554	610	670	738	811	893
% of yearly increase due to 1978-81 program	-	-	20	40	60	80	100	100	80	60	40	20	-	-
Increase in sales due to 1978-81 program (GWh) e/	-	-	87	285	612	1,085	1,543	2,047	2,490	2,856	3,124	3,272	3,272	3,272
Revenues from 1978-1981 Investment Program (10^3US$) h/	-	-	4,092	13,513	30,507	52,003	74,064	98,256	119,520	137,088	149,952	157,056	157,056	157,056
ESCELSA:														
Total energy sold (GWh) d/	1,491	1,989	2,626	3,127	4,182	4,406	4,847	5,331	5,864	6,451	7,096	7,805	8,586	9,445
Increase in energy sold over 1977 (GWh)	-	498	1,135	1,696	2,691	2,915	3,356	3,840	4,373	4,960	5,605	6,314	7,095	7,954
Increase in energy sold over previous year (GWh)	-	498	637	501	1,055	224	441	484	533	587	645	709	781	859
% of yearly increase due to 1978-81 program	-	-	20	40	60	80	100	100	80	60	40	20	-	-
Increase in sales due to 1978-81 program (GWh) e/	-	-	127	328	961	1,140	1,581	2,065	2,491	2,844	3,102	3,243	3,243	3,243
Revenues from 1978-81 Investment Program (10^3US$) i/	-	-	3,541	9,785	24,471	31,920	44,268	57,820	69,748	79,632	86,856	90,804	90,804	90,804
TOTAL														
Revenues from 1978-81 Investment Program (10^3US$)	-	-	26,348	85,637	157,065	249,639	360,948	479,700	580,536	659,517	740,165	776,749	776,749	776,749

a/ Investment costs as estimated in Chapter 4, after deletion of taxes.

b/ These costs have been estimated on the basis of the projected real increases in operation and maintenance costs, allocated in proportion to the increase in sales assumed to be due to the 1978-1981 Investment Program.

c/ For each of the utilities, the unit cost of purchased energy reflects the energy and demand charges applicable to its case for 1977. This unit cost may vary in the future due to variations in the load factor of the purchases and/or the difference between contractual demands and actual purchases.

d/ See Chapter 3 for the forecast market through 1982; a 10% p.a. increase in total sales has been assumed after 1982.

e/ It has been assumed that the existing systems allow the utilities to generate, transmit and distribute energy beyond their present level of sales and that the new investments will reach their capacity in about 6 years after their completion.

f/ Assuming an average tariff of US$0.035/kWh, estimated to be the resulting average of the 1977 tariffs to the public, plus the sole tax on electricity consumption.

g/ In this case, only retail sales have been used for the economic calculations, as the sales to other utilities may be made in the future by ELETROSUL, the regional bulk supplier.

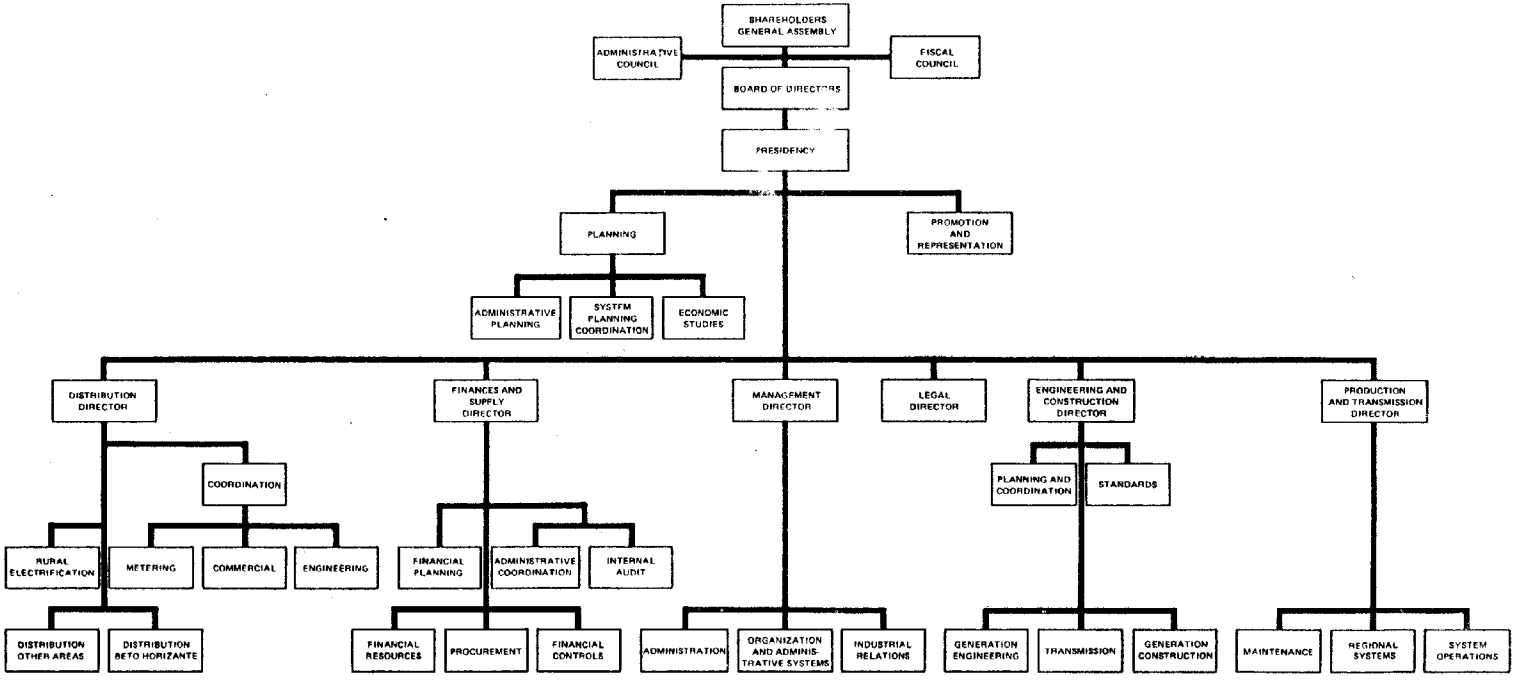
h/ Assuming an average tariff of US$0.048/kWh, estimated to be the resulting average of the 1977 tariffs to the public, plus the sole tax on electricity consumption.

i/ Assuming an average tariff of US$0.028/kWh, estimated to be the resulting average of the 1977 tariffs to the public, plus the sole tax on electricity consumption.

ANNEX B

C-1

CEMIG ORGANIZATION CHART



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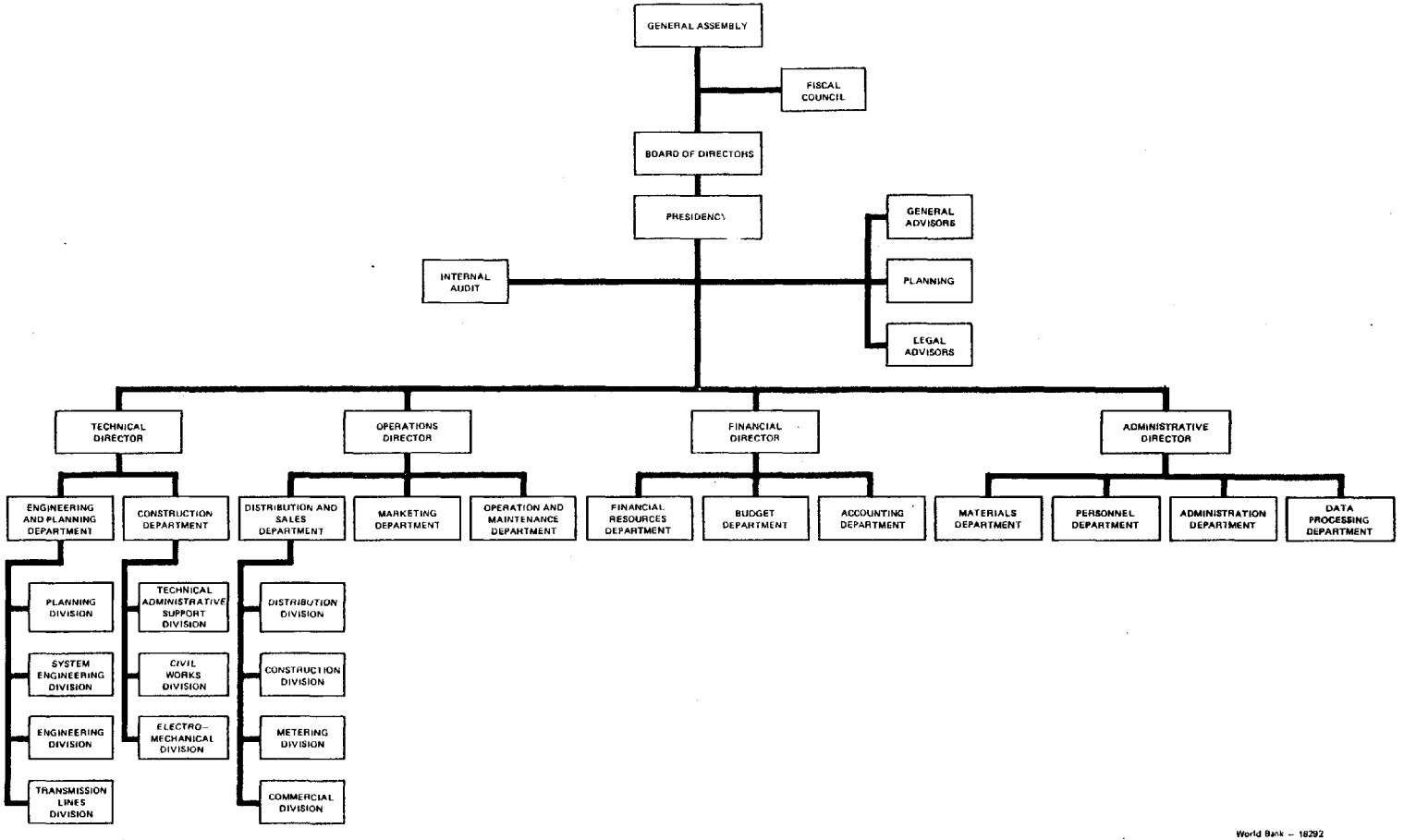
ANNEX B

C-2

CELESC ORGANIZATION CHART

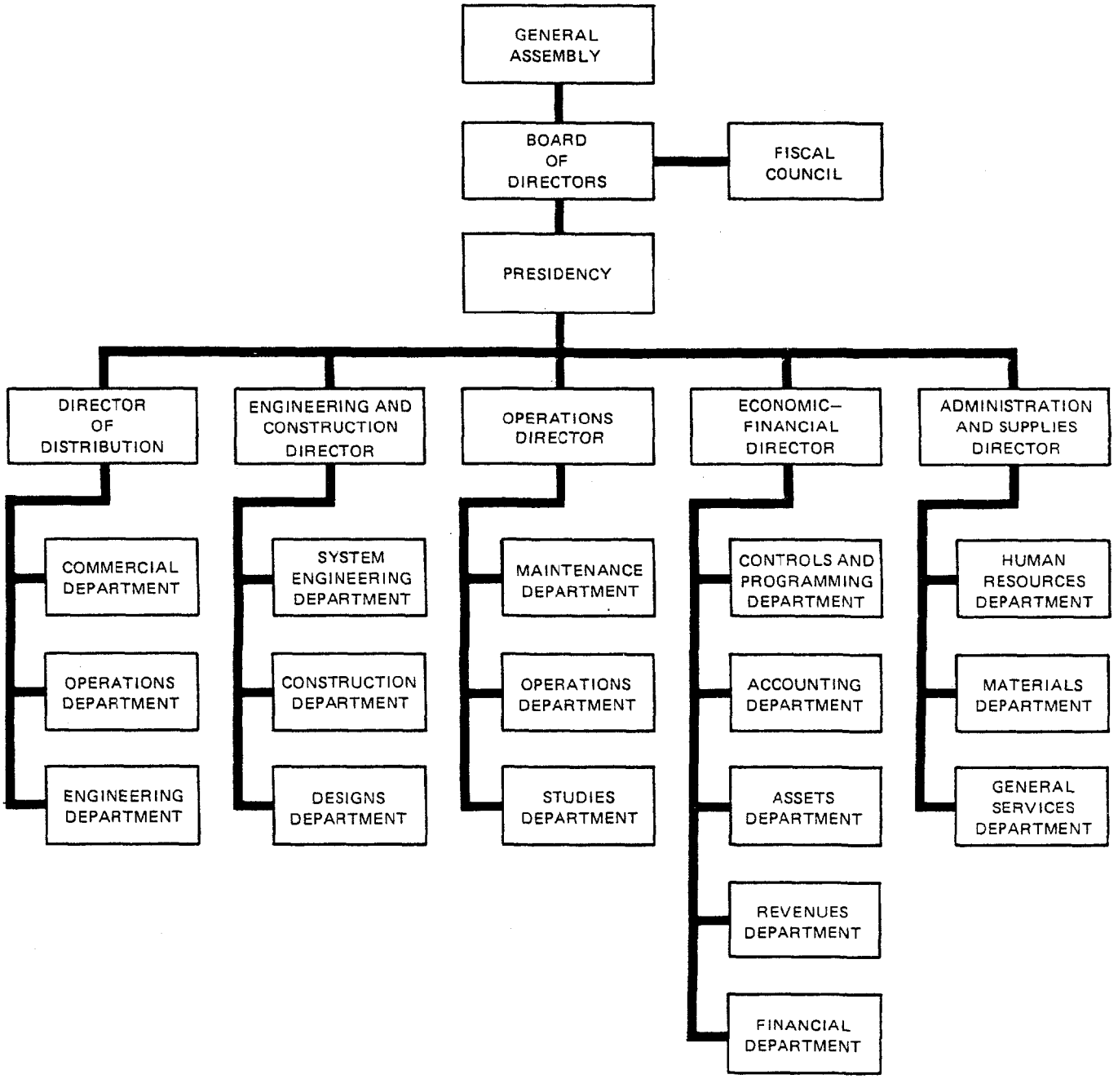


World Bank – 18292

ANNEX B

C-3

ESCELSA ORGANIZATION CHART



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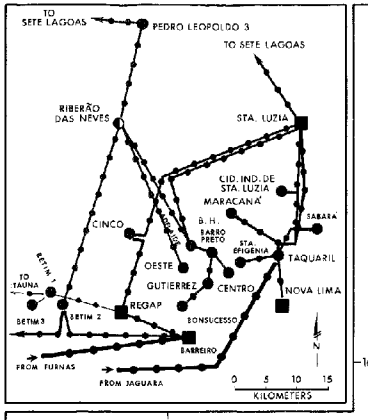
BRAZIL

SOUTH - SOUTHEAST POWER DISTRIBUTION PROJECT

State of Minas Gerais



This map has been prepared by the World Bank's staff exclusively for the convenience of the readers of the report to which it is attached. The denominations used and the boundaries shown on this map do not imply, on the part of the World Bank and its affiliates, any judgment on the legal status of any territory or any endorsement or acceptance of such boundaries.

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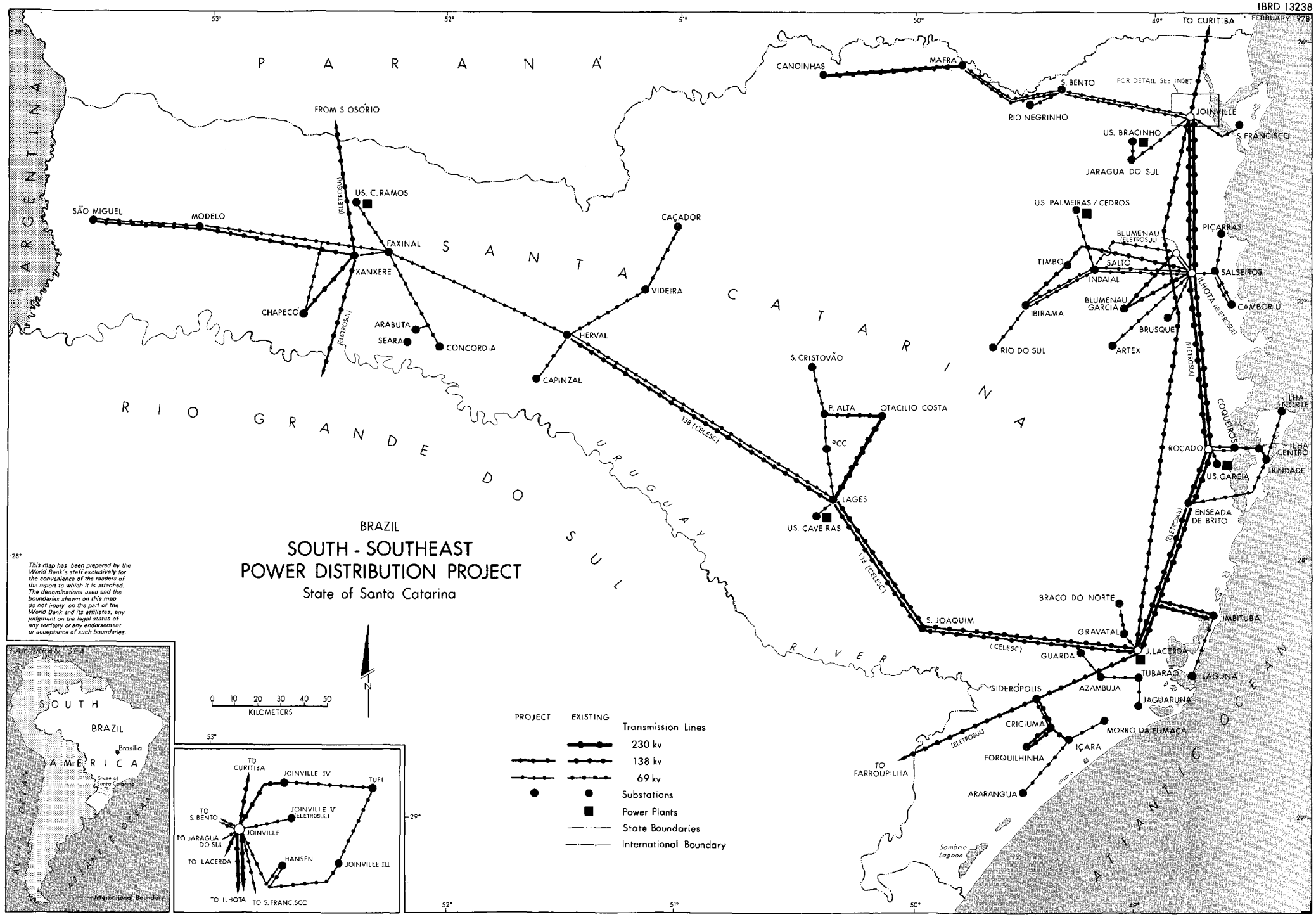

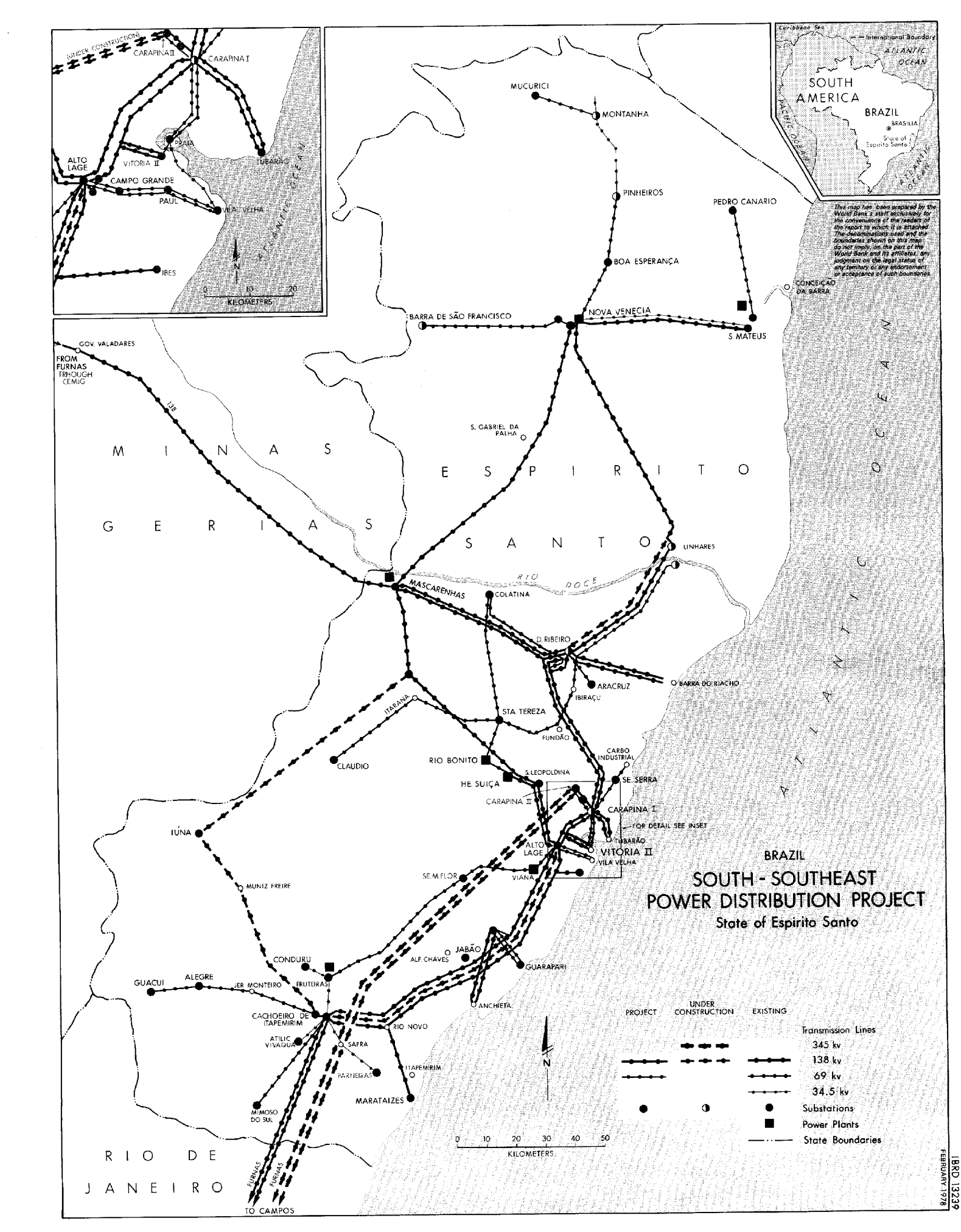

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ANNEX C
Page 1 of 2 pages

BRAZIL

SOUTH-SOUTHEAST DISTRIBUTION PROJECT

Selected Documents and Data Available in the Project File

A. Selected report and studies on the sector, the Borrower and the Beneficiaries

1. ELETROBRAS' Annual reports 1974 - 1976
2. CEMIG's Annual reports 1974 - 1976
3. ESCELSA's Annual reports 1972-1975
4. CEMIG's Statistical reports 1975 and 1976
5. CELESC's Statistical reports 1973-1976
6. Analise Retrospectiva da Economia Mineira en 1976 e suas Perspectivas CEMIG - September 1977
7. Subestações e Usinas - CEMIG - December 1976
8. Appraisal of ELETROSUL Transmission Project - November 1976 (Report No. 1265b-BR)
9. Appraisal of COPEL Distribution Project - April 1976 (Report No. 1028b-BR)
10. Appraisal of Northeast Power Distribution Project - ELETROBRAS April 1976 (Report No. 1028b-BR)
11. Problemas Estruturais do Setor de Energia Eletrica do Brasil-CEMIG - 1977
12. Avaliação do Mercado 1976/1975 - CELESC (April 1977)
13. ELETROBRAS' Audited financial statements, 1974 - 1976
14. CEMIG's Audited financial statements, 1974 - 1976
15. CELESC's Audited financial statements, 1974 - 1976
16. ESCELSA's Audited financial statements, 1974 - 1976
17. BRAZIL's Summarized Legislation Related to Tariffs (1977)

B. Selected reports and documents related to the Project

1. Pedido de Financiamento ao Banco Mundial - CEMIG (November 1976)
2. Reformulação do Pedido de Financiamento ao Banco Mundial - CEMIG (June 1977)
3. Pedido de Financiamento ao Banco Mundial - Justificativa Tecnico Economica - CEMIG (1977)
4. Cash flow-CEMIG (May 1977)
5. Pedido de Financiamento a ELETROBRAS - CEMIG (July 1977)
6. Informações para o Banco Mundial - CEMIG (October 1976)
7. Padron de Entrada para Consumidores de Baixa Renda CEMIG (June 1977)
8. Mercado de Energia Eletrica - CEMIG (March 1976)
9. Mercado de Energia Eletrica - CEMIG (June 1977)
10. Distribuição de Frequencia - Serviço primario y secundario - CEMIG (June 1977)

11. Analise da Evolução do Numero de Empregados e sua Projeção - CEMIG (June 1976)
12. Santa Catarina Power Distribution Project (7 vols) - CELESC (December 1976)
13. Santa Catarina Power Distribution Project - Relatorio Complementar - CELESC (April 1977)
14. Pedido Financiamento (3 vols) - ESCELSA (November 1976)
15. Informações para o Banco Mundial - ESCELSA (January 1977)
16. Informações para o Banco Mundial - ESCELSA (May 1977)
17. Plano de obras do trienio 1977-1979 ESCELSA (May 1976)
18. Projeto para Ligações de Consumidores de Baixa Renda - ESCELSA (September 1976)

C. Appraisal Working Papers

1. Computer outputs for economic calculations
2. Detailed cost estimates for project and program items
3. Worksheets for financial forecasts
4. Computer outputs for financial forecasts