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The World Bank

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Report No. 4641b-GU

STAFF APPRAISAL REPORT

GUATEMALA

POWER DISTRIBUTION PROJECT

May 20, 1986

CURRENCY EQUIVALENTS

Official Foreign Exchange Rate	Parallel Foreign Exchange Rate
US$1.00 = Q (Quetzal) 1.00	US$1.00 = Q 2.50
Q 1.00 = US$1.00	Q 1.00 = US$0.40

MEASURES AND EQUIVALENTS

t (metric ton)	=	1,000 kgs (2,205)
kcal (kilocalorie)	=	3,968 Btu (British thermal units)
T.o.e. (ton oil equivalent)	=	10.7 million kcal approx.
1 barrel (bbl)	=	42 US gallons = 159 liters
1 kilovolt (kV)	=	1,000 volts (V)
1 kilowatt (kW)	=	1,000 watts (kW)
1 megawatt (MW)	=	1,000 kilowatts (kW)
1 kilowatt hour (kWh)	=	1,000 watt hours (Wh)
1 gigawatt hour (GWh)	=	1,000,000 kilowatt hours (kWh)
1 megavolt ampere (MVA)	=	1,000 kilovolt ampere (kVA)
1 kilometer (km)	=	0.6214 mile (mi)
1 square kilometer (km^2)	=	0.386 square mile (sq. mi.)

ABBREVIATIONS AND ACRONYMS

CABEI	=	Central American Bank for Economic Integration
EBASCO	=	Electric Bond and Share Company (U.S.A.)
EEG	=	Empresa Electrica de Guatemala S.A.
EMPAGUA	=	Empresa de Agua Potable de Guatemala
FIV	=	Fondo de Inversiones de Venezuela
IDB	=	Inter-American Development Bank
INDE	=	Instituto Nacional de Electrificacion
MEM	=	Ministry of Energy and Mines
MCTPW	=	Ministry of Communications, Transports and Public Works
OPEC	=	Organization of Petroleum Exporting Countries
USAID	=	United States Agency for International Development

FISCAL YEAR

January 1 to December 31

GUATEMALA

POWER DISTRIBUTION PROJECT

STAFF APPRAISAL REPORT

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This report is based on the findings of missions to Guatemala by Messrs. Jose Maria Bakovic and Manuel I. Dussan in October 1982 and May/June 1983, and by Messrs. Nelson de Franco and Ricardo Klockner in June/July 1985 and in February 1986.

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1. PROJECT SUMMARY

Borrower:	Instituto Nacional de Electrificacion (INDE)
Guarantor:	Republic of Guatemala
Executing Agencies:	Instituto Nacional de Electrificacion (INDE) Empresa Electrica de Guatemala, S.A. (EEG)
Amount:	US$81.0 million
Terms:	Repayment in 15 years, including 5 years of grace, with interest at the Bank standard variable rate.
Relending Terms:	INDE would transfer US$35.0 million equivalent of the proceeds of the loan to a trust fund which would onlend to EEG on the same terms and conditions of the loan. EEG would bear the foreign exchange and interest risks.
Project Objectives:	The Project would serve to: (i) expand and improve the subtransmission and distribution systems in the areas served by EEG; (ii) improve the operating reliability of INDE's system and the efficiency of INDE's operations; and (iii) complete the necessary studies to ensure that a decision on the next power generation expansion can be based on consideration of all available options. The project would also seek to improve the efficiency of the sector through: (i) the implementation of personnel, tariff and accounting measures in INDE; (ii) reductions in INDE's workforce, as efficiency improvements are achieved; (iii) improved coordination between INDE and EEG; and (iv) training of INDE's and EEG's staff.
Project Description:	The project consists of the following components: (i) a slice of EEG's subtransmission and distribution expansion for the period 1987-93 including a rural electrification program; (ii) INDE's construction and equipping of a National Control Center of the country's electric power system and expansion of the communication systems; (iii) rehabilitation of INDE's two steam units at Escuintla; (iv) completion of INDE's studies for the Chulac and Xalala hydro projects; (v) acquisition by INDE of vehicles, laboratory instrumentation and a digital computer with peripherals and software; (vi) INDE's and EEG's staff four-year training program; and (vii) technical assistance to INDE in the financial, planning and administrative areas.
Benefits and Risks:	The proposed project would help improve the power sector's efficiency and would allow meeting minimum system expansion requirements consistent with present load growth expectations. The project faces no major

physical risks and entails no detrimental environmental effects. Implementation of tariff increases, and staff restructuring and reductions sought under the project might be delayed, should the present wide political support to the newly elected Government become weaker. Project execution may also be affected if the Government is unable to move as quickly as planned in carrying out its economic adjustment efforts.

Estimated Project Cost	US$ million		
	Foreign	Local	Total
EEG Component			
69 kV Lines and substations	4.1	2.5	6.6
Urban Distribution	11.1	8.0	19.1
Rural Electrification	3.9	2.4	6.3
Communications	1.3	0.4	1.7
Vehicles	2.9	0.4	3.3
Training	0.7	0.2	0.9
EEG Base Cost	24.0	13.9	37.9
INDE Component			
Thermal Plant Rehabilitation	6.0	0.6	6.6
Control Center and Communications	13.5	5.5	19.0
Chulac and Xalala Studies	6.2	3.0	9.2
Computer Center	0.4	0.1	0.5
Vehicles	2.3	0.5	2.8
Laboratory Equipment	1.3	0.4	1.7
Training	0.7	0.2	0.9
Technical Assistance	0.7	0.2	0.9
INDE Base Cost	31.1	10.5	41.6
Total Base Cost 1/	55.1	24.4	79.5
Physical Contingencies	5.9	2.4	8.3
Subtotal	61.0	26.8	87.8
Price Contingencies	13.8	6.4	20.2
Total Project Cost	74.8	33.2	108.0
Financial Charges	25.2	-	25.2
Total Financing Requirements	100.0	33.2	133.2
Financing Plan:			
Bank Loan	81.0	-	81.0
EEG/INDE Funds	19.0	33.2	52.2
Total	100.0	33.2	133.2

Estimated Disbursements:

Bank FY	1987	1988	1989	1990	1991	1992	1993	1994
Annual	5.1	15.8	19.2	19.0	11.1	7.9	2.5	0.4
Cumulative	5.1	20.9	40.1	59.1	70.2	78.1	80.6	81.0

Rate of Return: 12% on INDE's and EEG's investment program.
Map: IBRD No. 19425

1/ At May 1986 price level (US$1.00 = Q2.50). The local costs include taxes and other duties estimated at US$5.9 million.

2. THE ENERGY SECTOR

Energy Consumption and Resources.

2.01 Gross energy consumption in Guatemala is low, equivalent to 0.47 tons of oil equivalent per capita, which is about 10 percent below the Central American average. In 1984, the industrial sector accounted for about 20 percent of total consumption, transportation for 13 percent, the residential and commercial sectors for 66 percent, and agriculture for the remaining 1 percent. While petroleum and hydrologic resources have been growing in importance, they only accounted for 3 percent and 24 percent of consumption respectively in 1984. A high proportion of total energy, estimated at 71 percent in 1984, is still derived from wood and bagasse. Forest resources are important, but may be depleted by the turn of the century unless other energy resources are developed and the Government's programs of reforestation are carried out.

2.02 Domestic production of crude oil averaged 4,900 barrels per day in 1981-85, and covered only about 20 percent of domestic consumption. Proven reserves are estimated at about 9 million barrels, equivalent to one year of consumption. The Government plans to step up exploration of extensive areas of potentially rich oil-bearing strata which are still unexplored. The domestic price of gasoline (Q2.92-3.10 equivalent to US$1.17-1.24 per gallon) and diesel oil (Q1.70 equivalent to US$0.68 per gallon) are in line with international prices.

2.03 Natural gas is flared at oil fields at a rate of about 1.5 million m^3 per month, and is being considered for electricity generation. Geothermal potential for electricity production has been explored in the past with limited success. So far, only a 15 MW installation, at Zunil, has been proven feasible; it is scheduled for commissioning in 1991. Exploration continues and a number of pre-feasibility studies for other projects are under way.

2.04 The country has a large, technically exploitable hydroelectric potential which is estimated at about 5000 MW, or six times the present installed capacity. Although the number of residential consumers increased at about 7.4 percent p.a. from 1979 to 1985, i.e., well above the population growth rate (2.9 percent), only 28 percent of the total population received electricity service at the end of the period, compared with 36 percent in El Salvador, 45 percent in Nicaragua, and 79 percent in Costa Rica. Electricity consumption per capita, estimated at 156 kWh, also is low by Central American standards. The Government is aware that electricity must be made available to a greater proportion of the population, and has a number of rural electrification programs to meet this objective. The proposed project addresses this issue through the expansion of the distribution network (para. 2.14).

Sector Organization and Coordination

2.05 Public electricity service is provided by INDE, EEG and ten small municipal utilities. INDE was created in 1959 as a government-owned institution responsible for power generation and transmission, rural electrification, the supply of bulk electricity, and retail distribution outside the area of the capital city. EEG, a former subsidiary of Boise

Cascade (USA), became a mixed public and private enterprise in 1977, with 92% of its shares owned by the Government and the remainder by private shareholders.

2.06 Till the early 1980's, lack of coordination and institutional weakness of INDE have been a major problem in the energy sector. EEG operated thermal generation and electricity distribution in Guatemala city and its environs, i.e. the most profitable portion of the market, with sales concentrated in a small area comprising most industrial and high income users. As a result, a significant part of the sector's financial resources was generated by EEG. Because of resistance by EEG, INDE was for many years unable to obtain a share of the sector's cash generation in accordance with its investment needs to meet the required expansion of generation capacity and provision of service to remote, low income rural areas. As a result, installation of new generation capacity did not always keep pace with growing needs, and there have been periods of service interruptions.

2.07 Over the last five years, the Government has taken a number of significant steps to improve coordination and develop INDE's institutional capacity. First, a Ministry of Energy and Mines (MEM) was created in 1983 to formulate the country's energy policies, coordinate planning activities, and take executive responsibilities for the development of hydrocarbons. Second, the Government transferred to INDE its shares in EEG, completed a number of studies to strengthen INDE, increased its planning capacity, nominated the same President for INDE and EEG, and created a joint INDE-EEG committee to coordinate the system's operation. Lastly, the Government established in 1985 a commission presided over by the Ministry of Energy and Mines and comprising the Minister of Economy, the Secretary General of Planning, and the President of INDE to formulate policies for the power sector, including development strategy, investment plans, and tariffs. The responsibility for overall supervision of INDE was shifted from the Ministry of Communications, Transport and Public Works to MEM.

Power Sector Development Plan

2.08 The power sector investment program for 1987-93 totals US$516 million at May 1986 prices. It aims at keeping expansion to the minimum compatible with ensuring that the expected load growth can be met with an appropriate level of reliability. About 58 percent of the program is for overdue investments in transmission (including interconnection with El Salvador and Honduras), distribution, system communications and control, and planning studies; 42 percent is for generation, including construction of a 68 MW (Santa Maria II) hydropower project, and two geothermal plants (Zunil I, 15 MW, and Zunil II, 55 MW) and the rehabilitation of the 86 MW Escuintla steam units (Annex 3.5, paras. 6 - 19). The program includes a rural electrification component, aiming at increasing by 40 percent the number of rural consumers. The proposed project is an integral part of this program.

2.09 INDE has about one and a half years to complete feasibility studies of hydropower, geothermal and natural gas projects, to analyze generation alternatives, and to prepare new generation and transmission programs (Annex 3.5, paras. 13, 18 and 19). During negotiations, INDE agreed to (i) engage by March 31, 1987, consultants for the updating and completion

of the feasibility studies of two large and complex hydroelectric projects, Chulac (440MW) and Xalala (360 MW), under terms of reference which would be submitted for the Bank's review no later than October 31, 1986; (ii) complete by December 31, 1987, the other feasibility studies required for updating the sector's Master Plan for generation/transmission; and (iii) submit such expansion program, based on a least-cost analysis of alternatives, to the Bank by March 31, 1988. The proposed loan would finance the necessary hydrogeological investigations and studies for Chulac and Xalala.

Bank Participation in the Power Sector

2.10 The Bank has supported the development of the Power Sector in Guatemala since 1967, through four loans to INDE totalling US$193.6 million. A project performance audit report prepared by the Operations Evaluation Department on the First Power Project (Loan 487-GU, 60 MW Jurun-Marinala Hydroelectric Project) and the Second Power Project (Loan 545-GU, Thermal Power Project) was distributed to the Executive Directors on February 14, 1985 (Report no. 625). A review of the power sector was carried out in August 1975. The main conclusions of these reports were that, although the Bank had played a large part in the expansion of Guatemala's power supply and in helping to establish INDE as the main institution in the power sector, it could have contributed more to the solution of the two most serious problems -- the sector's poor financial performance arising mainly from the unsatisfactory arrangements between INDE and EEG, and the lack of development of the country's hydroelectric resources. Accordingly, Bank assistance was designed to address both these problems through the financing of the Aguacapa Hydropower Project (Loan 1426-GU) and Chixoy Hydropower Project (Loan 1605-GU).

2.11 Through the construction of the Aguacapa Project (90MW, commissioned in 1981) and the Chixoy Project (300 MW, commissioned in January 1986), the Bank assisted the country in doubling its installed capacity to 867 MW, and in transforming a generation system 80% dependent on oil into one totally relying on hydropower. As a result, fuel consumption for electricity generation is expected to be negligible in 1986, with savings of about 1.8 million barrels compared with 1985, representing one-fourth of Guatemala's total oil consumption.

2.12 In addition to promoting the coordination measures described above in para 2.07, the Bank also played a key role in: (i) stopping construction in 1982 of the insufficiently studied, large size Chulac Hydropower Project; (ii) preventing the premature start of another hydropower project, the Sta. Maria II; and (iii) shifting the responsibility of the Chulac project to INDE and eliminating an "ad hoc" unnecessary entity (HIDROCHULAC). As regards the appropriate sharing of the sector's cash generation between INDE and EEG to help finance the respective investment needs, INDE's bulk sale rates to EEG were increased by 20% in February 1985, in accordance with Section 5.05 of Loan Agreement 1605-GU, which provides for tariff levels adequate to result in a transfer from EEG to INDE of the funds available to EEG which are in excess of its requirements for operations, repayment of debt, net working capital, and capital expenditures.

2.13 Since the expansion of efficient electricity services is essential for the development of industry and services in Guatemala, to promote an expansion of production and exports, there is a clear need for further institutional improvements in the organizational, technical, administrative and financial arrangements for the sector. To achieve these objectives, the Government needs to continue efforts to (i) strengthen INDE's capacity, to plan and execute investment programs effectively and generate an adequate share of its investment needs, thus enabling it to play a leading role in the sector; and (ii) increase the sector's efficiency by specializing the functions of INDE in power generation and transmission, and those of EEG in distribution over the whole national territory, including rural electrification.

2.14 The proposed project is the first to include EEG and would seek to promote closer coordination between INDE and EEG. It would also initiate EEG in the field of rural electrification. The proposed project is designed to make further substantial progress in strengthening the institutional framework of the sector by: (a) improving coordination, staff skills and tariff structure; (b) improving operational efficiency and productivity of the sector through the reduction of system losses and the increased reliability of power supply; (c) strengthening the planning of generation expansion; and (d) increasing the availability of electricity services through expansion of the distribution.

2.15 As regards sector coordination, INDE and EEG agreed during negotiations to take measures satisfactory to the Bank for the coordination in planning, operation and investment financing of their respective systems. These measures include that INDE will exercise its right to designate its own President and Board of Directors for the election to the same position in EEG. The Plan of Action (Annex 3.1) provides for the creation by December 31, 1986 of joint INDE-EEG committees for the planning of supply points, preparation of demand projections, and programming of transmission lines and substations.

2.16 The new Minister of Energy and Mines -- a former manager of INDE and private entrepreneur -- recognizes that other adjustments will subsequently be required to improve the functioning of the sector and further strengthen the institutional capacity of INDE as the entity responsible for the coordination and expansion of electricity services. These adjustments would entail a complete restructuring of responsibilities between INDE and EEG for electricity generation and transmission, on one side, and distribution, on the other. At the Government's request, the Bank is considering assistance for this effort under a subsequent loan.

3. THE PROJECT

Background

3.01 The project was identified in February 1981, was prepared by INDE and EEG with the assistance of consultants, and was appraised in October 1982 and post appraised in May/June 1983. Further processing was interrupted, pending the introduction of economic stabilization measures, and was resumed through an updating of the appraisal in June 1985, and a

confirmation of the sector's priorities by the newly elected authorities in February, 1986. Negotiations were held in Washington from May 12 to 16, 1986. The Guatemalan delegation was led by Mr. Guillermo Salazar, Director, Ministry of Finance.

Project Objectives

3.02 The main project objectives are:

(a) to improve the efficiency of the power sector by (i) training management and professional staff; (ii) providing technical assistance to INDE for the implementation of measures recommended by existing studies in the financial, administrative and planning areas; (iii) improving the coordination between INDE and EEG and promoting the distribution of cash generated in the sector in a way appropriate to address INDE's and EEG's respective investment needs; (iv) gradually increasing the consumer/employee ratio in INDE; and (v) improving the mobilization of domestic resources through rationalization of tariff structures;

(b) to improve the operating reliability of the INDE system by: (i) rehabilitating the Escuintla steam plant to assure an appropriate back-up to the hydropower generation system; (ii) building and equipping a National Control Center and related communications system to provide a safe and economic operation of the system; (iii) providing specialized maintenance vehicles to improve preventive maintenance and reduce service restoration times; (v) acquiring instrumentation for an electronics laboratory to expedite checking and repair of electrical components of the protection, supervision, control and communications system;

(c) to help prepare the generation expansion program by carrying out the investigations and studies still needed to determine the feasibility of the Chulac and Xalala projects;

(d) to expand the subtransmission and primary and secondary distribution systems of EEG to (i) meet the demand for 1988-1993 with the hydropower energy already available; (ii) improve the reliability of the distribution system; and (iii) connect new consumers to the grid, including rural areas.

3.03 To achieve the institutional objectives indicated above, during negotiations: (1) INDE and EEG agreed to: (i) implement the "Plan of Action for Institutional Development" including the tasks and schedule presented in Annex 3.1; and (ii) submit to the Bank through INDE by November 30 of each year, a progress report on such Plan of Action; and (2) the Government agreed to enable INDE and EEG to comply with the above provisions.

Project Description

3.04 The Project comprises the following components:

(a) EEG
- erection of 62 km of 69 kV lines and 87 MVA of 69/13.8 kV power transformers; 960 km of 13.2 kV primary and secondary distribution lines and 85 MVA of distribution transformers;
- acquisition of meters, protection equipment, switching equipment and public lighting accessories; 100 operating and maintenance vechicles; and a communications system between EEG's control center and the major company facilities;
- implementation of a rural electrification program including 180 villages and 13,000 households, through construction of about 870 km of 13.2 kV primary and secondary lines, 8.5 MVA of distribution transformers;
- implementation of a four-year staff training program;

(b) INDE
- construction and equipping of a National Control Center and expansion of the related communications systems;
- rehabilitation of two steam units at the Escuintla thermal plant;
- acquisition of 90 operation and maintenance vehicles, instrumentation for an electronic laboratory, and a digital computer with peripherals and software;
- additional geological investigations and completion of the feasibility study for the Chulac Hydroelectric Project, and completion of the feasibility study for the Xalala hydroelectric project.

Project Cost

3.05 The estimated total cost of the proposed project, including price and physical contingencies, duties, and taxes, is US$108.0 million equivalent, of which US$74.8 million equivalent (69%) are foreign costs. A table at the beginning of this report shows the breakdown by project components. Duties and taxes have been estimated at US$5.9 million. Total financing requirements, including financing charges (US$25.2 million equivalent), are estimated at US$133.2 million equivalent, of which US$100.0 million equivalent would be in foreign exchange. Project component costs are based on detailed estimates at January 1985 prices and have been adjusted to May 1986 price levels. Consultant services have been estimated at 80 staff-months for the review and completion of the Xalala and Chulac studies, 10 staff-months for the review of thermal plan rehabilitation requirements, 80 staff-months for the supervision of the dispatch center and communication system construction, and 290 staff-months for training and technical assistance. Physical contingencies amount to 10.4% of the project base cost. They have been calculated, on the basis of experience with similar projects, at 10 percent of base costs for all components, including distribution, except for thermal plant rehabilitation (20 percent), hydrogeological investigations of project studies (15%), subtransmission (5 per cent) and training and technical assistance (0 per cent). Price contingencies for foreign and domestic costs have been calculated at about 7 percent annually for 1986-90 and 4 percent thereafter. Total price contingencies amount to 23 percent of base cost including physical contingencies.

Financing Plan

3.06 The Bank would finance: (i) US$71.5 million of the project cost, representing nearly 96 percent of the total foreign cost; and (ii) US$9.5 million of financial charges maturing before June 30, 1990, to alleviate the sector's already heavy servicing requirements arising from the external debt contracted for the financing of the large hydropower projects built in the past years. Since INDE is not authorized to onlend funds, INDE would transfer US$35.0 million equivalent of the proceeds of the loan to a trust fund which would onlend to EEG on the same terms and conditions of the loan. The signing of the trust fund agreement would be a condition of loan effectiveness. EEG would bear the foreign exchange and interest rate risk. INDE and EEG would finance the local costs (US$33.2 million equivalent) and US$19.0 million of foreign exchange financing requirements from internally generated cash.

Project Implementation

3.07 The Project would start in June 1986 and would be completed by December 1993. All the engineering required for the distribution and rural electrification works will be provided by EEG, which has adequate expertise. Distribution works, exclusive of the expansion of new primary circuits, will be carried out by force account by EEG, which has handled satisfactorily a similar volume of works during the last few years. Construction of the 69 kV lines and of new primary circuits will be carried out by local contractors which have experience in this kind of work. A feasibility study for the National Control Center and associated communications was completed in January, 1986. During negotiations, INDE agreed to hire consultants for the supervision of the construction and equipping of the Control Center and the associated communications system by September 30, 1987. Terms of reference should be submitted for the Bank's review no later than March 31, 1987. Terms of reference for hiring consultant will be submitted to the Bank (i) no later than October 31, 1986, for the execution of the Chulac and Xalala studies (para. 2.09); and (ii) no later than July 31, 1986, for consultant services in the financial, planning and administrative areas (para. 3.12). A thermal rehabilitation assessment is expected to be completed by independent consultants under an existing IDB loan, and is expected to be submitted to the Bank by September 30, 1986. A detailed four-year plan for the training needs would be prepared by consultants by April 30, 1987 (para. 3.12).

The Market 1/

3.08 Total electricity demand started increasing slowly in 1983, after a modest decrease in 1980-82 due to declining economic activity and private investment. Total consumption thus recovered in 1985 to 1243 GWh, approximately equal to the 1979 level. While residential and commercial consumption kept growing during this period, industrial consumption only recovered to a modest level of growth in 1984-85 (3.5 percent p.a. after a drop of 9.8 percent p.a. in 1980-83). Based on prospects for economic recovery assisted by the stabilization and adjustment policies of the new

1/ See Annex 3.5 for further details on the power market.

Government, consumption is projected to reach about 2,120 GWh in 1993, with an annual average growth of 6.6%, well below the rate in 1971-79 (10% p.a.). There are no prospects of substantive demand from neighboring countries, as the two countries which will be interconnected, El Salvador and Honduras, will only need energy interchanges during emergency periods.

3.09 Electricity losses in the interconnected system have been high during the last four years--an average of 16.9% of net generation--both because of the postponement of investments in distribution and inadequate control of losses. The proposed project is expected to: (i) reduce from 15% to 10% the losses of EEG; and (ii) achieve a better control of consumption and sales through improved metering, billing and surveillance in INDE. Total system losses would thus decrease to about 13% by 1990.

Executing Agencies

INDE

3.10 A new organizational framework for INDE was introduced in January 1986 taking into account studies financed under Bank loans (Annex 3.6, attachment 1). INDE's seven-member Board is appointed by the Government. The President and Vice-President are full time members with executive functions. Their appointment is proposed by the Minister of Energy and Mines. The other members are representatives of this Ministry as well as the Ministries of Communications, Transport, and Public Works; Finance; and Economy; and of the General Secretariat of Planning. The current President and Vice-President have long experience in the power sector and have held top management positions in EEG in the past.

3.11 INDE currently has about 7,600 employees (including 230 professionals). This staff level is excessive, since it results in a ratio of 25 consumers per employee compared with 60 to 80 per employee for utilities in most developing countries which is adequate. To address this situation, during negotiations: (1) INDE agreed to: (i) submit, no later than September 30, 1986, a five-year program of staff restructuring and reduction, establishing targets acceptable to the Bank, for increasing the ratio of consumers to employee to not less than 40 by December 31, 1987, and not less than 75 by December 31, 1991; and (ii) promptly carry out the program, taking into consideration the Bank's comments; and (2) the Government agreed to enable INDE to comply with the above provisions.

3.12 INDE's staff is subject to Guatemalan civil service regulations, which limit salary levels. As a result, INDE lacks qualified staff, notably in the financial and administrative areas, and in the intermediate management levels, since the private sector offers better salaries and work conditions. The Plan of Action (Annex 3.1) provides for the exclusion of INDE's staff from the Guatemalan civil service regulations, and the revision of INDE's salary levels and personnel regulations no later than June 1987. During negotiations INDE agreed to: (i) engage consultants no later than October 31, 1986, under terms of reference to be submitted to the Bank's review no later than July 31, 1986, to work directly with INDE's staff in key positions and advise on important day-to-day management problems, personnel administration, finances, planning, internal control and management information systems; (ii) engage consultants no later than October 31, 1986, to assist in the preparation and implementation of a four-year staff training program under

terms of reference to be submitted to the Bank no later than July 31, 1986; (iii) submit such program to the Bank by April 30, 1987; and (iv) prepare by October 31 every year a detailed program of training activities for the following year, taking into account the Bank's comments. The Plan of Action provides for specific measures to improve the accounting system, budget management, internal audit, and insurance management (Annexes 3.1 and 3.6). External audit of INDE's accounts has been performed satisfactorily. During negotiations, INDE agreed to continue appointing independent auditors acceptable to the Bank and to send to the Bank the audited financial statements together with the auditor's reports within four months from the end of each fiscal year.

EEG

3.13 EEG is an efficient, well managed and profit-oriented entity which follows sound managerial practices and operates outside the civil service regulations. EEG's shareholders elect a Board of Directors which, in turn, selects the President and Vice-President of the company, and appoints the General Manager. Under EEG's current organizational structure four managers (Financial, Commercial, Administrative, and Operational) report directly to the General Manager, as well as three staff units (Planning, Legal, and Internal Auditor) and three regional agencies (Annex 3.6, Attachment 2). Adequate delegation of responsibility permits an efficient operation. EEG's General Manager has wide experience in the Guatemalan power sector. All other managers have worked for EEG for more than ten years and have acquired managerial expertise under the former private owners of the company.

3.14 EEG employs 1,233 people (including about 50 professionals) and plans to reach 1,600 in 1993. The ratio of consumers per employee is excellent (225 in 1985; 231 in 1993). Since EEG staff is not subject to the civil service regulations, adequate salary levels permit EEG to recruit and retain well qualified personnel. EEG requires new equipment, technical assistance and additional overseas training for its comprehensive staff training programs. During negotiations, EEG agreed to: (i) engage consultants no later than October 31, 1986, to assist in the preparation and implementation of a four-year training program under terms of reference to be submitted to the Bank no later than July 31, 1986; (ii) submit such program to the Bank by April 30, 1987; and (iii) present by October 31 every year a detailed program of the training activities for the following year, taking into account the Bank's comments. The "Plan of Action" provides for improvement of EEG insurance coverage (Annexes 3.1 and 3.6). During negotiations, EEG agreed to appoint independent auditors acceptable to the Bank and to send to the Bank the audited financial statements together with the auditor's reports within four months from the end of each fiscal year.

Procurement

3.15 Procurement arrangements would be as follows:

Procurement Element	Procurement Method (Amounts in US$million equivalent) a/					
	ICB b/	LCB c/	IS/DP d/	FA e/	Other f/	Total
Sub-Transmission Equipment	4.9	0.4	0.2			5.5
and Materials	(4.9)		(0.2)			(5.1)
Distribution Equipment	26.9	1.6	1.4			29.9
and Materials g/	(26.9)		(0.2)			(27.1)
Dispatch Center/						
Communications	18.2	3.7	0.9			22.8
Equipment/Installat.	(18.2)					(18.2)
Generation Rehabilit.	8.2	0.3	0.4			(9.6)
Equip./Assembling	(7.5)		(0.4)			(8.6)
Computer/Lab. Equip.	1.8	0.3	0.4			2.9
and Assembling	(1.8)		(0.4)			(2.2)
Studies/Training		1.4			14.7	17.1
		(0.9)h/			(10.1)	(11.7)
Construction Works		17.7		4.6		15.5
Total Project	60.0	25.4	3.3	4.6	14.7	108.0
	(59.3)	(0.9)	(1.2)		(10.1)	(71.5)

Note: Figures in parentheses are amounts to be financed by the Bank.
a/ Includes import duties and sales taxes, which amount to US$5.9 million.
b/ ICB = International Competitive Bidding.
c/ LCB = Local Competitive Bidding.
d/ IS/DP = International Shopping/Direct Purchase.
e/ FA = Force Account (to be supplied through EEG manpower).
f/ Consultants' services to be provided in accordance with Bank guidelines. It also includes field and laboratory tests and core drillings for the Chulac and Xalala feasibility studies and construction supervision of the National Control Center and communication system.
g/ Includes vehicles
h/ Construction of exploration galleries in connection with the Chulac feasibility study.

3.16 Equipment and materials would be procured under international competitive bidding in accordance with the "Guidelines for Procurement under IBRD Loans and IDA Credits", except for equipment estimated not to exceed US$1,200,000 in total which would be procured through international shopping (US$700,000 in contracts less than US$50,000 each) or direct purchase (US$500,000) because of compatibility with existing equipment, or limited number of suppliers which can meet the specifications. At the Government's request, manufacturers of equipment and materials in member countries of the Central American Common Market would have a margin of preference in bid evaluation of 15 percent of the C.I.F. cost or half the amount of taxes on the importation of such goods, whichever is lower. Regional manufacturers are likely to participate in bids for conductors and concrete poles.

3.17 Construction of the exploration galleries required for field investigations of the Chulac Hydroelectric Project, estimated not to exceed about US$1.4 million equivalent, would be procured under local competitive tendering open to the participation of foreign bidders. Construction of EEG's subtransmission and distribution primary lines, and of INDE's building

of the National Control Center and communications facilities would be contracted under EEG's and INDE's procurement procedures, which are acceptable. For goods estimated to cost the equivalent of US$200,000 or more the Bank would review and approve tender documents before they are issued. For civil works, model bidding documents and contracts would be submitted to the Bank before advertising and tendering. Contracts for goods above US$200,000 and civil works would be awarded after Bank's review of the borrower's bid evaluation report. Bank's prior review of procurement documentation covers 100 per cent of the total estimated value of works contracts and about 90 per cent of goods contracts. Consultants would be selected and contracted in accordance with the "Guidelines for the use of consultants by World Bank Borrowers and by the World Bank as Executing Agency.

Disbursements

3.18 Proceeds of the proposed loan would be disbursed for:

(a) 100% of foreign expenditures and 93% of ex-factory cost of local expenditures for electrical, electronic, and mechanical equipment and parts; material for distribution, subtransmission and communication plant; transportation equipment; computer equipment;

(b) 100% of expenditures for consultant services for preinvestment studies, dispatch center and communications construction supervision, and technical assistance;

(c) 100% of foreign expenditures for training services;

(d) 100% of foreign expenditures for equipment installation in the dispatch center and communications system;

(e) 62% of total expenditures for construction of exploration galleries related to preinvestment studies (representing the estimated foreign cost component);

(f) 70% of total expenditures for contractor services for thermal plant rehabilitation (representing the estimated foreign cost component);

(g) Financing charges accrued until June 30, 1990 up to a total amount of US$9.5 million.

3.19 The proposed loan would be disbursed over a period of seven and half years, in accordance with the Bank's standard disbursement profile. The Closing Date would be June 30, 1994. In order to facilitate disbursement, a Special Account would be established in the Central Bank (Banco de Guatemala) on terms and conditions satisfactory to the Bank. The initial deposit in the Special Account would be US$4 million equivalent. Disbursement requests would be fully documented, except for imported goods whose value is less than US$100,000 equivalent which would be based on presentation of a statement of expenditures.

Financial Performance 2/

3.20 Between 1982 and 1984 the sector's financial position was burdened by the cost overruns and completion delays of the Chixoy project, the resulting need to continue to use fuel, and a 5 percent decrease in electricity sales compared with the 1979/1981 period. Notwithstanding electricity rates at the highest level in Central America (Annex 3.10), the average contribution to investment was only 13%, and the sector had to rely on government contributions (36%) and borrowings (51%) to finance large investment expenditures (US$463 million). The main burden fell on INDE, which was able to contribute only about 5% to its large investment expenditures (US$447 million) and had to step up its borrowing, so that its debt service coverage decreased to 1.0. EEG financial position remained strong. Internal cash generation allowed EEG to finance as in the previous years all its working capital and investment requirements without significant borrowing. Accounts receivable absorbed a large component of the working capital, growing from US$24.1 million in 1982 to US$36.4 million in 1984, equivalent to 107 days of billing. Most of this amount is owed to EEG by municipalities and Government agencies, including about US$21.6 million owed by the capital city's water supply company, EMPAGUA.

Financial Objectives 2/

3.21 The financial position of the sector is expected to strengthen in 1987-1993 because of two main factors. First, the shift of the system from thermal-based to hydropower generation would reduce the operating expenses per kWh sold from US cents 9.3 in 1982-84 to US cents 7.7 in 1986. Fuel expenses are expected to decrease to 3 percent of operating expenses in 1986-93, compared with 53 percent in 1982-84. Depreciation will increase from 14 percent of operating expenses to 56 percent. Second, annual investment requirements in 1987-93, (averaging US$113 million in current prices, equivalent to US$74 million May 1986 prices) will be 54% lower than in 1982-85 (US$145 million in May 1986 prices). Provided tariff levels are kept at a level adequate to achieve a 5% rate of return, the sector would be able to contribute about 62% of the financing requirements for investment (US$810 million) and working capital (US$92 million), in addition to a transfer of about US$93 million equivalent to the Government budget in 1989-93. The debt service coverage would be at satisfactory level (about 1.5 times). During negotiations, (1) INDE and EEG agreed, subject to the provisions indicated in para. 3.22, (i) to set tariffs at such level as to allow each utility to earn a rate of return not lower than 5 percent, calculated on a rate base annually revalued; the covenant of Loan 1605-GU for a rate of return of the sector (5% in 1986-1987; 6% in 1988; 7% in 1989; and 8% thereafter) would be superseded by this agreement; (ii) to present to the Bank by September 30 of each year, starting in 1986, a schedule of tariff adjustments for the following year to meet compliance with the 5% covenanted rate of return; and (iii) to repeat the provision of Loan Agreement 1605-GU requiring review of any capital expenditures in excess of US$5.0 million which are not included in the investment program reviewed by the Bank; and (2) the Government agreed to enable INDE and EEG to comply with the above provisions. The Plan of Action (Annex 3.1) provides for the revaluation of INDE's and EEG's assets.

2/ See Annex 3.9 for further details on financial analysis.

3.22 Electricity tariffs have been increased in the past in accordance with the increasing cost of fuel, and reached in 1984 Quetzales 12.6 cents/kWh (equivalent to US cents 12.6/kWh) on the average, estimated to be 40 percent above the level of long-term marginal costs. Since then, however, the Quetzal has significantly depreciated. The Government's ongoing process of unification of exchange rates will require tariff increases. Based on the assumption of an exchange rate for external debt servicing set at US$1 = Q2.5 starting in December 1987 (see Annex 3.9, para. 12), the current average tariff in Quetzales of cents 12.6/KWh would have to be increased by about 22 percent in 1987 and by 48 percent in 1988 to achieve a 5 percent rate of return. To avoid a sharp increase of 48% in January 1988, during negotiations, INDE and EEG agreed to increase their average tariff to final consumers every month during 1987, starting in January, so as to achieve a reduction of their operating ratios to 49 percent and 92 percent respectively in 1987 (Annex 3.9, attachment 1.4). This is expected to result in a rate of return exceeding 5 percent in 1987. It was agreed, therefore, that INDE's and EEG's net operating incomes in excess of what would have been required to reach a 5 percent rate of return in 1987 would be taken into account for the calculation of the rate of return in 1988. With these increases, the average level of tariffs would be in line with the long-term marginal costs. Bank financed tariff study carried out in 1983 concluded that INDE's and EEG's tariff structures are out of line with the structures of long-term marginal costs valued at the new exchange rate. Accordingly, the Plan of Action (Annex 3.1) provides for a review of the structure of electricity tariffs.

3.23 During negotiations: (i) the Government agreed to take all necessary actions to ensure that by January 1, 1987, and at all times thereafter, the accounts payable by public agencies to INDE and EEG shall not exceed 60 days of billing; and (ii) INDE and EEG agreed to maintain a 60 day collection period for private consumers by December 31, 1986 and thereafter.

3.24 During 1987-93, INDE will have by far the largest financing requirements for investment and working capital: US$785 million, compared with US$117 million for EEG. During the same period, EEG will have an internal cash generation which is expected to be sufficient to finance about 37% of its investments and working capital requirements. Therefore, with the objective of (i) sharing more equitably than in the past the contribution to the financing of investment in the sector; and (ii) using of EEG's yet untapped capacity to borrow domestically and abroad, during negotiations: (1) EEG agreed to: (i) pay annually starting in 1986 dividends equivalent to the amount of its net income after taxes and provisions for legal reserves; (ii) pay to INDE its electricity bill within 45 days; (iii) pay 50 percent of dividends accrued up to 1985, by no later than January 1, 1987; and (iv) gradually pay in 1987 and thereafter the balance of dividends accrued up to 1985; and (2) the Government, EMPAGUA and EEG would execute an agreement for the settlement of EMPAGUA's arrears as a condition of loan effectiveness.

3.25 With the above measures, INDE's internal cash generation, after transferring US$93 million to the Government budget and receiving EEG's dividends, should allow INDE to finance 66 percent of its investment program in 1987-93. During negotiations, INDE agreed to submit to the Bank by June 30, 1987 a set of procedures and criteria to regulate the transfer of funds from INDE to the Government to ensure that such transfers do not impair INDE's financial position or project execution. The existing covenant under Loan 1605-GU on the debt service coverage ratio (1.5) would continue to apply to INDE and would be extended to EEG.

Project Benefits and Justification

3.26 The proposed project would help improve the power sector's efficiency and would enable minimum system expansion requirements to be met consistent with present load growth expectations. The project is justified as part of the least-cost expansion program of the sector's generation, transmission and distribution systems. A measure of the minimum benefits associated with these programs is given by the incremental sales revenue. Based on valuing the latter at the average tariff resulting from the covenanted financial rate of return, the rate of return for the project is estimated to be 12 percent, which is at the upper end of the range of the opportunity cost of capital in Guatemala (10-12 percent). The project, however, is likely to generate additional social benefits accruing from expanded residential and public use, as well as additional economic benefits accruing to production from a more reliable electricity supply. Sensitivity analysis show that the minimum rate of return would be 10.9 percent in case investment costs are 10 percent higher than now estimated.

Risks and Environmental Considerations

3.27 The project is not expected to have detrimental effects on the environment and presents no major physical risks, since construction of standard subtransmission, distribution and communication facilities are involved. Delays in project execution could arise due to the following: (i) EEG has no previous experience with Bank loans and procedures; and (ii) INDE has no previous experience in the construction of a control center and extensive communications systems. To minimize these risks, (i) a Bank procurement specialist has discussed with EEG the Bank's guidelines for procurement; and (ii) consultants would supervise the construction and equipping of the control center and communication system (para. 3.07). Implementation of staff restructuring and reductions, and tariff increases sought under the project might be delayed, should the present significant political support accorded to the newly elected Government weaken. Project execution may also be affected if the Government is unable to move as quickly as planned in carrying out its economic adjustment efforts.

4. AGREEMENTS REACHED AND RECOMMENDATIONS

4.01 During negotiations, agreement has been reached with the Government, and/or INDE and/or EEG, as appropriate, that:

(a) Expansion Program. INDE would:(i) engage by March 31, 1987, consultants for the updating and completion of the feasibility studies for two large and complex hydroelectric projects, Chulac (440 MW) and Xalala (360 MW), under terms of reference to be submitted to the Bank's review no later than October 31, 1986; (ii) complete by December 31, 1987, the other feasibility studies required for updating the sector's Master Plan for generation/transmission; and (iii) submit such expansion program, based on a least-cost analysis of alternatives, to the Bank by March 31, 1988 (para. 2.09).

(b) Management and Institutional Strengthening. (1) INDE and EEG would: (i) take measures satisfactory to the Bank for the coordination in planning, operation and investment financing of their respective systems. These measures will include that INDE will exercise its right to designate its own President and Board of Directors for the election to the same positions in EEG (para. 2.15); (ii) implement a "Plan of Action for Institutional Improvements" including the tasks and schedule presented in Annex 3.1; (iii) submit to the Bank through INDE by November 30, of each year, a progress report on the Plan of Action (para. 3.03); (2) the Government would enable INDE and EEG to carry out their respective obligations in the Plan of Action (para. 3.03); and (3) INDE would engage consultants no later than October 31, 1986, under terms of reference to be submitted to Bank's review no later than July 31, 1986, to work directly with INDE's key staff and advise on important day-to-day management problems, personnel administration, finances, planning, internal control and management information systems (para 3.12).

(c) Manpower. (1) INDE would: (i) submit no later than September 30,1986, a five-year program of staff restructuring and reduction, establishing targets acceptable to the Bank, for increasing the ratio of consumers to employee to not less than 40 by December 31, 1987, and not less than 75 by December 31, 1991; and (ii) promptly carry out the program, taking into consideration the Bank's comments; and (2) the Government would enable INDE to comply with the above provisions (para. 3.11).

(d) Staff Training. INDE and EEG would: (i) engage consultants nolater than October 31, 1986, to assist in the preparation and implementation of a four-year training program, under terms of reference to be submitted to the Bank, no later than July 31, 1986; and (ii) submit such program to the Bank by April 30, 1987; and (iii) prepare by October 31, every year a detailed program of training activities for the following year, taking into account the comments of the Bank (paras. 3.12 and 3.14).

(e) Construction Supervision. INDE would hire consultants for the supervision of the construction and equipping of the Control Center and the associated communications system by September 30, 1987. Terms of reference to be submitted for the Bank's review no later than March 31, 1987 (para. 3.07).

(f) Sector Arrears. (i) The Government would take all necessary actions to ensure that by January 1, 1987, and at all times thereafter, the accounts payable by public agencies to EEG and INDE shall not exceed 60 days of billing (para. 3.23); (ii) INDE and EEG would maintain a 60 days collection period for private consumers by December 31, 1986 and thereafter (para. 3.23); and (iii) EEG would pay to INDE its electricity bill within 45 days (para. 3.24).

(g) Tariffs. (1) INDE and EEG would: (i) set tariffs at such level as to allow each utility to earn a rate of return not lower than five percent (5%), calculated on a rate base annually revalued; the covenant of Loan 1605-GU for a rate of return of the sector (5% in 1986-1987; 6% in 1988; 7% in 1989 and 8% thereafter) would be superseded by this agreement (para. 3.21); (ii) increase their tariff to final consumers every month during 1987, starting in January, so as to achieve a reduction of their operating ratios to 49 percent and 92 percent respectively in 1987. INDE's and EEG's net operating incomes in excess of what would have been required to reach a 5 percent rate of return in 1987 would be taken into account for the calculation of the rate of return in 1988 (para. 3.22); and (iii) present to the Bank's comments by September 30 of each year, starting in 1986, a schedule of tariff adjustments for the following year to meet compliance with the 5% covenanted rate of return (para. 3.21); and (2) The Government would enable INDE and EEG to comply with the above provisions (para. 3.21).

(h) Dividends and Transfers of Funds. (1) INDE would submit to Bank's consideration by June 30, 1987, a set of procedures and criteria to regulate the transfer of funds from INDE to the Government to ensure that such transfers do not impair INDE's financial position and project execution (para. 3.25); and (2) EEG would: (i) pay annually, starting in 1986, dividends equivalent to the amount of its net income after taxes and provisions for legal reserves; (ii) pay 50 percent of dividends accrued up to 1985, by no later than January 1, 1987; and (iii) gradually pay in 1987 and thereafter the balance of dividends accrued up to 1985 (para. 3.24).

4.02 The following main provisions of the Loan Agreement of Loan 1605-GU would be maintained and extended to EEG as appropriate:

(a) Auditing and financing statements (paras. 3.12 and 3.14);

(b) Major project clause (para. 3.21);

(c) Debt-service coverage (para 3.25).

Conditions of Effectiveness

4.03 The following events have been agreed as condition of effectiveness:

(a) the establishment of a trust fund arrangement between INDE and EEG satisfactory to the Bank (para. 3.06)

(b) the execution of a contract between the Government, EEG and EMPAGUA, satisfactory to the Bank, whereby EMPAGUA shall undertake to pay its outstanding debt to EEG (para. 3.23).

4.04 With actions taken and agreements reached as indicated above, the proposed project would be a suitable basis for a loan of US$81 million equivalent by the Bank to INDE to be repaid over a period of 15 years, including five years of grace.

GUATEMALA

POWER DISTRIBUTION PROJECT

POWER SECTOR

1987-1993 SECTOR INVESTMENT PROGRAM SUMMARY

(Millions of May 1986 Dollars)

	Forecast							Total
	1987	1988	1989	1990	1991	1992	1993	87-93
INDE	72.8	69.8	47.6	63.5	63.5	50.4	91.4	458.9
Proposed Project	11.8	12.2	10.5	6.7	5.3	0.0	0.0	46.6
Ongoing and Future Projects	61.0	57.5	37.0	56.8	58.3	50.4	91.4	412.4
EEG	6.2	8.5	9.4	8.7	7.3	9.5	7.9	57.5
Proposed Project	4.5	6.7	8.9	7.8	6.9	5.3	1.2	41.3
Ongoing and Future Projects	1.7	1.8	0.5	0.9	0.4	4.2	6.6	16.2
SECTOR	79.0	78.3	57.0	72.2	70.8	59.8	99.3	516.4
Proposed Project	16.4	18.9	19.4	14.6	12.1	5.3	1.2	87.9
Ongoing and Future Projects	62.6	59.3	37.6	57.7	58.7	54.6	98.1	428.6
Local Currency	30.0	27.2	25.3	34.2	27.8	25.4	37.7	207.6
Foreign Currency	49.0	51.0	31.7	38.0	43.0	34.5	61.6	308.9

1987-1993 TOTALS

	INDE	EEG	SECTOR	%
Proposed Project	46.6	41.3	87.9	17.0
Ongoing and Future Projects	412.4	16.2	428.6	83.0
Total Investment	458.9	57.5	516.4	100.0
Generation	217.0	0.0	217.0	42.0
Transmission/Substransmission	53.5	7.5	61.0	11.8
Distribution/R. Electrification	113.5	44.0	157.5	30.5
Communication/Control	20.9	2.0	22.9	4.4
Studies	44.8	0.0	44.8	8.7
Others	9.2	4.1	13.3	2.6

GUATEMALA

POWER DISTRIBUTION PROJECT

INDE

INVESTMENT PROGRAM 1987-1993

(Thousands of May 1986 Dollars)

	Forecast							Total
	1987	1988	1989	1990	1991	1992	1993	Period 87-93
1.- PROPOSED PROJECT	11810	12230	10510	6730	5270	0	0	46550
2.- ONGOING AND FUTURE PROJECTS								
- Aguacapa Hydro Plant	2084	1990	0	0	0	0	0	4074
- Chixoy Hydro Plant	3126	0	0	0	0	0	0	3126
- Santa Maria Hydro Plant	0	0	0	28855	38474	28855	0	96185
-Zunil I Geothermal	6773	9565	11089	6308	0	0	0	33735
-Geothermal Plant II	0	0	0	0	0	0	71898	71898
-Guatemala-El Salvador Transmission Line	2206	0	0	0	0	0	0	2206
-Guate sur to Norte Transmission System	1173	0	0	0	0	0	0	1173
-230 kV Escuintla S. Sebastian Tr. Line	13233	11566	0	0	0	0	0	24800
-Rural Electrification II	2188	0	0	0	0	0	0	2188
-Rural Electrification Peten	1139	1009	1183	1359	1554	3650	0	9893
-69 kV Sub transmission System	4066	7935	4883	3055	1718	547	521	22725
-69 kV Guatemala - Honduras	2605	0	0	0	0	0	0	2605
-Distribution System	11904	11595	12827	14265	14691	15595	17477	98354
-Geothermal Prefactibility Studies	1980	6669	1094	0	0	0	0	9743
-Usumacinta Hydro Plant Studies	521	261	52	52	52	52	52	1042
-Hydro Plant Studies	3175	1914	712	182	0	0	0	5983
-Other Planning Studies	4064	4105	4272	1771	1146	1146	1146	17651
-Other Investments	729	938	938	938	625	521	313	5002
TOTAL ONGOING AND FUTURE PROJECTS	60966	57547	37049	56786	58260	50366	91407	412383
3.- TOTAL INVESTMENT	72776	69777	47559	63516	63530	50366	91407	458933
a.- Proposed project								
-Foreign component	8590	9900	7860	4780	3750	0	0	34880
-Local component	3220	2330	2650	1950	1520	0	0	11670
b.- Ongoing and Future Projects								
-Foreign component	37159	36281	17741	27647	34528	28463	56865	238684
-Local component	23808	21265	19308	29140	23732	21904	34542	173699

ANNEX 2.3

GUATEMALA

POWER DISTRIBUTION PROJECT

EEG

INVESTMENT PROGRAM 1987-1993

(Thousands of May 1986 Dollars)

	Forecast							Total
	1987	1988	1989	1990	1991	1992	1993	87-93
1.- PROPOSED PROJECT	4540	6710	8900	7830	6870	5250	1210	41310
2.- ONGOING AND FUTURE PROJECTS	1683	1789	531	892	432	4223	6644	16195
-69 kV Transmission Lines	0	0	0	0	0	297	0	297
-69 kV Transmission Substations	0	0	0	0	0	192	0	192
-13.2 kv Primary lines	0	0	0	0	0	680	1270	1951
-2.4 & 7.6 kV Secondary lines	0	0	0	0	0	369	774	1143
-Distribution transformers	0	0	0	0	0	373	747	1120
-Meters and Connections	0	0	0	0	0	408	792	1200
-Street Lighting	0	0	0	0	0	390	767	1157
-Miscellaneous equipment	0	0	0	0	0	142	286	427
-Communications	0	0	0	0	0	109	0	109
-Rural Electrification	0	0	0	0	0	625	1250	1876
-Vehicles	381	582	337	556	380	585	705	3526
-General Installations	1303	1208	194	336	52	52	52	3197
3.- TOTAL INVESTMENT	6223	8499	9431	8722	7302	9473	7854	57505
a.-Proposed project								
- Foreign Component	2850	4220	5690	4990	4330	3310	760	26150
- Local Component	1690	2490	3210	2840	2540	1940	450	15160
a.-Ongoing and Future projects								
- Foreign Component	433	634	389	608	432	2686	3965	9147
- Local Component	1250	1156	142	284	0	1537	2679	7048

GUATEMALA

FIFTH POWER PROJECT

PLAN OF ACTION FOR INSTITUTIONAL DEVELOPMENT

Institution/ Area	Item	Description of Tasks	Dates (Month/Year) Updating Studies	Implementation Beginning	Implementation Completion
SECTOR					
General	o Financial and personnel statistics	(a) Preparation by INDE of consolidated financial statistics for the sector, including financial statements and basic personnel statistics.	Not required	1/87	6/87
Inventories	o Uniform codification	Introduction of a uniform code number for spare parts, material and equipment used by INDE and EEG, to interchange parts and reduce the stock level	Not required	6/87	6/88
Planning	o System expansion and financial projections.	(a) Establishment of coordinating committees to plan INDE's supply to EEG, prepare demand projections and program construction of transmission lines and substations.	-	-	12/86
		(b) Preparation of consolidated financial projections in a coordinated manner with system expansion studies.	-	1/87	12/87

Institution/ Area	Item	Description of Tasks	Dates (Month/Year) Updating Studies	Implementation Beginning	Implementation Completion
Tariffs	o Structure	(a) Updating of the marginal cost studies by INDE's planning Department.	12/86	6/86	6/87
		(b) Standardization and simplification of the existing tariff schedules based on criteria satisfactory to the Bank.	-	6/86	12/86
Accounting	o Revaluation and reassessment of fixed assets	(a) Revaluation of assets in INDE and EEG respective accounting systems together with audited accounts in accordance with criteria to be agreed with the Bank.	-	already started	12/86
		(b) Depuration of fixed assets by excluding plants and/or studies to be written-off or transferred to operating plants or to work in progress.	-	-	12/86
INDE					
Personnel	o Human Resources Management	Implementation of the measures which have been recommended by studies made by consultant PCA in: grading system, compensation, recruiting, files, statistics, evaluation and benefits.	12/86	3/87	12/87
	o Civil Service Regulations	Execution of the appropriate legal instruments to exclude INDE's staff from civil service regulations.	-	-	6/87

Institution/ Area	Item	Description of Tasks	Dates (Month/Year) Updating Studies	Implementation Beginning	Implementation Completion
Accounting	o Accounting system	(a) Completing the incorporation of data processing into the accounting system;	-	1/87	12/87
		(b) Reconcilement of account as of December 86.	-	6/86	6/87
Budget	o Budget Management	(a) Incorporation of the budget system in the data processing procedure.	-	9/86	12/87
		(b) Preparation of monthly financial reports which are consistent with both the accounting system and the budget procedures.	-	6/86	6/88
Internal Auditing	o Internal auditing functions	Submission to the Bank of a program to:			
		(a) Improve the supervision of all accounting systems; and	-	12/86	12/87
		(b) Include the internal control systems and operational systems in its functions.	-	12/87	12/88
Insurance	o Coverage and management	Insurance of INDE's assets against all risks, based on revalued assets.	-	already started	3/87
EEG					
Insurance	o Coverage and management	Insurance of EEG's assets against all risks, based on revalued assets.	-	6/86	12/86

GUATEMALA

POWER DISTRIBUTION PROJECT

DESCRIPTION AND JUSTIFICATION OF THE PROJECT ELEMENTS

Distribution Program (EEG)

1. EEG's distribution system comprises of: (i) a 69 kV system which serves as a link between the high voltage substations (230 kV and 138 kV) and the distribution substations (69 kV - 7.62/13.2 kV); (ii) a primary distribution system, which is a four-wire 7620/13200 volts overhead system; and (iii) a secondary distribution system, which is a 60 Hz 120/240 volts, three-wire, single phase or 208/120 volts, four-wire, three-phase system. The distribution system generally is designed and constructed to meet standards satisfactory for local conditions. The quality of service is good and its reliability adequate, although many circuits and transformers are becoming overloaded. The works included in the Project for EEG's distribution system are mainly related to: (i) system expansion to serve new loads and to adapt the system to the bulk supply points related to the Chixoy Hydroelectric Project; and (ii) system improvements in operation flexibility (increased switching capabilities), voltage levels (capacitors, loading of transformers and substations), and expansion flexibility (increased transformer capacity and number of primary feeders). The distribution program considered for EEG in the proposed Project is in fact a four-year time slice of the EEG's original investment program expanded over seven-and-a-half years to account for normal execution delays and reflect the Bank's applicable disbursement profiles.

Rural Electrification Program (EEG)

2. EEG supplies about 120 rural villages, even though it has given no special consideration to the rural consumers under its expansion programs of the last ten years. In 1983, EEG completed a survey of rural villages and mid-size farms (fincas) on which basis a rural electrification program was developed. Based on the estimated consumption per type of dwelling and finca, dispersion of dwellings and fincas, existing infrastructure in the villages (access roads, water, health center, school), and proximity of existing lines, priority was established on the basis of a cost-benefit analysis for the connection of new villages and fincas to the system and extension of the supply to other consumers in already connected villages. Details are given in reference B.10, Annex 3.12. The first phase of the program to be funded by the proposed project, aims at connecting 88 new villages and 47 new fincas and extend services in 92 villages. This would require construction of about 870 km of new lines, out of which 470 km of

13.2 kV primary lines (about 250 km single-phase, 210 km two-phase and 50 km three-phase) and 400 km in secondary lines, and acquisition and installation of 8,500 kVA of distribution transformers. It is estimated that 13,100 new consumers will be connected, out of which some two-thirds are located in areas not yet served. It is expected that a population of about 86,000 people will be benefited by this rural electrification program.

Vehicles (EEG)

3. About 140 vehicles are now available for maintenance and operation work in EEG, of which only about half are less than six years old. Total number of vehicles is considered adequate to meet the requirements of the system, but they have to be replaced gradually according to their service life, which varies between 5 years for small pick-ups and panels to 10 years for trucks and specialized vehicles. The Project includes procurement of about 100 vehicles to replace worn-out equipment.

Training (EEG)

4. Although EEG has a long-established training program, it is necessary to strengthen it by providing overseas training for professional staff, reviewing out-of-date or worn-out equipment, and resorting to technical assistance for training instructors, updating teaching materials and methodology, elaborating procedures and manuals. A four-year program will be formulated as part of the proposed project with assistance from consultants, to address those needs.

Chulac Studies (INDE)

5. The Chulac Hydroelectric Project's initial design comprised a 163-meter high rockfill dam with an asphaltic-cement blanket, and a total installed capacity of 440 MW. In 1980 a consultant completed a feasibility study for this project, but concluded that the conditions of the rock in the right abutment of the dam site was poor and required further investigations. Further in-site tests of the rock in this abutment indicated that its mechanic characteristics were very poor and a board of consultants that examined available information on the project in mid-1982 concluded that this rock is a poor foundation for a 163 m high dam in a high-earthquake risk area, and that lowering the dam about 30 m should be considered to obtain a satisfactory design. The board of consultants also recommended to carry out an investigation program, which is included as a component of the proposed Project, consisting of about 640 m of exploration galleries, drill holes, in-site and laboratory shear tests, and grouting tests. The results of the investigation program will be used to modify the preliminary design of the project and prepare new cost estimates and energy studies to determine its economic justification, for which about 40 man-months of consultant services are included in the proposed project.

Xalala Studies (INDE)

6. The Xalala Hydroelectric Project would be located on the Chixoy River, about 42 km downstream from the Chixoy Hydro Project, and would comprise a 95 m high rockfill dam, three power tunnels 330 m long, and a powerhouse with 3 x 120 MW generating units. A feasibility study for this project which was considered completed in 1980, concluded that the project was economically attractive, indeed the most attractive of the hydro projects studied at that time; however, a serious technical problem was detected: a Karstic formation which surrounds the reservoir was not well understood and additional investigations were required to establish the elevation at which the reservoir's watertightness could be ensured. These investigations have not been carried out yet, and are proposed now as a component of the Power Distribution Project, as follows: drill holes for hydrogeological studies, installation of a permanent seismic network, revision of the preliminary design, cost estimates and economic justification; about 44 man-months of consultant services are included to complete the feasibility study for this project.

Dispatch Center and Communications (INDE)

7. INDE does not have appropriate facilities to supervise, coordinate and control the operation of the generation and transmission system in the country. The power system is becoming complex (the Chixoy Hydroelectric Plant and the electric interconnection with El Salvador will be in operation by 1986 and 1987 respectively) and will require soon an adequate control system to maintain a reliable, economic and good quality service. A preliminary report on the functional requirements of the national dispatch center and associated communications system were prepared by Harza Engineering Co. in January 1985 and reviewed by the re-appraisal mission of May 1985. The final feasibility report was completed in January 1986 and includes, as discussed with that Bank's mission, the definition of a priority stage of the dispatch center and communications facilities. Only such a stage is considered as a project component. It covers the major generating stations and substations and would consist basically of a supervisory control and data acquisition system, an automatic generation control function and a microwave/power line carrier system. The feasibility report as issued includes the building layout and the specifications of the hardware and software for the dispatch center and the basic design features of the communications system. Harza is also going to provide the tender documents for the equipment and services by May 31, 1986.

Rehabilitation of Thermal Plants (INDE)

8. The availability of the Escuintla steam units is essential to ensure a reliable supply to the interconnected system (Annex 3.5, para. 12). Unit number one boiler exploded in the end of 1983 and the plant has not operated ever since. Due to the extremely critical supply conditions following the tunnel collapse of Chixoy, Escuintla unit number two operated

for about two years with virtually no stopping (although sometimes at a derated capacity) until the recommissioning of Chixoy in early 1986. There is an immediate need for a major overhaul of this unit. INDE management has accepted the risk of increasing the amount of damage to the unit to avoid a power curtailment (or its dramatic increase as would have occurred in the second quarter of 1985). The rehabilitation of unit I has been studied by the manufacturer (AEG) and would include the whole boiler and parts of the plant measurement and regulation system, turbine, exciter and voltage regulator, and cooling tower. The actual repair needs for unit II will be revealed by the time it is thoroughly inspected by specialists. An assessment made by INDE's Operation Department is the basis for the estimate used in this report. It would include partial repairs of the boiler, turbine, feed water system, condensate system and cooling tower. INDE should submit to the Bank a detailed report on the rehabilitation requirements of the two units based on the findings of the manufacturers or experts acceptable to the Bank not later than July 31, 1986. The estimated cost of the repairs is US$8.0 million (mid 1986 prices) which results in an attractive cost of US$93/kW.

Vehicles (INDE)

9. INDE supplies many villages scattered around the country and does not have a satisfactory number of operation and maintenance vehicles. The proposed Project provides for the acquisition of about 90 vehicles to complement INDE's current plan and enable it to reach the minimum requirement of one vehicle per village (or villages within a distance of 50 km) with more than 500 consumers.

Laboratory Equipment (INDE)

10. The present INDE's need for a well equipped electronics laboratory will progressively increase as Chixoy gets in operation, the communications systems build up and the dispatch center is commissioned. It is essential for the checking and repairs of the electronic components of the generation and transmission protection, the communication system, the supervision and control of the generating plants and substations.

Data Processing (INDE)

11. The digital computer facilities of INDE are under dimensioned and many of the components being out of date add to the inefficiency of the services rendered to the technical, commercial and administrative areas. The acquisition of a 4 megabyte computer with peripherals and about 20 remote terminals, complemented by part of the existing equipment, would meet INDE's needs for about 5 years after its installation. Software will be also acquired as needed to strengthen the existing capability. In-house training for mid-level staff and overseas training for leading professional staff should also be carried out as part of INDE's training program (para. 12).

Training (INDE)

12. The training unit of INDE was created last year and needs strong support for the definition of a basic training policy, establishment of training methodology, elaboration of procedures and manuals, acquisition of teaching material, and training of its own instructors. A four-year plan will be formulated as part of the proposed project, with assistance from consultants to address those needs and establish the overseas training of professional staff.

ANNEX 3.3

GUATEMALA

POWER DISTRIBUTION PROJECT

POWER SECTOR

PROJECT DISBURSEMENT PLAN

(Basic Cost in May 1986 US$ Million)

I.- EEG	TOTAL FC	TOTAL LC	1987 FC	1987 LC	1988 FC	1988 LC	1989 FC	1989 LC	1990 FC	1990 LC	1991 FC	1991 LC	1992 FC	1992 LC	1993 FC	1993 LC
A1.- TRAINING	0.70	0.22	0.05	0.05	0.15	0.10	0.35	0.07	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00
A2.- CAPITAL INVESTMENT	23.33	13.70	2.57	1.51	3.73	2.19	4.90	2.88	4.43	2.60	3.97	2.33	3.03	1.78	0.70	0.41
-2.1. 69 KV Transmission Lines	3.04	1.80	0.33	0.20	0.49	0.29	0.64	0.38	0.58	0.34	0.52	0.31	0.40	0.23	0.09	0.05
-2.2. 69kV Substations	1.10	0.68	0.12	0.08	0.18	0.11	0.23	0.14	0.21	0.13	0.19	0.12	0.14	0.09	0.03	0.02
-2.3. 13.2 kV lines	2.91	2.48	0.32	0.27	0.47	0.40	0.61	0.52	0.55	0.47	0.49	0.42	0.38	0.32	0.09	0.07
-2.4. 2.4-7.6 kV Lines	1.67	1.29	0.18	0.14	0.27	0.21	0.35	0.27	0.32	0.25	0.28	0.22	0.22	0.17	0.05	0.04
-2.5. Distribution Transformers	2.27	0.76	0.25	0.08	0.36	0.12	0.48	0.16	0.43	0.15	0.39	0.13	0.29	0.10	0.07	0.02
-2.6. Meters and Services	2.14	1.47	0.24	0.16	0.34	0.24	0.45	0.31	0.41	0.28	0.36	0.25	0.28	0.19	0.06	0.04
-2.7. Protection	0.42	0.18	0.05	0.02	0.07	0.03	0.09	0.04	0.08	0.03	0.07	0.03	0.05	0.02	0.01	0.01
-2.8. Reliability	0.27	0.11	0.03	0.01	0.04	0.02	0.06	0.02	0.05	0.02	0.05	0.02	0.03	0.01	0.01	.00
-2.9. Lighting	1.46	1.66	0.16	0.18	0.23	0.27	0.31	0.35	0.28	0.31	0.25	0.28	0.19	0.22	0.04	0.05
-2.10. Vehicles	2.85	0.43	0.31	0.05	0.46	0.07	0.60	0.09	0.54	0.08	0.48	0.07	0.37	0.06	0.09	0.01
-2.11. Rural Electrification	3.92	2.42	0.43	0.27	0.63	0.39	0.82	0.51	0.75	0.46	0.67	0.41	0.51	0.31	0.12	0.07
-2.12. Communications	1.28	0.41	0.14	0.05	0.21	0.07	0.27	0.09	0.24	0.08	0.22	0.07	0.17	0.05	0.04	0.01
- Basic cost	24.03	13.92	2.62	1.56	3.88	2.29	5.25	2.95	4.58	2.60	3.97	2.33	3.03	1.78	0.70	0.41
- Physical Contingency	2.13	1.25	0.23	0.14	0.34	0.20	0.45	0.26	0.40	0.24	0.36	0.21	0.28	0.16	0.06	0.04
- Basic Cost Plus Phys Contingency	26.15	15.16	2.85	1.69	4.22	2.49	5.69	3.21	4.99	2.84	4.33	2.54	3.31	1.94	0.76	0.45
- Price Contingency	7.04	4.08	0.21	0.12	0.61	0.36	1.26	0.71	1.53	0.87	1.64	0.96	1.43	0.84	0.37	0.21
TOTAL EEG's PROJECT	33.19	19.24	3.05	1.82	4.84	2.85	6.95	3.92	6.51	3.71	5.97	3.50	4.74	2.78	1.13	0.66
II.- INDE																
B1.- TRAINING AND CONSULTANTS	1.40	0.40	0.15	0.00	0.45	0.15	0.60	0.20	0.15	0.05	0.05	0.00	0.00	0.00	0.00	0.00
-1.1. Training	0.70	0.20	0.05	0.00	0.15	0.05	0.30	0.10	0.15	0.05	0.05	0.00	0.00	0.00	0.00	0.00
-1.2. Administrative Consultants	0.70	0.20	0.10	0.00	0.30	0.10	0.30	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B2.- STUDIES	6.20	2.97	5.27	2.52	0.93	0.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-2.1. Chulac	3.24	1.13	2.76	0.96	0.49	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-2.2. Xalala	2.96	1.83	2.52	1.56	0.44	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B3.- CAPITAL EXPENDITURES	23.51	7.14	2.10	0.32	7.24	1.49	6.60	2.23	4.20	1.73	3.36	1.38	0.00	0.00	0.00	0.00
-3.1. Thermal Plant Rehabilitation	6.04	0.63	1.76	0.18	4.28	0.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-3.1.1. Escuintla Unit #1 (AEG)	2.77	0.36	0.81	0.10	1.96	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-3.1.2. Escuintla Unit #2 (Breda)	3.27	0.27	0.96	0.08	2.32	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-3.2. Dispatch Center/Communication	13.44	5.52	0.34	0.14	2.02	0.83	3.53	1.45	4.20	1.73	3.36	1.38	0.00	0.00	0.00	0.00
-3.2.1. Dispatch Center	7.52	2.69	0.19	0.07	1.13	0.40	1.98	0.71	2.35	0.84	1.88	0.67	0.00	0.00	0.00	0.00
-3.2.2. Communications	5.92	2.83	0.15	0.07	0.89	0.43	1.55	0.74	1.85	0.89	1.48	0.71	0.00	0.00	0.00	0.00
-3.3. Computer center	0.40	0.08	0.00	0.00	0.40	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-3.4. Vehicles	2.34	0.47	0.00	0.00	0.35	0.07	1.99	0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-3.5. Lab. Intrumentation	1.27	0.45	0.00	0.00	0.19	0.07	1.08	0.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
- Basic cost	31.11	10.51	7.52	2.84	8.62	2.08	7.20	2.43	4.35	1.78	3.41	1.38	0.00	0.00	0.00	0.00
- Physical Contingency	3.76	1.16	1.07	0.38	1.27	0.25	0.66	0.22	0.42	0.17	0.34	0.14	0.00	0.00	0.00	0.00
- Basic Cost Plus Phys Contingency	34.87	11.67	8.59	3.22	9.90	2.33	7.86	2.65	4.77	1.95	3.75	1.52	0.00	0.00	0.00	0.00
- Price Contingency	6.72	2.34	0.64	0.24	1.43	0.33	1.76	0.59	1.46	0.60	1.42	0.58	0.00	0.00	0.00	0.00
TOTAL INDE's PROJECT	41.60	14.01	9.24	3.46	11.33	2.66	9.62	3.24	6.24	2.55	5.17	2.10	0.00	0.00	0.00	0.00
III.- SUMMARY																
Basic Cost	55.14	24.42	10.14	4.40	12.51	4.37	12.45	5.37	8.93	4.38	7.38	3.71	3.03	1.78	0.70	0.41
- INDE	31.11	10.51	7.52	2.84	8.62	2.08	7.20	2.43	4.35	1.78	3.41	1.38	0.00	0.00	0.00	0.00
- EEG	24.03	13.92	2.62	1.56	3.88	2.29	5.25	2.95	4.58	2.60	3.97	2.33	3.03	1.78	0.70	0.41
Physical contingency	5.89	2.41	1.31	0.52	1.61	0.45	1.11	0.48	0.82	0.41	0.70	0.35	0.28	0.16	0.06	0.04
- INDE	3.76	1.16	1.07	0.38	1.27	0.25	0.66	0.22	0.42	0.17	0.34	0.14	0.00	0.00	0.00	0.00
- EEG	2.13	1.25	0.23	0.14	0.34	0.20	0.45	0.26	0.40	0.24	0.36	0.21	0.28	0.16	0.06	0.04
Basic Cost Plus Phys Contingency	61.02	26.83	11.44	4.91	14.12	4.82	13.56	5.86	9.76	4.79	8.07	4.06	3.31	1.94	0.76	0.45
- INDE	34.87	11.67	8.59	3.22	9.90	2.33	7.86	2.65	4.77	1.95	3.75	1.52	0.00	0.00	0.00	0.00
- EEG	26.15	15.16	2.85	1.69	4.22	2.49	5.69	3.21	4.99	2.84	4.33	2.54	3.31	1.94	0.76	0.45
Price contingency	13.76	6.42	0.85	0.36	2.04	0.69	3.02	1.30	2.99	1.47	3.07	1.54	1.43	0.84	0.37	0.21
- INDE	6.72	2.34	0.64	0.24	1.43	0.33	1.76	0.59	1.46	0.60	1.42	0.58	0.00	0.00	0.00	0.00
- EEG	7.04	4.08	0.21	0.12	0.61	0.36	1.26	0.71	1.53	0.87	1.64	0.96	1.43	0.84	0.37	0.21
TOTAL PROJECT	74.79	33.25	12.29	5.27	16.16	5.52	16.58	7.16	12.75	6.26	11.14	5.60	4.74	2.78	1.13	0.66

GUATEMALA

POWER DISTRIBUTION PROJECT

PROJECT IMPLEMENTATION SCHEDULE

Component	Sign Contract	Initiate Work/ Delivery	Complete Work/ Delivery
1. EEG Distribution Program			
69 kV lines (2.5 circuit km)			
- Villa Nueva-Torre 41 (single, 2.0 km)	04/88	07/88	09/88
- Switch Rack-Guatenorte (double, 9.7 km)	04/87	07/87	12/87
- Escuintla-Puerto Pacifico (single, 38.1 km)	08/88	11/88	06/90
- Villa Canales-Villa Nueva (single, 3.0 km)	01/90	04/90	07/90
69 kV substations (86.8 MVA)			
- Sitio (Expansion, 22.4 MVA)	07/87	04/88	08/88
- San Cristobal (14 MVA)	12/88	08/89	02/90
- Castellana (expansion, 22.4 MVA)	12/88	08/89	12/90
- Villa Canales (14 MVA)	01/90	10/90	04/91
- Puerto Pacifico (14 MVA)	01/90	10/90	04/91
13.8 kV lines (Total 498 km)	Annual	Annual	Annual
Secondary Lines & Connections (Total 463 km)	Annual	Annual	Annual
Street lighting (about 4,200 lamps)	Annual	Annual	Annual
Vehicles (about 100 O & M vehicles)	Annual	Annual	Annual
2. EEG Training	02/87	03/87	06/90
3. INDE Studies/Technical Assistance			
Chulac Additional Investigations			
- Consultant Services	03/87	03/87	12/87
- Core drillings	03/87	03/87	10/87
- Exploration galleries	03/87	03/87	10/87
- Tests	03/87	04/87	10/87

Component	Sign Contract	Initiative Work/ Delivery	Complete Work/ Delivery
Xalala Feasibility Study			
- Consultant Services	03/87	03/87	12/87
- Hydrogeological drillings	03/87	03/87	10/87
- Seismic station	03/87	04/87	10/87
Technical Assistance	10/86	10/86	04/88
4. INDE Thermal Rehabilitation Program			
- Consultant services 1/	06/86	06/86	10/86
- Escuintla unit No. 1	03/87	07/87	11/88
- Escuintla unit No. 2	03/87	10/87	12/88
5. INDE Dispatch Center			
- Civil Works	03/87	05/87	09/88
- Equipments	05/87	03/88	01/89
- Assembling/Testing	05/87	06/88	06/89
- Supervision Services	09/87	10/87	09/89
6. INDE Communication System			
- Equipment	05/87	11/87	11/88
- Construction	10/87	12/87	03/89
- Supervision Services	09/87	12/87	09/89
7. INDE Computer Center	10/87	04/88	07/88
8. INDE Vehicles (about 90 vehicles)	Annual	Annual	Annual
9. INDE Laboratory Equipment	10/87	04/88	02/89
10. INDE Training	10/86	10/86	06/91

1/ To be financed by existing IDB loan.

GUATEMALA

POWER DISTRIBUTION PROJECT

NOTES ON THE POWER MARKET AND GENERATION BALANCES

Background

1. The public power market is served by EEG, INDE and 10 municipal utilities. In 1985, about 81% of the retail market was served by EEG, 14% by INDE, and 5% by the municipal utilities, as shown in the following table:

	Municipalities		Sales to Final Consum.		Consumers	
Utilities	Number	%	GWh	%	Thousand	%
INDE	258	79	177	14	194	37
EEG	44	13	1005	81	278	53
Municipal	26	8	61	5	50	10
Total	328	100	1243	100	522	100

Geographically, the market is distributed as follows:

Region	Population (%)	Consumers (%)	Consumption (%)
Central (includes Guatemala City)	30	53	80.9
Western	35	22	9.7
Eastern	16	17	5.9
Atlantic	5	2	1.8
Central-North	11	5	1.4
Subtotal Interconnected	97	99	99.7
Northern (Peten) (isolated)	3	1	0.3
Total	100	100	100.0

The distribution of electricity sales by sector for 1973, 1979 and 1985 is shown below:

Sector	Percentage Distribution		
	1973	1979	1985
Residential	27	25	31
Commercial	15	18	21
Industrial	42	44	31
Others	16	13	17
	100	100	100

The participation of the industrial sector has dropped dramatically as a result of a declining economic activity since 1980 (para. 3).

2. In 1985, electricity consumption per capita was 156 kWh and the electrification rate was 28%, both low by Central American standards.1/ Total number of residential consumers increased, however, at a rate of about 7.4% p.a. from 1979 to 1985, well above the rate of growth of the population (2.9%).

3. In 1985, electricity sales were 1243 GWh (the same level as in 1979). The reduction of the electricity demand during the period 1980/1982 is related with a declining economic activity in the country due to a drop in private investment, fall in sugar and coffee prices, and decline in the Central American Common Market trade. Whereas the industrial demand has dropped from 1979 to 1983 at an average rate of 9.8% p.a. (as compared to a rate of growth of 11.8% p.a. from 1971 to 1979), the residential and commercial sectors had an average rate of growth of about 3% in the same period (as compared with 9.7% p.a. from 1971 to 1979). A slow recovery of electricity consumption started in 1983, in which the increases in the residential and commercial sectors offset the reduction in the industrial sector. In spite of the persisting economic difficulties, the lowering trend in industrial consumption reversed in 1984 and in 1985 it increased 4.6% (supported by an increase of 6.5% in the number of EEG industrial consumers). The utilities have succeeded in connecting new residential/commercial consumers at the satisfactory sustained rate of 7.1% for the last 6 years (see also para. 2).

Sales Projections

4. INDE revised the demand projections for the sector in August 1984 with assistance from independent consultants. The methodology used is

1/

Country	Consumption kWh/capita	Electrification rate %
El Salvador:	290	36%
Nicaragua:	299	45%
Costa Rica:	855	79%

adequate and gives a separate treatment to each major category of electric consumption (residential, commercial, industrial, public use), resorting to the major variables that can explain the consumption 2/. By June 1985, it was found that the short-term projections were somewhat optimistic. INDE adjusted the demand projections using the available demand for 1984 and early 1985. The revised demand projection (Attachment 1) represents a two year lag by 1988 on the original INDE's projections, however, by the year 1993, the consumption figures for both projections coincide. The average growth rate for 1985-1993 period is 6.6%, below the historic trend from 1971 to 1979 (10% p.a.). Based on present conditions, this seems reasonable. In spite of the surpluses generated by Chixoy, there are no prospects of sales to neighboring countries, even though mutual assistance during emergencies could occur through the future interconnections with El Salvador and Honduras.

Losses and Generation Requirements

5. Electricity losses in the interconnected system have been very high during the last four years: an average of 16.9% (as a percentage of net generation). EEG's losses exceeded 15% in 1985, representing an upward trend as compared to the average level of 8% in the 70's and the level of 9.5% in 1980. To some degree this is because investments in EEG's electric system did not keep pace with the increase of demand in the late 70's and the changing pattern of consumption in the 80's (para. 3) which has required more intensive use of low voltage lines. The generation requirements for the interconnected system were projected on the basis of the following loss and station use assumptions. Total system losses are expected to drop to 13% by 1990 reflecting a drop in EEG's losses to a level of 10%, as a result of the proposed project; a better use of the 230/69 kV transmission system with Chixoy coming on stream; and a better control by INDE on non technical losses. Station use would drop from the 3.0% average in the last five years (which is a reasonable value for a nearly 2/3 thermal-based generation system), to 1% from 1986, when demand will be served nearly wholly by hydroelectric plants.

Energy and Power Balances/Generation Expansion
Background

6. According to the 1976 Master Plan for electricity supply, the generation expansion for the 1980's relied on a few large and complex hydroelectric projects (Chulac - 440 MW and Xalala - 360 MW) complemented by medium-size hydros (El Carmen and Serchil) and geothermal alternatives. Prefeasibility and feasibility studies for these projects showed, however, that the medium size projects were not economically attractive, that the two large projects had complex technical problems and that the geothermal potential of Zunil had to be further explored to warrant installation in excess of the planned 15 MW station.

2/ The methodology used represented an improvement with respect to previous demand projection. The latter were mainly based on a correlation between electricity consumption and GDP (gross domestic product): this method fails to adequately reflect Government policies to promote oil substitution by electricity or accelerated rates of electrification, which may take place without any correlation with GDP increases.

7. In 1980, a generation expansion program prepared by INDE recommended commissioning 2 hydroelectric projects, Santa Maria II (68 MW) and Chulac (440 MW), in 1984 and 1988 respectively, complemented by the Zunil Geothermal Project (15 MW) in 1986. In late 1981, the two hydroelectric stations were under construction, and major contracts for civil works and electromechanical equipment were ready for award. At that time, however, some new developments affected the timing of both projects: first, it was apparent that electricity demand was stagnant and that the demand projection used to justify project timing was too optimistic; second, the Chulac project was facing complex technical problems related to a poor rock condition at the dam foundation and to the unprecedented use of an asphaltic blanket in a dam of its characteristics that made it advisable to continue field investigations to demonstrate the project's technical and economic justification; and third, the cost estimates for both projects, based on tender prices, were too high and their economic justification was questionable.

8. Following the advice of the Bank, in 1982 the Government took several actions: (i) stopped the execution of the Chulac and Santa Maria II hydroelectric projects; (ii) appointed a board of consultants to examine the technical problems of Chulac; (iii) transferred the responsibility of implementing Chulac hydropower project from HIDROCHULAC to INDE; and (iv) revised the generation expansion program in the light of new demand projections.

9. Natural gas was studied in 1983 and abandoned as an uneconomically competitive alternative to hydro, however present conditions of natural gas development and hydro costs which may develop from the planned feasibility studies may not lead to the same conclusion and thus warrant further exploration of natural gas as a viable generation alternative.

10. Chixoy first operated in June 1983. As a result of the new demand projections prepared in May 1983, it was apparent that it would not be necessary to commence construction of a new major generation station before 1987 and that a decision about the development of a new generating station would not have to be taken before mid-1985. In June 1985, the reappraisal mission revised the demand projections (para. 4) and found that no other project, besides Chixoy (tunnel which collapsed in December 1983 was under final repairs) and Zunil I (15 MW, already committed with IDB financing), should be commissioned before 1993.

Current Situation

11. As of December 31, 1985 total installed capacity in the country was 587 MW (details in Attachment 2), of which 33% is hydro and 67% is thermal, distributed as follows:

Installed Capacity (MW)

	Public Service				Private	Total
	INDE	EEG	Other	Subtotal		
Hydropower	187.7	-	4.5	192.2	-	192.2 (33%)
Thermal Power:	209.4	97.4	2.9	306.7	88.5 3/	395.2 (67%)
Steam	86.0	33.0	-	119.0	57.6	176.6
Gas Turbine	107.0	59.4	-	166.4	-	166.4
Diesel	16.4	5.0	2.9	24.3	30.9	55.2
Total	397.1	97.4	7.4	498.9	88.5	587.4
Proportion of the total - %	67	17	1	85	15	100

Fuel consumption for electricity generation in 1985 was about 1.8 million barrels, representing nearly one fourth of total oil consumption in Guatemala.

12. In 1985, supply conditions have been unsatisfactory due to repeated problems with the thermal plants (Annex 33, para. 7) and to a loss of hydro capacity in the dry season, when the yearly maximum demand occurs (Attachments 4 and 5 for energy and power balances). With the commissioning of Chixoy in 1986, sizeable electrical energy surpluses are available. On the basis of average streamflow conditions, no fossil-fueled generation would be required until 1990. This period 1986-1990 is suitable for a thorough maintenance of the Laguna thermal plant and the rehabilitation of the Escuintla steam units scheduled for 1987/1988 4/. Once reliable thermal power is again available it is advisable to inspect the Chixoy tunnel (1989). During the outage of the Chixoy power plant (estimated to last some six weeks to allow for minor repairs), thermal generation will be mandatory. This underlines the importance of having existing thermal capacity 5/ in good operating conditions as a back-up for a major outage of Chixoy, which is a high risk event for the reliable supply of the Guatemalan system, since Chixoy will represent for many years after its commissioning a considerable proportion of the generation sources. The thermal rehabilitation (Annex 3.3, para. 8), because of its cost (US$8.0 million, US$93/kW) and the short term required to have the 86 MW steam capacity at Escuintla available to the system, is a much better solution than the acquisition of any other generation means. On the other hand, such a cost is equivalent to a curtailment of only 9.3 GWh 6/. The rehabilitation is highly justified since this curtailed energy corresponds in average to less than 5 days of Chixoy's unavailability.

3/ Isolated plants located at the Exmibal nickel refinery, whose activities were interrupted in 1980.

4/ Escuintla unit No. 1 boiler exploded in 1983 and Escuintla unit No. 2 needs important repairs (Annex 3.3, para 8).

5/ Some 230 MW of thermal capacity should be given prioritary attention: 65 MW in Laguna (operating in a combined-cycle mode) and 156 MW in Escuintla (86 MW steam plus 80 MW gas turbines of reasonable performance). The remainder will be progressively retired as maintenance and operating costs become too high.

6/ Curtailed energy valued at US$1.0/kWh.

The Expansion Program

13. The current least-cost generation expansion program until 1995 is defined on the basis of energy requirements and includes the Zunil I geothermal plant (15 MW, a pilot project supported by IDB) in 1991, the Santa Maria II hydroproject (68 MW) in 1993 and the Zunil II geothermal plant (55 MW) in 1995.

14. Zunil I capital cost is expected to be about US$2,250/kW resulting in an energy cost in the order of US cents 3.9/kWh7/. This compares favorably with the fuel cost of the Escuintla steam units of US cents 4.7/kWh8/.

15. Sta. Maria is the only non-committed project that has an acceptable feasibility study. It would aggregate to the system capability 62 MW peak, 110 GWh firm energy per year and 222 GWh average energy per year. Its current energy cost is around US cents 4.4/kWh average or US cents 8.8/kWh firm9/. This is reasonable when compared with the present Chixoy costs of US cents 5.6 and 8.0/kWh respectively10/. Furthermore, the size of the project is well suited to the market increases and would correspondingly be a reasonably-scaled capital investment. The average energy cost also compares favorably with the cost of running the most efficient existing thermal plants (para. 14).

16. Although the studies for the geothermal field of Zunil II have not been started, it is believed that on the basis of the data collected for Zunil I, there is a good prospect for the installation of a 55 MW unit at a cost of US$2,250/kW. This would correspond, as for Zunil I, to an attractive cost of US cents 3.9/kWh 7/, which is lower than other projects at a comparable degree of investigation or running the existing thermal plants (para. 14), and for that it is considered as the next generation addition in 1995.

7/ At 10% discount rate, 70% capacity factor, May 1986 price levels, US$1 = Q 2.5, interest during construction and O & M costs not included. At 12% discount rate it would increase to US cents 4.6/kWh.

8/ At an average efficiency of 12.8 kWh net/gallon and a fuel cost (bunker) of US$25/barrel at the plant.

9/ At 10% discount rate, May 1986 price levels, US$1 = Q 2.5, interest during construction and O & M not included. At 12% discount rate, the energy costs in US cents/kWh would be 5.2 (average energy) and 10.4 (firm energy).

10/ At 10% discount rate, interest during construction and O & M costs not included; all local costs have been valued at US$1 = Q 1. The remaining local cost investment that would be affected by a new rate of exchange US$1 = Q 2.5 is very small and would have a negligible effect on the total cost in equivalent US dollars. At 12% discount rate, the energy costs in US cents/kWh would be 6.8 (average energy) and 9.6 (firm energy).

17. As shown in Attachment 5, once energy requirements are met, there will be a substantial power reserve. When the Chixoy plant is taken out for tunnel inspection in 1989, a coordinated maintenance plan should ensure that the remaining plant is fully available. The margin of 36% for power reserve under those circumstances is more than adequate to meet forced outages.

18. INDE is required to confirm that the current generation expansion program is the least-cost solution (para 19). For instance, the timing of Sta. Maria and Zunil II is very sensitive to the evolution of oil costs and the ensuing operating costs of the Excuintla steam units. The proposed Project includes further investigation in Chulac and Xalala to confer to the existing studies an acceptable degree of confidence on the proposed solutions and cost estimates or else to develop alternative solutions. IDB is financing a program of feasibility studies of several sites in the rivers Samala, Grande de Zacapa and middle Chixoy and at the geothermal field of Zunil II or Amatitlan (whichever proves more attractive from the prefeasibility studies financed by IDB and OPEC). INDE should update the studies made in 1983 on the use of the natural gas being flared in the Rubelsanto oil field for power generation and request from the MEM Directorate of Hydrocarbons an evaluation of the mid-term prospects of other natural gas developments and a gas pricing utilization study. The Bank should closely supervise INDE's progress on this undertaking and provide assistance, if necessary, in preparing terms of reference for the study. INDE should also include in the formulation of alternatives the connection to the system of the 58 MW steam-plant of the Exmibal nickel refinery. Oil-fired plants, other than the existing ones, are bound to be uneconomical and furthermore, the country is a heavy net importer of oil. Nevertheless, the generation expansion study should evaluate the cost of energy produced by new oil-fired plants to be used as a reference value for the assessment of hydro and geothermal projects.

19. No commitment needs to be made on generation expansion before mid-1988. INDE has agreed to finish all required feasibility studies by December 31, 1987 and present to the Bank a least-cost expansion program for the nineties not later than March 31, 1988 (para. 2.09).

GUATEMALA

POWER DISTRIBUTION PROJECT

ELECTRICITY DEMAND - NATIONAL POWER SYSTEM

	HISTORIC								PROJECTED									
	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Empresa Electrica de Guatemala (EEG)																		
Residential	231.0	248.9	257.3	262.3	272.4	281.0	294.5	301.8	311	321	333	348	370	389	406	428	454	483
Commercial	174.2	199.2	213.7	221.7	227.1	228.9	238.8	243.6	250	258	271	281	296	307	319	332	346	361
Industrial	444.5	456.5	426.7	395.3	322.4	313.3	319.5	339.2	355	370	395	423	468	543	624	675	721	771
Others 1/	99.4	97.9	102.8	105.0	112.5	118.8	120.8	120.5	121	122	133	144	161	164	171	176	187	195
Total Sales (GWh)	949.1	1002.6	1000.6	984.2	934.4	942.0	973.6	1005.1	1037	1071	1132	1196	1295	1403	1520	1611	1708	1810
Instituto Nacional de Electrificacion (INDE)																		
Residential	40.1	54.5	52.8	60.6	54.7	65.4	68.8	75.7	79	86	95	104	110	116	126	133	137	141
Commercial	16.5	19.0	18.9	19.4	15.7	17.0	16.9	17.6	20	22	23	25	27	29	31	33	34	35
Industrial	78.5	89.2	88.3	89.7	58.8	48.8	51.0	48.3	51	60	76	93	119	142	169	185	214	242
Others 1/	65.1	74.0	75.2	74.7	75.2	76.0	78.1	96.2	96	98	104	111	117	131	142	154	161	172
Total Sales (GWh)	200.3	236.6	235.2	244.4	204.4	207.2	214.8	237.8	246	266	298	333	373	418	468	505	546	590
Power Sector (EEG & INDE)																		
Residential	271.2	303.4	310.1	322.9	327.1	346.4	363.3	377.5	390	407	428	452	480	505	532	561	591	624
Commercial	190.8	218.2	232.6	241.1	242.8	245.9	255.7	261.2	270	280	292	306	323	336	350	365	380	396
Industrial	523.0	545.7	515.0	485.0	381.2	362.1	370.5	387.5	406	430	471	516	587	685	793	861	935	1013
Others 1/	164.5	171.8	178.0	179.7	187.7	194.8	198.9	216.7	217	220	237	255	278	295	313	330	348	367
Total Sales (GWh)	1149.4	1239.1	1235.7	1228.6	1138.8	1149.2	1188.4	1242.9	1283	1337	1430	1529	1668	1821	1988	2117	2254	2400
Rates of Growth Over Previous year (%)																		
Residential	9.9	11.9	2.2	4.1	1.3	5.9	4.9	3.9	3.3	4.4	5.2	5.6	6.2	5.3	5.3	5.4	5.4	5.5
Commercial	18.2	14.4	6.6	3.7	0.7	8.3	-0.6	2.2	3.4	3.7	4.3	4.8	5.6	4.1	4.1	4.2	4.2	4.3
Industrial	10.3	4.3	-5.6	-5.8	-21.4	-5.0	2.3	4.6	4.8	5.9	9.5	9.6	13.8	16.7	15.8	8.6	8.6	8.3
Others	5.5	4.4	3.6	1.0	4.5	3.8	2.1	9.0	0.1	1.4	7.7	7.6	9.0	6.1	6.1	5.5	5.5	5.5
Total Sales (%)	10.7	7.8	-0.2	-0.6	-7.3	0.9	3.4	4.6	3.2	4.2	7.0	6.9	9.1	9.2	9.2	6.5	6.5	6.5

Note: Due to rounded-off errors totals may not coincide with sum of partial figures.

1/ Includes sales to Government, municipalities and public lighting. INDE includes in this category bulk sales to municipal power companies.

GUATEMALA

POWER DISTRIBUTION PROJECT

ELECTRICITY GENERATION AND LOSSES - NATIONAL POWER SYSTEM

		HISTORIC								PROJECTED									
		1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Gross Generation	(GWh)	1346.5	1432.4	1466.4	1458.0	1412.7	1407.0	1480.3	1544.6	1567	1613	1699	1796	1936	2114	2308	2457	2617	2786
Station Use	(GWh)	46.7	45.0	53.8	55.2	48.1	34.2	41.7	42.0	16 3/	16	17	18	19	21	23	24	26	28
	(%) 1/	3.5	3.1	3.7	3.8	3.4	2.5	2.8	2.7	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Net Generation	(GWh)	1299.8	1387.4	1412.6	1402.8	1364.6	1372.8	1438.6	1502.6	1551	1597	1682	1778	1917	2093	2285	2433	2591	2758
Losses	(GWh)	150.4	148.3	176.9	174.2	225.8	223.6	250.2	259.7	268	260	252	249	249	272	297	316	337	359
	(%) 2/	11.6	10.7	12.5	12.4	16.5	16.3	17.4	17.3	17.3	16.3	15.0	14.0	13.0	13.0	13.0	13.0	13.0	13.0
Total Sales	(GWh)	1149.4	1239.1	1235.7	1228.6	1138.8	1149.2	1188.4	1242.9	1283	1337	1430	1529	1668	1821	1988	2117	2254	2400
Peak Demand	(MW)	251.3	269.8	278.1	292.3	278.1	282.5	290.4	304.0	316	324	338	355	379	410	444	468	495	524
Load Factor	(%) 4/	59.0	58.7	57.8	54.8	56.0	55.5	56.6	56.4	56.0	56.3	56.7	57.2	57.8	58.3	58.8	59.3	59.7	60.1

1/ Expressed as a percentage of gross generation.
2/ Expressed as a percentage of net generation.
3/ Station use is decreased to 1% once the demand is nearly all met by hydroplants.
4/ Referred to net generation.

March 21, 1986

GUATEMALA

POWER DISTRIBUTION PROJECT

Installed and Effective Capacities in MW as of December 31, 1985

	PUBLIC SERVICE					PRIVATE	TOTAL
	INDE		EEG	OTHER	SUB-TOTAL		
INSTALLED CAPACITY							
A. Hydro	187.7		-	4.5	192.2	-	192.2
Aguacapa	90.0 4/						
Jurun Marinala	60.0						
Esclavos	13.5						
Santa Maria	6.5						
El Salto	5.5						
San Luis	5.0						
Rio Hondo	2.4						
El Porvenir	2.3						
Palin	1.8						
Chichaic	0.7						
B. Thermal	209.4		94.4	2.9	306.7	88.5	395.2
B.1 Steam	86.0		30.0	-	116.0	57.6	173.6
Escuintla I	33.0 5/	Laguna	30.0			Exmibal 57.6 1/	
Escuintla II	53.0						
B.2 Gas Turbines	107.0		59.4	-	166.4	-	166.4
Escuintla 1/2	25.0 6/	Laguna 1	12.5 7/				
Escuintla 3/4	50.0	Laguna2/3	46.9 8/				
Escuintla 5 9/							
B.3 Diesel	16.4 3/		5.0	2.9	24.3	30.9	55.2
P. Barrios 2/	9.6	Castellana	5.0			Exmibal 10.9 1/	
Sta. Elena 2/	3.0					Other 20.0 10/	
San Felipe	1.2						
El Estor 2/	0.9						
Livingston 2/	0.6						
Poptun 2/	0.5						
Melchor de Mencos 2/	0.4						
Sebol 2/	1.2						
C. TOTAL	397.1		94.4	7.4	498.9	88.5	587.4
EFFECTIVE CAPACITY 11/							
D. TOTAL	332.1		80.5	7.4	420.0	88.5	508.5

1/ Isolated plants located at the Exmibal Nickel Refinery whose activities were interrupted at the end of 1980.
2/ Isolated plants in the public service system. The Atlantic system, which comprises the diesels P. Barrios, Livingston, and El Estor, was connected to the main grid in 1985.
3/ Figures do not add up due to round-offs.
4/ Only two units of 30 MW each have been in operation since the flood of the power house in late 1982. Third unit will be available in 1987.
5/ Boiler exploded in late 1983 and unit cannot generate until rehabilitation scheduled for 1987/1988 is completed.
6/ Effective capacity is 23 MW.
7/ Effective capacity is 10.5 MW.
8/ Effective capacity is 35 MW.
9/ On lease from USAID.
10/ Estimated
11/ See notes 4, 5, 6, 7 and 8.

March 21, 1986

GUATEMALA

POWER DISTRIBUTION PROJECT

ENERGY BALANCE - NATIONAL POWER SYSTEM
Figures in GWh

	ACTUAL 1/				PROJECTED									
	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
A. Generation Requirements	1413	1407	1480	1545	1567	1613	1699	1796	1936	2114	2308	2457	2617	2786
B. Firm Generation 3/	1413	1407	1480	1545	2719	2254	2254	2666	2503	2595	2595	2705	2705	3042
Existing in 1985	1413	1407	1480	1545	1713	1398	1398	1925	1507	1507	1507	1507	1507	1507
Hydro	481	808 2/	605	678	370	370	370	370	370	370	370	370	370	370
Thermal 5/	932	599	875	867	1343	1028	1028	1555	1137	1137	1137	1137	1137	1137
Chixoy 4/				-	996	996	996	881 6/	996	996	996	996	996	996
Other additions 4/				-						92	92	202	202	539
Zunil I										92	92	92	92	92
Sta. Maria II												110	110	110
Geothermal Project II														337
Firm Energy Margin -(GWh)					1152	781	695	1010	567	481	287	248	88	256
(%)					74	48	41	56	29	23	12	10	3	9
C. Average Generation 3/					3367	3042	3042	3405	3151	3243	3243	3465	3465	3802
Existing in 1985					1949	1624	1624	2151	1733	1733	1733	1733	1733	1733
Hydro					596	596	596	596	596	596	596	596	596	596
Thermal 5/					1343	1028	1028	1555	1137	1137	1137	1137	1137	1137
Chixoy 4/					1418	1418	1418	1254 6/	1418	1418	1418	1418	1418	1418
Other additions 4/										92	92	314	314	651
Zunil I										92	92	92	92	92
Sta. Maria II												222	222	337
Geothermal Project II														
Average Energy Margin														
Total (GWh)				256	1800	1429	1343	1609	1215	1129	935	1008	848	1016
(%)				16	115	89	79	90	63	53	41	41	32	36
Without fossil fuel thermal (GWh)				-957	447	401	315	54	78	-8	-202	-129	-289	-121
(%)				-62	29	25	19	3	4	-	-9	-5	-11	-4

1/ Actual gross generation is shown. No energy margin is calculated for years 1982-1985.
2/ Chixoy generated 285 GWh during trial operation in the second semester of 1983.
3/ Projected generation was calculated on the following bases: (i) thermal power annual plant availability: 70% for steam, 60% for diesels, and 50% for gas turbines; (effective capacity considered); (ii) hydro firm generation corresponds to streamflows with a 95% probability of being exceeded; an allowance of 5% is made for inefficiencies in operation and unavailability; (iii) hydro average generation as in (ii), except that probability of 50% is considered.
4/ Plants are added to the system on January 1 of the following years: Chixoy 1986; Zunil I 1991; Sta. Maria II 1993; Geothermal Project II 1995.
5/ Thermal plants are out of service as follows: Escuintla Steam I 1984 to 1988; Escuintla Steam II 1987 and 1988; Laguna Gas Turbine I and Escuintla Gas Turbines 1, 2 and 5 - retired in 1990; 25 MW in diesel plants retired in 1990.
6/ Chixoy is out of operation for tunnel inspection during 6 weeks.

April 10, 1986

ANNEX 3.5

GUATEMALA

POWER DISTRIBUTION PROJECT

POWER BALANCE - NATIONAL POWER SYSTEM
Figures in MW

	ACTUAL				PROJECTED									
	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Peak Demand	278.1	282.5	290.4	304.0	316	324	338	355	379	410	444	468	495	524
Installed Capacity 1/ (MW)	451.0	421.0 4/	388.0	420.0	720	697	697	483	693	708	708	770	770	825
Existing	451.0	421.0	388.0	420.0	420	397	397	483	393	393	393	393	393	393
Hydroelectric	192.2	162.2	162.2	162.0	162	192	192	192	192	192	192	192	192	192
Thermal	258.8	258.8	225.8	258.0	258	205 2/	205 2/	291	201 3/	201	201	201	201	201
Chixoy Hydroelectric 6/					300	300	300	- 5/	300	300	300	300	300	300
Other additions 6/										15	15	77	77	132
Zunil I										15	15	15	15	15
Sta. Maria II												62	62	62
Geothermal Project II														55
Reserve														
(MW)	172.9	138.5	97.6	116.0	404	373	359	128	314	298	264	302	275	301
(%)	62	49	34	38	128	115	106	36	83	73	59	65	56	57

1/ Effective capacity is considered. Power plant units which have been subjected to major damage and are disabled for operation, are not accounted: Escuintla I Steam from 1984 until 1988; Aguacapa 3 from 1983 to 1986.
2/ Escuintla II Steam out of service for rehabilitation.
3/ Laguna I and Escuintla 1, 2 and 5 Gas Turbines and 25 MW in Diesel plants are retired in 1990.
4/ It does not include Chixoy, which operated on a trial basis in the second semester.
5/ Chixoy out of operation for tunnel inspection during 6 weeks.
6/ Plants are added to the system on January 1, of the following years: Chixoy 1986; Zunil I 1991; Sta. Maria II 1993; Geothermal Project II 1995.

March 21, 1986

GUATEMALA

POWER DISTRIBUTION PROJECT

NOTES ON ORGANIZATIONAL AND INSTITUTIONAL ASPECTS

Organization

1. Attachments 1 and 2 show the Organization Charts of INDE and EEG.

Training

2. INDE's training activities need strengthening. In 1984, a Training Department was created under the Administrative Unit. The personnel involved in this Department is insufficient in quantity and not well qualified. Training programs have to be defined with emphasis on management and professional staff, procedures to manage these programs have to be established, and basic training equipment is required.

3. EEG has a comprehensive training program for staff development at all levels, but requires renewed equipment, technical assistance and additional overseas training. EEG has built a training yard for linemen which requires renewal and modern equipment to continue performing its role. Technical assistance is also needed to update teaching materials and methodology, to develop procedures and manuals, and to train instructors. US$0.7 million is included in the proposed loan to finance EEG's training component.

Accounting and Auditing

4. INDE is in the process of improving its accounting system through the engagement of a consultant funded by the last IDB loan; the monthly financial statements are issued with two months delay compared with six months of previous years. Due to the lack of computer capacity, several accounting subsidiary systems (fixed assets, suppliers, income budget, budget execution) have not yet been implemented. In 1978, INDE installed a HP/3000 computer - which is presently overloaded and must be replaced by a more powerful machine. The proposed project includes provisions for the purchase of computer facilities, and the corresponding software and training.

5. INDE's internal auditing unit reports directly to the Board of Directors. Its functions are limited to supervision of cash transactions, contracts, and inventories because of lack of qualified personnel. Its scope needs to be broadened to include, in a first stage, supervision of all accounting systems and, in a second stage, internal control systems, and operational systems. Consultants engaged in 1979 provided norms and procedures that are partially being implemented. The internal control report of the independent auditors calls for the attention of deficiencies in the accounting and internal control systems. The Plan of Action proposed (Annex 3.1) addresses the needs of the internal auditing unit.

6. INDE's financial statements are audited by a local firm of independent auditors (Arevalo Perez y Asociados - Arthur Anderson correspondent), acceptable to the Bank, and present auditing arrangements are satisfactory. In 1982 and 1983, the former independent auditor (Lizarralde, Ayestas y Asociados) was not able to give an opinion because of substantial differences found in many accounts. In 1984, the current independent auditor gave a qualified opinion. INDE plans to engage a consultant, funded by the last IDB loan, to improve its accounting procedures. INDE should agree to continue appointing independent auditors acceptable to the Bank and to send to the Bank the audited financial statements together with the auditor's reports within four months from the end of each fiscal year.

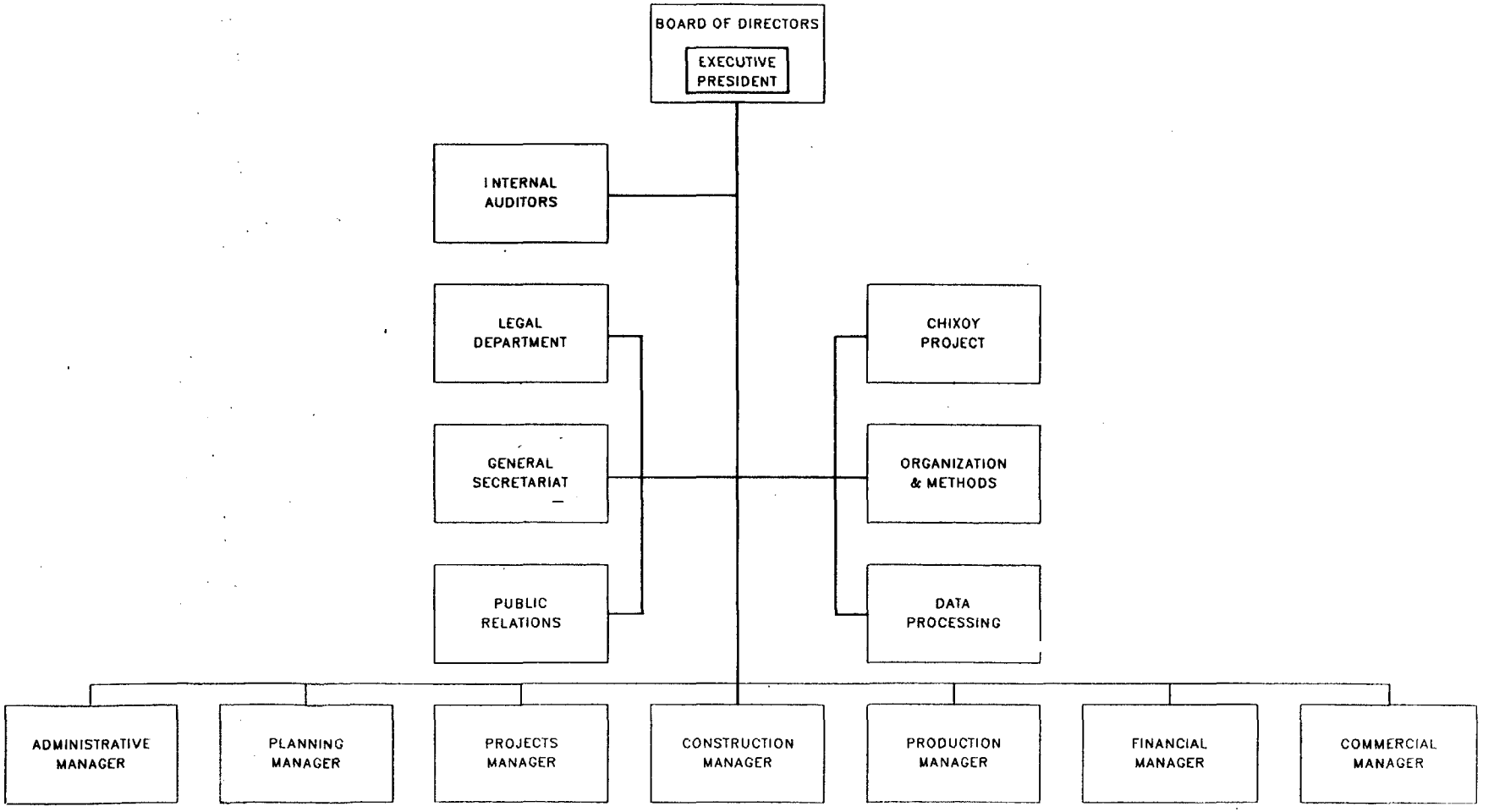
7. EEG's accounting system is satisfactory and well suited to EEG's needs. Internal control functions are vested in the Internal Auditing Department, which reports to the General Manager. Internal audit carries an adequate program of financial audits. EEG's financial statements are audited by a local firm of independent auditors (Arevalo, Perez y Asociados), acceptable to the Bank, and present auditing arrangements are satisfactory. EEG should agree to continue appointing independent auditors acceptable to the Bank and to send to the Bank the audited financial statements together with the auditor's report within four months from the end of each fiscal year.

Insurance

8. INDE's insurance practices require to be improved. For instance, old thermal generating plants and electrical substations are insured against physical loss and direct damage covering 160% of historical book value, but Aguacapa hydro plant is only covered for 60% of historical book value. Most of the Chixoy hydroplant components need renewal of their insurance policies. INDE has agreed with IDB to engage a consultant to address this problem. Supervision missions should follow-up progress on this matter.

9. EEG's insurance practices are acceptable but the amounts insured are based on historical-valued assets instead of replacement costs. EEG carries insurance against all risk covering up to 70% of historical-valued assets. EEG is already undertaking a study on insurance requirements which is expected to be completed by May 31, 1986 and implemented thereafter.

GUATEMALA
POWER DISTRIBUTION PROJECT
INDE
ORGANIZATION CHART



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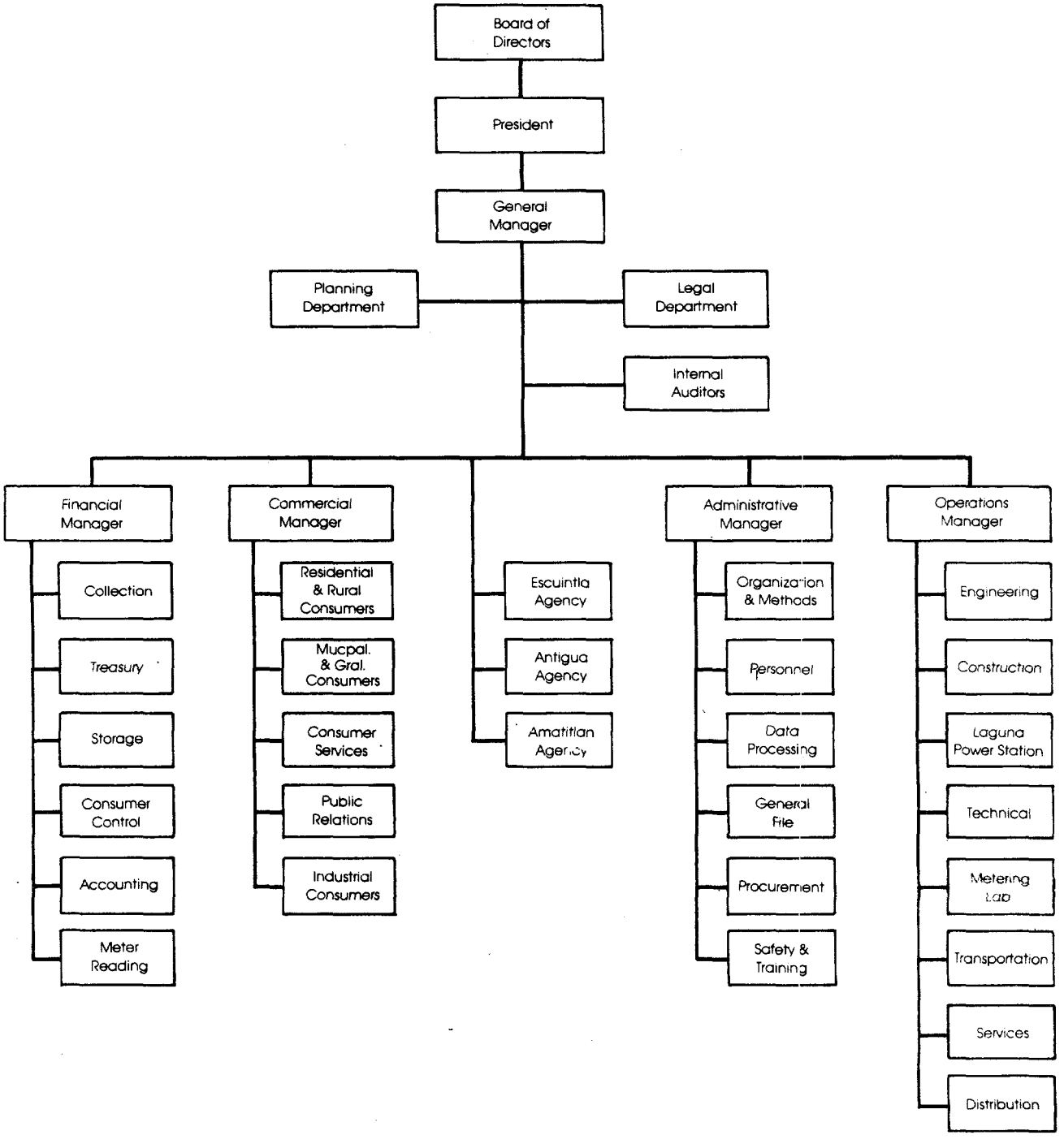
ANNEX 3.6
Attachment 2

GUATEMALA
POWER DISTRIBUTION PROJECT
EEG
Organization Chart



World Bank—27770

GUATEMALA
POWER DISTRIBUTION PROJECT
PROCUREMENT SCHEDULE

	UNITS	QUANTITY	START PREPARATION OF BID DOCUMENTS	BID DOCUMENTS PREPARED	BIDS INVITED	BIDS OPENED	BIDS EVALUATED & CONTRACT AWARDED	GOODS DELIVERY STARTED
1. EEG DISTRIB. EXPANSION								
Hardware, lamps and insulators (I)	-	Lot	06/86	08/86	10/86	01/87	04/87	07/87 01/88 07/88
Hardware, lamps and insulators (II)	-	Lot	11/89	01/89	03/89	06/89	09/89	01/90 07/90 01/91
Conductors (I)	km	1800	06/86	08/86	10/86	01/87	04/87	08/87 02/88 08/88
Conductors (II)	km	1900	02/89	04/89	06/89	09/89	12/89	04/90 10/90 04/91
Distribution Transformers (I)	MVA	25	06/86	08/86	10/86	01/87	04/87	10/87 04/88 10/88
Distribution Transformer(II)	MVA	54	02/89	04/89	06/89	09/89	12/89	06/90 12/90 06/91
Poles (concrete & steel) (I)	each	3000	06/86	08/86	10/86	01/87	04/87	08/87 02/88 08/88 02/89
Poles (concrete & steel) (II)	each	3400	04/89	06/89	08/89	11/89	02/90	06/90 12/90 06/91 12/91
Meters (I)	each	40000	06/86	08/86	10/86	01/87	04/87	09/87 03/88 09/88
Meters (II)	each	40000	09/88	11/88	01/89	04/89	07/89	01/90 07/90 01/91
Circuit breakers, cut offs, lightning arresters, reclosers (I)	-	Lot	06/86	08/86	10/86	01/87	04/87	09/87
Circuit breakers, cut offs, lightning arresters, reclosers (II)	-	Lot	09/88	11/88	01/89	04/89	07/89	12/89
Substation equipment (I)	-	Lot	06/86	09/86	11/86	02/87	05/87	04/88
Substation equipment (II)	-	Lot	11/87	01/88	03/88	06/88	09/88	08/89
Substation equipment (III)	-	Lot	01/89	03/89	05/89	08/89	11/89	10/90
Vehicles (I)	each	25	06/86	08/86	10/86	01/87	04/87	07/87
Vehicles (II)	each	25	12/87	02/88	04/88	07/88	10/88	01/89
Vehicles (III)	each	25	12/88	02/89	04/89	07/89	10/89	01/90
Vehicles (IV)	each	25	12/89	02/90	04/90	07/90	10/90	01/91
2. INDE Thermal Rehabilitation Program								
Escuintla Unit No. 1 Equipment/Parts	-	Lot	06/86	10/86	10/86	12/86	03/87	07/87
Escuintla Unit No. 2 Equipment/Parts	-	Lot	06/86	10/86	10/86	12/87	03/87	10/87
3. INDE Computer Center Equip.	-	Lot	07/86	02/87	04/87	07/87	10/87	04/88
4. INDE Vehicles (I)	each	30	10/86	02/87	04/87	07/87	10/87	02/88
(II)	each	30	12/87	02/88	04/88	07/88	10/88	01/89
(III)	each	30	12/88	02/89	04/89	07/89	10/89	01/90
5. INDE Laboratory Equipment	-	Lot	07/86	02/87	04/87	07/87	10/87	01/88

ANNEX 3.8

GUATEMALA

FIFTH POWER PROJECT

ESTIMATED LOAN DISBURSEMENT SCHEDULE
(US$ million)

Assumptions:
Board Approval: June 1986
Loan Signing : August 1986
Effective Date: November 1986
Project Completion: December 1993
Closing Date : June 1994

IBRD Fiscal Year and Semester	Disbursement During Semester		Cumulative Disbursement At end of Semester	
	US$ million	%	US$ million	%
1987				
December 31, 1986	-	-	-	-
June 30, 1987	5.1	6.3	5.1	6.3
1988				
December 31, 1987	8.0	9.9	13.1	16.2
June 30, 1988	7.8	9.6	20.9	25.8
1989				
December 31, 1988	10.0	12.3	30.9	38.1
June 30, 1989	9.2	11.4	40.1	49.5
1990				
December 31, 1989	10.5	13.0	50.6	62.5
June 30, 1990	8.5	10.5	59.1	73.0
1991				
December 31, 1990	5.7	7.0	64.8	80.0
June 30, 1991	5.4	6.7	70.2	86.7
1992				
December 31, 1991	5.1	6.3	75.3	93.0
June 30, 1992	2.8	3.5	78.1	96.5
1993				
December 31, 1992	1.8	2.2	79.9	98.7
June 30, 1993	0.7	0.9	80.6	99.6
1994				
December 31, 1993	0.4	0.4	81.0	100.0

May 18, 1986

GUATEMALA

POWER DISTRIBUTION PROJECT

FINANCIAL ANALYSIS

Sector's Past Performance

1. Between 1982 and 1984[1/], the Guatemalan power sector was in severe financial difficulties, mainly as a result of the additional financial requirements caused by the cost overrun and delays of Chixoy and ensuing heavy fuel expenses. Furthermore, as a consequence of the recession, and of problems in the operation of the thermal plants, electricity sales for this period were 5% lower than between 1979 and 1981. The average tariff, which is high in relation to the electricity tariffs of other central American countries as measured at the official exchange rate[2/], decreased slightly from 13 US cents/kWh in 1982 to 12.7 US cents/kWh in 1984. The sector achieved an average rate of return on historically-valued assets of 11.5%. Because of the burden imposed by the construction of Chixoy, the average contribution to investment program was only 13%, and the sector had to rely on government contributions (36%) and borrowings (51%) to finance an investment program of US$463.3 million.

INDE's Past Performance

2. INDE's financial performance between 1982 and 1984 reflected the evolution discussed above. In 1983, as a result of the temporary operation of Chixoy hydro plant (Annex 3.4), INDE's bulk sales grew by 28% as compared with 1982 and fuel expenses decreased by about 35% (Attachment 2.1) but this improving trend was reversed in 1984 due to the Chixoy tunnel collapse. In 1984, electricity sales decreased by 6.8% and fuel expenses increased by about 23%. Since INDE was responsible for the construction of Chixoy between 1982 and 1984, it was only able to self finance about 5% of its investment program, which was mainly funded by government contribution (36%) and borrowings (53%). The remainder (6%) was provided by decreases in working capital. The debt service coverage ratio was 1.0.

INDE's Finance Structure

3. As of December 31, 1984, INDE's financial structure was the following (Attachment 2.3):

	US$ million	%
Equity	991.2	66
Long-term Debt	386.8	26
Current Liabilities	122.3	8
Other Liabilities	1.9	-
TOTAL	1,502.2	100

1/ Since only preliminary financial data were available for 1985 at the time of the report, the historical financial analysis was made up to 1984.

2/ The average prices of electricity in some countries of the Region were in UScents/kWh: Costa Rica 4.2 (in 1983); Panama 12.4 (in 1983); Honduras 8.9 (in 1984); Guatemala 12.7 (in 1984).

4. As of December 31, 1984, INDE's principal creditors were international financing institutions (71% of the total long-term debt): the debt balance to IDB under its first seven loans amounted to US$141 million (34%); and the balance to the Bank amounted to US$109 million (26%). The other international creditors were CABEI with US$31 million (7%) and AID with US$13 million (3%). The Government is the only local creditor (29% of the total long term debt).

EEG's Past Performance

5. Between 1982 and 1984, EEG's financial performance was satisfactory. In 1984, electricity sales, which represent about 80% of the sector's retail sales, were 3.7% higher than in 1983 but still 2.7% below the 1979 level. In late 1984, INDE's tariff rate for bulk sales to EEG was increased by 20% in order to transfer funds to INDE as agreed with the Bank during the negotiations for the Chixoy's supplemental loan.

6. Internal cash generation allowed EEG to fund its working capital and investment requirements without borrowing. However, it should be noted that investment was kept low due to the country's constraints in the access to foreign exchange. A large component of the working capital is accounts receivable which have been steadily growing from US$ 24.1 million in 1982 to US$36.4 million in 1984, equivalent to 107 billing days. Most of this amount is owed by municipalities and Government agencies and it is mainly (US$21.6 million) owed by the capital city's water supply company (EMPAGUA). Loan 1605-GU provides that by December 31, 1986 power sector's accounts receivable from public agencies shall not exceed US$15.5 million. This covenant was modified during negotiations to further strengthen this commitment. (Chapter 4).

EEG' Financial Structure

7. As of December 31, 1984, EEG financial structure was composed of: other liabilities US$5.2 million (5%) (Attachment 3.3). EEG has only used short-term loans in the past, which amounted to US$0.6 million as of December 31, 1984.

Investment Program and Financing Plan

8. The investment program and financing plan are shown in detail in Attachment 1.2 (Sector), 2.2 (INDE) and 3.2 (EEG) to this annex and are summarized below:

Proposed Investment Program and Financing Plan
1987-1993
Current US$ million 3/

	EEG	%	INDE	%	SECTOR	%
REQUIREMENTS	117.0	100	784.5	100	901.5	100
Investments	104.0	89	705.6	90	809.6	90
Proposed Project	52.4	45	55.6	7	108.0	12
Other Investments	37.8	32	607.5	77	645.3	72
Interest during Construction	13.8	12	42.4	5	56.2	6
Increase in working Capital	13.0	11	78.9	10	91.9	10
FINANCING	117.0	100	784.5	100	901.5	100
Gross Internal Generation	119.4	102	1041.2	133	1160.6	129
Less:						
-Income Taxes	12.6	11	0.0	0	12.6	1
-Dividends	47.0	40	-45.6	-6	1.4	0
-Transfer to Government	0.0	0	92.8	12	92.8	10
Debt Service	26.8	23	550.5	70	577.3	64
Net internal cash generation	33.0	28	443.5	57	476.5	54
Consumer contributions	12.4	11	0.0	0	12.4	1
Borrowings	71.8	61	340.9	44	412.7	46
-Existing		0	23.9	3	23.9	3
-Future	36.8	31	271.0	35	307.8	34
-Proposed	35.0	30	46.0	6	81.0	9

3/ On the basis of 1US$=2.5Q.

9. Based on the assumptions of an exchange rate of US$1 = Q2.5 for debt since payments in 1988 and thereafter (para. 12), and provided that tariff levels would be set so as to achieve the 5% rate of return agreed with the Government (para. 14), it is expected that the sector would be able to finance the investment program without difficulties. Future borrowings for financing the foreign component of the program have been considered under current international agency terms (FIV, CABEI, IDB), which are shown in Attachment 2.4 to this annex.

Assets and Revaluation

10. Both INDE and EEG have yet to incorporate revaluation of assets into their accounting systems. The study for the revaluation of sector assets was completed with figures as of December 31, 1979. Since the study includes the revaluation system, INDE and EEG should not encounter major difficulties in updating the figures of the study. In addition, the book value of INDE's assets requires a reassessment because: (i) some thermal plants are to be scrapped; and (ii) a decision needs to be taken on the accounting treatment of a significant amount of studies (US$63 million), some of which are quite old. These amounts should either be debited to ongoing projects or operating plant if appropriate, or written off. The plan of action proposed (Annex) addresses the revaluation of INDE's and EEG's assets and the valuation of INDE's fixed assets.

Sector's Financial Outlook

11. The Guatemalan power sector (Attachments 1.1 to 1.4) is expected to perform satisfactorily during the 1986-1993 period provided that the tariff and rate of return targets are achieved (para. 13). This would enable INDE and EEG to carry out the project in a timely fashion.

12. The financial forecast has been based on the assumption that, in December 1987, the Government will set the exchange rate at US$1 = Q2.5 for all transactions. Additionally, the financial forecast assumes that during the 1988-1993 period the exchange rate will be adjusted to reflect the difference between domestic and international inflation. Sensitivity studies show that in case of a higher devaluation, the 5% rate of return would suffice to ensure the soundness of the financing plan but additional financing would be temporarily required.

13. During the projection period tariff levels should be adjusted to achieve a consolidated rate of return on fully revalued assets not lower than 5%. This will require a higher increase in the early years of the program, to be tapered over the period to reflect the projected decline in operating costs (para. 18) and in the direction of the system's long run marginal costs (Annex 3.11). Nominal increases of 22% in 1987, 48% in 1988 and 39% in 1989 would be required to meet the 5% rate of return. To avoid a sharp punctual increase in January 1988, during negotiations INDE and EEG agreed to increase their average tariff to final consumers by 4% monthly during 1987. The 4% monthly increase during 1987 imply that an average increase of 13 % is required in 1988 (for instance 13% in January or about 2% monthly during the year), tapering towards 1993. These tariff adjustments would be adequate to meet the financial requirements of the sector including a contribution of about US$93 million during 1989-1993 from INDE to the Government (para. 18).

14. To ensure the soundness of the financial plan until the project is completed, during negotiations, INDE and EEG agreed to set tariffs to enable each utility to earn a rate of return not lower than 5%, on a rate base annually revalued using a methodology satisfactory to the Bank. The rate of return covenant of Loan 1605-GU 4/ was superseded by this agreement. For

4/ 5% in 1986-1987; 6% in 1988; 7% in 1989; and 8% in 1990 and thereafter.

1988, the calculation of rate of return will take into account the net income in excess of what could have been required to reach a 5% rate of return in 1987.

15. In addition, at negotiations, the Government agreed to maintain the concurrence of the Bank as stated in clause 5.07 of the loan agreement for the Chixoy Hydro Project (Loan 1605-GU), before authorizing any capital expenditures in new projects which are not included in an updated investment program as reviewed by the Bank.

16. Following the commissioning of Chixoy in early 1986, the Guatemalan power sector becomes a hydro based system; fuel costs are reduced significantly and the cost structure shifts from one of heavy share of fuel expense into one of an increasing share of depreciation (Attachment 1.1). Fuel expenses would become 3% of operating expenses in the 1985-1993 period, as compared with 53% in the 1982-1984 period. For the same period, depreciation, which was 14% of operating expenses, would become 56%. Operating costs per kWh sold are projected to decline in real terms over the 1986-1993 period.

Performance and Financial Indicators

17. Attachment 1.4 defines targets for improving the operating efficiency of EEG and INDE.

INDE's Financial Outlook

18. In general, INDE's finances (Attachments 2.1 to 2.7) reflect the sector finances. The rate of return based on revalued assets would be practically the same as the sector's rate of return, as INDE's rate base represents 96% of the sector's rate base. Internal cash generation after transferring funds to Government and receiving EEG's dividends (para. 19) should allow INDE to finance 66% of its investment program as average during 1986-1993 period. This implies a significant improvement in INDE's performance, and indicates that not only will it not require financial assistance from the Government, but may actually be in condition to repay some of the funds it received in recent years. However, to ensure that such transfers to the Government do not negatively impact INDE's financial soundness and the pace of project execution, limitations to this transfer were included during negotiations (Chapter 4). The existing covenant under Loan 1605-GU on the debt service coverage ratio (1.5) was extended to EEG.

EEG's Financial Outlook

19. Assuming that tariff levels would be set to allow EEG to achieve the proposed 5% rate of return EEG's finances (Attachmens 3.1 to 3.3) are expected to be satisfactory. Internal cash generation would allow EEG to finance 39% of the investment program, after income taxes and dividends. EEG would still have temporary surplus funds assuming EMPAGUA payments of its arrears in 1986. During negotiations, agreements were reached in payments of dividends and electricity bills (Chapter 4).

GUATEMALA

POWER DISTRIBUTION PROJECT

POWER SECTOR

Actual and Forecast Income Statements a/ b/
(Million of Current Dollars)

	Actual			Forecast								
	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Sales (GWh)	1138.9	1149.3	1186.2	1246.3	1320.0	1337.0	1430.0	1529.0	1668.0	1821.0	1988.0	2116.0
Average Tariff (cents/kWh)	13.0	12.9	12.7	12.8	12.7	16.1	9.2	12.8	12.4	12.4	12.5	11.8
Operating Revenues												
Energy Sales	148.2	148.2	150.1	159.1	168.1	215.4	131.4	195.2	206.1	226.4	249.0	249.3
Other Revenues	0.5	0.4	0.4	0.4	0.5	0.7	0.3	0.3	0.3	0.3	0.3	0.3
Total Operating Revenues	148.7	148.6	150.5	159.5	168.6	216.1	131.7	195.5	206.4	226.8	249.4	249.6
Operating Expenses												
Fuel and Lubrication	71.6	44.7	56.9	60.4	6.0	1.4	0.7	7.1	0.9	2.4	9.2	1.1
Operation and Maintenance	16.6	21.4	18.9	20.2	27.3	36.8	22.1	22.7	25.3	27.0	27.9	28.9
General & Administration	7.4	7.8	9.0	9.8	11.0	13.3	6.9	7.4	8.1	8.6	9.0	9.3
Other	8.5	7.8	5.7	7.4	8.4	12.2	5.2	5.6	6.0	6.2	6.4	6.7
Depreciation	14.0	16.0	15.8	17.1	49.4	59.5	34.8	56.6	62.8	68.4	73.6	79.7
Total Operating Expenses	120.1	97.7	106.3	114.9	102.2	123.2	69.6	99.4	103.0	112.6	126.1	125.7
Operating Income	28.6	50.9	44.2	44.6	66.4	92.9	62.1	96.1	103.4	114.1	123.2	123.9
Non-Operating Income	0.1	2.8	1.1	1.6	2.0	2.4	1.0	1.1	1.2	1.2	1.3	1.3
Net Income before Interest	28.7	53.7	45.3	46.2	68.5	95.3	63.1	97.2	104.6	115.4	124.5	125.2
Interest Charges	23.6	24.9	25.7	25.2	34.3	35.9	33.5	34.5	36.3	46.3	52.4	58.1
Less: Interest During Construction	12.8	13.4	21.7	13.4	2.9	6.8	7.6	7.4	5.5	9.1	10.4	9.5
Interest Charged to Operation	10.8	11.5	4.0	11.9	31.4	29.2	25.9	27.1	30.7	37.3	42.0	48.6
Adjustment Previous Years	11.2	5.0	-3.3									
Net Income Before Tax	29.1	47.2	38.0	34.4	37.1	66.1	37.2	70.1	73.8	78.1	82.5	76.6
Income Tax	6.4	7.0	7.2	2.3	1.9	6.5	0.7	1.7	1.7	1.9	2.1	1.8
Net Income After Tax	22.7	40.2	30.8	32.1	35.1	59.6	36.5	68.4	72.2	76.2	80.4	74.8
Less: Dividends paid	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.0	20.0	20.0	36.0	4.8
Retained Earnings	22.7	40.2	30.8	32.1	35.1	59.6	36.5	56.4	52.2	56.2	44.4	70.0

a/ Consolidated for the Sector. See Definitions and assumptions in Attachment 2.1 for INDE. and Attachment 3.1 for EEG
b/ Figures may not add up because they have been rounded off.

GUATEMALA

POWER DISTRIBUTION PROJECT

POWER SECTOR

Actual and Forecast Sources and Application Funds a/ b/
(Million of Current Dollars)

	Actual			Forecast									total
S O U R C E S	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	Period 85-93
Internal Sources													
Income Before Interest	28.7	53.7	45.3	46.2	68.5	95.3	63.1	97.2	104.6	115.4	124.5	125.2	839.9
Depreciation	14.0	16.0	15.8	17.1	49.4	59.5	34.8	56.6	62.8	68.4	73.6	79.7	501.9
Other non-cash expenses	1.7	1.7	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gross Internal Cash Generation	44.4	71.4	62.7	63.3	117.9	154.8	97.9	153.8	167.4	183.7	198.1	204.9	1341.8
Less:													
Income taxes	0.0	6.4	7.0	7.2	1.7	1.9	2.6	0.7	1.7	1.7	1.9	2.1	21.5
Dividends	0.1	0.1	0.0	.0	0.3	0.2	0.3	0.1	0.2	0.2	0.2	0.2	1.6
Transfer to Government	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.0	20.0	20.0	36.0	4.8	92.8
Total	0.1	6.5	7.0	7.2	2.0	2.1	2.9	12.8	21.8	21.8	38.2	7.1	115.9
Less: Debt Service													
Amortization	15.1	28.2	24.3	24.9	38.8	42.4	38.9	45.7	47.8	48.0	55.3	58.4	400.2
Interest Charges	23.6	24.9	25.7	25.2	34.3	35.9	33.5	34.5	36.3	46.3	52.4	58.1	356.5
Total Debt Service	38.7	53.1	50.0	50.1	73.0	78.3	72.4	80.3	84.1	94.4	107.7	116.5	756.7
Less: Interest During Construction	12.8	13.4	21.7	13.4	2.9	6.8	7.6	7.4	5.5	9.1	10.4	9.5	72.5
Net Debt Service	25.9	39.7	28.3	36.7	70.2	71.6	64.8	72.9	78.5	85.3	97.3	107.0	684.2
Net Internal Cash Generation	18.4	25.2	27.4	19.4	45.7	81.1	30.2	68.1	67.0	76.6	62.7	90.8	541.6
Borrowings													
Existing loans	162.8	60.2	13.2	68.1	57.9	7.5	7.8	7.9	0.7	0.0	0.0	0.0	149.9
Proposed IBRD Loan	0.0	0.0	0.0	0.0	0.0	13.2	17.9	19.7	14.2	10.5	4.5	1.1	81.0
Future Loans	0.0	0.7	0.0	0.0	5.8	35.1	45.5	7.1	41.9	58.3	56.9	63.0	313.6
Total Borrowings	162.8	60.9	13.2	68.1	63.7	55.7	71.2	34.7	56.8	68.8	61.4	64.0	544.4
Consumer's Contribution	1.8	2.0	1.9	2.0	3.7	3.1	1.3	1.4	1.5	1.6	1.7	1.7	18.1
Government Contribution	47.3	75.1	40.5	76.9	53.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	130.6
TOTAL SOURCES	230.3	163.2	83.0	166.4	166.8	140.0	102.8	104.1	125.3	147.0	125.8	156.6	1234.8
A P P L I C A T I O N S													
Construction Program													
Ongoing and Future Works	215.2	104.8	95.4	118.6	165.8	62.6	73.8	51.2	93.3	102.5	96.4	153.2	917.4
Proposed Project	0.0	0.0	0.0	0.0	0.0	17.6	21.7	23.7	19.0	16.8	7.5	1.8	108.0
Sub total	215.2	104.8	95.4	118.6	165.8	80.2	95.4	74.9	112.3	119.3	103.9	155.0	1025.4
Interest During Construction	12.8	13.4	21.7	13.4	2.9	6.8	7.6	7.4	5.5	9.1	10.4	9.5	72.5
Total Construction Program	228.0	118.2	117.1	132.0	168.7	87.0	103.0	82.3	117.8	128.3	114.3	164.5	1097.9
Constructions for Customers	1.8	2.0	1.6	2.0	3.7	3.1	1.3	1.4	1.5	1.6	1.7	1.7	18.1
Variation in Working Capital	0.5	43.0	-35.7	32.4	-5.5	49.9	-1.6	20.4	5.9	17.1	9.8	-9.6	118.8
TOTAL APPLICATIONS	230.3	163.2	83.0	166.4	166.9	140.0	102.8	104.1	125.3	147.0	125.7	156.6	1234.7

a/ Consolidated for the Sector. See Definitions and assumptions in Attachment 2.2 for INDE. and Attachment 3.2 for EEG

b/ Figures may not add up because they have been rounded off.

GUATEMALA

POWER DISTRIBUTION PROJECT

POWER SECTOR

Actual and Forecast Balance Sheet a/ b/
(Million of Current Dollars)

	Actual			Forecast								
ASSETS	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Plants in Operation	451.0	467.3	487.3	1338.4	2097.1	2323.1	2162.2	2353.9	2589.0	2743.5	2977.5	3138.5
Less: Accumulated Depreciation	92.7	109.7	126.6	143.7	467.4	559.3	362.5	446.2	542.3	634.4	735.7	847.6
Net Plants	358.3	357.6	360.7	1194.7	1629.7	1763.9	1799.7	1907.7	2046.6	2109.1	2241.8	2290.9
Work in Progress	852.8	945.4	1019.2	297.3	303.4	329.1	119.2	152.1	150.4	197.3	50.4	159.4
Total Fixed Assets	1211.1	1303.0	1379.9	1492.0	1933.1	2093.0	1918.9	2059.8	2197.1	2306.4	2292.2	2450.3
Other Assets	0.0	0.1	3.1	3.2	3.5	4.5	2.0	2.2	2.4	2.6	2.7	2.8
Current Assets												
Cash and Banks	27.8	31.1	24.3	38.9	35.4	87.8	16.4	14.4	17.6	22.4	20.0	11.1
Temporary Surplus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Accounts Receivable	44.7	53.4	53.8	53.7	38.5	27.8	20.1	31.4	33.7	38.0	43.1	43.5
Inventories	32.3	31.9	44.3	47.3	31.1	34.1	29.6	33.4	35.0	37.2	47.1	47.6
Other	33.1	26.7	24.7	27.3	26.3	22.3	17.8	14.9	20.9	22.3	19.7	27.9
Total Current Assets	137.9	143.1	147.1	167.2	131.2	172.0	83.9	94.0	107.1	119.9	129.9	130.1
TOTAL ASSETS	1349.0	1446.2	1530.1	1662.4	2067.8	2269.5	2004.8	2156.0	2306.6	2428.8	2424.7	2583.2
LIABILITIES AND EQUITY												
Equity												
Capital	751.2	816.5	837.7	911.9	966.0	980.2	396.5	397.3	399.3	400.9	402.7	405.0
Retained Earnigs	72.0	110.5	156.5	191.2	225.7	271.0	140.6	196.5	246.9	301.6	344.4	412.2
Revaluation Reserve	0.0	0.0	0.0	0.0	321.9	447.0	964.0	1079.2	1161.4	1210.7	1155.9	1229.2
Total Equity	823.2	927.0	994.2	1103.1	1513.5	1698.2	1501.0	1673.0	1807.6	1913.3	1903.1	2046.5
Long Term Debt	387.0	415.9	388.1	417.4	438.7	460.7	414.7	401.5	410.3	423.8	426.9	439.0
Current Liabilities												
Current Portion of Long-Term Debt	16.1	23.8	24.9	38.8	42.4	38.9	45.7	47.8	48.0	55.3	58.4	51.9
Short-Term Debt	1.0	3.1	0.6	0.7	6.2	0.0	0.0	0.0	0.0	2.0	2.0	7.0
Income Tax	6.4	7.0	7.2	1.9	2.1	6.7	0.8	1.7	1.7	2.0	2.2	1.9
Account Payable	93.8	52.5	92.7	69.9	34.7	31.3	28.2	16.7	22.7	15.5	14.7	18.7
Other Current Liabilities	16.8	12.2	15.3	23.0	22.3	24.8	10.6	11.4	12.2	12.6	13.1	13.7
Total Current Liabilities	134.1	98.6	140.7	134.3	107.7	101.8	85.4	77.5	84.7	87.5	90.4	93.1
Other Liabilities	4.7	4.7	7.1	7.6	8.0	8.8	3.7	3.9	4.1	4.3	4.4	4.6
TOTAL LIABILITIES AND EQUITY	1349.0	1446.2	1530.1	1662.4	2067.9	2269.4	2004.7	2155.9	2306.6	2428.8	2424.8	2583.2

a/ Consolidated for the Sector. See Definitions and assumptions in Attachment 2.3 for INDE. and Attachment 3.3 for EEG
b/ Figures may not add up because they have been rounded off.

ANNEX 3.9
Attachment 1.4

GUATEMALA

POWER DISTRIBUTION PROJECT

POWER SECTOR

Performance and Financial Indicators

	Actual 1982	1983	1984	Forecas 1985	1986	1987	1988	1989	1990	1991	1992	1993
1.- POWER SECTOR												
A.- Performance Indicators												
-Number of employees	8929	8471	8810	8640	7795	7290	6830	6430	6025	5670	5365	5112
-Number of customers ('000)	393	425	455	485	510	537	566	596	626	658	692	727
-Customers/employee	44	50	52	56	65	74	83	93	104	116	129	142
-MWh sold/employee	128	136	135	144	169	183	209	238	277	321	371	414
-Losses (% of Net Generation)	16.7	16.5	17.4	17.5	17.3	16.3	15.0	14.0	13.0	13.0	13.0	13.0
B.- Financial Indicators												
- Rate of return d/	8.0	14.2	12.3	5.7	4.7	5.5	5.0	5.2	5.2	5.5	5.7	5.5
- Self Financing Ratio e/	8.1	21.3	23.4	14.7	27.1	93.3	29.3	82.7	56.9	59.7	54.8	55.2
- Debt Service Coverage ratio f/	1.1	1.2	1.1	1.1	1.6	1.9	1.3	1.8	1.7	1.7	1.5	1.7
- Operating ratio (%)	81	66	71	72	61	57	53	51	50	50	51	50
- Accounts receivable (days)	110	132	131	123	84	47	56	59	60	61	63	64
2.- INDE												
A.- Performance Indicators												
-Number of employees a/ i/	7789	7295	7589	7407	6500	5950	5450	5000	4550	4150	3800	3500
-Number of customers ('000)	148	170	193	207	221	236	253	271	290	310	332	355
-Customers/employee	19	23	25	28	34	40	46	54	64	75	87	101
-Losses (% of Net Generation)	10.6	8.1	9.6	9.6	6.6	6.3	5.8	5.7	5.5	5.5	5.5	5.5
B.- Financial Indicators												
- Rate of return d/	4.5	11.4	8.0	5.5	4.8	5.1	5.2	5.2	5.2	5.5	5.7	5.5
- Self Financing Ratio g/	0.5	9.8	10.1	12.5	22.5	102.5	32.2	89.0	58.7	59.4	59.6	57.7
- Debt Service Coverage ratio h/	0.7	1.0	0.8	1.0	1.4	1.7	1.3	1.9	1.9	1.9	1.8	1.8
- Operating ratio (%)	83	63	71	62	51	49	44	45	43	43	44	44
- Accounts receivable (days) b/	203	190	147	100	63	63	60	61	62	62	63	64
3.- EEG												
A.- Performance Indicators												
-Number of employees i/	1140	1176	1221	1233	1295	1340	1380	1430	1475	1520	1565	1612
-Number of customers ('000)	245	255	262	278	289	301	313	325	336	348	360	372
-Customers/employee	215	217	215	225	223	225	227	227	228	229	230	231
-MWh sold/employee	820	801	797	815	801	799	820	836	878	923	971	999
-Losses (% of Net Generation)	12.2	12.6	13.3	13.9	13.8	13.0	12.0	11.0	10.0	10.0	10.0	10.0
B.- Financial Indicators												
- Rate of return d/	29.4	31.0	39.0	9.2	3.4	9.4	1.2	5.5	5.3	5.6	5.2	5.0
- Self Financing Ratio e/	238	412	266	58	57	42	6	49	41	63	26	29
- Operating ratio (%)	88	87	84	96	98	92	99	97	97	97	97	97
- Accounts receivable (days) c/	71	93	107	121	90	44	55	58	60	62	64	65

a/ It assumes a reduction of 907 employees in 1986 as a result of commissioning of Chixoy, and about 9% annual reduction betwwen 1986-1993 up to reaching 3500 employees in 1993.
b/ It assumes the following accounts receivable :Government and Municipalities (60 days); EEG (45 days) and Private (60 days)
c/ It assumes the following accounts receivable :Government and Municipalities (60 days); Private (40 days)
d/ Operating Income/Average Net Plant in Service
e/ (Net Internal cash Generation plus dividends paid by EEG less transfer to Government)/Total construction Program
f/ (Gross Internal Cash Generation less Equity Service)/Total Debt service
g/ (Net Internal cash Generation plus Dividend paid by EEG)/Total construction Program
h/ Gross Internal Cash Generation/Total Debt service
i/ It does not reflect the changes in personnel due to transfer of distribution responsabilities.

GUATEMALA

POWER DISTRIBUTION PROJECT

INDE

Actual and Forecast Income Statements
(Million of Current Dol) a/ j/

		Actual		Forecast									
		1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Sales (GWh)													
Bulk to EEG		641.3	819.4	742.4	788.0	1203.0	1231.0	1286.0	1344.0	1439.0	1559.0	1689.0	1790.0
Other Sales		204.5	207.3	212.6	241.0	283.0	266.0	298.0	333.0	373.0	418.0	468.0	505.0
Total Sales		845.8	1026.7	955.0	1029.0	1486.0	1497.0	1584.0	1677.0	1812.0	1977.0	2157.0	2295.0
Average Tariff (cents/kWh)	b/												
Bulk to EEG		8.8	8.2	8.0	9.4	7.7	9.1	6.4	9.3	8.9	8.9	9.1	8.4
Other Sales		12.2	12.5	12.3	12.8	12.8	16.1	9.2	12.8	12.4	12.4	12.5	11.7
Total Average Tariff		9.6	9.1	9.0	10.2	8.7	10.3	6.9	10.0	9.6	9.7	9.8	9.2
Operating Revenues													
Bulk to EEG		56.6	67.3	59.7	74.4	92.6	111.8	81.7	124.5	128.0	139.4	153.5	151.0
Other Sales		24.9	26.0	26.2	30.9	36.1	42.9	27.4	42.6	46.1	51.9	58.5	59.3
Other Revenues		0.1	0.1	0.1	0.2	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1
Total Operating Revenues		81.6	93.4	86.0	105.5	128.8	154.9	109.2	167.2	174.2	191.4	212.0	210.4
Operating Expenses	c/												
Fuel and Lubrication	d/	40.7	26.6	32.6	35.0	6.0	1.4	0.7	7.1	0.9	2.4	9.2	1.1
Operation and Maintenance	e/	10.9	13.2	9.9	9.7	13.0	17.6	13.5	13.3	14.2	15.1	15.3	15.7
General & Administration	f/	4.2	4.1	4.4	4.7	5.0	5.7	3.3	3.5	3.8	3.9	4.1	4.2
Other		2.5	3.4	3.3	4.5	5.0	5.8	2.5	2.7	2.9	3.0	3.1	3.2
Depreciation	g/	9.7	11.3	11.1	11.5	36.4	44.9	28.0	48.6	53.6	58.0	62.3	67.3
Total Operating Expenses		68.0	58.6	61.3	65.4	65.5	75.4	47.9	75.2	75.3	82.5	93.9	91.6
Operating Income		13.6	34.8	24.7	40.1	63.3	79.6	61.3	92.0	98.9	108.9	118.1	118.8
Non-Operating Income		-0.6	2.1	0.5	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1
Net Income before Interest		13.0	36.9	25.2	40.3	63.5	79.8	61.4	92.1	99.0	109.1	118.2	118.9
Interest Charges	h/	22.2	23.8	25.0	24.5	33.8	32.3	31.8	32.1	33.5	43.4	48.6	53.6
Less: Interest During Construction		12.6	13.3	21.5	13.2	2.7	3.1	6.0	6.1	4.4	7.9	8.0	7.0
Interest Charged to Operation		9.6	10.5	3.5	11.4	31.1	29.2	25.9	26.0	29.1	35.6	40.7	46.6
Previous Years Adjustments		11.2	5.0	-3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Net Income		14.6	31.4	18.4	29.0	32.5	50.7	35.5	66.1	69.9	73.5	77.5	72.3
Participation in EEG	i/	4.0	0.0	11.4	2.9	2.5	8.3	0.9	2.1	2.1	2.5	2.6	2.4

a/ It has been assumed an exchange rate of : 1 US$ = 2.5 Q for the debt service since 1988
b/ Tariffs have been forecast in line with a 5% rate of return.
c/ The operating costs have been estimated based on historical trend and considering improvement in efficiency.
d/ Based on thermal generation forecasted for isolating systems.
e/ Forecasted as a function of related variables: transmission (gross assets), distribution (number of customers) and generation (maintained constant in real terms)
f/ It assumes that would be maintained constant in real terms.
g/ Forecast 86-93 depreciation was calculated based on depreciation rate recommended by Beck Co.
h/ See Attachment 2.7.
i/ 91.7% of EEG Equity.
j/ Figures may not add up because they have been rounded off.

GUATEMALA

POWER DISTRIBUTION PROJECT

INDE

Sources and Application Statements
(Million of Current Dollars) a/ j/

		Actual			Forecast									total
S O U R C E S		1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	Period 85-93
Internal Sources														
Income Before Interest		13.0	36.9	25.2	40.3	63.5	79.8	61.4	92.1	99.0	109.1	118.2	118.9	782.3
Depreciation		9.7	11.3	11.1	11.5	36.4	44.9	28.0	48.6	53.6	58.0	62.3	67.3	410.6
Other non-cash expenses		1.7	1.7	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gross Internal Cash Generation		24.4	49.9	37.9	51.8	99.9	124.7	89.4	140.7	152.6	167.1	180.5	186.2	1192.9
Less: Debt Service														
Amortization	b/	13.8	28.2	24.3	24.9	38.8	42.4	38.9	43.3	45.4	45.6	49.4	52.5	381.2
Interest Charges	c/	22.2	23.8	25.0	24.5	33.8	32.3	31.8	32.1	33.5	43.4	48.6	53.6	333.7
Total Debt Service		36.0	52.0	49.3	49.4	72.5	74.7	70.7	75.5	78.9	89.1	98.0	106.1	714.9
Less: Interest During Construction		12.6	13.3	21.5	13.2	2.7	3.1	6.0	6.1	4.4	7.9	8.0	7.0	58.3
Net Debt Service		23.4	38.7	27.8	36.2	69.8	71.6	64.8	69.3	74.5	81.2	90.1	99.1	656.6
Net Internal Cash Generation		1.0	11.2	10.1	15.6	30.1	53.2	24.6	71.3	78.1	85.8	90.4	87.2	536.4
Dividends paid by EEG	d/	0.0	0.0	1.1	0.1	2.9	22.5	4.9	2.5	3.7	3.7	4.1	4.2	48.6
Transfer to Government	e/	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.0	20.0	20.0	36.0	4.8	92.8
Borrowings	f/													
Proposed IBRD Loan		0.0	0.0	0.0	0.0	0.0	9.7	12.5	11.7	7.2	4.8	0.0	0.0	46.0
Other existing Loans		162.8	60.2	13.2	68.1	57.9	7.5	7.8	7.9	0.7	0.0	0.0	0.0	149.9
Future Loans		0.0	0.0	0.0	0.0	5.8	18.8	40.0	7.1	41.9	58.3	46.9	58.0	276.8
Total Borrowings		162.8	60.2	13.2	68.1	63.7	36.0	60.4	26.7	49.8	63.1	46.9	58.0	472.7
Government Contribution	g/	47.3	75.1	40.5	76.9	53.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	130.6
TOTAL SOURCES		211.1	146.5	64.9	160.7	150.3	111.7	89.9	88.6	111.6	132.7	105.4	144.6	1095.5
A P P L I C A T I O N S														
Construction Program	h/													
Ongoing and future Works		208.1	101.5	89.5	112.4	143.6	58.0	71.7	50.5	92.1	101.9	90.2	143.1	863.6
Proposed Project		0.0	0.0	0.0	0.0	0.0	12.7	14.0	12.9	8.8	7.3	0.0	0.0	55.6
Sub total		208.1	101.5	89.5	112.4	143.6	70.7	85.6	63.4	100.9	109.2	90.2	143.1	919.2
Interest During Construction		12.6	13.3	21.5	13.2	2.7	3.1	6.0	6.1	4.4	7.9	8.0	7.0	58.3
Total Construction Program		220.7	114.8	111.0	125.6	146.3	73.8	91.6	69.5	105.3	117.1	98.2	150.1	977.5
Variation in Working Capital	i/	-9.6	31.7	-46.1	35.1	4.0	38.0	-1.7	19.1	6.3	15.6	7.2	-5.6	118.0
TOTAL APPLICATIONS		211.1	146.5	64.9	160.7	150.4	111.8	89.9	88.6	111.6	132.7	105.4	144.5	1095.5

a/ It has been assumed an exchange rate of : 1 US$ = 2.5 Q for debt service since 1988.
b/ See Attachment 2.6.
c/ See Attachment 2.7
d/ Assumes that EEG would pay to INDE 91.7% of Annual Net Income as Cash Dividend.
e/ Assumes that INDE would transfer annual surplus to Government since 1989
f/ See Attachment 2.5
g/ A Government Constribution is required in 1986.
h/ See Annex 2.2
i/ Working Capital has been defined as the sum of Current Assets less Current Liabilities (Exclusive of current portion of Long-Term debt)
j/ Figures may not add up because they have been rounded off.

GUATEMALA

POWER DISTRIBUTION PROJECT

INDE

Actual and Forecast Balance Sheet
(Million of Current Dollars) a/ i/

		Actual			Forecast								
A S S E T S		1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Plants in Operation	b/	364.7	379.2	395.3	1242.4	1747.3	1930.5	1980.1	2147.7	2352.5	2486.6	2697.9	2837.4
Less: Accumulated Depreciation		59.7	72.1	84.6	96.1	251.9	314.5	251.2	319.1	397.0	472.8	556.4	648.8
Net Plants		305.0	307.1	310.7	1146.3	1495.4	1616.1	1728.9	1828.6	1955.5	2013.7	2141.5	2188.6
Work in Progress		851.6	943.1	1015.8	294.3	282.6	295.5	108.8	140.3	141.8	188.3	37.8	142.9
Total Fixed Assets		1156.6	1250.2	1326.5	1440.6	1778.0	1911.6	1837.7	1968.9	2097.3	2202.0	2179.3	2331.5
Other Assets													
EEG shares		0.0	55.6	72.1	74.8	74.5	60.3	19.7	18.9	16.9	15.3	13.4	11.1
Other Assets		0.0	0.1	2.9	2.9	2.9	3.0	1.2	1.2	1.2	1.2	1.2	1.2
Total Other Assets		0.0	55.7	75.0	77.7	77.4	63.3	20.9	20.1	18.1	16.5	14.6	12.3
Current Assets													
Cash and Banks		25.2	30.5	22.4	37.9	33.0	63.9	10.0	10.8	15.8	19.2	16.8	7.5
Receivables from EEG	c/	10.9	12.7	6.7	9.2	10.1	12.3	9.0	13.6	14.0	15.3	16.8	16.5
Accounts Receivable	d/	20.6	22.4	17.4	11.2	5.9	7.1	4.5	7.0	7.6	8.5	9.6	9.7
Inventories	e/	23.2	23.0	36.8	38.3	23.2	25.4	25.9	29.4	30.8	32.8	42.4	42.8
Other		27.9	20.8	17.4	18.5	16.5	10.6	12.8	9.5	15.1	16.4	13.5	21.5
Total Current Assets		107.8	109.4	100.7	115.1	88.8	119.2	62.2	70.4	83.3	92.2	99.2	98.0
TOTAL ASSETS		1264.4	1415.3	1502.2	1633.4	1944.2	2094.0	1920.8	2059.4	2198.7	2310.7	2293.1	2441.9
L I A B I L I T I E S A N D E Q U I T Y													
Equity													
Capital		720.5	839.7	876.5	953.4	1007.1	1007.1	402.9	402.9	402.9	402.9	402.9	402.9
Retained Earnigs		48.0	79.2	114.7	146.4	181.3	240.3	132.5	188.7	240.7	296.7	340.8	410.7
Revaluation Reserve	f/	0.0	0.0	0.0	0.0	227.5	332.2	914.1	1024.4	1101.0	1146.7	1088.2	1157.5
Total Equity		768.5	918.9	991.2	1099.8	1416.0	1579.6	1449.4	1616.0	1744.6	1846.2	1831.8	1971.0
Long Term Debt		385.1	415.9	388.1	417.4	438.7	435.8	396.3	377.6	381.8	395.5	390.0	399.5
Current Liabilities													
Short Term Debt		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Current Portion of Long-Term Debt		13.8	21.9	24.9	38.8	42.4	38.9	43.3	45.4	45.6	49.4	52.5	48.4
Account Payable	g/	86.5	47.4	87.0	61.4	31.0	22.4	24.4	12.6	18.4	11.0	10.0	13.8
Other Current Liabilities	h/	10.5	11.2	9.1	14.1	14.2	15.2	6.5	6.9	7.4	7.7	8.0	8.3
Total Current Liabilities		110.8	80.5	121.0	114.3	87.6	76.5	74.2	64.9	71.4	68.1	70.5	70.5
Other Liabilities		0.0	0.0	1.9	1.9	2.0	2.0	0.8	0.8	0.8	0.8	0.8	0.8
TOTAL LIABILITIES AND EQUITY		1264.4	1415.3	1502.2	1633.4	1944.3	2093.9	1920.7	2059.3	2198.6	2310.7	2293.1	2441.9

a/ It has been assumed an exchange rate of : 1 US$ = 2.5 Q for debt service since 1988
b/ Revaluated starting 1986, according to methodology recommended by Beck. Co.
c/ Forecasted as 40 days of billing starting 1986
d/ Forecast estimated on the basis of decreasing number of billing days (from 135 in 1985 to 60 days in 1987 and thereafter). See indicators in Attachment 1.4.
e/ Forecast estimated as a percentage (1.5%) of gross assets in service and 30 days of fuel expenses.
f/ It takes into account assets revaluation and devaluation effect.
g/ Forecast estimated as a decreasing trend of investment program from 90 days in 1986 to 30 days in 1987 and thereafter and 30 days of opearting expenses (exclusive depreciation).
h/ It has been forecast assuming the 1985 level would remain constant in real terms.
i/ Figures may not add up because they have been rounded off.

GUATEMALA

POWER DISTRIBUTION PROJECT

INDE

LONG-TERM DEBT SCHEDULE

LENDER	(Number)	PURPOSE	MONTH/ YEAR	AMOUNT MILLION US$	GRACE PERIOD YEARS	TOTAL REPAYMENT PERIOD YEARS	INTEREST (%)	COMMITMENT FEE (%)	OUTSTANDING BALANCE AS OF 12/31/85 h/
EXISTING LOANS									
Bonds	(21-72 & 42-83)	EEG's share	04/1983	6.00 c/	-	15	2.5;8.12	-	2.40
Bonds	(73-73)	Thermal Plants	09/1973	20.00	-	18	2.50	e/	6.10
Bonds	(13-81)	Aguacapa,Sta.Maria & Chixoy	05/1981	115.00 c/	3.0	15	1.50	g/	109.24
AID	(520-L-019)	Rural Electrification I	08/1971	6.99	10.0	40	2a/;3b/	-	6.47
AID	(520-T-031) *	Rural Electrification II	05/1979	8.60	10.0	40	2a/;3b/	-	6.20
AID	(520-T-038) *	Rural Electrification II	05/1979	2.00	10.0	40	2a/;3b/	-	*
CABEI	(75)	Chixoy Roads	11/1974	5.40	5.0	15	8.00	0.75	2.16
CABEI	(75-1)	Chixoy Roads	06/1978	7.50	5.0	15	8.75	0.75	5.63
CABEI	(101)	Escuintla-Guate Sur Transm.	12/1975	8.72	5.0	15	8.00	0.75	4.36
CABEI	(101-1)	Escuintla-Guate Sur Transm.	06/1978	1.31	5.0	15	8.75	0.75	0.97
CABEI	(102-1)	Aguacapa and Other Studies	06/1978	1.49	2.5	7	8.75	0.75	0.00
CABEI	(142)	Chulac and Xalala Studies	06/1979	2.00	2.0	10	8.75	0.75	0.87
CABEI	(536-FO)	Guate Sur-Guate-Norte Transm.	01/1980	14.00	5.0	15	8.75	0.75	13.30
CABEI	(166)	Guatemala-Salvador Interconn.	04/1981	10.40	5.0	15	8.75	0.75	3.18
IBRD	(487-GU)	Jurun-Marinala Hydro Plant	06/1967	15.00	3.0	25	6.00	0.375	6.66
IBRD	(545-GU)	Gaucalate Thermal Plant	06/1968	7.00	4.0	23	6.25	0.75	2.84
IBRD	(1426-GU)	Aguacapa Hydro Plant	06/1977	55.00	4.0	17	8.20	0.75	34.65
IBRD	(1605-GU)	Chixoy hydro Plant	07/1978	72.00	4.0	17	7.50	0.75	55.36
IBRD	(1605-1-GU)	Chixoy hydro Plant	09/1984	44.60	4.0	17	9.29	1.25	33.25
IDB	(301/OC-GU)	Chixoy hydro Plant	01/1976	10.00	6.5	25	8.00	1.25	8.16
IDB	(454/SF-GU)	Chixoy hydro Plant	01/1976	45.00	10.5	40	1a/;2b/	0.50	45.00
IDB	(6/VF-GU)	Chixoy hydro Plant	01/1976	35.00 d/	6.5	25	8.00	1.25	28.55
IDB	(301-A/OC-GU)	Chixoy hydro Plant	12/1981	45.00	3.0	20	9.25	1.25	43.67
IDB	(302-A/OC-GU)	Chixoy hydro Plant	12/1981	25.00	2.5	7	Libor+1	0.5;0.625 f/	16.67
IDB	(456-O-GU)	Geothermal Studies & Constr.	09/1984	34.13	5.0	15	9.25	1.25	0.00
IDB	(739-O-GU)	Geothermal Studies & Others	06/1985	18.48	5.0	40	1.00	0.50	0.00
IDB	(169/OC-GU)	Chixoy hydro Plant	10/1985	57.00	2.0	20	10.00	1.25	20.43
OPEP	(339-P)	Geothermal Studies	07/1983	1.10	4.0	14	3.00	1.00	0.00
								Total	456.12
PROPOSED									
IBRD		Various Works,Studies & Training		77.00	5.0	15	8.50	0.75	
FUTURE									
-1		Escuintla-San Sebastian Line	1986	21.07	3.0	15	2	-	
-2		Sub-Transmission System	1986	16.32	4.0	17	10	0.75	
-3		Distribution System	1987	22.13	4.0	17	10	0.75	
-4		Sta Maria Hydro Plant	1989	123.20	4.0	17	10	0.75	
-5		Distribution System	1990	26.08	4.0	17	10	0.75	
-6		Geothermal Plant II	1993	48.00	4.0	17	10	0.75	
-7		Several Projects	1988	20.00	1.0	5	10	-	

a/ During grace period
b/ During amortization period
c/ In Quetzals
d/ Of this total, US$50 million in US dollars, and US$5 million in Bolivares (Bol$21.5 million equiv.)
e/ Other fees: Service 0.25
f/ Other fees: Front end 1.4
g/ Other fees: Service 0.75
h/ Mission estimates.
*/ Financed by the Government

GUATEMALA

POWER DISTRIBUTION PROJECT

INDE

FORECAST LONG-TERM LOAN DISBURSEMENT STATEMENT

Thousands of Current Dollars

		Forecas							Total
	1986	1987	1988	1989	1990	1991	1992	1993	86-93
1.- EXISTING BORROWINGS									
IDB 301 A - OC - GU	0	0	0	0	0	0	0	0	0
IDB 302 A - OC - GU	0	0	0	0	0	0	0	0	0
IDB 456 - OC - GU	3894	4900	6799	7925	729	0	0	0	24247
IDB 739 - SF - GU	5496	40	0	0	0	0	0	0	5536
IDB 169 - O - GU	32316	1175	0	0	0	0	0	0	33491
IBRD 1605 GU	0	0	0	0	0	0	0	0	0
IBRD 1605 A GU	5848	1380	1000	0	0	0	0	0	8228
AID 520 T 031	2352	0	0	0	0	0	0	0	2352
AID 520 T 038	2000								
CABEI 1 0166 0	5210	0	0	0	0	0	0	0	5210
CABEI 1 0536 F0	0	0	0	0	0	0	0	0	0
OPEC 339 - P	754	0	0	0	0	0	0	0	754
Total existing Loans	57870	7495	7799	7925	729	0	0	0	81818
2.- PROPOSED IBRD LOAN	0	9730	12530	11740	7190	4810	0	0	46000
3.- FUTURE LOANS a/									
- 1	3669	9010	8390	0	0	0	0	0	21068
- 2	2151	2789	6055	2177	1745	1401	0	0	16318
- 3	0	7018	5593	4907	4615	0	0	0	22133
- 4	0	0	0	0	35500	49300	38400	0	123200
- 5	0	0	0	0	0	7600	8529	9952	26081
- 6	0	0	0	0	0	0	0	48000	48000
- 7	0	0	20000	0	0	0	0	0	20000
Total Future Loans	5820	18817	40038	7084	41860	58301	46929	57952	276800
TOTAL BORROWINGS	63690	36042	60367	26749	49779	63111	46929	57952	404618

GUATEMALA

POWER DISTRIBUTION PROJECT

INDE

FORECAST OF AMORTIZATION 1986-1994

In Thousands

		Forecast								
		1986	1987	1988	1989	1990	1991	1992	1993	1994
1.- INTERNAL LOANS (Thousands of quetzals)										
Bonds Decree (73-73)		1332	1332	1332	1332	773	0	0	0	0
Bonds Decree (13-81)		9200	9200	9200	9200	9200	9200	9200	9200	9200
Bonds EEGSA Decree (21-72 and 42-83)		1200	1200	0	0	0	0	0	0	0
Total Internal Loans		11732	11732	10532	10532	9973	9200	9200	9200	9200
2.- EXTERNAL EXISTING LOANS (Thousands of Dollars)										
IDB	006 - VF - GU	1842	1842	1842	1842	1842	1842	1842	1842	1842
IDB	301 - OC - GU	526	526	526	526	526	526	526	526	526
IDB	301 A - OC - GU	2813	2813	2813	2813	2813	2813	2813	2813	2813
IDB	302 A - OC - GU	5556	5556	5556	0	0	0	0	0	0
IDB	454 - SF - GU	750	1500	1500	1500	1500	1500	1500	1500	1500
IDB	456 - OC - GU	0	0	0	1625	3250	3250	3250	3250	3250
IDB	739 - SF - GU	0	0	0	0	0	0	0	0	0
IDB	169 - O - GU	0	2222	4444	4444	4444	4444	4444	4444	4444
IBRD	487 GU	865	915	975	1035	1095	1160	615	0	0
IBRD	545 GU	445	475	505	540	570	305	0	0	0
IBRD	1426 GU	4070	4070	4070	4070	4070	4070	4070	4070	4070
IBRD	1605 GU	5540	5540	5540	5540	5540	5540	5540	5540	5540
IBRD	1605 A GU	0	0	1652	3304	3304	3304	3304	3304	3304
AID	520 L 019	159	164	169	174	179	184	190	195	200
AID	520 T 031	0	0	0	0	0	0	0	0	0
AID	520 T 038		0	0	0	0	0	0	0	0
CABEI	1 075 0	540	540	540	540	0	0	0	0	0
CABEI	1 075 1	750	750	750	750	750	750	750	375	0
CABEI	1 0101 0	872	872	872	872	872	0	0	0	0
CABEI	1 0101 1	133	133	133	133	133	133	133	42	0
CABEI	1 0102 1	0	0	0	0	0	0	0	0	
CABEI	1 0142 0	250	250	250	121	0	0	0	0	
CABEI	1 0166 0	520	1040	1040	1040	1040	1040	1040	1040	1040
CABEI	1 0536 FO	1400	1400	1400	1400	1400	1400	1400	1400	1400
OPEC	339 - P	0	53	105	105	105	105	105	105	105
Total Foreign Loans		27030	30661	34682	32374	33432	32366	31521	30446	30034
3.- Proposed IBRD Loan		0	0	0	0	0	0	4600	4600	4600
4.- Future Borrowings										
- 1		0	0	0	1755	1755	1755	1755	1755	1755
- 2		0	0	0	0	1209	1209	1209	1209	1209
- 3		0	0	0	0	0	1640	1640	1640	1640
- 4		0	0	0	0	0	0	0	9126	9126
- 5		0	0	0	0	0	0	0	0	0
- 6		0	0	0	0	0	0	0	0	0
- 7		0	0	0	5000	5000	5000	5000	0	0
Total Future Loans		0	0	0	6755	7964	9604	9604	13730	13730
TOTAL AMORTIZATION (Thousands of Dollars)		38762	42393	38894	43342	45386	45650	49405	52456	48364

GUATEMALA

POWER DISTRIBUTION PROJECT

INDE

FORECAST OF INTEREST PAYMENTS 1986-1993

In Thousands

		Forecas							
		1986	1987	1988	1989	1990	1991	1992	1993
1.- INTERNAL LOANS (in Thousands of quetzals)									
Bonds Decree (73-73)		181	120	88	53	20	0	0	0
Bonds Decree (13-81)		2600	1495	1395	1296	1196	1096	997	897
Bonds EEGSA Decree (21-72 and 42-83)		192	96						
Total Internal Loans		2953	1711	1481	1349	1216	1096	997	897
2.- EXTERNAL EXISTING LOANS (Thousands of Dollars)									
IDB	006 - VF - GU	2321	2137	1990	1843	1695	1548	1400	1252
IDB	301 - OC - GU	663	611	569	527	485	443	400	357
IDB	301 A - OC - GU	4163	3903	3643	3383	3122	2862	2602	2219
IDB	302 A - OC - GU	2708	1358	581	0	0	0	0	0
IDB	454 - SF - GU	863	870	840	810	780	750	720	690
IDB	456 - OC - GU	241	587	1137	1734	1900	1642	1341	1040
IDB	739 - SF - GU	50	55	55	55	55	55	55	55
IDB	169 - IC - GU	4473	5356	5100	4725	4280	3837	3390	2950
IBRD	487 GU	412	348	293	235	173	107	19	0
IBRD	545 GU	170	143	113	81	46	10	0	0
IBRD	1426 GU	2925	2508	2174	1841	1507	1173	839	505
IBRD	1605 GU	4257	3634	3219	2803	2388	1972	1557	1141
IBRD	1605 A GU	3556	3876	3973	3791	3494	3196	2898	2602
AID	520 L 019	193	189	184	179	173	168	163	158
AID	520 T 031	169	172	172	172	172	172	172	172
AID	520 T 038	0	0	0	0	0	0	0	0
CABEI	1 075 0	184	130	87	44	0	0	0	0
CABEI	1 075 1	509	427	361	296	230	165	99	0
CABEI	1 0101 0	366	280	210	140	70	0	0	0
CABEI	1 0101 1	88	74	62	51	39	28	16	
CABEI	1 0102 1	0	0	0	0	0	0	0	0
CABEI	1 0142 0	82	55	33	11	0	0	0	
CABEI	1 0166 0	817	842	751	660	569	478	387	143
CABEI	1 0536 FO	1194	1011	888	766	643	529	398	276
OPEC	339 - P	14	32	29	26	23	20	17	14
Total Foreign Loans		30418	28598	26464	24173	21853	19155	16473	13574
3.- Proposed IBRD Loan		0	830	1540	2470	3270	3910	3812	3421
4.- Future Borrowings									
- 1		40	160	340	410	380	340	310	270
- 2		340	460	800	1200	1600	1480	1360	1240
- 3		0	510	1100	1580	2000	2170	2010	1850
- 4		0	0	0	0	2700	6670	10700	12320
- 5		0	0	0	0	0	580	1330	2110
- 6		0	0	0	0	0	0	0	2500
- 7		0	0	1000	1750	1250	750	250	0
Total Future Loans		380	1130	3240	4940	7930	19920	27950	36250
TOTAL INTEREST PAYMENT (Thousands of Dollars)		33751	32269	31836	32123	33539	43423	48634	53604

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POWER DISTRIBUTION PROJECT

EEG

Actual and Forecast Income Statements
(Million of Current Dollars) a/ f/

		Actual			Forecast								
		1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Sales (GWh)		934.4	942.0	973.6	1005.3	1037.0	1071.0	1132.0	1196.0	1295.0	1403.0	1520.0	1611.0
Average Tariff (cents/kWh)	b/	13.2	13.0	12.7	12.8	5.1	6.4	9.2	12.8	12.4	12.4	12.5	11.8
Operating Revenues													
Energy Sales		123.3	122.2	123.9	128.2	52.8	69.0	104.0	152.6	160.0	174.5	190.6	190.0
Other Revenues		0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3
Total Operating Revenues		123.7	122.5	124.2	128.4	53.0	69.2	104.2	152.8	160.2	174.8	190.8	190.2
Operating Expenses	c/												
Fuel and Lubrication		30.9	18.1	24.3	25.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Operation and Maintenance		7.7	8.2	9.0	10.5	5.7	7.7	8.6	9.4	11.0	11.9	12.6	13.1
Purchased Energy		56.6	67.3	59.7	74.4	37.0	44.7	81.7	124.5	128.0	139.4	153.5	151.0
General & Administration		3.2	3.7	4.6	5.1	2.4	3.1	3.6	3.9	4.3	4.6	4.9	5.1
Other		6.0	4.4	2.4	2.9	1.4	2.5	2.7	2.9	3.1	3.2	3.4	3.5
Depreciation	d/	4.3	4.7	4.7	5.6	5.2	5.8	6.8	8.0	9.2	10.4	11.3	12.4
Total Operating Expenses		108.7	106.4	104.7	123.9	51.7	63.9	103.4	148.7	155.7	169.5	185.7	185.1
Operating Income		15.0	16.1	19.5	4.5	1.2	5.3	0.8	4.1	4.5	5.2	5.1	5.1
Non-Operating Income		0.7	0.7	0.6	1.4	0.7	0.9	0.9	1.0	1.1	1.1	1.2	1.2
Net Income before Interest		15.7	16.8	20.1	5.9	2.0	6.2	1.7	5.1	5.6	6.3	6.3	6.3
Interest Charges		1.4	1.1	0.7	0.7	0.2	1.5	1.6	2.4	2.7	2.9	3.7	4.5
Less: Interest During Construction		0.2	0.1	0.2	0.2	0.1	1.5	1.6	1.3	1.1	1.2	2.4	2.5
Interest Charged to Operation		1.2	1.0	0.5	0.5	0.1	0.0	0.0	1.1	1.6	1.7	1.3	2.0
Net Income Before Tax		14.5	15.8	19.6	5.4	1.8	6.2	1.7	3.9	3.9	4.6	5.0	4.3
Income Tax	e/	6.4	7.0	7.2	2.3	0.8	2.6	0.7	1.7	1.7	1.9	2.1	1.8
Net Income After Tax		8.1	8.8	12.4	3.1	1.1	3.6	1.0	2.3	2.3	2.7	2.9	2.5

a/ It has been used an exchange rate of : 1 US$ = 2.5 Q since 1986.
b/ Tariffs have been forecast in line with a 5% rate of return.
c/ Except where noted otherwise, the operating expenses are estimated by EEg based on historic average .
d/ Forecast 86-93 depreciation was calculated based on depreciation rate recommended by Beck Co.
e/ Estimated as 42% Net income.
f/ Figures may not add up because they have been rounded off.

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POWER DISTRIBUTION PROJECT

EEG

Sources and Application Statements
(Million of Current Dollars) a/ e/

SOURCES	Actual 1982	1983	1984	Forecas 1985	1986	1987	1988	1989	1990	1991	1992	1993	total Period 85-93
Internal Sources													
Income Before Interest	15.7	16.8	20.1	5.9	2.0	6.2	1.7	5.1	5.6	6.3	6.3	6.3	45.4
Depreciation	4.3	4.7	4.7	5.6	5.2	5.8	6.8	8.0	9.2	10.4	11.3	12.4	74.7
Gross Internal Cash Generation	20.0	21.5	24.8	11.5	7.2	12.0	8.5	13.1	14.8	16.7	17.6	18.7	120.0
Less:													
Income taxes	0.0	6.4	7.0	7.2	0.7	0.8	2.6	0.7	1.7	1.7	1.9	2.1	19.3
Dividends b/	0.1	0.1	1.1	0.1	1.3	9.1	5.2	2.6	3.9	3.9	4.3	4.5	34.7
Total	0.1	6.5	8.1	7.3	1.9	9.8	7.8	3.3	5.5	5.5	6.2	6.6	54.1
Less: Debt Service													
Amortization	1.3	0.0	0.0	0.0	0.0	0.0	0.0	2.4	2.4	2.4	5.9	5.9	19.0
Interest Charges	1.4	1.1	0.7	0.7	0.2	1.5	1.6	2.4	2.7	2.9	3.7	4.5	20.3
Total Debt Service	2.7	1.1	0.7	0.7	0.2	1.5	1.6	4.8	5.1	5.3	9.6	10.4	39.3
Less: Interest During Construction	0.2	0.1	0.2	0.2	0.1	1.5	1.6	1.3	1.1	1.2	2.4	2.5	11.8
Net Debt Service	2.5	1.0	0.5	0.5	0.1	0.0	0.0	3.5	4.0	4.1	7.2	7.9	27.5
Net Internal Cash Generation	17.4	14.0	16.2	3.7	5.1	2.2	0.7	6.2	5.2	7.1	4.2	4.2	38.5
Borrowings													
Proposed IBRD Loan	0.0	0.0	0.0	0.0	0.0	3.4	5.3	7.9	7.0	5.7	4.5	1.1	35.0
Existing and Future Loans	0.0	0.7	0.0	0.0	0.0	6.5	5.5	0.0	0.0	0.0	10.0	5.0	27.0
Total Borrowings	0.0	0.7	0.0	0.0	0.0	9.9	10.8	7.9	7.0	5.7	14.5	6.1	62.0
Consumer's Contribution	1.8	2.0	1.9	2.0	1.5	1.2	1.3	1.4	1.5	1.6	1.7	1.7	14.0
TOTAL SOURCES	19.2	16.7	18.1	5.7	6.6	13.4	12.9	15.5	13.7	14.3	20.3	12.0	114.5
APPLICATIONS													
Construction Program c/													
Ongoing and future Works	7.1	3.3	5.9	6.2	8.9	1.8	2.1	0.7	1.2	0.6	6.1	10.0	37.7
Proposed Project	0.0	0.0	0.0	0.0	0.0	4.9	7.7	10.9	10.2	9.5	7.5	1.8	52.4
Sub total	7.1	3.3	5.9	6.2	8.9	6.7	9.8	11.5	11.4	10.1	13.7	11.8	90.1
Interest During Construction	0.2	0.1	0.2	0.2	0.1	1.5	1.6	1.3	1.1	1.2	2.4	2.5	11.8
Total Construction Program	7.3	3.4	6.1	6.4	9.0	8.2	11.4	12.8	12.5	11.3	16.1	14.3	102.0
Constructions for Customers	1.8	2.0	1.6	2.0	1.5	1.2	1.3	1.4	1.5	1.6	1.7	1.7	14.0
Variation in Working Capital d/	10.1	11.3	10.4	-2.7	-3.8	3.9	0.1	1.3	-0.3	1.5	2.6	-4.0	-1.5
TOTAL APPLICATIONS	19.2	16.7	18.1	5.7	6.6	13.4	12.9	15.5	13.7	14.4	20.3	12.0	114.5

a/ It has been used an exchange rate of : 1 US$ = 2.5 Q since 1986.
b/ Forecast assumes that EEG would pay 100% cash Dividend. In addition, it has been assumed that EEG would transfer to INDE Q 20 million in 1987, after Empagua Pays, and additionally Q 5 million thereafter.
c/ See detail in Annex 2.3
d/ Working Capital has been defined as the sum of Current Assets less Current Liabilities (Exclusive of current current portion of debt and income tax)
e/ Figures may not add up because they have been rounded off.

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POWER DISTRIBUTION PROJECT

EEG

Actual and Forecast Balance Sheet
(Million of Current Dollars) a/ f/

	Actual			Forecast								
ASSETS	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Plants in Operation	86.3	88.1	92.0	96.0	139.9	157.0	182.1	206.2	236.5	256.9	279.6	301.2
Less: Accumulated Depreciation	33.0	37.6	42.0	47.6	86.2	97.9	111.3	127.1	145.4	161.5	179.3	198.9
Net Plants	53.3	50.5	50.0	48.4	53.7	59.1	70.8	79.0	91.1	95.3	100.3	102.3
Work in Progress	1.2	2.3	3.4	3.0	8.3	13.4	10.4	11.8	8.7	9.0	12.6	16.5
Total Fixed Assets	54.5	52.8	53.4	51.4	62.0	72.6	81.2	90.9	99.8	104.3	112.9	118.8
Other Assets	0.0	0.0	0.2	0.3	0.3	0.6	0.8	1.0	1.2	1.4	1.5	1.6
Current Assets												
Cash and Banks	2.6	0.6	1.9	1.0	1.0	9.6	6.4	3.6	1.8	3.2	3.2	3.6
Temporary Surplus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Accounts Receivable b/	24.1	31.0	36.4	42.5	13.0	8.3	15.6	24.4	26.1	29.4	33.5	33.7
Inventories c/	9.1	8.9	7.5	9.0	3.1	3.5	3.7	3.9	4.2	4.4	4.7	4.9
Other d/	5.2	5.9	7.3	8.8	3.9	4.7	5.0	5.3	5.7	6.0	6.2	6.4
Total Current Assets	41.0	46.4	53.1	61.3	21.0	26.0	30.7	37.3	37.9	43.0	47.5	48.6
TOTAL ASSETS	95.5	99.2	106.7	113.0	83.3	99.2	112.7	129.1	138.9	148.7	161.9	169.0
LIABILITIES AND EQUITY												
Equity												
Capital	30.7	32.4	33.3	33.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3
Retained Earnings	24.0	31.3	41.8	44.8	17.7	12.3	8.1	7.8	6.2	5.0	3.6	1.6
Revaluation Reserve	0.0	0.0	0.0	0.0	37.7	45.9	49.9	54.8	60.4	64.0	67.8	71.8
Total Equity	54.7	63.7	75.1	78.1	68.8	71.5	71.3	75.9	79.9	82.3	84.7	86.6
Long Term Debt	1.9	0.0	0.0	0.0	0.0	9.9	18.4	23.9	28.5	28.3	36.9	39.5
Current Liabilities												
Current Portion of Long-Term Debt	2.3	1.9	0.0	0.0	0.0	0.0	2.4	2.4	2.4	5.9	5.9	3.5
Short-Term Debt	1.0	3.1	0.6	0.7	2.5	0.0	0.0	0.0	0.0	2.0	2.0	7.0
Payable to INDE e/	10.9	12.7	6.7	9.2	4.1	4.9	9.0	13.6	14.0	15.3	16.8	16.5
Account Payable f/	7.3	5.1	5.7	8.5	1.5	3.6	3.8	4.1	4.4	4.5	4.7	4.9
Income tax	6.4	7.0	7.2	1.9	0.9	2.7	0.8	1.7	1.7	2.0	2.2	1.9
Other Current Liabilities g/	6.3	1.0	6.2	8.9	3.2	3.9	4.1	4.4	4.7	4.9	5.1	5.3
Total Current Liabilities	34.2	30.8	26.4	29.2	12.1	15.0	20.1	26.3	27.3	34.7	36.7	39.1
Other Deferred Liabilities	3.2	3.2	3.2	3.2	1.4	1.5	1.6	1.7	1.8	1.9	1.9	2.0
Other Reserves for Contingencies	1.5	1.5	2.0	2.5	1.0	1.2	1.3	1.4	1.5	1.6	1.7	1.7
TOTAL LIABILITIES AND EQUITY	95.5	99.2	106.7	113.0	83.3	99.2	112.7	129.2	138.9	148.7	161.9	169.0

a/ It has been used an exchange rate of : 1 US$ = 2.5 Q since 1986.
b/ It is expected to decrease from 115 days in 1985 to 42 days in 1987 and thereafter.
c/ Forecasted as a function of gross assets, fuel consumption and construction program
d/ It has been forecast assuming the 1985 level would remain constant in real terms
e/ Forecast assumes EEG would pay to INDE within 45 days
f/ Figures may not add up because they have been rounded off.

ANNEX 3.10

GUATEMALA

POWER DISTRIBUTION PROJECT

POWER SECTOR TARIFFS

1. The tariff structures and levels of INDE and EEG are not uniform (Attachments 1 and 2). INDE's rate for bulk sales to EEG is established under a private agreement, not subject to Governmental approval. In compliance with conditions established in Bank Loans 1605-GU and 1406-GU1/ in February 1985, INDE's bulk sale rates were increased by 20%.

2. A Bank financed tariff study carried out by international consultants in 1983 found that INDE's and EEG's tariff structures were out of line with the structures calculated on the basis of long-term marginal costs. A subsequent review of the study by the staff of INDE's Planning Department, concluded that its assumptions were outdated. Until the expansion program for the sector has been defined, however, it would not make sense to carry out an update. However, some actions could still be undertaken to simplify the existing tariff schedules and promote their uniformity. In this regard, the plan of action for institutional improvement (Annex 3.1) agreed during negotiations with INDE and EEG included a review of the electricity tariff schedules based on criteria satisfactory to the Bank, to be made by INDE's staff and completed by December 31, 1986, and its recommendations subsequently implemented according to a timetable satisfactory to the Bank.

1/ The loan covenants provided that INDE's rates for bulk sales to EEG would be set at a level required to transfer to INDE all funds available to EEG in excess of EEG's requirements for operations, repayment of debt, net working capital and capital expenditures.

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POWER DISTRIBUTION PROJECT

INDE

ELECTRICITY RATES AS OF MAY 1, 1985 1/

	Number of Customers	Energy Billed Kwh	Minimum Energy Charge Q/kWh	Power Demand Charge Q/kW	Energy Charge Qcent/kWh
General Use Customers (ITG-1) without power demand at low voltage					
Energy Charge					
First 7 kWh	44,101	147,000	1.00		
Next 33 "	74,902	1,329,000			15.4
Next 80 "	25,219	1,890,000			12.3
Next 120 "	9,877	1,604,000			11.0
Above 240 "	3,706	1,720,000			10.0
General use: Government and Municipalities (ITG-2) without power demand at low voltage					
Energy Charge					
First 7 kWh	554	757	1.00		
Next 33 "	447	9,740			14.6
Next 80 "	483	37,173			11.7
Next 120 "	262	43,228			10.5
Above 240 "	309	284,041			9.5
General use: North Rural Customers (ITRU-1) without power demand at low voltage					
Energy Charge					
First 7 kWh	6,741	16,502	1.0		
Next 33 "	9,529	175,014			15.7
Next 80 "	3,843	278,243			12.3
Next 120 "	1,404	229,437			11.0
Above 240 "	504	256,696			10.0

	Number of Customers	Energy Billed Kwh	Minimum Energy Charge Q/kWh	Power Demand Charge Q/kW	Energy Charge Qcent/kWh
General use: Peten's Rural Customers (ITRU-2)					
Energy Charge					
First 7 kWh	875	2,240	1.15		
Next 33 "	1,971	39,053			16.7
Next 160 "	1,560	148,804			15.7
Next 150 "	156	39,528			15.1
Next 150 "	47	19,319			14.4
Next 150 "	18	10,351			14.0
Next 150 "	7	5,067			13.4
Next 200 "	5	4,297			12.8
Above 1000 "	9	14,559			11.7
Intermediate Consumption (IT C1-1) with a power demand lower than 50 kW					
Demand Charge				3.9	
Energy Charge					
First 100 kWh per kW	162	1,475			14.3
Next 100 kWh per kW	46	6,576			13.6
Above 200	404	1,362,810			12.7
High Consumption at high tension (ITAO-1) with a power demand greater than 50 Kw					
Demand Charge				3.9	
Energy Charge					
First 100 kWh per kW	8	11			13.36
Next 100 kWh per kW	2	272			12.9
Above 200	78	4,337,568			12.22
Municipality Electrical Distribution Utility (ITDD-1) with a power demand greater than 50 kW at primary voltage					
Demand Charge				3.55	
Energy Charge					
First 100 kWh/kW					9.00
Next 200 kWh/kW	2/	2/			7.77
Above 300					7.41
Agricultural water pumping, high consumption (ITB-1) with a power demand greater than 50 kW at primary voltage					
Demand Charge					
First 50 kW				170.0	
Above 50 kW				3.4	
Energy Charge					
First 10 MWh	-	-	950.0		
Next 10 MWh	-	-			9.5
Above-20 MWh	9	590683			8.6

	Number of Customers	Energy Billed Kwh	Minimum Energy Charge Q/kWh	Power Demand Charge Q/kW	Energy Charge Qcent/kWh
Agricultural Water Pumping, intermediate consumption (ITB-2) with a power demand lower than 50 kW					
Demand Charge					
First 4 kW			17 in season	13.50	
Above 4 kW			13.5 out of season	3.40	
Energy Charge					
First 50 kWh	25	9	3.5		
Next 100 kWh per kW	2	189			10.7
Above 150	33	94880			9.5
Drinking Water Pumping: high consumption (ITBM-1) with a power demand greater than 50 kW at primary voltage					
Demand Charge					
First 50 kW				170.00	
Above 50 kW				3.40	
Energy Charge					
First 10 MWh			970.0		
Next 10 MWh	3	35434			8.0
Above 20 MWh					7.1
Drinking Water Pumping: intermediate consumption (ITBM-2) with a power demand lower than 50 kW					
Demand Charge					
First 4 kW			16.25	13.50	
Above 4 kW				3.40	
Energy Charge					
First 50 kWh	2/	2/	2.7		
Next 100 kWh per kW					9.2
Above 150 kWh					8.1

Street Lighting

(ITAP-1): where municipalities are in charge of bill collection: 4 Q cents per installed kW
(ITAP-3): where INDE is in charge of bill collection: 3 Q cents additional to each customer
(ITAP-2): in Livingston and Peten: 5.5 Q cents per installed kW

1/ There are also temporary tariffs applied to: consumers with a power demand lower than 50 kW during less than 30 days.
- consumers with a load lower than 4 kW during less than 20 days (ITST-2)
- agricultural and minor consumers with a power demand greater than 50 kW and a total energy consumption of 132 MWh between 6 and 12 months.
- consumers with a load lower than 500 W and a duration of 16 days as a maximum (ITST-3).

2/ Not available at the time of preparation of this report.

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EEG

POWER DISTRIBUTION PROJECT

Electricity Rates as of June 30, 1985

	Number of Customers	Energy Billed MWh	Average Tariff Q cent/kWh	Minimum Charge Q cent/kWh	Demand Charge Q/kW	Energy Charge Q cent/kWh
Residential (R1)						
0-14 kWh	23453	169	29.23	192.18		2.72
15-60 kWh	72983	2494	13.70	243.00		11.76
61-200 kWh	84470	9368	12.13	771.00		11.29
Above-200 kWh	26705	12302	10.72	2462.22		9.49
General Use Customers (G1) with a demand less than 10 kW						
Demand Charge					2.388	
Energy Charge						
0-14 kWh	5496	30	50.56			14.85
15-200 kWh	34354	3167	15.96			14.57
Above 200 kWh	16036	8881	13.60			12.66
General Use Tariff (G1I) Apply on Industrial Customers						
Demand Charge					2.388	
Energy Charge						
0-14 kWh	14	-	-			14.85
15-200 kWh	60	6	18.44			14.57
Above 200 kWh	169	142	13.79			12.66
Government (G1G)						
Demand Charge					2.171	
Energy Charge						
0-14 kWh	110	0.4	-			14.46
15-200 kWh	513	55	14.16			13.29
Above 200 kWh	524	359	12.21			11.55
Municipalities (G1M)						
Demand Charge					2.171	
Energy Charge						
0-14 kWh	151	0.6	-			14.46
15-200 kWh	271	21	14.49			13.29
Above 200 kWh	186	178	12.02			11.55
General Use Customers (G2) with a demand greater than 10 kW						
Demand Charge					2.786	
Energy Charge						
0-100 kWh	637	795	19.70			13.13
101-200 kWh	465	2156	14.75			12.34
Above 200 kWh	425	4744	12.89			10.58

	Number of Customers	Energy Billed MWh	Average Tariff Q cent/kWh	Minimum Charge Q cent/kWh	Demand Charge Q/kW	Energy Charge Q cent/kWh
Industrial and Commercial (G2I) with a demand greater than 10 kW						
Demand Charge					2.913	
Energy Charge						
0-100 kWh	218	524	19.92			13.97
101-200 kWh	239	1953	15.65			13.14
Above 200 kWh	176	3894	13.58			11.30
Government (G2G) with a demand greater than 10 kW						
Demand Charge						
Energy Charge						
0-100 kWh	61	79	17.57			11.99
101-200 kWh	64	275	13.50			11.26
Above 200 kWh	63	854	11.80			9.67
Municipalities (G2M) with a demand greater than 10 kW						
Demand Charge					2.53	
Energy Charge						
0-100 kWh	35	54	18.70			11.99
101-200 kWh	19	92	13.40			11.26
Above 200 kWh	94	1291	11.33			9.67
Industrial at high tension (I1 & I1I) with a minimum charge of 225 kW						
Demand Charge					2.91	
Energy Charge						
0-100 kWh	19	596	18.38			12.97
101-200 kWh	39	2241	14.67			12.30
Above 200 kWh	91	17994	12.55			10.64
Government at high tension						
Demand Charge					2.53	
Energy Charge						
0-100 kWh	2	26	19.18			11.12
101-200 kWh	2	112	12.85			10.54
Above-200 kWh	4	640	11.11			9.09
Municipalities at high tension						
Demand Charge					2.53	
Energy Charge						
0-100 kWh	1	21	13.87			11.12
101-200 kWh	4	153	12.57			10.54
Above 200	4	3215	10.27			9.09

Street Lighting

Incandescent		Mix Light		Mercury		Sodium	
Lumen	Q/month	Lumen	Q/month	Lumen	Q/month	Lumen	Q/month
1000	3.57	2900	5.77	3200	5.23	3200	5.23
2500	6.22	5500	9.01	7000	7.01	7000	7.01
4000	9.72			11000	10.23	11000	10.23
				18000	14.85	18000	14.85

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POWER DISTRIBUTION PROJECT

ECONOMIC ANALYSIS

1. The Project consists of two distinct components: (i) capital expenditures, comprising EEG's distribution expansion program for the period 1987-1992 and selected items of INDE's investment program for the same period (thermal plant rehabilitation, dispatch center and associated communications facilities, computer center, vehicles, laboratory equipment); and (ii) preinvestment studies for INDE (para. 4.04c). The two components, however, are part of the Power Sector investment program and cannot be evaluated in isolation. Consequently, the economic analysis of the project was carried out for the entire investment program.

The Least-Cost Solution

2. EEG's distribution expansion program includes normal expansion of primary and secondary feeders and extension of the 69 kV subtransmission system. The expansion requirements were determined based on expected load growths and normal standards of quality of supply. In general, there were few alternatives for the distribution system expansion, other than to consider conductor and transformer sizing, and substation expansion, as explained below. Sizing of primary and secondary circuits and of distribution transformers was optimized to minimize total investment and operating cost. The design of 69 kV substations was revised andthe expansion of existing substation was analyzed as an alternative to the construction of new substations. The Program includes changing power transformers to increase their capacity in substations where this alternative was considered appropriate. Extension of the 69 kV subtransmission system in Guatemala City was limited to improvement in the reliability and flexibility of operation of the subtransmission network, necessary to adapt the distribution system to the latest 230 kV supply point (Guatemala Norte Substation) linked to the Chixoy Hydroelectric Plant. EEG existing subtransmission and distribution voltages (69 kV and 13.2 kV) are considered adequate for the planning horizon studied.

3. INDE's investment expansion program has been reviewed to ascertain that only essential investments in generation, transmission and distribution are planned. Least-cost generation expansion is discussed in para. 3.08 and Annex 3.6. Transmission, including the 69 kV subtransmission, is based on a previous study made by consultants which defined the maximum level of 230 kV as being adequate for system development beyond the period under consideration. The same study defined 69 kV as the adequate level for subtransmission. The present 230/69 kV program expansion was scheduled on

the basis of expected load growths and normal standards of quality supply. Distribution expansion has been designed as a normal expansion of the existing networks in the small and middle size cities covered by INDE, according to INDE's standards, to meet the expected load growth. Other capital investment items included in the program such as the dispatch center and associated communications, have been designed as to include the essential features required to help provide an acceptable level of reliability to the system operations, with minimum capital expenditures (Annex 4.4).

Economic Costs and Benefits

4. The program costs include capital investments, and incremental operation and maintenance costs associated to the expansion of capacity, and the costs of preinvestment studies mentioned above. Fuel expenses (derived from simulating the system's operation) were found to be incurred during the temporary shut-down of Chixoy and in the two years preceding the commissioning of new generation facilities, and valued at CIF prices of imported heavy fuel-oil. Capital investments consist of expenditures on generation, transmission, distribution, and other additions to fixed assets (communications, dispatch center, property, vehicles). All cost streams were expressed at border prices in May 1986 dollars; an exchange rate of Q 2.5 = US$1 was used for the conversion of local costs. Local costs, largely consisting of labor costs, were shadow priced by a factor of 0.85, to account for unemployment conditions in Guatemala.

5. The benefits derived from the program are associated to the increase in sales resulting from the new investments, with a one year lag, and expressed in border prices. Incremental sales were valued at the average electricity rate levels resulting from the covenanted financial rate of return.

Rate of Return

6. The resulting rate of return is about 12%, which is at the upper end of the range assumed for the opportunity cost of capital in Guatemala (10 - 12%). The foregoing revenue-based rate of return, which is more a measure of the adequacy of tariffs to the incremental costs of the investment program than a measure of the project's economic merits, thus indicates that the covenanted tariff adjustments would be sufficient to meet the long-term marginal costs of power supply in Guatemala.

7. The 12% estimated rate of return does not fully measure the benefits to society, resulting from the implementation of the project. These include the social benefits of residential and public uses, and the economic benefits to production of reliable electricity supply. In this sense, the base value of 12% is deemed to be a minimum measure of the benefits conferred by the project.

8. Standard sensitivy tests were carried out to evaluate the impact of changes in key parameters on the rate of return. The results are shown below:

Scenario	Rate of Return (%)
1. Base	12.4
2. Investment costs 10% higher	11.0
3. Benefits 10% lower	10.6
4. Investment costs 10% higher and benefits 10% lower	9.3

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FIFTH POWER PROJECT

COSTS AND BENEFITS ANALYSIS

YEAR	COST STREAMS (MILLION 1985 US$)								BENEFITS		
	CAPITAL INVESTMENTS a/ b/					O&M COSTS c/	FUEL	TOTAL COSTS	SALES DUE TO EXPANSION(GWH) d/	REVENUE (MILLION 1985 US$)	NET BENEFITS
	GENERATION	TRANSMISSION	DISTRIBUTION	OTHER	SUBTOTAL						
1987	11.2	15.3	20.4	10.7	57.6	0.0	1.3	58.9	0.0	0.0	-58.9
1988	12.9	11.6	22.1	23.4	70.0	0.7	0.6	71.3	93.0	7.3	-64.0
1989	16.1	1.0	21.5	12.7	51.3	1.3	5.6	58.2	192.0	19.2	-39.0
1990	32.3	1.3	24.8	11.2	69.6	2.3	0.7	72.6	331.0	30.1	-42.5
1991	36.0	1.1	21.3	8.4	66.8	3.4	1.7	71.9	484.0	42.1	-29.8
1992	27.1	1.5	25.6	6.7	60.9	4.6	6.3	71.8	651.0	54.7	-17.1
1993	67.4	0.8	25.6	1.5	95.3	5.5	0.7	101.5	780.0	59.3	-42.2
1994						6.4		6.4	917.0	69.7	63.3
1995						6.4		6.4	917.0	69.7	63.3
1996						6.4		6.4	917.0	69.7	63.3
1997						6.4		6.4	917.0	69.7	63.3
1998						6.4		6.4	917.0	69.7	63.3
1999						6.4		6.4	917.0	69.7	63.3
2000						6.4		6.4	917.0	69.7	63.3
2001						6.4		6.4	917.0	69.7	63.3
2002						6.4		6.4	917.0	69.7	63.3
2003						6.4		6.4	917.0	69.7	63.3
2004						6.4		6.4	917.0	69.7	63.3
2005						6.4		6.4	917.0	69.7	63.3
2006						6.4		6.4	917.0	69.7	63.3
2007						6.4		6.4	917.0	69.7	63.3
2008						6.4		6.4	917.0	69.7	63.3
2009						6.4		6.4	917.0	69.7	63.3
2010						6.4		6.4	917.0	69.7	63.3
2011						6.4		6.4	917.0	69.7	63.3
2012						6.4		6.4	917.0	69.7	63.3

RATE OF RETURN 0.124

a/ Net of taxes and import duties.
b/ Local costs adjusted by standard convertion factor (SCF)=0.85
c/ O&M costs calculated as US$ 0.007 per incremental kWh sold.
O&M local components (75%) adjusted by SCF=0.85
d/ Increase over 1987 sales.

GUATEMALA

POWER DISTRIBUTION PROJECT

Documents and data available in the Project File

A. Reports related to the Energy Sector and Power Subsector

1. "Anuario Estadistico" Ministerio de Energia y Minas, September 1985
2. "Plan Nacional de Desarrollo-INDE", INDE, April 1982.
3. "Informe Financiero y Estadistico", 1974-1983, INDE, report, 1984.
4. "Proyecciones Financieras del INDE, EEGSA y del Sector Electrico 1982-1987", INDE, November 1982.
5. "Informe sobre el Sector Electrico Guatemalteco", INDE, 1982.
6. "Empresas Electricas Municipales", INDE, September 1982.
7. "Informe Economico de Diez Anos, 1970-1979", EEG, 1980.

B. Reports relating to the Project

1. "Proyecto Hidroelectrico Chulac, review of technical feasibility", Board of Consultants, Report No. 3, June 1982.
2. "Manual de Administracion de Sueldos y Salarios", PCA, December 1980.
3. "Informe Comision Estudio de Fortalecimiento Administrativo", October 1981.
4. "Estudio de Revaluacion de los Activos Fijos, Sector Electrico de Guatemala", R.W. Beck and Associates, March 1982.
5. "Manual de Cuentas", INDE, 1981.
6. "Estudio de Evaluacion y Reorganizacion de la Auditoria Interna del INDE", Arturo Morales Palencia y Asociados, October 1979.
7. "Estimacion costos de explotacion, 1984-1987", INDE, November 1984.
8. "Estudio de necesidades de crecimiento computacional del INDE", November 1983.
9. "Definition of the Project to equip the load dispatch system and the communication system", Harza Engineering, preliminary report, January 1985; final report January 1986.
10. "Plan de Inversiones 1986-1992", Planning Dept., EEG, July 1985.

C. Working Papers Prepared by Bank Staff

1. Miscellaneous working papers covering demand studies, economic analysis and financial analysis. August 1985, by R. Klockner and Nelson de Franco.

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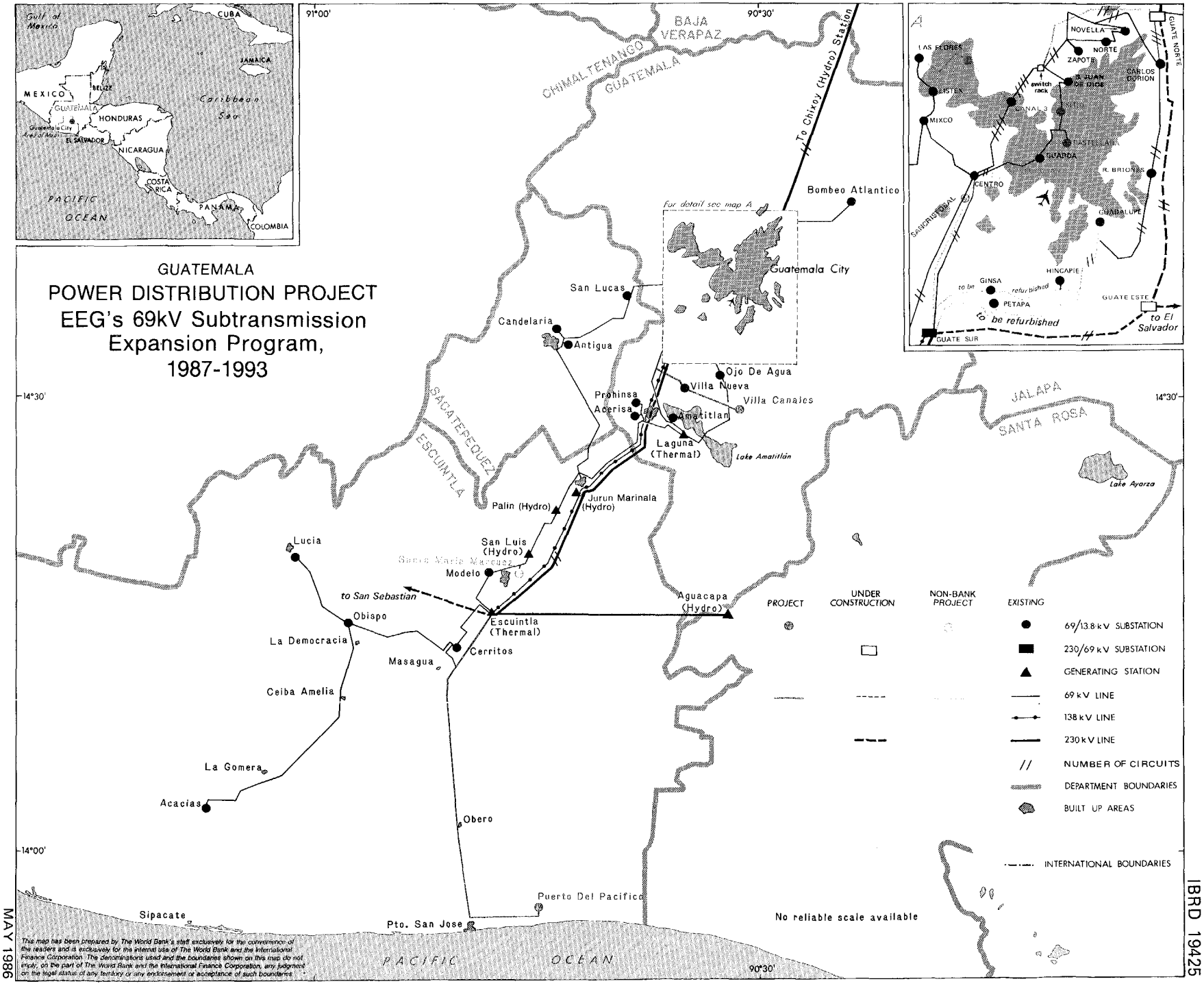

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