

**PUBLIC**

**DOCUMENT OF THE INTER-AMERICAN DEVELOPMENT BANK**

**EL SALVADOR**

**LOAN TO THE COMISIÓN EJECUTIVA HIDROELÉCTRICA  
DEL RÍO LEMPA  
CERRÓN GRANDE HYDROELECTRIC PROJECT**

**(ES0008)**

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"Cerrón Grande" Hydroelectric Development Project

	<u>INDEX</u>	<u>Page</u>
SUMMARY		1
I. INTRODUCTION		8
A. The Application		8
B. Technical Assistance of Contingent Recuperation		10
II. THE BORROWER AND EXECUTING AGENCY		11
A. The Borrower		11
B. The Executing Agency. Name. Jurisdiction and Functions		11
C. Organization Structure, Services and Staff		12
D. Administrative and Financial Affairs		14
E. Market for Electricity and Inter-connected System		22
F. Tariff System		23
G. Rural Electrification on the Part of CEL		24
H. Participation of the World Bank in the CEL Electrification Program		26
I. Legal Capacity		27
J. Guarantee		28
III. THE PROJECT		29
A. CEL Electric Energy Development Program		29
B. Description of the Project		32
C. Financial Plan and Total Cost of Project		34
D. Origin and Use of Currencies		36
E. Investment Categories		37
F. Execution of Project		39
G. Land Purchase, Rights-of-way and Resettlement Program Purchase of Land and Rights-of-way		48
H. Rate Schedules		52
I. Local Contribution Fund		54
J. Auditing		56
K. IDB Inspection		56
IV. JUSTIFICATION		57
A. Technical Feasibility		57
B. Financial Feasibility		59
C. Economic Appraisal		62
D. Commentary of CIAP		77

...

V. CONCLUSIONS AND RECOMMENDATIONS

78

APPENDIXES

"A" Anexo B del Contrato de Préstamo.

"B" a "M" Anexos Complementarios.

ANEXO A: INFORME DE LA COMISION DE INVESTIGACIONES

ANEXO B: INFORME DE LA COMISION DE INVESTIGACIONES

ANEXO C: INFORME DE LA COMISION DE INVESTIGACIONES

ANEXO D: INFORME DE LA COMISION DE INVESTIGACIONES

ANEXO E: INFORME DE LA COMISION DE INVESTIGACIONES

ANEXO F: INFORME DE LA COMISION DE INVESTIGACIONES

ANEXO G: INFORME DE LA COMISION DE INVESTIGACIONES

ANEXO H: INFORME DE LA COMISION DE INVESTIGACIONES

ANEXO I: INFORME DE LA COMISION DE INVESTIGACIONES

ANEXO J: INFORME DE LA COMISION DE INVESTIGACIONES

ANEXO K: INFORME DE LA COMISION DE INVESTIGACIONES

ANEXO L: INFORME DE LA COMISION DE INVESTIGACIONES

ANEXO M: INFORME DE LA COMISION DE INVESTIGACIONES

ANEXO N: INFORME DE LA COMISION DE INVESTIGACIONES

ANEXO O: INFORME DE LA COMISION DE INVESTIGACIONES

ANEXO P: INFORME DE LA COMISION DE INVESTIGACIONES

ANEXO Q: INFORME DE LA COMISION DE INVESTIGACIONES

ANEXO R: INFORME DE LA COMISION DE INVESTIGACIONES

ANEXO S: INFORME DE LA COMISION DE INVESTIGACIONES

ANEXO T: INFORME DE LA COMISION DE INVESTIGACIONES

ANEXO U: INFORME DE LA COMISION DE INVESTIGACIONES

ANEXO V: INFORME DE LA COMISION DE INVESTIGACIONES

ANEXO W: INFORME DE LA COMISION DE INVESTIGACIONES

ANEXO X: INFORME DE LA COMISION DE INVESTIGACIONES

ANEXO Y: INFORME DE LA COMISION DE INVESTIGACIONES

ANEXO Z: INFORME DE LA COMISION DE INVESTIGACIONES

ANEXO AA: INFORME DE LA COMISION DE INVESTIGACIONES

ANEXO AB: INFORME DE LA COMISION DE INVESTIGACIONES

ANEXO AC: INFORME DE LA COMISION DE INVESTIGACIONES

ANEXO AD: INFORME DE LA COMISION DE INVESTIGACIONES

ANEXO AE: INFORME DE LA COMISION DE INVESTIGACIONES

ANEXO AF: INFORME DE LA COMISION DE INVESTIGACIONES

ANEXO AG: INFORME DE LA COMISION DE INVESTIGACIONES

ANEXO AH: INFORME DE LA COMISION DE INVESTIGACIONES

ANEXO AI: INFORME DE LA COMISION DE INVESTIGACIONES

ANEXO AJ: INFORME DE LA COMISION DE INVESTIGACIONES

ANEXO AK: INFORME DE LA COMISION DE INVESTIGACIONES

ANEXO AL: INFORME DE LA COMISION DE INVESTIGACIONES

ANEXO AM: INFORME DE LA COMISION DE INVESTIGACIONES

ANEXO AN: INFORME DE LA COMISION DE INVESTIGACIONES

ANEXO AO: INFORME DE LA COMISION DE INVESTIGACIONES

REPUBLIC OF EL SALVADOR

## SUMMARY OF LOAN PROPOSAL

(Cerrón Grande Hydroelectric Development Project)

1. Borrower and Executing Agency: The borrower is to be the Republic of El Salvador. It would transfer the loan proceeds to the executing agency in the manner described below. The executing agency would be the Comisión Ejecutiva Hidroeléctrica del Río Lempa (CEL), an autonomous public utility possessing juridical personality and capital assets, organized as a non-profit corporation by Executive Decree of October 3, 1945 and governed at present by Legislative Decree 137 of September 18, 1948, as amended. The purposes of CEL are to develop, conserve, manage and utilize the water resources of El Salvador, particularly those of the Lempa River, and any other means of electric energy generation.
2. Amount and Currencies: 1/ Up to US\$38,100,000, or the equivalent in other currencies which are part of the Fund for Special Operations, of which amount up to the equivalent of US\$32,100,000 would be disbursed in foreign exchange to cover direct costs of goods and services of external origin and for such other purposes as may be specified in the loan contract, and up to the equivalent of US\$6,000,000 would be disbursed in Salvadorian Colones to cover local expenses.
3. Source of Funds: The Fund for Special Operations.
4. Term, Interest, Service Charge, Commitment Fee, Disbursement, and Currencies of Payment:
  - a) Term: The loan would be amortized over a period of 40 years from the date of the contract by means of 60 semiannual, consecutive and equal installments, the first of which would be payable 10-1/2 years after that date.
  - b) Interest, Service Charge and Commitment Fee: The interest rate would be 1/4 of 1% per annum for the first ten years after the date of the contract, and 1-1/4% per annum thereafter. The service charge would be 3/4 of 1% per annum. Both interest and service charge would be payable semiannually on principal amount outstanding, with the first payment due six months after the date of the contract. In addition, a commitment fee of 1/2 of 1% would be charged on the undisbursed portion of the loan, commencing to accrue 60 days after the effective date of the contract.

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1/ Rate of exchange: US\$1.00 = ¢2.50

At the request of the borrower the loan proceeds may be used to pay interest and service charge thereon during the loan disbursement period.

c) Disbursement Period: The loan would be disbursed over a period of five years from the date of the contract.

d) Currencies of Payment:

(i) Amortization and Interest: Payments of amortization and interest would be made proportionately in the respective currencies disbursed or, at the election of the debtor, except with respect to amounts disbursed in the currencies of Mexico or Venezuela, they could be made in Salvadorian colones, in all cases in a quantity equivalent to the corresponding amount owed, calculated in terms of United States dollars.

(ii) Service Charge: The service charge would be payable in United States dollars on amounts disbursed in that currency, and on disbursement in other currencies it could be paid in Salvadorian colones at the equivalence in dollars or, at the election of the debtor, proportionately in the currencies disbursed, except that with respect to amounts disbursed in the currencies of Mexico or Venezuela payments should be made proportionately in such currencies only.

(iii) Commitment Fee: The commitment fee would be paid proportionately in United States dollars and in such other currencies as are specified in the contract.

5. Guarantee: General responsibility of the Republic of El Salvador.

6. Description of Project:

The project consists mainly in the construction and installation of:

(i) a rock-fill dam on the Lempa River; (ii) a spillway; (iii) intake structures and approach channel; (iv) a powerhouse; (v) a step-up substation with two transformers; (vi) transmission lines to Nejapa (for San Salvador); (vii) a connecting line to the 5 de Noviembre Station; and (viii) a diversion tunnel.

The Cerrón Grande dam would be located on the Lempa River and would impound a reservoir measuring 135 square kilometers, with 1,430 cubic meters of storage capacity. The rock-fill dam would be built approximately 20 kilometers upstream from the 5 de Noviembre plant. The dam would have a maximum height of 85 meters. The water would be carried through two intakes and two tunnels with a diameter of 6.4 meters which would supply two generating sets inside the plant. The gross head for energy generation is 64 meters. The powerhouse would be designed for four generating sets, although the project envisages installing only the first two sets with 135,000 KW (67,500 KW each), of generating capacity which operating together could generate 584 million KWH per year.

7. Total Cost of Project: The total cost of the project is estimated at the equivalent of US\$80 million, as itemized below:

(equivalent in millions of US\$)

<u>Item</u>	<u>Foreign Currency Costs 1/</u>	<u>Local Costs</u>	<u>Total</u>	<u>%</u>
(1) Engineering and administration	6,1	1,9	8,0	10.0
(2) Land, relocations, easements, etc.	-	14,3	14,3	17,9
(3) Preliminary works	0,4	1,5	1,9	2.4
(4) Main civil works 2/	21,4	9,9	31,3	39.1
(5) Mechanical equipment for plant	2,8	-	2,8	3.5
(6) Turbines and Generators 2/	5,5	-	5,5	6.9
(7) Ancillary Electrical Equipment	0,3	-	0,3	0.4
(8) Transmission facilities	1,8	0,5	2,3	2.9
(9) Finance charges 3/	4,4	0,1	4,5	5.5
(10) Contribution to Inspection and Supervision Fund	0,4	-	0,4	0.5
(11) Associated Costs 4/	-	0,7	0,7	0.9
(12) No specific allocation 5/	5,4	2,6	8,0	10.0
Total	<u>48,5</u>	<u>31,5</u>	<u>80,0</u>	<u>100,0</u>
Percentage	60.6	39.4	100.0	

- 1/ No indirect foreign-currency costs are foreseen.  
2/ Includes an allowance for goods and services, provided goods and services are purchased in eligible member countries of the IDB.  
3/ Interest and other charges on external loans during project execution.  
4/ Training of people now living on the future site of the reservoir, who would be relocated.  
5/ Includes allowances for general contingencies, including monetary contingency and price escalation.

Note: Figures rounded off.

8. Financial Plan: The project would be financed as follows:

(equivalent in millions of US\$)

	Currency of origin		Currency of use (costs)		Total	%
	Foreign	Local	Foreign 3/	Local		
IDB	32,1	6,0	32,1	6,0	38,1	47,6
IBRD 1/	15,9	-	15,9	-	15,9	19,9
CEL (Local Contribution)	0,5 2/	25,5	0,5 2/	25,5	26,0	32,5
Total	48,5	31,5	48,5	31,5	80,0	100,0
Percentage	60.6	39.4	60.6	39.5	100.0	

9. Justification:

The CEL development program is aimed primarily at meeting the future electric energy needs of El Salvador at the lowest possible cost while also improving the quality and reliability of service. In order to maintain an adequate supply for the coming years, CEL has prepared an expansion program for 1971-1984 that calls for increasing the total installed capacity from 176 MW to 631 MW over that period. This is reasonably in line with the growth of demand, which is expected to increase at a rate of 11% per year, from 133 MW in 1971 to 519 MW in 1984. Consumption per capita is expected to increase during the same period from 175 KWH to about 400 KWH per year.

It should be noted that the installed capacity has been planned in such a way that at any given time it will exceed peak demand by a margin ensuring an adequate supply at any time of the year and any hour of the day (firm power).

This increase in CEL's capacity would be based principally on hydro-electric and geothermal generating plants and would provide for more rational utilization of the natural energy resources available in the country.

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1/ The World Bank would finance also the equivalent of US\$8.2 million for the Ahuachapán geothermal project.

2/ Finance charges payable in dollars.

3/ No loan proceeds in foreign currency would be used to finance local costs.

The only natural sources of electrical energy in El Salvador are the Lempa River and the geothermal deposits at Ahuachapán, the combined potential of which is estimated at 4,200 million KWH per year. On the Lempa River, the Cerrón Grande project is considered to be the most suitable next stage in the CEL development program. Actually there are two other sites on the lower Lempa river which are considered suitable for hydroelectric development - El Tigre and La Pintada - the first of which would require flooding part of the territory of Honduras, while the second would require streamflow regulation during the dry season at Cerrón Grande in order to be justifiable. In the upper Lempa River the El Zapotillo, Paso de Oso and Astilleros projects were shown by previous studies to be more costly than Cerrón Grande.

During 1967-1972 CEL utilized thermal electric plants to meet the rising demand for electricity, so that by the end of 1972 there was more thermal electric capacity (52%) than hydroelectric capacity (48%) in the CEL system. Should the Cerrón Grande project not be constructed, it would be necessary to install a larger number of thermal units in the coming years, whereupon El Salvador would have to rely increasingly on costly imports of fuel oil for its supply of electricity.

The design and studies for the project are consistent with generally accepted engineering standards. The estimated costs of construction and equipment are considered appropriate, <sup>1/</sup> as are the amounts allocated for contingencies and price escalation. The investment schedule and period of project execution are realistic. Construction would be carried out by firms having international experience and found acceptable by the Bank. Complete and satisfactory execution of the project is not expected to present any difficulty.

CEL utilized the services of an internationally experienced consulting firm, acceptable to the Bank, for matters relating to general planning and supervision of construction. The institutional structure of CEL is considered adequate for the performance of its functions, although appropriate administrative measures are being taken so that the Cerrón Grande project may be executed in the manner described herein.

The financial projection of CEL indicate that it would generate sufficient resources to cover the greater part of the requirements for the local contribution toward financing of the project (the

<sup>1/</sup> The cost per installed KW for the first two units is estimated at the equivalent of US\$593 and that for the 4 units at the equivalent of US\$358.

equivalent of US\$23 million). The balance (equivalent of US\$3 million) would be obtained through a domestic bond issue duly authorized by the Central Reserve Bank. The projections also indicate that CEL would be able to service the proposed loan on a proper and timely basis, along with generating revenues from rates sufficient to produce a satisfactory rate of return consistent with the Bank's standards (9%).

The project is economically justified: the internal rate of return is 16.8% and goes even higher if the agricultural costs and benefits of the project are included. The sensitivity analysis shows the project to be sound, since even with significant changes in important parameters (costs, price of fuel and demand) the rate of return continues to be very acceptable.

It is estimated that in 1973 the price of fuel oil would be higher than that paid by CEL in 1969. This increase, together with subsequent increases after 1973 and the need to import fuel oil in increasing amounts, would bring about a loss of foreign exchange <sup>1/</sup> which El Salvador could otherwise use for other national development projects. It would also result in electricity rates higher than the present ones.

Analysis of the electric rates per KWH (to the consumer) charged in Central America indicates that those in El Salvador (2.84 cents of a dollar) and Costa Rica are the only ones below the average for the region as a whole (3.09 cents of a dollar). In regard to costs, ECLA studies indicate that CEL's operating and thermal generation costs are the lowest in Central America and that for hydroelectric energy only the Costa Rican utilities have lower costs.

In conclusion, the projections of electric energy demand indicate that the country's economy would be seriously impaired if this project were not constructed, since there would be an adverse effect on the rate structure and on the country's balance of payments as a result of the prices for fuel oil in the international market. This makes it advisable to include in the expansion program of CEL the hydroelectric project described herein.

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<sup>1/</sup> The savings on imports of Bunker C. fuel oil would amount to the equivalent of US\$3 million per year.

Use of resources from the Fund for Special Operations to finance this project is considered appropriate in view of the status of El Salvador as a less developed country. So that the particularly favorable conditions of FSO lending may benefit the whole country, the Government of El Salvador will transfer funds to CEL at a higher interest rate and on shorter repayment terms than are applied to the loan from the Bank. To implement this measure, the government would set up a Fund for Local Contributions that would be used to help accelerate the country's economic development and would be replenished by yearly contributions from CEL, comprised by the difference between the amount of installment payments made by the Government of El Salvador to the IDB for loan service, and the payments received by the Government from the CEL, which are to be deposited with the Central Reserve Bank.

In the Final Report of the CIAP Subcommittee meeting in 1971, the Government of El Salvador included this hydroelectric development project in the tentative list of projects to be carried out in subsequent years with the help of international organizations.

10. Recommendation

Based on the findings and recommendations of the Project Committee to the effect that the project is justified from the technical, economic, financial, institutional and legal points of view, the Operations Department forwards this loan document to the President of the Bank with the recommendation that, should he deem it advisable, he submit the relevant proposed resolution to the Board of Executive Directors recommending its approval.

## I. INTRODUCTION

### A. The Application

- 1.01 In late May 1972 a delegation from El Salvador composed of the Executive Director of CEL and a representative of CONAPLAN visited the Bank's headquarters for the purpose of presenting an application of the Comisión Ejecutiva Hidroeléctrica del Río Lempa (CEL), dated May 19, 1972, for a loan on the most favorable possible conditions from FSO for partial financing of a hydroelectrical development project calling for the construction of a dam at a place known as Cerrón Grande. The application was based on a technical, economic and financial feasibility study prepared by the Harza Engineering Company International, a United States consulting firm, in association with Atilio García Prieto & Cía. of El Salvador, in which earlier studies for the same project, made in 1947 and 1967, were taken into account.
- 1.02 The National Planning Council, in a communication dated June 12, 1972, pointed out the importance of this electrification project for the economy of El Salvador and its relationship to other projects to be carried out during 1973-1977. On this basis, the Council declared the Cerrón Grande project to be of first priority with a view to the undertaking of formal financial negotiations between CEL and the Bank.
- 1.03 The analysis of the project was substantially completed last June by a mission from the Bank.
- 1.04 On August 24, 1972, during a visit of the President of the IDB to San Salvador, the President of El Salvador, Col. Arturo Armando Molina, declared that his Government had decided to build the hydroelectric project at a site known as Cerrón Grande, with the Comisión Ejecutiva del Río Lempa assuming responsibility, and confirmed that the project was regarded as having high priority for the economic development of El Salvador.
- 1.05 During the above-mentioned visit of a delegation from El Salvador to the Bank's headquarters, representatives of the World Bank expressed their interest in lending IBRD funds to help finance both the Cerrón Grande project and the project for development of geothermal energy at Ahuachapán. Technical missions from the IBRD visited El Salvador in June and September 1972 to evaluate this operation. In view of this, the Management consulted the Board of Executive Directors of the Bank 1/ regarding this application with the aim of obtaining its

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1/ See Document PR-528 of August 17, 1972.

points of view and guidance concerning continued study of this operation in conjunction with the World Bank

- 1.06 As a result of observations made during the September 7, 1972 meeting of the Board of Executive Directors, the authorities of the Republic of El Salvador and officials of the World Bank were consulted a number of times and various financing alternatives were examined on each occasion. A plan of financing which it was felt would make it possible to carry out this operation was prepared. The share of each of the two financial institutions in financing the various project items has been worked out in such a way as to preclude discrimination against any member country of the Bank that might be interested in providing goods and services.
- 1.07 This proposal was considered by the Board of Executive Directors on October 26 last, 1/ and, since there was no objections, the Management completed the analysis of the project.
- 1.08 Since May 1972, technicians from the IDB and the IBERD have worked together on all aspects of the project analysis. Thus, its technical, financial and economic feasibility aspects were analyzed on the same basis of calculation, so that the results are also the same in respect of project costs, financial plan, financial projections, rates of financial return, internal rates of return and other fundamentals of evaluation. Similarly, the conditions precedent 2/ to the loan were determined after a number of meetings between officials of both banks, so they are in agreement in the fundamentals aspects. The World Bank expects to negotiate the Cerron Grande - Ahuachapán operation with El Salvador's authorities in February 1973, so it is probable that the loan contract can be signed in April 1973, after the Executive Board of the World Bank has approved the loan.
- 1.09 In a letter dated December 4, 1972 the CEL reaffirmed its interest in obtaining a loan from the Bank for up to the equivalent of US\$38.1 million for partial financing of the above-mentioned program, the total cost of which is estimated at the equivalent of US\$80.0 million. The balance would be financed with a loan that the CEL has requested of the IBERD in the amount of US\$15.9 million, as well as with a local contribution of US\$26.0 million equivalent, of which amount US\$23.0 million equivalent would be drawn on the CEL's own assets and the rest as proceeds of a US\$3.0 million equivalent bond issue which the Government will guarantee. And by letter of November 27, 1972 signed

1/ See Document PR-528-1 of October 24, 1972.

2/ See Draft Resolution, Conclusions and Recommendations and Appendix A.

by the Finance Minister, the Government of El Salvador advised the Bank that the bond issue would be guaranteed by the Republic, subject to legislative approval.

B. Technical Assistance of Contigent recuperation

- 1.10 The Bank has granted the Republic of El Salvador no contingent-recovery technical assistance in connection with this project.

## II. THE BORROWER AND EXECUTING AGENCY

### A. The Borrower

- 2.01 The Republic of El Salvador would be the borrower. It would transfer the loan resources to the executing agency in the form explained later in this chapter.

### B. The Executing Agency, Name, Jurisdiction and Functions

- 2.02 The project executing agency would be the Comisión Ejecutiva Hidroeléctrica del Río Lempa (CEL), an autonomous, non-profit public utility, organized as a corporation with capital assets. Its purpose is to develop, conserve, administer and utilize the water resources of El Salvador, particularly those of the Lempa River, and any other means of electric energy generation.
- 2.03 CEL was created by the Executive Decree of October 3, 1945 and reorganized by Executive Decree on March 16, 1946, for the purpose of preparing studies to determine the possibilities and bases for development of the Lempa River so as to implement the national electrification program. By virtue of preparatory studies done by CEL, with the assistance of specialized technicians, the National Legislative Assembly enacted Decree No. 137 of September 18, 1948, as amended, 1/ which confers on CEL the public utility status and autonomous powers which it has at present. On August 12, 1958, regulations were enacted for application of the act creating the CEL.
- 2.04 According to legislation in effect, the principal duties of CEL are as follows:
- a) Prepare studies, plans, designs and budgets for the construction, expansion, improvement and repair of any facilities necessary for its purposes.
  - b) Construct any work necessary for the fulfillment of its objectives.
  - c) Acquire and utilize water, produce electrical energy and make use of the waters and electric power in its domain for

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1/ Legislative Decrees 849 of 1950, 987 of 1953, 1253 of 1953 and 2856 of 1959.

supply to rural populations and areas, for irrigation of land, and for any agricultural, industrial or public service purposes. The distribution of electric power shall be made preferable on a wholesale basis, through municipal government or private enterprises and consumers' associations.

- d) Determine, fix and modify rates to reasonable levels with approval of the Ministry of Economy, providing for fees and other charges in the supply of electric energy and irrigation water.
- e) Obtain loans directly, issue and place bonds in domestic and domestic and foreign markets and acquire other obligations, acting in all cases with prior approval of the appropriate executive branch of government, namely the Ministry of Economy.
- f) Acquire goods under any title.

2.05 In Article 6 of Decree No. 137<sup>1/</sup> creating CEL, it is provided that the following works will be considered necessary for the fulfillment of the purposes entrusted to CEL by law: electrical structures, plants or systems (with all their parts and appurtenances), supply and distribution systems; powerplants to generate electricity, stations, dams, canals, tunnels, conduits, transmission and distribution lines, and other works and accessories necessary for the production, utilization, transport, distribution or any other disposition of water or electric energy.

C. Organization structure, Services and Staff

2.06 1) Background

The structure of the institution is determined by the "Regulations for the Application of the Act of the CEL", approved by the Executive Branch by virtue of Decree No. 72 of August 12, 1958. As provided in Decree No. 137<sup>1/</sup>, and in the above Regulations, the supreme authority of the corporation vested in a commission composed by 7 Directors in four-year terms, and their alternates, as follows: one Director appointed by the Ministry of the Interior, who is chairman of the commission; three directors appointed by the ministries of Industry, of Agriculture and Livestock, Production, and of Public Works; one director representing the Central Reserve Bank and banks operating in El Salvador; one director appointed by the executive branch from a list of 6 persons proposed by agricultural and industrial associations and organizations

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<sup>1/</sup> See Paragraph 2.02.

established in the country; and one director elected by the holders of domestic currency bonds for which CEL is liable.

- 2.07 In this respect, it is provided that this commission has responsibility for administrative, technical and financial management of the corporation. The commission has the power to appoint and remove the executive director, the deputy executive director, heads of departments, superintendents and supervisors. 1/

The executive director is in charge of the management of CEL. The Agency has the following Departments: Legal, Secretary's, Accounting, Treasury, Internal Audit, Financial, Rural Electrification, Civil Works, Research, Technical Superintendency, and General Superintendency. The last-named Department has, under it, the Superintendency of Plants, of Sub-stations and of Lines.

- 2.08 CEL is empowered to appoint its own staff and, according to Article 122 of the Constitution, its scheme of salaries is submitted for the approval of the Legislative Assembly, together with its general budget. The executive director is responsible for hiring.

Staff

- 2.09 CEL has a staff of 663 employees and workers, that is considered appropriate for the purpose of accomplishing its functions, as long as adequate administrative measures are taken for the execution of the proposed expansion program of its electrical system. The staff is organized into several departments and sections, as described below:

STAFF OF CEL - 1972

	<u>Professionals</u>	<u>Others</u>	<u>Total</u>
General Superintendency	32	443	475
Rural Electrification	24	94	118
Technical Superintendency	3	-	3
General Construction	5	-	5
Research	2	-	2
Accounting	1	29	30
Treasury	1	7	8
Internal Audit	1	1	2
Legal	1	6	7
Secretariat	-	13	13
TOTAL CEL	<u>70</u>	<u>593</u>	<u>663</u>

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1/ See Appendix C.

D. Administrative and Financial Affairs

Management and Financial Affairs Accounting

- 2.10 The organization of the CEL's management and financial affairs accounting is comprised by the following departments: (a) Accounting, (b) Treasury, (c) Internal Audit, and (d) Financial. The Accounting and Treasury Departments are considered to be well-organized; they produce monthly balance-sheets and adequate management information. The financial programing conducted by Harza Engineering Co. will in the future, be performed by the Financial Department, recently created and at present in the process of organization.
- 2.11 CEL is proceeding to hire a consultant, who would be financed with its resources, to review present organization, drafting manuals of procedure, including manuals of internal audit procedure, and implementing his own recommendations for bringing the organization up to the level of future operating requirements. CEL will undertake to inform IDB about the progress of the work done by the consultant, and apply his recommendations (see Conclusions and Recommendations).
- 2.12 The management and financial affairs accounting of CEL is considered satisfactory for present levels of operation, except for the need to implement an adequate program of activities for the Internal Audit Department.

Financial Condition

- 2.13 Analysis of the past and present financial condition of CEL covers fiscal years from 1969 to 1971. It was based on financial statements examined by independent auditors whose reports of each of these years contained no exceptions. A summary of comparative financial statements for these years is shown below:

(equivalent in thousands of US\$)

<u>ASSETS</u>	<u>1969</u>	<u>1970</u>	<u>1971</u> <sup>1/</sup>
Net fixed assets	51,080	52,894	53,498
Investments	40	120	120
Circulating assets	2,338	2,586	4,947
Deferred charges <sup>2/</sup>	2,888	3,074	3,424
Total Activo	<u>56,346</u>	<u>58,674</u>	<u>61,989</u>
<u>LIABILITIES AND CAPITAL</u>			
Capital	35,704	40,379	45,099
Long-term liabilities	16,578	14,594	12,997
Circulating liabilities	4,018	3,644	3,816
Deferred credits	46	57	77
Total	<u>56,346</u>	<u>58,674</u>	<u>61,989</u>
Current ratio	0.6:1	0.7:1	1.2:1
Long-term debt/capital ratio	0.4:1	0.4:1	0.3:1

Assets

- 2.14 The total assets of CEL have shown an increase equivalent to U.S.\$5.6 million (10%) during 1969-71. Capital increased in the same period by the equivalent of U.S.\$9.4 million (26.3%) as a result of capitalization of profits and 60% was applied to financing the increase in assets, so that the remaining 40% was allotted for repayment of short- and long-term liabilities. The financing of assets out of its own capital is reflected in the low levels obtained for the ratio of long-term debt/capital which was 23:77 0.3:1 in 1971.

<sup>1/</sup> An adjustment of U.S.\$922,000 in fixed assets and long- and short-term liabilities is included, which is the result of the revaluation of the debt in foreign currency.

<sup>2/</sup> See Paragraph 2.19.

2.15 In 1969 and 1970, CEL's current ratios were less than one. Because of CEL's capacity for internal generation of funds and application (together with the proceed of an intermediate-term loan from the Central Reserve Bank) of such funds to repayment of the short-term debt in 1971, this situation has improved, so much so that the current ratio was 1.2:1 in 1971.

2.16 Accounts receivable from energy sales amounted to U.S.\$1.6 million on December 31, 1971, which represents 58 days from the date of billing. Subtracting 30 days from the billing cycle, which is considered normal, a delay of 28 days is recorded. (US\$717.000). Of this delay, the equivalent of 16 days corresponds to the following customers:

	Amount (equivalent in thousands of US\$)	No. of days from sale	Delin- quency
a) Montecristo Mines	110	4 days	Owed since Dec., 1969
B) ANDA 1/	299	12 days	Owed since
	<u>409</u>	<u>16 days</u>	Sept., 1970

2.17 The amount owed by the Montecristo Mines it is felt, is probably unrecoverable. As for ANDA, it is believed that the government, through the Ministry of Finance, will proceed to pay the invoices that have become due or are about to become due (see Conclusions and Recommendations). The following summary table shows billing and collections for services rendered during 1969-71:

	(equivalent in millions of U.S.\$)					
	1969		1970		1971	
	Sales	Collec- tions	Sales	Collec- tions	Sales	Collec- tions
Distributors	7.6	7.5	8.2	8.2	9.0	9.0
Direct consumers 2/	0.2	0.3	0.2	0.1	0.3	0.1
Direct distribution	0.3	0.3	0.4	0.3	0.4	0.4
	<u>8.1</u>	<u>8.1</u>	<u>8.8</u>	<u>8.6</u>	<u>9.7</u>	<u>9.5</u>

1/ Administración Nacional de Acueductos y Alcantarillados.

2/ Includes sales to and collections from Montecristo Mines and ANDA.

With the exception of collections from direct consumers, which represent 0.1% of the total billing of CEL in 1971, the remaining 99.9% of the collections can be considered highly satisfactory.

- 2.18 As for the category of Fixed Assets, its composition on December 31, 1971, was as follows:

	(equivalent in thousands of U.S.\$)		
	<u>Original Value</u>	<u>Cumulative Depreciation</u>	<u>Net</u>
<u>Works of Power Generation</u>			
Generation of hydraulic power	33,109	8,873	24,236
Generation of thermal power	<u>14,460</u>	<u>1,816</u>	<u>12,644</u>
Total works of power generation	47,569	10,689	36,880
<u>Transmission Works</u>	10,614	2,079	8,535
<u>Distribution Works</u>	5,585	528	5,057
<u>General Goods and Installations</u>	2,011	654	1,357
<u>Revaluation of Foreign Exchange</u>	<u>922</u>	<u>-</u>	<u>922</u>
T o t a l	<u>66,701</u>	<u>13,950</u>	<u>52,751</u>

Depreciation is calculated on a straight line basis. The coefficients applied to the individual items are considered adequate for the purpose.

- 2.19 The category of deferred charges as of Dec. 31, 1971, includes the equivalent of U.S.\$3.3 million for the Study of Future Projects, as part of which there are studies for geothermal resources (U.S.\$2.0 million equivalent) and of the Cerrón Grande hydroelectric project (U.S.\$428,000 equivalent). In CEL's financial projections for the next few years, these charges have been debited to fixed assets and amortized over the useful life of these projects.

Liabilities

- 2.20 The capital of CEL which, on December 31, 1971, amounted the equivalent of U.S.\$45,100.000, was constituted as follows:

	(equivalent in thousands of U.S.\$)	%
a) Contributions from Central Government	8,968	19.8
b) Capitalization of profits (1960-71)	36,131	80.2
Total	45,099	100.0

The above shows that some 80% of the capital of CEL has been constituted through retained earnings, during the previous decade.

- 2.21 The long- and short-term obligations of CEL, as of December 31, 1971, are detailed below:

	(equivalent in thousands of US\$)			
	Original Amount	Total Outstand- ing 12/31/71	Long- term	Short- term <sup>2/</sup>
Bonds guaranteed by the Gov't. (1975, 5%)	5,240	1,294	943	351
Central Reserve Bank of El Salvador No. 3 (4-1/2 %) <sup>1/</sup>	183	167	161	6
Central Reserve Bank of El Salvador No. 85 (5%)	2,000	1,000	-	1,000
IBRD No. 22-ES (4.25%)	12,545	3,127	2,287	840
IBRD No. 221-ES (5.75%)	2,703	2,035	1,925	110
IBRD No. 263-ES (5.75%)	3,472	2,652	2,525	127
IBRD No. 342-ES (5.5%)	5,939	5,278	4,898	380
MITSUBISHI (6.5%)	1,118	482	258	224
Total	33,200	16,035	12,997	3,038

<sup>1/</sup> Corresponds to the IDB Loan 11/SF-ES granted through the Central Reserve Bank and transferred to CEL as executor of the program.

<sup>2/</sup> Amount of long term debt due in one year or less.

Besides the IBRD loans mentioned in the above table, in January 1971, it granted, through the International Development Association (IDA), a loan for the equivalent of U.S.\$5.6 million for the partial financing of the "Soyapango" Gas Turbine project, which will be disbursed during 1972 and 1973 (see Paragraph 2.51).

Earnings

2.22 A summary of the statement of earnings for the period 1969-71<sup>1/</sup> is presented below:

	<u>1969</u>	<u>1970</u>	<u>1971</u>
Sales in millions of Kw-h	499.0	538.8	598.3
Average income per kw-h (in U.S. cents)	1.62	1.63	1.62
<u>Operating income</u>	(In thousands of U.S.\$)		
Operating income from sales	8,069	8,746	9,675
Other income	<u>2</u>	<u>2</u>	<u>2</u>
Total income	8,071	8,748	9,678
<u>Operating expenses</u> <sup>2/</sup>	<u>2,900</u>	<u>3,347</u>	<u>4,050</u>
Net operating income	5,171	5,401	5,628
Net operating income	<u>28</u>	<u>166</u>	<u>34</u>
Net income before interest	5,199	5,567	5,662
Interest	<u>906</u>	<u>837</u>	<u>777</u>
Net earnings	<u>4,293</u>	<u>4,730</u>	<u>4,885</u>

<sup>1/</sup> Rate of exchange used: ₡2.50 = US\$1.00.  
<sup>2/</sup> Includes depreciation.

In the above table, it may be seen that sales of CEL have increased in 1970 and 1971 by 8% and 11% respectively; so has the flow of income in the same proportion. The operating costs have increased by 8.8% during the period 1969-1971. The net earnings increased from U.S.\$4.3 million in 1969 to U.S.\$4.9 million in 1971, that is, a relative increase of 14%.

2.23 The following table shows the most significant indices that can be derived from the economic results of the operations of CEL during the period 1969-1971:

	<u>1969</u>	<u>1970</u>	<u>1971</u>
<u>Net income before interest</u> (in thousands of US\$)	<u>5.199</u>	<u>5.567</u>	<u>5.662</u>
As per cent of net sales ("Operating Ratio")	64,4	63,7	58,5
As per cent of net average fixed assets <u>1/</u>	12,1	12,0	10,1
<u>Internal generation of funds</u> (in thousands of US\$)	<u>6.447</u>	<u>7.005</u>	<u>7.332</u>
<u>Service of long-term debt</u> (in thousands of US\$)	<u>3.241</u>	<u>3.197</u>	<u>3.776</u>
Coverage debt service, Number of times	1.99	2.19	1.94

As is clear from the table, the indices of income on net fixed assets and coverage of debt service, calculated for the years under review, are adequate and exceed those required in the loan contracts with the IBRD 4/.

1/ Return on investments in fixed assets.

2/ Before interest on long-term debt.

3/ Includes interest.

4/ They prescribe a 9% minimum return on net fixed assets and a debt service coverage of 1.5 times.

#### Internal Audit

- 2.24 The Internal Audit section of CEL is not equipped with staff in adequate numbers for the discharge of its functions, nor with an appropriate program of annual activities for the pursuance of its functions. (See Conclusions and Recommendations). In this respect, it may be stated that internal audit procedures would be improved in accordance with modern methods. This task would be undertaken by a consultant to be engaged by CEL.

#### External Audit

- 2.25 According to its charter, CEL is subject to inspection by the Corte de Cuentas de la República. The Central Reserve Bank of El Salvador, as the fiscal agent of this agency, appoints the external auditors. For purposes of this project, the Central Bank will designate a firm of independent public accountants acceptable to IDB, so that it may conduct the external audit of CEL's activities, instead of the firm now rendering this service, as its performance is not considered adequate for the type of work that must be accomplished in relation to the project.

#### Creditworthiness of CEL

- 2.26 CEL has satisfactorily fulfilled its domestic and external contractual obligations, as a result of which it enjoys solid prestige in national and international circles. Proof of the above is the reception accorded to the bond issues it has floated,<sup>1/</sup> (see Appendix L) as well as the financial assistance it has received from the World Bank (see Paragraph 2.51).

#### Administrative and Technical Capacity

- 2.27 The administrative and technical capacity of CEL is based on a staff that possesses the professional knowledge needed to operate the enterprise. CEL has been doing satisfactory work in the administration of its programs and resources and it is recognized as an agency experienced in the electric utility field.
- 2.28 It is, therefore, believed that the organization structure of CEL, its management and administration, and its professional and administrative staff, are adequate for the execution of operations. Both for undertaking the expansion program of national electrical development and, in particular, for implementing the Cerron Grande hydroelectric project, CEL would increase the number of qualified professional staff. (See Paragraphs 2.11 and 3.33).

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<sup>1/</sup> Through its fiscal agent, viz., the BCR, and with the guarantee of the Government.

E. Market for Electricity and Inter-connected System

- 2.29 CEL produced around 88% of the 743 Gw-h generated in El Salvador during 1971, while private companies and other small plants generated the remaining 12%. (See Appendix E). CEL sold block energy through an interconnected system that serves the whole country, a total of 540 Gw-h in 1970 to 10 other distributing companies (95%), and to various industrial consumers and some 11,000 rural consumers (5%). In the map shown in Appendix B, the principal details of transmission systems and the areas served by these companies are presented. CAESS, the Electric Light Company of San Salvador, a subsidiary of the Canadian International Power Company of Montreal serves the capital and other areas of the country, and is the principal customer of CEL, marketing around 3/4 of the electric power produced in the country.
- 2.30 The inter-connected system of CEL at present represents about 200 kilometers of transmission lines rated at 44,35 and 22 KV. The CEL generating plants have a total of 166 Mw of capacity, as follows: (i) the 5 de Noviembre hydroelectric plant, located in Guayabo on the Lempa River, 81 Mw; (ii) the hydroelectric plant of Guajayo on the Guija Lake, 15 Mw; (iii) the thermal plant of Acajutla on the Pacific Coast, 70 Mw.
- 2.31 These plants are inter-connected by 115 KV lines, which also connect San Salvador, the capital, with the system of the sub-station of Soyapango, where the new gas power plant is located (see Paragraph 2.51). All the power plants which belong to other companies, except one, are connected with the central system by means of lines rated at 44 KV or less.
- 2.32 At present, there are ten public electric utility enterprises in the country, listed below in order of energy consumption: (1) Electric Light Company of San Salvador (CAESS); (2) Electric Light Company of Santa Ana (CLESA); (3) Hydroelectric Executive Commission of the Lempa River (CEL); (4) Electric Distribution Company (Mixed Ownership) of Usulután (DEUSEM); (5) Electric Light Company of Sonsonate (CLES); (6) Oriental Salvadorean Electric Light Company, S.A. (COSAESA); (7) Electric Light Company of Ahuachapán (CLEA); (8) Electric Company of Cucumacayán, S.A. (CECSA); (9) Hydroelectric Company Roberto de Matheu (RMCO); and (10) Electric Distribution Company (Mixed Ownership) of Sensutepeque (DESSEM). The total installed capacity of these enterprises (excluding CEL) amounts to 20 Mw, and this production, together with that of CEL, serves 166,400 consumers.
- 2.33 At present, there are also 33 privately owned self-generating plants in operation, with an installed capacity of 50 Kw each. Taken together, the installed capacity of these private electric generating plants amounts to 17 Mw, which represents only 8.2% of total installed capacity in the country.

F. Tariff System

- 2.34 The Electric Services Law, approved by Legislative Decree No. 177 of December 31, 1935, and amended in October 1961, specifically declares that enterprises engaged in the production, transmission and distribution of electric power for public use are subject to government supervision, done by the Inspectorate General of Electric Services. This institution works under the Ministry of Economy and its function is limited mainly to practical work related to the financial and technical inspection of companies in the private sector. It is the Minister of Economy who decides all matters related to the policies of the energy sector, for which purpose he is advised by the Executive Director of CEL, by the Director of the Inspectorate General and by an official of the same Ministry.
- 2.35 CEL has the legal authority, with the approval of the Ministry of Economy, to fix rates in such a way that they cover costs and permit it to fulfill its obligations to creditors. The loan contracts entered into by CEL with the World Bank specify a minimum rate of return of 9% of its net fixed assets, a requirement with which CEL has satisfactorily complied with since 1960, and in addition it has been able to finance alone the major part of its expansion plans.
- 2.36 Except CEL, all other electricity companies of San Salvador are subject to a provision in the Electric Services Law, which lays down that the rates of an enterprise must be reduced if its return in relation to its "patrimonio neto" (substantially the same as "net equity") exceeds 8%. In case the rate of return is consistently less than 8%, the companies may request a tariff adjustment.
- 2.37 During 1971, CAESS made representations before the Ministry of Economy to secure a reduction in the tariffs on energy sales by CEL. It was not granted but this enterprise was exonerated from the payment of the demand for arrears 1/, with the billing to be limited to the actual demand for each month, on the condition that CAESS, on its part, would pass the savings on to its consumers without charging them for the arrears. CEL deemed it inappropriate for its financial position to consider reductions in its rates, in view of the rise in the prices of imported fuel oil, which tends to increase the costs of power production in the thermal plants of the system.

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1/ Actual demand for the previous month.

2.38 According to the system of CEL, the bulk rates consist of two parts:

- a) a demand charge of 45 centavos of Colón per Kw of maximum demand per year for the larger companies (CAESS, CLESA, CLEA, DEUSUN and DESSEN); a demand charge of 50 centavos of Colón per Kw of maximum demand per year for the other distributors as well as for the National Aqueduct and Sewerage Administration (ANDA) and for the Montecristo Mines. This is consistent with the increase in costs of supplying additional power.
- b) an energy charge of 3 centavos of Colón per Kw-h, which is somewhat higher than the cost of production envisaged for the next few years.

2.39 Appendix J shows the principal rates schedules of CEL, bulk and retail, for the four main distributors in El Salvador. The existing tariff system in the country is considered satisfactory from the point of view of both residential rates and those charged in the commercial and industrial sectors.

2.40 In comparison with other countries in the region, the average rate applied to the residential sector is the lowest, due largely to the social objectives of the "General Plan of Rural Electrification" of El Salvador.

#### G. Rural Electrification on the Part of CEL

2.41 Ever since the potential of the Lempa River for national hydro-electric development became known, the Government of El Salvador and CEL were concerned with the establishment of the basic outlines of a program which would permit the attainment, in a prudent period of time, of total electrification of the country, including rural areas. In 1969, CEL prepared a preliminary study of the cost involved in bringing the benefits of electrification to all the towns and villages where it was lacking, reaching the conclusion that any rural area where electric service was introduced, would show losses for several years. Nevertheless, this work has eminently social objectives, and it takes into account the convenience of having electric power as a prior element in the development of such areas.

2.42 CEL divided the Republic into 17 zones which, because of their geographical location, could be comprised by administrative units of the "General Plan of Rural Electrification", which consists in the supply of electric power to small localities with scarce economic resources, engaged mostly in farming, small business, or services. Similarly, the CEL study took into account population density, access facilities and the possibilities for increasing the productivity of existing resources in each zone.

- 2.43 In order to initiate this plan of rural electrification and to obtain necessary experience in aspects related to its administration, consumption trends and levels of costs in 1962, CEL put into effect a project called "Pilot Plan of Rural Electrification", at an approximate cost of U.S.\$200,000 equivalent, which was partly financed with proceeds of Loan 11/SF-ES made by the IDB in that year in the amount of U.S.\$183,000 equivalent. The local contribution amounted to U.S.\$17,000 equivalent.
- 2.44 To implement this Pilot Plan, CEL selected the zone denominated as No. 15, formed by 11 towns situated in the sector of Olocuilta, Department of La Paz, between San Salvador and the City of Zacatecoluca, with an approximate population of 14,000 urban inhabitants in 3,200 houses.
- 2.45 The investments executed as a result of this Pilot Plan, which was officially completed in November 1972, consisted of the following works:
- a) installation of 58.4 kilometers of transmission lines;
  - b) construction of the sub-station of Olocuilta and protective devices, and
  - c) installation of the distribution system, with meters and household service drops in villages to be served.
- 2.46 In line with the growth of needs in Zone 15, the Pilot Plan has undergone a noticeable expansion and, at present, 51 towns and villages in this zone are served by 21 transmission lines measuring 209.5 kilometers. On August 31, 1972, these lines served a total of 3,145 consumers, which included residential service, public lighting, government and municipalities, small industry, retail business, and agricultural machinery and irrigation.
- 2.47 On the basis of the experience gained since 1964, through the application of this Pilot Plan in Zone 15, CEL has prepared other projects for developing, in successive steps, the electrification of rural areas in the rest of the country. In fact, during this period, works of rural electrification are progressing in the North and in the coastal zone of the Departments of Morazán, in the Eastern region of the Republic and in various areas situated in the West and center of the country.
- 2.48 In all, the works of rural electrification executed by CEL, as of August 31, 1972, benefited 308 communities comprised by 94 towns, of which 80 are served exclusively by CEL and consist of the following: (i) 21 rural sub-stations; (ii) 444 kilometers of sub-transmission lines; (iii) 1,267 kilometers of primary distribution lines; and (iv) 308 distribution grids in towns and rural communities.

- 2.49 All these works of rural electrification, with the exception of the IDB contribution for the Pilot Plan in Zone 15, have been built and financed by CEL with its own resources and a local short-term loan. It is estimated that the cumulative total of the CEL's investment in these works so far amounts to the equivalent of U.S.\$5.6 million, inasmuch as the present rural electrification program being implemented by CEL requires annual investments on its part of about U.S.\$400,000 equivalent (see Paragraph 2.43).
- 2.50 The active continuation of this progress in rural electrification depends in large measure on the possibility that CEL can execute energy expansion on schedule, as part of program which the Cerrón Grande project has the highest priority.

H. Participation of the World Bank in the CEL Electrification Program

- 2.51 From 1949 until the present, the IBRD and the IDA have granted 5 loans to El Salvador for the equivalent of U.S.\$31.0 million, with a view to collaborating in the financing of the nation's power development program, as detailed below:

<u>Loan From</u>	<u>Date</u>	<u>Amount</u> <u>(U.S.\$ million)</u>	<u>Project</u>
1. IBRD	December 1949	12,6	Guayabo (5 de Noviembre), hydroelectric, 15 Mw
2. IBRD	February 1959	3,0	Guayabo, expansion, 15 Mw
3. IBRD	July 1960	3,8	Guajoyo, hydroelectric, 15 Mw
4. IBRD	June 1963	6,0	Guayabo, expansion, 21.4 Mw and Acajutla, thermal, 30 Mw
5. IDA	January 1971	5,6	Soyapango, Gas, 33 Mw

It is understood that the experience of the IBRD with the above loans has been satisfactory. 1/

1/ The first four loans listed above are fully disbursed.

I. Legal Capacity

- 2.52 As a sovereign state, the Republic of El Salvador has the legal capacity to enter into a contract for the loan. For this purpose it will be necessary for the Legislative Branch, pursuant to the National Constitution Article 47, to approve the fiscal affair division of the executive branch of government must appoint, by mean of a resolution, the official who is to represent the government. In order for the contract to be valid, it must be ratified by the Legislative Assembly, pursuant to Article 75 of the Constitution.
- 2.53 It is not expected that these approvals will take a long time in view of the interest shown publicly by high officials of the executive and legislative branches of government. In order to simplify arrangements as much as possible, all authorizations needed will be requested of the Legislative Assembly at the same time. In addition to the approval and ratification of the loan contract, authorization will be required for:
- (a) Extraordinary appropriation to the CEL budget so that it may use the proceeds of the loans from the IDB and IBRD, as well as the local contribution, for project-related purposes.
  - (b) A bond issue, yielding interest at 7 percent so that it can be placed on the same conditions as other local issues jointly guaranteed by government.
  - (c) The Act creating the Fund for Local Contributions of the Republic of El Salvador.
- 2.54 According to the reform introduced by Legislative Decree No. 1253 of December 2, 1953, CEL is authorized to obtain direct loans, issue bonds in domestic and foreign markets and contract other obligations, with the prior authorization of the Executive Branch through its arm, the Ministry of Economy, and to utilize the funds thus obtained for the achievement of its objectives, in accordance with its budgets and with the terms of the Law. This authorization should be understood as being limited to loans and bonds issued for purposes of complying with the regular budget, since Article 125 of the Constitution and Article 19, Clause (b) of Decree 137 which created CEL, require that the commitments of funds that may affect future budgets, be approved by the Legislative Assembly in the form of an Extraordinary Budget for the agency. Furthermore, respect to the bonds that should have the guarantee of the government, such guarantee must also be authorized by the Legislative Assembly. Similarly, according to a constitutional provision (Article 47, Section 16) the Legislative Assembly must state, in the appropriate decree, the purpose for which the funds will be used and the main conditions of the transaction.

- 2.55 The CEL is empowered by current legislation to acquire ownership of land and obtain whatever easements it requires for the project. In fact, the law providing for expropriation land for national electrification works and the act creating the CEL empower it to expropriate such land as it may need to accomplish its aims whenever such land cannot be acquired by direct purchase. Expropriation of such real property as is to be foaded is regarded as necessary including land needed to erect and maintain dams, plants and other facilities, as well as land, easements-or rights-of-way- for constructing and maintaining transmission lines and other energy or water supply services. The expropriation procedure is a very short one and the claim is brought before any civil court in the capital city. Provisions are also made for land deeds to be registered in the name of the CEL at the office of land registration whenever the land owners or holders lack a registered title thereto or hold a defective title.
- 2.56 In relation to easements, the Act on Establishment of Easements for purposes of national electrification empowers the CEL to acquire easements necessary for cables, posts, sub-stations and other structures, by means of similarly short procedures. The law also provides for restrictions on such actions as may be taken by owners of real property subject to easement where such action might obstruct the CEL in the performance of its labors.
- 2.57 Pursuant Article 2 of the Act creating it, the CEL may develop, conserve, manage, and utilize the water resources of the Lempa River, and therefore, it does not require a grant or other authorization to impound and utilize water for the project.
- 2.58 In conformity with the above paragraphs, CEL is empowered to:  
(i) obtain an eventual loan from the Bank to be conveyed to it by the government; (ii) enter into the respective contract; (iii) execute the works of the project; (iv) exercise the corresponding expropriations; (v) establish the rights-of-way for electric transmission and distribution lines; (vi) dam waters for the project; and (vii) set tariffs.

J. Guarantee:

- 2.59 The general responsability of the Republic of El Salvador.

### III. THE PROJECT

#### A. CEL Electric Energy Development Program

##### 1. Introduction

- 3.01 Electric energy consumption in San Salvador has grown at an average of 11.5% per annum during the last 10 years. The CEL, which already supplies 90% of the total amount of electric energy used in El Salvador has increased production at the average rate of 11.4% per annum in the same 10-year period in order to meet growing demands placed on the system. Such growth was stimulated by the pace of economic activity and the increase in population (3.8% per annum), along with greater use of electric energy in homes, businesses, farms and industry.
- 3.02 The chief aim of the program for development of CEL consists of meeting all future needs for electric energy in El Salvador at the lowest possible cost while improving the quality of electric service as well as reliability of the system.
- 3.03 Therefore, in order to maintain supply at a suitable level in coming years, CEL has prepared the following expansion program:

#### Projected Electric Power Demand and Expansion Program

<u>Year</u>	<u>Maximum demand (MW)</u>	<u>Projects in service during the year</u>	<u>Total Installed capacity (MW)</u>
1971	133 (current)		166
1972	148	Soyapango, 33 MW (gas turbines)	199
1973	164		199
1974	182	Ahuachapán, 30 MW (geothermal)	229
1975	202		229
1976	225	Cerrón Grande, 135 MW	364
1977	250		364
1978	278		364
1979	308	Cerrón Grande, 67.5 MW	431.5
1980	342		431.5
1981	380	Conventional thermal or geothermal power, 66 MW	497.5
1982	422		497.5
1983	468	Cerrón Grande, 67.5 MW	565
1984	519	Conventional thermal power, 66 MW <sup>1/</sup>	631

<sup>1/</sup> See paragraph 3.06, second part.

- 3.04 The first project, called the Soyapango power station, is being financed with a loan from the IDA. Work is now in progress and it is expected that the first installations will be set in operation at the end of 1972. The second project comprises the Ahuachapán geothermal electric plant which is to be located in the department of the same name along the border with Guatemala. The investment required for this project is estimated at US\$17.6 million equivalent; and consists of ancillary transmission and distribution facilities. The foreign exchange requirement of investment would be financed with resources of the IBRD <sup>1/</sup>, and it is expected that these facilities may be set in commercial operation at the end of 1976.
- 3.05 The third project in the program (in the order in which facilities will be placed in service) is called Cerrón Grande and is of fundamental importance. As shown in the table above, the facilities would first be comprised by two generating sets (combined capacity of 135 MW) scheduled to begin operating at the end of 1976. There would then be a second stage installation comprising a third set (67.5 MW) scheduled for operation in 1979. To meet projected demand through 1981, a conventional thermal electric generating station would be installed, with a nameplate rating of 66 MW. The alternative is a geothermal plant of the same capacity. At that time consideration must be given to adding to the system a thermal plant instead of a fourth generating set at Cerrón Grande, the reason being the characteristics of energy demand (base load) and the proposed hydroelectric development. To meet projected demand for 1983, the fourth 67.5 MW set could enter service at Cerrón Grande, followed by another thermal installation of about 66 MW which would meet projected demand through 1984.

#### Present Demand and Future Energy Needs

- 3.06 At the end of 1971, the maximum demand of the CEL system was 133 MW. In the next decade the annual increase in demand is estimated at about 11%, which is slightly less than in the preceding decade (11.6%). Thus, at the end of 1976, when the Cerrón Grande project begins to generate energy, maximum demand would be 225 MW, and the annual increase from 1976 to 1984 would be in the order of 25 to 50 MW. As shown in the preceding table, the 135 MW installed capacity in 1976 with the Cerrón Grande project, as well as the 270 MW capacity which the project would eventually provide, are perfectly reasonable in station capacities in relation to system needs. In fact, installed capacity was so programmed as to exceed the foreseeable peak load at any time, allowing an appropriate margin which would assure an adequate supply of energy at any time of the year and at any time of day (firm power).

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<sup>1/</sup> See paragraph 3.17.

Present Supply and Sources of Generation

- 3.07 CEL now has an installed capacity of 166 MW, of which 96.4 MW (58% of capacity) is hydroelectric generation and the remainder is thermal generation. In 1972 this capacity will increase by addition of a 33 MW gas turbine to be located at Soyapango, along with the 30 MW geothermal plant at Ahuachapán that is to be added in December 1974. Therefore, the system would have 229 MW of installed capacity in 1976, of which 42% would be hydroelectric generation. The first two units at Cerrón Grande would raise total installed capacity in that year to 364 MW, thus creating 231.4 MW of hydroelectric capacity, that is, 63% of total capacity.
- 3.08 Indigenous sources of electric energy in El Salvador are located along the Lempa River and in geothermal deposits (steam). Total hydroelectric potential of the Lempa River is estimated at 3,500 million KWH per annum, while the known geothermal potential at Ahuachapán would be about 700 million KWH per annum, that is a combined total of 4,200 million KWH per annum. In comparison, the energy needs of the CEL system in 1990 are estimated at about 4,700 million KWH per annum. Therefore, if all indigenous energy sources in El Salvador are used during the next 20 years, it will still be necessary to import fuel to meet part of the demand. Surveys show that hydroelectric plants must be used in combination with thermal plants during the dry season when demand is at peak. This is a feature of CEL's expansion program.
- 3.09 Along the Lempa River itself, the Cerrón Grande project is the most appropriate next stage in the program described herein. Along the Lower Lempa River (Bajo Lempa) are two places that might be suitable for utilization of hydroelectric potential: El Tigre and La Pintada. The first of these would require that part of the territory of Honduras be flooded, whereas the La Pintada Project would require regulation during the dry season at Cerrón Grande in order to be justifiable. On the High Lempa River (Alto Lempa) are alternatives at El Zapotillo, Paso del Oso, and Astilleros which are relatively more expensive than Cerrón Grande, according to recent studies. The Cerrón Grande project, with two units installed will generate an average of 556 million KWH per year and increase generation at the existing plant, which is called "5 de Noviembre", by about 142 million KWH per year, until total generation is 698 million KWH. During the 6-months dry season, the Cerrón Grande project, including regulation of the downriver steamflow, would add 368 million KWH of electric energy to the system.
- 3.10 From 1967 to 1972, the CEL installed thermal electric plants in order to meet growing requirements for electricity, so that by the end of 1972 there will be more thermal electric capacity than hydroelectric capacity in the CEL system, and it will be necessary to install more

thermal units in the next few years in the event that the Cerrón Grande project is not constructed. This means that El Salvador would become increasingly dependent upon costly fuel oil imports for its supply of electricity.

- 3.11 In fact, it is estimated that in 1973 the price of fuel oil would be above the price obtained by CEL in 1969. This increase, along with those foreseen after 1973 <sup>1/</sup>, as well as the need to import growing quantities of fuel oil, would determine an increase in the electric rates along with a loss of foreign exchange which El Salvador might otherwise use for national development projects. In view of these possible consequences, CEL decided to renew its efforts to develop the Cerrón Grande project.

#### B. Description of the Project

- 3.12 The locations of the Cerrón Grande facilities and transmission lines are shown in the map in Appendix B. The principal facilities of the project, which are illustrated in Appendix H, are as follows: (i) an rock-fill dam on the Lempa existing dam at the 5 de Noviembre site; (ii) chute spillway on the left bank of the river; (iii) intakes on the right of the channel leading to the spillway; (iv) a generating station on the left bank of the river; and (v) a step-up substation on the right bank of the river, equipped with transformers and from which would originate transmission lines leading to the existing substation at Nejapa (for San Salvador) and others leading to the substation of the 5 de Noviembre powerplant.

##### Dam

The rock-fill dam would be constructed of rock-fill, aggregate, sand and soil of different physical properties. The height of the dam would be 85 meters measured from the lowest point of the foundation (at elevation 165 <sup>2/</sup>) to the crest (at elevation 250). The dam would be about 600 meters long at the crest.

The proposed dam would create a reservoir on the Lempa River of 135 km<sup>2</sup> at normal maximum elevation. The volume of water usable for generation (between elevations 228 and 243) will be about 1,430 million cubic meters. Reservoir volume (power storage) at the lowest elevation for power generation (elevation 228) would be about 750 million cubic meters. With sedimentation estimated at about more than 100 years of operation. The reservoir would flood 13,500 hectares of land where an estimated 1,000 families make their homes.

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<sup>1/</sup> See paragraph 4.10

<sup>2/</sup> Above sea level.

Also in the area below elevation 243 are the Bosque Cayetano ferry, apprivately-owned sugarmill at San Esteban, and some bridges and sections of the Norte and Chalatenango highways 1/.

#### Spillway

The spillway would be of the chute type. Four gates located across the channel leading to the spillway would regulate discharge of water. At normal top level (elevation 243), the spillway is capable of discharging a flow estimated at 6,500 cubic meters per second which would equal the inflow of water to the reservoir caused by a flood such as would occur probably once every 50 years. If the maximum probable flood weew to occur, the spillway is capable of releasing the resulting discharge.

#### Convenyance Structures

Convenyance structures would consist of two intakes and two short, lened tunnels of 6.4 meters diameter. Each of the tunnels would feed the two generatin sets to be installed in the power plants. The project embodies features that would allow for construction of two additional intakes and tunnels to additional generating sets during the expansion stage of the project.

#### Power plant

The powerhouse, or power station, would privede for installation of four complete generating sets, buy only the first two sets would be installed under the present project. Each of the first sets would comprise one turbine directly coupled to one generator.

#### Transmission Facilities

Execution of the Cerrón Grande project, and, in general, of the whole CEL program in the future, must be accompanied by a program for expansion of the transmission system. For such purposes, work be completed at the end of 1976 of the installation of a 115 KV two circuit transmission line from Cerrón Grande to Nejapa substation (34 Km), and a 115 KV single circuit line to be constructed to link the Cerrón Grande substation with the 5 de Noviembre plant (20 Km). This expansion of the transmission system will provide enough capacity to convey energy from the Cerrón Grande plant and the 5 de Noviembre plant, even in the event that one of the circuits of the Cerrón Grande project is out of service. The capacity of transformers and related equipment at the Cerrón Grande and Nejapa substations will be increased commensurately with the increase in generating

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1/ See paragraphs 3.47 to 3.55, 4.51 and Appendix F.

capacity. A third 115 KV circuit will be installed in 1983 when the fourth Cerrón Grande unit is added to the system. <sup>1/</sup> The circuit will link Cerrón Grande with Nejapa or some other substation serving San Salvador.

#### Control Center

Control center would be installed at the main building of CEL in San Salvador. It would contain equipment to control operation of the Cerrón Grande plant and substation, the Soyapango plant, and the new 115 KV substation, provided with facilities for remote control.

- 3.13 It is estimated that the first unit of the Cerrón Grande project will start operating in December 1976. For that purpose it is necessary for the diversion tunnel to be completed by November 1973, so that the contractor for other civil engineering works will be able to start earth filling operation in the river bed during the dry season at the end of 1973 and 1974.

#### C. Financial Plan and Total Cost of Project

- 3.14 The total cost of the Cerrón Grande project has been destimated at US\$80.0 million equivalent, allocated as described below:

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<sup>1/</sup> See paragraph 3.05

(Equivalent in millions of US\$)

<u>Categories</u>	<u>Costs in foreign exchange 1/</u>	<u>Local Costs</u>	<u>Total</u>	<u>%</u>
1. Engineering and Administration	6.1	1,9	8,0	10.0
2. Land, relocation, easements, etc.	-	14,3	14,3	17.9
3. Preliminary work	0,4	1,5	1,9	2.4
4. Main Civil Works 2/	21,4	9,9	31,3	39.1
5. Mechanical Equipment for Station	2,8	-	2,8	3.5
6. Turbines and Generators 2/	5,5	-	5,5	6.9
7. Ancillary Electrical Equipment	0,3	-	0,3	0.4
8. Transmission Facilities	1.8	0,5	2.3	2.9
9. Financing Charges 3/	4,4	0,1	4.5	5.5
10. Contribution to Inspection and Supervision Fund	0.4	-	0,4	0.5
11. Associated Costs 4/	-	0,7	0,7	0.9
12. No Specific Allocation 5/	<u>5.4</u>	<u>2.6</u>	<u>8.0</u>	<u>10.0</u>
Total	<u>48.5</u>	<u>31.5</u>	<u>80.0</u>	<u>100.0</u>
Percentage	60.6	39.4	100.0	

1/ No indirect costs in foreign exchange are provided for.

2/ Includes an allowance applicable to procurement of goods and services provided procurement is made in eligible member countries of the Bank.

3/ Interest and fees on external loans during project execution.

4/ Training of settlers who live on the land to be flooded for the reservoir and who will be moved elsewhere.

5/ Includes allowances for general contingencies, including monetary contingency and price escalation.

Note: All figures are rounded off.

D. Origin and Use of Currencies

- 3.15 The sources of funds, and the origin and use of currencies are shown below:

(Equivalent in millions of US\$)

	<u>Origin of Currencies</u>		<u>Use of currencies (costs)</u>		<u>Total</u>	<u>%</u>
	<u>Foreign 3/</u>	<u>Local</u>	<u>Foreign 3/</u>	<u>Local</u>		
IDB	32.1	6.0	32.1	6.0	38.1	47.6
IBRD 1/	15.9	-	15.9	-	15.9	19.9
CEL (Local Contribution)	0.5 2/	25.5	0.5 2/	25.5	26.0	32.5
Total	<u>48.5</u>	<u>31.5</u>	<u>48.5</u>	<u>31.5</u>	<u>80.0</u>	<u>100.0</u>
Percentage	60.6	39.4	60.6	39.4	100.0	

IDB Financing

- 3.16 The loan from the Bank would amount to US\$38.1 million equivalent, of which as much as US\$6 million equivalent be disbursed in Salvadorian colones. Loan resources may be used to acquire goods and services in El Salvador and in other eligible member countries of the Bank.

Loan resources to be disbursed in foreign exchange (US\$32.1 million equivalent) may be used to finance goods and services procured by means of public international bidding, using margins of preference acceptable to the Bank, where appropriate. The loan resources would defray direct costs 4/ in foreign currency. Furthermore, such proceeds of the loan as are disbursed in Salvadorian colones may be used to finance part of the costs in local currency of contracts for construction of civil items awarded by means of public bidding as mentioned above, as well as goods and services of domestic origin. Such goods and services may be acquired by public bidding within El Salvador alone. The portion of the loan amount to be used in financing local costs would be US\$6.0 million equivalent,

- 1/ The World Bank will also lend US\$8.2 million equivalent for the Ahuachapán geothermal project.  
 2/ Represents financing expenses payable in dollars.  
 3/ No foreign exchange proceeds of the loan will be used to finance local costs.  
 4/ Includes interest and service charge on the loan amount in foreign exchange. No provision is made for indirect costs in foreign exchange.

which accounts for 7.5% of the total project cost and 19.0% of the cost of the project in local currency. Only Salvadorian colones may be used to finance local costs chargeable to the loan from IDE, and no provision is made to allow the use of foreign exchange for this purpose.

#### Financing of the World Bank

- 3.17 The IBRD loan would amount to US\$15.9 million equivalent. This amount may be used to acquire goods and services in El Salvador, in other member countries of the International Monetary Fund, and in Switzerland. It is expected that the total amount of the IBRD loan will be disbursed in foreign exchange. 1/ The IBRD loan would be made directly to the CEL at 7-1/4% interest, a commitment fee of 3/4 of 1%, allow 25 years as the term for amortization, with a 5 year grace period.

#### Local contribution

- 3.18 The local contribution to finance this project is estimated at US\$26 million equivalent, of which amount US\$23 million equivalent will be financed with the CEL's own resources, and the rest with funds acquired through domestic borrowing. According to the CEL's financial projections, 2/ it may be predicted that the CEL will face no difficulties in paying up its contribution to the project. The amount of US\$3 million equivalent that is required to complete the local contribution would be obtained through bonds guaranteed by the government and issued by the Central Reserve Bank of El Salvador (BCR), 3/ in its capacity as fiscal agent of CEL and placed by it in the market.

#### E. Investment Categories

- 3.19 It is estimated that the investment in the project would be financed as follows:

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1/ The IBRD is likewise considering the possibility of financing the geothermal project at Ahuachapán, in which case the loan from IBRD would amount to US\$27.2 million equivalent, including studies, training, etc.  
2/ See Appendix G, paragraph 4.09, and subsequent paragraphs.  
3/ See paragraph 4.16.

Financial Plan

Classified by Category of Investment

(In millions of US\$)

	IDB		IBRD		CEL		Total	
	FC	NC	FC	FC	NC	FC	NC	
1. <u>Engineering and Management</u>								
1.1 Engineering	-	-	6.1	-	-	6.1	-	
1.2 Administration	-	-	-	-	1.9	-	1.9	
Total 1	-	-	6.1	-	1.9	6.1	1.9	
2. <u>Direct Costs</u>								
2.1 <u>Generation</u>								
2.11 Land, easements, relocation, etc.	-	-	-	-	14.3	-	14.3	
2.12 Preliminary Works	-	-	0.4	-	1.5	0.4	1.5	
2.13 Main Civil Works 1/	21.4	5.9	-	-	4.0	21.4	9.9	
2.14 Mechanical Equipment for Plant	-	-	2.8	-	-	2.8	-	
2.15 Turbines and Generators 1/	5.5	-	-	-	-	5.5	-	
2.16 Ancillary Electrical Equipment Facilities	-	-	0.3	-	-	0.3	-	
2.2 <u>Transmission</u>								
2.21 Substations	-	-	1.1	-	-	1.1	-	
2.22 Transmission lines	-	-	0.7	-	0.5	0.7	0.5	
Total 2	26.9	5.9	5.3	-	20.3	32.2	26.2	
3. <u>Financing Expenses</u>								
3.1 Interest	0.8	0.1	2.8	-	-	3.6	0.1	
3.2 Commitment fee	-	-	0.3	0.5	-	0.8	-	
3.2 Inspection and Supervision Fund	0.4	-	-	-	-	0.4	-	
Total 3	1.2	0.1	3.1	0.5	-	4.8	0.1	
4. <u>Associated Costs</u>								
4.1 Training of settlers	-	-	-	-	0.7	-	0.7	
Total 4	-	-	-	-	0.7	-	0.7	
5. <u>No Specific Allocation</u>								
5.1 General Contingencies	1.5	-	0.5	-	2.6	2.0	2.6	
5.2 Monetary Contingency	-	-	0.3	-	-	0.3	-	
5.3 Allowance for price increase	2.5	-	0.6	-	-	3.1	-	
Total 5	4.0	-	1.4	-	2.6	5.4	2.6	
Expenditures, by type of currency	32.1	6.0	15.9	0.5	25.5	48.5	31.5	
Total Expenditures	38.1	-	15.9	-	26.0	80.0	-	
Percentages	47.6%	-	19.9%	-	32.5%	100.0%	-	

1/ Includes an allowance for goods and services, provided goods and services are purchased in eligible member countries of the IDB.

Note: FC = Foreign currency  
NC = National currency

Items Financiable by IDB

- 3.20 Proceeds of the IDB loan may be used to finance (i) all expenses made in foreign exchange for civil work items, as well as part of the expenses in local currency of such work; (ii) electro-mechanical equipment comprising generators and accessories, turbines and regulators; (iii) interest and service charge on the IDB loan; (iv) expenses of inspection and supervision by the IDB; and (v) all allowances for contingencies.

Items Financiable by the IBRD

- 3.21 The World Bank's resources may be used to finance: (i) consultants' services; (ii) expenses in foreign exchange to acquire equipment for the power plant and substations, comprising transformers, switchgear, gates, gate hoists, and other items; (iii) transmission lines; (iv) preliminary expenses for construction of the diversion tunnel and (v) financing charges and contingencies.

Items Financiable by the CEL

- 3.22 CEL resources may be used chiefly to finance such local materials and services as are related to: (i) management and general expenses of CEL; (ii) procurement of land for project construction, procurements of land for making grants, housing construction, family relocation, community development, construction of access roads and other items; (iii) expenses in national currency for construction of dam; (iv) expenses in national currency for machinery and equipment for the power plant and substations; (v) expenses in national currency for transmission lines; (vi) commitment fee; and (vii) contingencies.

F. Execution of Project

Studies and Designs

- 3.23 The complete studies of technical, economic and financial feasibility were prepared by Harza Engineering Company International of Chicago and by Atilio García Prieto of El Salvador, for work on the dam and the power plant as well as for the generation and transmission facilities. Furthermore, Harza Engineering Company International is now engaged in preparing documents relating to invitations for bids on such works, as well as technical specifications, instructions to bidders and general requirements and conditions of bidding. A provisional version is available of the general conditions for civil items. All other documents relating to such works and to the procurement of machinery and equipment will be submitted to the Bank in due course, in conformity with the time schedule for execution of the project.

- 3.24 The solution adopted for this project was arrived at as a result of careful examination of several design alternatives as well as demand projections, so as to preclude installations of excessive capacity and in order to minimize costs. With such ends in view, comparisons were made with other programs that comprised thermal and geothermal solutions and gas-impelled turbines plants. Likewise, consideration was given to other alternatives to provide for incorporating each of the four 67.5 KW units. The conclusion was that the proposed program is the one best suited to the country's needs in the light of the aims of CEL's expansion program. (See paragraph 3.02 et seq.).
- 3.25 The study for location of the dam included investigation of all hydro-electric resources in El Salvador, comprised by the High Lempa River and Low Lempa River (Alto Lempa y Bajo Lempa), Sonsonate River, Torola River, and Grande de San Miguel River. The possibility of using the Lake Ilopango for energy development was also examined. (See paragraph 4.45).
- 3.26 Exploratory surveys done at the construction site from 1965 to 1967 are considered adequate for purposes of planning, making preliminary designs, and estimating costs as applicable to feasibility studies. An additional program of exploration was developed in order to prepare the definitive construction project. Swissboring Overseas Corporation has been carrying out these investigations since July 1972, and it is expected, they will be completed before the end of 1972.

A contract was entered into in June 1972 between the CEL and Melhado & Co. the contractor for the southern approaches to the dam site, namely the Potonico-Cerrón Grande road. Construction of this road will be completed by the middle of 1973.

In September 1972 a contract providing for construction of the diversion tunnel was entered into between CEL and Columbus Latinoamericana de Construcciones S.A. Construction of the Lempa River diversion tunnel has already started. It is expected that the tunnel will be completed in 1973.

#### Bases for Cost Estimates

- 3.27 Cost estimates for the project are based on reasonable assessments and well grounded assumptions which were updated recently when missions from the IDB and the IBRD came to El Salvador in June and September 1972, respectively. The direct cost of project construction is based on preliminary work plans drawn up for the feasibility study. This study prescribed adequate staffing organization and suitable machinery to execute works according to schedule, including provisions for normal yields, and reasonable margins of profit and general expenses. Calculations include contingencies accounting for about 9% of direct costs -a percentage which is regarded as prudent.

- 3.28 The values of all items of construction machinery, electromechanical equipment, and transmission facilities were taken from recent quotations. Because the project will take nearly 6 years to execute an offsetting factor was applied to these values, taking into account price shifts in the industrialized countries during the last 10 years. As a result thereof, a factor of 4% per annum was allowed for price escalation. For budgetary purposes the amount reflected by this allowance for cost increases is shown separately in the cost section, and is designated "Allowance for Price Increase".
- 3.29 As procurements of goods and services financed with IDB funds are in this case subject to invitations for bids issued only in member countries of the Bank, and because this procedure may result in higher prices, an allowance to cover this contingency was included in the cost estimates. This allowance was computed by examining recent invitations for bids on civil engineering items and generating equipment in loans from the IDB energy sector as well as invitations for bids on preliminary work (diversion tunnel) for the selfsame Cerrón Grande project. The allowance mentioned above applies only to procurements for civil items such as general construction (50%) and installation of turbines and generator (20%) to be financed with foreign exchange proceeds of the IDB loan. (See paragraph 3.14 and 3.19). An amount set aside for this contingency is considerable, the draft resolution contains a clause providing for cancellation of any surplus of loan funds. (See Resolution).
- 3.30 In making cost estimates in local currency it was not deemed necessary to include offsetting allowances applicable thereto, because statistical data for the last 10 years <sup>1/</sup> show no significant inflationary trend.
- 3.31 Likewise, the total cost of the project includes an item for "monetary contingencies" in order to provide for shifts in the value of currencies other than the dollar (marks, yen, etc.) which may affect goods and services to be financed by the IBRD.

#### Project Execution

- 3.32 The CEL would be responsible for execution of the project for which purpose it entered into a contract on October 5, 1972 to provide for continued use of services provided by Harza, the consulting firm, after the prospective loans from the IDB and IBRD are made. The Harza firm will be needed particularly to carry out engineering tasks make the final designs and provide technical direction and supervision. The consultants will work closely and in permanent touch with the CEL's technical staff assigned to the project.

<sup>1/</sup> Consejo Nacional de Planificación y Coordinación Económica (CONAPLAN), Indicadores Económicos y Sociales 1971.

- 3.33 CEL shall provide management and logistical support services throughout the whole construction period and before construction (1973-1977) as well they will also provide inspectors. A provisional list of personnel to be provided by the CEL includes a chief engineer, who would report directly to the Executive Director of CEL, and at least 30 engineers and 19 administrative officials. Such personnel would be engaged by CEL and most of them will be attached to an organizational unit to be created for the purpose as described in Appendix I. Members of the CEL technical staff were awarded traineeships in Italy, Japan, France, Costa Rica and in the United States of America, and they are now studying in subject fields specifically relating to this project management and execution.<sup>1/</sup>

Coordination of Activities with the IBRD

- 3.34 For purposes of supervision during the execution and disbursement of this loan, the World Bank and the IDB would sign a memorandum of understanding, a preliminary copy of which is attached as Appendix M hereto. Said memorandum shall set forth that each institution is responsible for overseeing such procurements as are made with its resources (see paragraph 3.45). Likewise, the memorandum provides for indicating the institution to be made chiefly responsible for supervising the project during its execution and subsequent operation.

Schedule of Disbursements

- 3.35 Work on the project started in 1972 and will continue in conformance with the following schedule of disbursement:

(equivalent in millions of US\$)

	Yr. 0		Yr. 1		Yr. 2		Yr. 3		Yr. 4		Yr. 5		Total	
	(1972)		(1973)		(1974)		(1975)		(1976)		(1977)			
	FC	NC	FC	NC	FC	NC	FC	NC	FC	NC	FC	NC	FC	NC
BID	-	-	1.4	0.1	8.3	0.9	10.8	3.6	8.3	1.0	3.3	0.4	32.1	6.0
BIRF	0.2	-	1.8	-	3.5	-	5.2	-	3.5	-	1.7	-	15.9	-
Local Contribution (CEL)	-	0.1	0.2	1.3	0.1	7.5	0.1	8.0	0.1	7.0	-	1.4	0.5	25.5
Subtotal	0.2	0.1	3.4	1.4	11.9	8.4	16.1	11.6	11.9	8.2	5.0	1.8	48.5	31.5
Total	0.3	4.8	20.3	27.7	20.1	6.8	80.0							
%	0.4%	6.0%	25.4%	34.6%	25.1%	8.5%	100.0%							

<sup>1/</sup> See Conclusions and Recommendations.

The proposed schedule is regarded as reasonable in light of the time-spans needed to construct the basic project works and conform with the schedule for inviting bids.

Expenses before date of Contract

- 3.36 It is expected that before the date of the prospective loan contract, CEL will have spent about US\$1,500,000 equivalent in Salvadorian colones, and US\$500,000 in foreign currency for the purpose of defraying expenses for services provided by the consulting firm, studies and work relating to construction of the diversion tunnel, exploratory work for the foundations, and construction of access roads. Such expenses were made after the loan application was submitted <sup>1/</sup>. The total amount of such expenses would be financed with resources other than those of the IDB loan (see Conclusions and Recommendations).

Procurement of Goods and Services

a. Procedures

- 3.37 The procedures to be used for inviting bids and awarding contracts for construction as well as for procurement of goods and services for the project will be governed by provisions of the laws of El Salvador and by the appropriate guidelines of the Bank. During the course of negotiations for this loan, the Salvadorian authorities and the CEL were made aware of the Bank's requirements as to contract for services, procurement of goods, and award of contracts under the project, as well as of policy guidelines on margins of preference.
- 3.38 The invitations to bids or other forms of competition which the CEL is required to organize for the project are regulated pursuant to Article 22 of the Decree establishing the CEL, which provides that in awarding contracts for procurements of goods and services the CEL shall not be subject to regulation by the General Budget Office (Dirección General de Presupuesto), or the General Supply Agency of the Republic (Proveeduría General de la República) nor to the provisions of the Law of Supplies (Ley de Suministro), but it must issue invitations to bid on a competitive basis or organize a competition whenever the outlay for procurement of moveable goods is more than 20,000 colones (US\$8,000 equivalent). Article 22 of the CEL charter requires prior approval by the Executive Branch of all undertakings costing more than 250,000 colones (US\$100,000 equivalent). But this requirement will not apply to procurements for the project, as legislative approval will be accorded the project once issuance of the guarantee is authorized.

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<sup>1/</sup> May 19, 1972.

- 3.39 CEL has not adopted a prescribed procedure for inviting bids or holding competition or provided norms applicable in individual cases. Therefore, in making procurements with loans from the IBRD the CEL has employed the IBRD's rules of procedure.

b. Engaging Services of Consultants

- 3.40 Using resources other than those of the Bank, the CEL would continue to employ the firm of Harza International to provide engineering services and project supervision. Furthermore, with its own resources, CEL has engaged an expert in operations, administrative affairs and accounting to work with it for the purpose of instituting whatever modern methods are required to conform with new demands of projects undergoing execution (see Conclusions and Recommendations).

c. Call for Bid

- 3.41 Any contract for procurement of equipment, machinery and construction of project works in which the value of such procurement or work is more than US\$10,000 equivalent would require a public invitation for sealed bids. International invitations to bid would be required for such procurements as are financed entirely or partly with loan proceeds in foreign exchange. Procurements to be financed with loan proceeds in local currency or with local counterpart funds may be restricted to bids from domestic suppliers.

Call for Bids on General Construction

- 3.42 General project construction work, including civil engineering items, will be the object of a single invitation for bids. Such invitation will be made only in eligible member countries of the Bank. All such work would be done by a single qualified contractor that would provide the necessary manpower materials and equipment. It is expected that the amount of the general construction contract will be attractive enough to encourage international competitive bidding.
- 3.43 Before inviting public bids for construction work, the CEL will submit to the Bank for approval, the final work plans, specifications and cost estimates, as well as all documents comprising the invitation for bids 1/. CEL will award the construction contract only after the Bank has given its approval.
- 3.44 Public invitations to bid on project works will be made in compliance with provision in the preceding paragraph and will be subject to the following requirements:

1/ See Conclusions and Recommendations.

(i) Call for Bids.

Advertisements will be published in at least two of San Salvador's daily newspapers with the largest circulation, and at least once in a technical magazine circulated internationally. International invitations for bids will be distributed to embassies and consulates of every member country of the Bank accredited in El Salvador.

The executing agency in agreement with the IDB shall determine the general forms to be used by interested parties to submit required data without establishing any condition or resolution that would restrict participation by firms of eligible member countries of the Bank.

(ii) Registration

Firms interested in participating in the invitation for bids must submit appropriate applications for registration. Applicants for registration in an international invitation for bids must submit their applications no later than 60 days before the first advertisement is published, and in national invitations for bids, no later than 45 days before such advertisement is published. Once the advertisement is made, national or foreign individuals and corporate entities that have submitted the required data, within the terms allowed and to the satisfaction of the executing agency, shall become officially "registered" as enterprises interested in bidding on work to be performed.

(iii) Prequalification

According to the background and activities of each of the parties interested in bidding, the executing agency will determine the firms to be regarded as "eligible", in light of the following requirements:

- Technical capacity;
- Financial capacity in relation to the work to be performed;
- Experience of the prospective bidder's staff as it relates to accomplishment of the work;
- Equipment for installation of all work;
- Number of contracts and volume of works that the interested party is currently performing, or has committed itself to perform during the scheduled period for work on this project;
- Background information on the performance by the prospective bidder;
- Administrative capability to perform the work.

(iv) Invitation to Bid

Once the prequalification arrangements mentioned in subsection (iii) above are completed, the executing agency will submit for prior approval

of the IDB the schedule of requirements and specific conditions of each invitation for bids, as well as the list of firms that will be invited to bid. The executing agency will likewise set the term for tendering proposals, signing the contract and the amount, and indicate the form for maintaining the terms and conditions of the proposal to be submitted to the executing agency. Firms that have qualified and are deemed "eligible" will thereupon be invited to bid. The executing agency will in due course provide the firms thus invited with all documents, including a description of the project, characteristics of the project works and materials, a complete set of plans and designs, and such supplementary data as may be necessary. The term allowed for tendering proposals shall be not less than 45 days from the date that such documents are sent to prospective bidders.

(v) Evaluation of Proposals

The executing agency shall proceed to make a study of the proposals in order to determine the award. Proposals must, of course, conform strictly to the conditions and requirements set forth in the invitations for bids, and if this is not the case, no proposals, however advantageous, will be considered. In any event, the CEL reserves the right to reject all proposals.

(vi) Award

The award will be made to the proposal quoting a reasonable price and this will be the lowest price, taking account of such factors as quality, efficiency, terms and any others that may be appropriate.

Inviting Bids for Equipment, Machinery and Other Goods

The executing agency will invite bids in the manner prescribed in paragraph 3.44 herein. Bids may be submitted by domestic suppliers and by suppliers in eligible member countries of the Bank. The award will be made taking into account the analysis of unit prices, specifications of machinery, equipment and materials, and equipment maintenance programs. In evaluating proposals the executing agency may accord a margin of preference to machinery, equipment and materials of local origin, pursuant to the Bank's policies in respect thereof. Otherwise, the procedure described in subsection (c) will be used when applicable.

d. Time Schedule and Quantities for Which Bids will be invited

- 3.45 The following schedule shows a summary of quantities for which bids will be invited and indicates when the awards will probably be made:

(equivalent in millions of US\$)

Contract	Item	Source	Total cost 1/	Dates scheduled	
				Invitation	Award
FE -1 y 2	Foundation Exploration	CEL	0.1		
C-2	Operators village	CEL	0.4		
C-5	Access roads	CEL	1.0		
C-3	General Construction	IDB/CEL	34.6	3/73	5/73
E-1	Electromechanical equipment (turbines)	IDB	3.4	3/73	7/73
E-2	Electromechanical equipment (generators)	IDB	3.0	3/73	7/73
C-1	Diversio tunnel	IBRD	0.4	-	
E-10	Mechanical equipment, craner, and hoists	IBRD	0.6	1/73	5/73
E-5	Mechanical equipment, gates and hoists	IBRD	2.8	11/73	2/74
E-11	Mechanical equipment, miscel- laneous	IBRD	0.2	8/74	1/75
E-7	Electrical equipment, ancillary (generator leads and switchgear)	IBRD	0.2	11/73	2/74
E-8	Electrical equipment, ancillary (switchboard)	IBRD	0.2	11/73	2/74
E-6	Equipment, substations (switchyard structures & equipment)	IBRD	0.1	11/73	2/74
E-3	Equipment, substations (transformers)	IBRD	0.5	1/74	4/74
E-4	Equipment, substations (circuit breakers and other devices)	IBRD	0.6	11/73	2/74
E-9	Equipment, substations (devices, miscellaneous)	IBRD	0.1	11/73	2/74
C-4	Transmission lines	IBRD/CEL	1.5	9/74	1/75
	Total: Bid Schedule Items		<u>49.7</u>		
	Consultants	IBRD/CEL	8.0		
	Land, easements, resettlement and training	CEL	15.0		
	TOTAL		<u>72.7</u> 2/		

1/ On date of award and including general contingencies. Also includes allowance for other contingencies. In the case of the IBRD it includes an allowance for eventual exchange rate fluctuations, in addition to contingencies.

2/ Not including allowance for price escalation, finance, charges, and contribution to IDB Inspection and Supervision Fund.

- 3.46. Strict conformance is required with the construction program listed in the above schedule because the first generating unit of the Cerrón Grande project is needed by the end of 1976.

As stated in paragraph 3.26, CEL has already advanced preliminary work in constructing the diversion tunnel, access roads, operators' village, and preparing documents for general construction and transmission lines. It is estimated that all such work will be completed on time so that the general construction contractor may start working at the end of 1973, as such work is essential if the first unit is to begin operating in 1976.

G. Land purchase, rights-of-way and resettlement program  
Purchase of Land and rights-of-way

- 3.47 As soon as a decision is made on financing of the Cerrón Grande project, CEL will begin to purchase land and rights-of-way along the proposed route of the transmission lines from Cerrón Grande to Nejapa, and for access roads to the project site. All rights-of-way will be acquired or definitively assigned by the end of 1973. Land purchases will also include land to be flooded for the reservoir (see paragraph 3.12) comprised by 4,000 1/ hectares of good land (32.6%) 7,806 hectares of marginal land (57.8%) and 1,294 hectares of rivers, roads and arroyos (9.6%). In terms of land potential, it is estimated that 9,748 hectares (72%) can be used for intensive cultivation of crops and the rest would be of little or no use as farmland (28%). Of the land to be flooded below elevation 243, the pattern of current and potential use is described below:

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1/ 2,400 hectares of this land are now used for growing sugarcane.

(A) Current Land use and Principal Crops

(Reservoir at 243 meters above sea level)

<u>Cultivated land</u>	<u>Hectares</u>
Corn	1,560
Sorghum (marker cropping)	(640)
Sugarcane	2,400
Rice	270
Cotton	100
Other	70
Subtotal	4,400
<u>Pasture, woods and underbrush</u>	<u>7,806</u>
Subtotal	12,206
Rivers, woods and streams	<u>1,294</u>
Total	13,500

(B) Potential Land Use

(Reservoir at 243 meters above sea level)

<u>Category</u>	<u>Hectares</u>
(1) Suitable for intensive farming	9,748
(2) Limited capacity for cultivation	514
(3) Suitable only for permanent crops	542
(4) Suitable for pasture and woods	1,402
Total	<u>12,206</u>

- 3.48 The CEL, together with other agencies in El Salvador, such as the Ministry of Agriculture and Livestock production, are now completing a survey for resettling persons living in the proposed reservoir area. Furthermore, these agencies are developing a resettlement program to move and train these people, who must be settled elsewhere during the second and third years (1974 and 1975) of project execution. Likewise, studies are being made for timely relocation of the San Esteban sugarmill which must take place during the third or fourth year of project execution (1976). To accomplish these ends CEL has prepared a time schedule which is included in Appendix F. A description of the program to be developed in accordance with the time schedule will be submitted to the Bank in due course (see Conclusions and Recommendations). Last August 16 the Government of El Salvador organized the "Ad-Hoc Committee for Relocation and Integrated Development of Cerrón Grande" in order to provide for execution of the resettlement program. The Committee is comprised by the following national authorities: the Vice-President of the Republic of El Salvador is the Coordinator General; other committee members are the Minister of Agriculture and Livestock Production, the Minister of Labor and Social Insurance, the Minister of Public Works, the Minister of Public Health and Social Assistance, the Minister of the Interior, the Chairman of CEL, the President of the Peasant Welfare Administration, the President of the Rural Land Settlement Institute, the President of the Central Reserve Bank, and the Executive Secretary of CONAPLAN.
- 3.49 The work is being carried out according to schedule. Two permanent Secretaries of the "Ad-Hoc Committee" have been appointed, one by the CEL and the other by CONAPLAN. CEL has authorized the hiring of additional personnel needed to: (1) speed up the census now in progress; (2) select and negotiate land for resettlement; and (3) plan and execute transfer and resettlement.

#### Relocation Program

- 3.50 The relocation program consists chiefly of training and settling displaced persons in the proposed reservoir area, including such persons as will meet success in finding other employment either in the relocated sugarmill, <sup>1/</sup> in construction

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<sup>1/</sup> The sugarmill may be located at San Vicente Volcano, on the plain of Apatepeque or near Santo Domingo (an area of low productivity owing to the lack of modern sugarmills, measuring 9,000 hectares of sugarcane).

and maintenance of the Cerrón Grande project, in recreation and fishery opportunities provided by the new lake, or on plantations near the reservoir.

- 3.51 Services to be included in the relocation program provide for: (i) assistance for payment of relocation costs of displaced persons, preferably landless families and workers who are not assigned to the construction project; (ii) credit to facilitate relocation of settlers' families and the families of workers at the sugarmill; (iii) agricultural extension services; (iv) training for new jobs; and (v) support for local government offices responsible for educational aspects and similar public services.
- 3.52 Many of the activities mentioned above may be accomplished as part of the programs and regular budgets of the various government units. However, some of these endeavors may require additional funds, and such funds must be officially allocated to the project. Therefore, the project includes US\$700,000 equivalent for training, as shown in paragraph 3.19. These aid programs may be executed by government agencies such as the Ministry of Agriculture, Ministry of Education, Ministry of Public Works, and other ministries.
- 3.53 The government could grant priority to a reforestation and soil conservation program in the reservoir area in order to provide employment to settlers who cannot be resettled. This program could be financed on an annual basis by the CEL, and managed by the Ministry of Agriculture. A provisional allocation of US\$200,000 per annum was included in the financial projections in order to execute this program, beginning in 1976 and allowing it to be maintained for at least 10 years. The government, with resources of the Local Contribution Fund, could finance investments to increase manpower employment in the project service area. (See paragraph 4.51 to 4.57).
- 3.54 Specifically, the principal expenses relating to training and resettlement of displaced persons in the reservoir area could be financed as shown below:

1. Land purchases and resettlement	US\$ 9,900,000
2. Training of settlers	700,000 <u>1/</u>
3. Minimum annual support	200,000 <u>2/</u>

- 1/ This amount would be disbursed during 1974, 1975 and 1976.
- 2/ Annual amount allocated by CEL from 1976 onward. This amount would be supplemented by normal or extraordinary budget appropriations of whatever agencies the government may determine.

- 3.55 The provisional schedule for carrying out "land purchases and relocations" is shown in the following table:

Land Purchases and Relocations 1/

(Equivalente in millions of US\$)

<u>Elevation (meters)</u>		<u>230</u>		<u>235</u>		<u>243</u>		<u>Total</u>	
<u>Years</u>		<u>(1974-75)</u>		<u>(1975-76)</u>		<u>(1976-77)</u>		<u>(1977)</u>	
<u>Items</u>	<u>No.</u>	<u>US\$</u>	<u>No.</u>	<u>US\$</u>	<u>No.</u>	<u>US\$</u>	<u>No.</u>	<u>US\$</u>	
(1) Hectares (2)	5,835	3.2	2,448	1.3	3,923	2.0	12,206 3/	6.5	
(2) Housing (4)	500	0.1	60	-	340	0.1	900	0.2	
(3) San Estéban sugar-mill 5/	1	1.0	-	-	-	-	-	1.0	
(4) Roads and bridges	-	0.6	-	0.4	-	1.2	-	2.2	
Total		<u>4.9</u>		<u>1.7</u>		<u>3.3</u>		<u>9.9 6</u>	

The CEL and the Salvadorean Government must submit a specific resettlement plan within one year of the loan contract. (See Conclusions and Recommendations).

H. Rate Schedules

- 3.56 One important advantage of increasing generation of hydroelectric energy is the favorable effect thereof on future electric energy rates. This was proved when the 5 de Noviembre project was installed. The initial debt attributable to that project will be amortized in full in 1975, whereas its operating costs and service and other debts account for the fourth of the costs of a thermal plant in similar circumstances.

- 1/ Estimates prepared by Harza International with the cooperation of Salvadorean technical agencies.
- 2/ Data based on special reports updated to 1971 from the Banco Hipotecario and the División General de Investigación y Extensión Agrícola.
- 3/ See paragraph 3.47.
- 4/ Data from air photogrammetric control surveys. The value of each house was estimated at US\$200, considering saving of serviceable materials.
- 5/ Includes preparation of the new site, dismantling operations, transportation, and reinstallation of buildings and equipment.
- 6/ Includes neither contingencies nor price escalation.

- 3.57 In view of this project's characteristics, it was determined that the CEL will take whatever measures are appropriate and acceptable to the Bank so that the rate schedule charges for electric energy from the system specifically relating to the loan shall (i) produce at least enough revenue to meet all operating expenses of the system, including expenses of administration, operations, maintenance and depreciations; (ii) yield a reasonable return (9%) on gross fixed assets in service, excluding work in progress, less accumulated depreciation; (iii) generate such additional revenue as may be necessary to provide for timely amortization of all obligations for which CEL is responsible if the cash flow from rate schedule charges is not sufficient for the purpose.<sup>1/</sup>
- 3.58 Therefore, accomplishment of the CEL program and particularly the timely execution of the Cerión Grande project will make it possible for the country's inhabitants to continue obtaining electric energy at a reasonable and relatively low cost as compared with other countries of the area. In fact, according to a study made by the Economic Commission for Latin America (ECLA) of February 1971, the situation was as follows:

<u>Region and country</u>	<u>Price per KWH</u>
Central America and Panama (average)	3.09 cents of a US dollar
Guatemala	3.69
Panama	3.63
Honduras	3.51
Nicaragua	3.25
El Salvador	2.84
Costa Rica	2.02

The above table shows that the mean price per KWH delivered in El Salvador is lower than the average for all Central America and Panama, whereas the actual price in El Salvador is below all others except Costa Rica.

<sup>1/</sup> See Conclusions and Recommendations.

I. Local Contributions Fund

- 3.59 So that the especially favorable conditions of loans from the Fund for Special Operations may benefit the country as a whole, the Government of El Salvador shall transfer to the CEL the proceeds of the Bank's loan at a higher rate of interest (5.5%) and a shorter period of repayment (25 years) than are applicable to the loan from IDB to the Republic of El Salvador. As a consequence thereof, the Government of El Salvador will create a Local Contributions Fund to be replenished by the differential between payments by the Republic of El Salvador to the IDB for service on the loan (principal, interest and fees) and the amounts received by the Republic of El Salvador from the CEL.
- 3.60 In determining the higher rate which the Government of El Salvador will charge the CEL: (i) an estimate was made of the annual payment (principal and interest) which CEL would have had to make in the event it had received a loan 1/ with interest at 7-1/4% per annum, over a 25-year term, with a grace period of 5 years; (ii) the rate of interest was computed, which applied to the amount to be transferred by the Government of El Salvador to the CEL (US\$38.1 million equivalent), would result in payments by the CEL of annual amounts similar to those obtained in the event of (i) above. This interest rate was 5.5%.

(Equivalent in millions of US\$)

	Government Loan to CEL <u>2/</u>	Hypothetical Alternative Loan <u>1/</u> <u>2/</u>
Amount	US\$38.1	US\$33.1
Annual Interest	5.5%	7-1/4%
Term	25 years (5 years of grace)	25 years (5 years of grace)
Annual Payment	US\$3.2	US\$3.2

1/ The amount of this alternative loan was adjusted in keeping with probable prices in member countries of the IMF and Switzerland.

2/ Includes principal, interest and fees (level payment).

- 3.61 Preliminary estimates show that beginning in 1978 and for 20 years thereafter, allotments to the Local Contributions Fund will amount to an accrued total of about US\$35 million.
- 3.62 Resources for this Fund shall be deposited by the Government in a special account with the Central Reserve Bank (BCR). The Fund will be utilized with prior approval of the Bank to cover all or part of the local contribution payable by the Republic of El Salvador for such projects as are included in national investment programs requiring external financing, whenever there are no specific budget allotments for the purpose or the resources available are insufficient to make up the local contribution, or for such other purposes as may be determined jointly by the Government of El Salvador and the IDB for the purpose of promoting the country's economic and social development. Except when the Fund is used to finance the contribution of the Republic of El Salvador, it shall be made available to the appropriate agencies by means of loans granted at suitable interest rates with principal payable over a prudent period of time.
- 3.63 The Fund will be created by law and administered by the Government of El Salvador after the loan contract is signed. Its operation, resources, and investments will be made in conformity with by-laws to be established by the Government of the Republic of El Salvador, to the Bank's satisfaction, no later than 12 months after the date of the loan contracts.
- 3.64 A term of 12 months was deemed advisable to regulate the Fund in view of the need to allow a prudent period of time to prepare and negotiate the regulatory provisions and standards of the Fund. Moreover, it has not been overlooked that only as of the beginning of the sixth year of project operation will there be any accumulation of resources available for the Fund from payments by the CEL, and payments to the Fund from other sources, as a result of similar arrangements in connection with other loans acquired in due course from the IDB, will probably not be made before that year. The general guidelines for the operation of the Fund were referred to and consulted with the Salvadorean authorities, who have expressed their conformity with the proposed mechanism.

The duration of the Fund would be at least as long as the life of the IDB loan contract (40 years).

Agreement Between the Republic of El Salvador and the CEL

- 3.65 The Republic of El Salvador, in its capacity as borrower, and the CEL in its capacity as executing agency for the project, shall enter into an agreement setting forth the conditions whereby the Republic of El Salvador will transfer to CEL the resources of the loan. The instrument shall set forth, among other provisions, that CEL shall undertake the exchange risk and the responsibility for maintaining the value of such currencies as it acquired from the IDB, through the medium of the Government of the Republic of El Salvador. (See Draft Resolution).

J. Auditing

- 3.66 Within 120 days after the end of each fiscal year, the CEL shall submit to the Bank its financial statements and those corresponding to the project. Such statements must be previously audited and approved by an independent firm of public accountants acceptable to the Bank. The fees of this firm shall be paid by the CEL with its own funds. The Central Reserve Bank must likewise submit the financial statements of the Local Contributions Fund to which paragraph 3.59 refers. Such statements must be submitted no later than 120 days after the close of each fiscal year beginning in 1978 and must be approved by the Superintendencia de Bancos.

K. IDB Inspection

- 3.67 The Office of the Bank's representative in El Salvador shall be responsible for IDB's Inspection and Supervision of the project, and in doing so it will be assisted by a project specialist to be engaged especially for project supervision.

#### IV. JUSTIFICATION

##### A. Technical Feasibility

- 4.01 The project is technically feasible. The selection of the type and height of the dam was made on the basis of suitable geological studies and an acceptable economic analysis. None of the works called for can be regarded as exceptional ones requiring special investigation; therefore, the definitive project plans (final plan) for construction can be implemented, and no extraordinary problems are expected as a result. All technical assumptions are based on recognized principles. The preliminary plan has been prepared in accordance with generally accepted engineering standards. Similarly, the analysis yielded results that allowed the dimensions of the project to be defined. The methodology of analysis is well known one.
- 4.02 Cost estimates <sup>1/</sup> are considered reasonable, according to prices and competitive conditions prevailing in member countries of the Bank, as well as in the rest of the international market. The percentages of allowances for unexpected expenses, as well as for price increases and contingencies, are considered appropriate. These provide a suitable margin of safety for possible cost overruns (see Paragraphs 3.27 on).
- 4.03 No difficulties are foreseen for timely provision of the goods and services required for civil items, equipment and machinery, both as to timely delivery and as to technical characteristics, taking into account the attraction which the project will have for construction contractors and suppliers of international prestige, as well as the availability of production factors in El Salvador to supply goods and services of local origin.
- 4.04 The technical staff of CEL has the knowledge and professional training to operate the enterprise. Harza Engineering Company, the consultants, will assist in the planning aspects. There

<sup>1/</sup> The cost per kilowatt of installed capacity of the four units is estimated at US\$358 equivalent, while the cost per kilowatt hour is calculated at 1.40 US cents equivalent.

is also a program of staff traineeships which are currently used to prepare technicians in aspects of its expansion program. CEL has in turn engaged a consultant to modernize its administration and financial system including the internal audit activity and to create a new technical section for project-related work. This is regarded as an appropriate measure.

#### Environmental Aspects

##### Natural Resources

- 4.05 The analysis <sup>1/</sup> of the effect of the Cerrón Grande project on the environmental conditions in the area around the dam site, leads to the expectation that no adverse effects will be produced in consequence of project construction.
- 4.06 The dam will change the natural conditions of existing flora and fauna but it is expected that most species, accustomed as they are to the normal flow of the river, will adapt to the clean, still waters of the prospective lake. From the public health standpoint, the dam will not alter water quality. Furthermore, the impact of the dam on migratory fish will be practically nil, as the 5 de Noviembre dam which is downstream of the proposed site of the Cerrón Grande dam, already impedes the movement of such species. No mineral deposits have been found nor is there any knowledge as to the presence of artifacts of archeological interest in the area of the dam. During construction, all necessary measures will be taken to prevent erosion. The vegetation cover will be reestablished as much as possible. The area to be flooded (13,000 hectares) contains farmland, but much of it is not productive and is of little value as a natural resource. The reservoir on the contrary, will become an important resource for fisheries industry.

##### Sedimentation

- 4.07 The Cerrón Grande reservoir will pick up almost all sedimentation that now accumulates in the 5 de Noviembre facebay. As for sedimentation in the Cerrón Grande reservoir, no adverse effects are anticipated because the volume of sediment would be insignificant in relation to reservoir volume. The case at 5 de Noviembre is quite different. Indeed, construction of the Cerrón Grande dam would act as a sediment filter for the 5 de Noviembre reservoir which has a considerably smaller capacity than Cerrón Grande

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1/ Prepared by Harza and included in the project feasibility study.

and is being affected by accumulation of matter that flows down the Lempa River at the rate of 7 million cubic meters annually. Without the Cerrón Grande dam, the 5 de Noviembre reservoir would be completely filled with sediment by 1995. The Cerrón Grande project, on the contrary, would take 350 years to be filled and, for about 100 years, there would be no major change in its storage capacity.

- 4.08 No appreciable changes in water quality are expected as a consequence of construction and operation of the Cerrón Grande project. Under present condition, one of the tributaries of the Lempa, the Acelhuate River, receives waste water from San Salvador and discharges it near the city of Colina, 47 water kilometers above the site proposed for the Cerrón Grande dam. However, according to data obtained from the Office of the Director General of Health, almost all of the biological demand for oxygen in the Acelhuate River is satisfied before it joins the Lempa River, so the effect of the waste water on the Lempa River would be eliminated.

#### B. Financial Feasibility

- 4.09 CEL's financial projections lead to the expectation that its income statements for 1972-78 may be summarized as follows:

#### SUMMARY OF STATEMENTS OF EARNINGS <sup>1/</sup>

(millones de US\$)

	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>
Operating Income							
Sales in Gwh	671.0	744.0	827.0	920.0	1024.0	1140.0	1266.0
Average income per Kwh (cents)	1.60	1.58	1.58	1.57	1.57	1.57	1.56
Total operating income	10.7	11.8	13.0	14.5	16.1	17.8	19.8
Operating expenses <sup>2/</sup>	4.4	5.5	5.9	7.8	8.9	8.2	8.3
Net operating income	6.3	6.3	7.1	6.7	7.2	9.6	11.5
Non-operating income	0.1	0.1	0.3	-	-	0.1	0.4
Net income before Interest	6.4	6.4	7.4	6.7	7.2	9.7	11.9
Interest	0.8	1.1	1.0	1.0	1.5	1.8	4.8
Net earnings	5.6	5.3	6.4	5.7	5.7	7.9	7.1
Rates of profitability <sup>3/</sup>	12.4%	11.5%	12.7%	10.1%	6.6%	6.6%	8.0%

<sup>1/</sup> Includes preliminary estimation of BID loan service and bonds issue.

<sup>2/</sup> Includes depreciation

<sup>3/</sup> Net income before interest average net fixed assets in operation.

- 4.10 Costs of operation, except fuel, reflect a normal increase due to expansion of CEL activities. In 1975 and 1976, an increase in expenses for fuel was assumed, because in 1974 the current contract for the supply of petroleum (US\$1.66 per barrel) will expire, so the cost from 1975-78 will be US\$3.75 per barrel. In 1977 and 1978, a decrease in this item would be registered on the coming into operation of the Cerrón Grande project, leading to a reduction in the relative utilization of thermal installations.
- 4.11 The projected rate of profitability, i.e., net operating income over net operating fixed assets, exceeds 10% for the years 1972-75. In 1976 and 1977, these rates of profitability decline, due to the above-mentioned increase in the price of petroleum and to the fact that the first two units of Cerrón Grande, which would enter into commercial operation towards the end of 1976, would not yet be working at full capacity during 1977. In 1978, this rate rises to 8%, reflecting the start of full capacity operation of these two units.

The increase in the interest item for 1978 corresponds to the first payment to the Government to be made by CEL on account of the IDB loan of which was provisionally estimated at US\$3.2 million equivalent.

#### Sources and Application of Funds

- 4.12 Appendix G shows changes in the flow of funds to CEL for the period 1972-78. These projections indicate that, if the basic assumptions come true, CEL will have sufficient funds at its disposal for the local contribution to the project, as also for the payment of existing obligations and of those that would be acquired to finance this operation. In 1978, a cumulative cash balance of US\$11.9 million <sup>1/</sup> is estimated, which could be utilized by CEL for its future expansion programs.

- 4.13 The coverage of debt service <sup>2/</sup> derived from the above projections indicates the following situation for the period 1972-78:

<u>Year:</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>
Number of times	2.03	2.20	2.34	2.35	2.49	2.48	1.83

The indexes are considered to be highly satisfactory.

- <sup>1/</sup> After the first contribution to the Fund for Local Contributions.  
<sup>2/</sup> Ratio, profits before interest plus depreciation/debt service (principal plus interest).

### Balance Sheet Projections

- 4.14 A summary of the most significant items in projected balance-sheets for the period 1972-78, is presented below:

#### Selected Items of Balance-Sheet <sup>1/</sup>

(In millions of US\$)

	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>
Current assets	5.6	7.6	3.0	3.2	4.2	11.6	18.0
Current liabilities	3.1	3.0	2.5	2.1	3.5	3.8	4.1
Capital	50.8	56.6	63.5	69.7	75.9	84.3	90.8
Long-term debt	16.0	21.0	37.5	60.4	73.7	78.8	77.5
Current Index	1.8:1	2.5:1	1.2:1	1.6:1	1.2:1	3.0:1	4.4:1
Index, long-term Liabilities/Capital	0.3:1	0.4:1	0.6:1	0.9:1	1.0:1	1.0:1	0.9:1

The current indexes are considered adequate. Those obtained for 1977 and 1978 will eventually diminish to the extent that CEL utilizes cash funds for its investment program. The ratio, long-term liabilities/profits is satisfactory.

### Local Financing of Project

- 4.15 In order to complete the local contribution (US\$23 million equivalent) to be made by CEL largely with its own resources the CEL would need to have resource to domestic borrowing or to a bond issue of US\$3.0 million equivalent during 1974, 1975 and 1976, according to financial projections.
- 4.16 The bonds would be guaranteed by the Government, would bear interest at 7% and would mature in 10 years.<sup>2/</sup> The amount that it would be necessary to place during those three years, can be compared with amounts of securities shown in Appendix K, from which it can be observed that the annual average placements of the public sector for 1961 to 1970, amounted to US\$3.2 million. Furthermore, institutions in this sector (excluding CEL) must place an amount of US\$9.1 million equivalent annually on the

<sup>1/</sup> Includes preliminary estimations of BID loan service and bonds issue.  
<sup>2/</sup> See Conclusions and Recommendations.

average during 1971-1980. Even though the above figures lead to the conclusion that the proposed issue signifies an important addition to the domestic market, no problems are foreseen in raising of funds, in view of the experience of CEL with issues in the past (see Appendix L), the prestige of CEL <sup>1/</sup>, and of cooperation from the Central Reserve Bank. <sup>2/</sup> In any case, keeping in mind the fact that other priority projects of government would need similar domestic resources, it is considered that the proposed amount of domestic indebtedness is adequate in relation to this project.

### Conclusions

- 4.17 The financial condition of CEL, during the period analyzed (1969-71), has been a comfortable one. CEL contributed, in large part with its own resources, to financing its assets, as indicated by the long-term debt/capital ratios obtained. The indicators of profitability in relation to net fixed assets and the coverage of debt service obtained during the years analyzed, are considered adequate and exceed those required in the loan contract of CEL with the World Bank.
- 4.18 The projections of the flow of funds of CEL show that, if the basic assumptions are realized, CEL would have sufficient funds at its disposal for the local contribution to the IDB program, as also for the payment of existing obligations and of those contracted for financing the program.

### C. Economic Appraisal

#### 1. Regional Electric Energy Development

##### (a) Basic Characteristics

- 4.19 According to ECIA data, the growth of the energy sector in the sub-region during 1970-80 is estimated at 10.7% average per annum, described below:

#### CENTRAL AMERICA - Maximum Demand for Power in Public Service (MW)

<u>Country</u>	<u>Year</u>		<u>Increase</u> <u>%</u>	<u>Average Annual Rate of</u> <u>Growth (Per cent)</u>
	<u>1970</u>	<u>1980</u>		
Guatemala	121	373	208	11.9
El Salvador	132	376	185	11.0
Honduras	60	210	250	13.3
Nicaragua	96	286	198	11.5
Costa Rica	211	447	112	7.8
Centroamérica	620	1.692	176	10.7

<sup>1/</sup> See Paragraph 2.26.

<sup>2/</sup> See Paragraph 3.18

- 4.20 On the basis of the expansion plans of the five countries, the most noticeable increase in installed generating capacity would be that of Honduras which, with the El Cajón project, would serve the markets of that country and of Nicaragua. Percentage wise, the smallest increase would be that of Costa Rica, which is explained by the large amount of installed capacity in that country in relation to Central America, as shown in the following table:

CENTRAL AMERICA - Installed Generating Capacity

<u>Type of Power plant in Public Service</u>											Total Increase 1970 to 1980
Country	1970					1980					
	Total	Hydro		Thermal		Total	Hydro		Thermal		
		MW	%	MW	%		MW	%	MW	%	
Guatemala	174	96	55	78	45	518	286	55	232	45	
El Salvador	187	108	58	79	42	442	297	67	145	33	
Honduras	90	30	33	60	67	475	410	86	65	14	
Nicaragua	122	50	41	72	59	317	100	32	217	68	
Costa Rica	216	171	79	45	21	466	361	77	105	23	
Centroamérica	789	455	58	334	42	2218	1454	66	764	34	

(b) Characteristics of Power Generation Projects to be undertaken during the Decade in the Region

- 4.21 The above table indicates that the increase in generating capacity is based mostly on hydroelectric projects, reflecting a more rational utilization of natural resources available in the region. Similarly, it may be observed that El Salvador would continue basing its power development principally on the utilization of water resources. This has a favorable influence on its unit costs and on the balance of payments as it reduces fuel imports.
- 4.22 The principal electric power projects envisaged for Central America during 1970-80 are the listed below:
- i) Hydroelectric projects, such as El Cajón in Honduras, Cerrón Grande in El Salvador, Talín and Chixoy in Guatemala, Arenal or La Angostura in Costa Rica, and Rio Grande de Matagalpa in Nicaragua.
  - ii) Thermal electric projects, among which are the thermal plants of Escuintla and Moyuta in Guatemala, as well as the steam turbines at Puerto Somoza and the Managua No. 2 in Nicaragua.

iii) Geothermal projects, such as that of Ahuachapán in El Salvador.

(c) The Total Electric Energy Use in the Region

4.23 It is estimated that between 1970 and 1980 the per capita consumption of energy will increase from 380 to 550 kilograms of fuel oil equivalent, which still compares unfavorably with the average for Latin America of 630 Kg. in 1967. The fuel oil used in the region, which in 1970 accounted for 46% of total energy use (considering thermal power generation, industry in general and other uses) and is estimated to account for 51% by 1980, is all imported. In the meantime, the use of thermal energy will keep increasing, and only between 1975 and 1980 will it tend to decrease in relative terms, due to the start-up of several important hydroelectric plants. Nevertheless, the size of the increase in hydroelectric energy generation would not be enough to offset the decline also relative expected in this decade for use of domestic fuel sources, such as firewood, coal and sugar-cane bagasse. The result would be a major increase in use of fuel oil as a share of the future use of fuel for energy. In this sense, the increase in hydroelectric energy generation is one of the most important issues for Central American countries, since it implies a considerable displacement of the fuels derived from petroleum which are utilized for energy generation and, to a lesser degree, of unsuitable fuels (firewood) through rural electrification programs.

(d) The Outlook for an Inter-connected Regional System

4.24 It is believed that the increasing size of national markets for electric energy in Central America and Panamá, as well as the characteristics of the sources of production, offer possibilities for integrated development, to the extent that certain difficulties holding back such programs can be overcome. Such difficulties include: (i) the lack of long-term national electrification programs; (ii) the lack of a general instruments for regulating the programs of system inter-connection in these countries, as well as for facilitating negotiations between public and private enterprises in different countries; (iii) the lack of experience with this type of problems; (iv) uncertainty as to energy generation facilities installed in neighboring countries; and (v) the implications of sharing natural resources or reserves with other countries.

- 4.25 Considering that the energy development projects of Central American countries will not be constructed simultaneously, it is expected that there will be a temporary surplus of energy in some countries, which would allow them to meet the needs of neighboring countries. In this respect the inter-connection of systems in El Salvador and Guatemala would be of particular importance. Besides, it would make it possible to reduce the reserve capacity which each of these systems must maintain. A noteworthy example is the project to be executed by ENALUF of Nicaragua with loans from the World Bank and the CABEI, which includes construction of a thermal power plant in Puerto Somoza and its interconnection with the electric system of Honduras. Once Honduras has built the El Cajón hydroelectric project, the situation may be reversed, since Honduras would probably produce surpluses for a number of years.

## 2. Recent Economic Trends in El Salvador

### (a) Gross Domestic Product (GDP)

- 4.26 Due to the weakness of the external sector in 1968 and the armed conflict with Honduras in 1969, the GDP of El Salvador has grown at a low rate: during 1968-70, the annual average rate of increase was 3.5% in the GDP at constant prices. In 1971, there was only a slight improvement to 4.3% according to preliminary estimates. This was adversely affected by the fall in the international price of coffee which, in turn, was responsible for the low growth of the whole farm sector.

### (b) Farm Sector

- 4.27 The farm sector in 1971 grew by less than 1% at current prices; however, if coffee is excluded, sector output increased by 6.7%, as a result of increases both in cultivated area and in yields. This expansion is related to the official policy of encouraging production of certain crops (cereals) by means of technical assistance programs for small and middle-scale farm operators, greater use of improved seeds and channeling of more credit towards these commodities. The main stimulus in the case of cotton is derived from growing foreign demand. It may be indicated that the negative incidence of coffee on sectoral development was offset by substantial increases, mainly in cotton, rice, sugar-cane and fishery. The incidence of coffee is regarded as very significant, since it accounted for 10% of the GDP and almost 40% of the output in the farm sector.

(c) Industrial Sector

- 4.28 In spite of the suspension of various industrial activities largely dependent on the Honduran market, the industrial sector on the whole registered a 6% increase in 1971, compared with the 3.2% in 1970. This is explained by the growth in food products, the relative increase in exports to the Central America, and the further stimulation of exports to countries outside the area. All branches of the sector shared in this last named expansion, most of which resulted from textiles and chemical products, the regional demand for which increased rapidly. Notwithstanding this trend, investments in the expansion of industries or the installation of new ones, remained at a low level. This happened in spite of the need to maintain industrial production at a level compatible with installed capacity and as a means of alleviating somewhat the demand for employment on the part of a growing population. The construction industry, however, has maintained a level of intensive activity (an expansion of 14.8%) with consequent effects in terms of labor absorption. Growth in 1972 is estimated at 18%.
- 4.29 The economic outlook for 1972 seems favorable, due mainly to increases in agricultural and industrial production, which are reflected in favorable trends in the exports of coffee, cotton, sugar and shrimp. Nevertheless, the lack of an agreement to settle the problems of the CACM affects the prospects for greater expansion of several Salvadoran industries.

(d) Fiscal Sector

- 4.30 The fiscal performance of the Government was reflected in a sizable improvement in current account savings, changing from a negative position in 1969 to 49.3 million colones in 1970. On the other hand, capital expenditures which had increased in 1969, were somewhat reduced in 1970, reaching 32.7 million colones. In the same year, a more intensive use was made of external resources for financing capital expenditures, at the same time reducing the debt with the Central Bank.
- 4.31 In 1971, fiscal policy has maintained the favorable situation experienced in the previous year. As a result of certain tax reforms in the process of being adopted since 1969, related to the income tax (basically to the tax on business income), and of increase in import duties and consumption taxes, current receipts increased by 6.3% in 1971, notwithstanding the decline in export receipts (due to the fall in the volume and the international price of coffee exports) from 43 to 34 million Colones from 1970 to 1971.

However, current expenditures increased by 10.7% as a result of salary increases in the lower income categories, which led to a decrease of 43.3 million colones in the current account savings of the Central Government.

- 4.32 As for capital expenditures, they increased substantially in 1971, reaching 65.6 million Colones, mainly related to the categories of education, public health, agriculture and public works. Thus, the over-all fiscal situation turned from a surplus in 1970 to a deficit of 22.3 million Colones, which was largely financed with resources of domestic origin.

(e) External Sector

- 4.33 In 1970, the favorable development of exports of coffee and other products such as cotton, sugar and shrimp produced an increase of 11% in the value of export which amounted to US\$229 million after declining in 1969, whereas exports of manufactures of the rest of Central American never regained the high levels of 1968. This situation, together with the relatively minor increase in imports, provide for considerable improvement in the current account of the balance of payments, from deficits of US\$15 and US\$20 million in 1968 and 1969, respectively, to a surplus of US\$2.8 million in 1970.
- 4.34 Nevertheless, the value of exports in 1971 remained practically stagnant at the level of the previous year, due to the decline in both the volume and price of coffee exports, which led to a reduction of about US\$20 million in the export receipts from this product. This situation could be offset, only in part, by the increases recorded for exports of cotton, sugar and manufactures. In that year, exports of manufactures from El Salvador to the Central American region were the only ones that increased in volume and value, following the decreases that have occurred in relation to 1968, even though the levels of the latter year have not yet been attained. At the same time, exports to countries outside the region increased from US\$14 million to US\$18 million between 1970 and 1971.
- 4.35 Imports of goods, for their part, increased by some 16% in 1971, which, when added to the stagnation of exports alluded to earlier, caused a trade deficit of US\$20 million in 1971, following a surplus in 1970 <sup>1/</sup>. As part of the picture, however, imports of goods and services have tended, although in a fluctuating manner,

<sup>1/</sup> However, in the first 8 months of 1972, the favorable trend of exports has produced a trade surplus of US\$18.3 million.

to diminish as a share of the total, due, in part, to farm sector development, so that imports of capital and intermediate goods (principally in the industrial sector), tend to exert a greater pressure on the trade balance, since the process of production requires goods that the domestic economy is not in a position to supply.

(f) International Reserves

- 4.36 As a result of this situation, the current account of the balance of payments showed a deficit of US\$28.2 million in 1971, as against the small surplus, mentioned earlier, in the previous year. On the other hand, the private and public capital inflow (US\$18.8 million) and the allocation of Special Drawing Rights (US\$3.7 million) offset the above-mentioned deficit in the current account of the balance of payments, leaving the international reserves virtually unchanged.

3. National Electrical Development

(a) Trends in Demand and Its Characteristics

- 4.37 According to the data of the Inspectorate General of Electrical Services, during the last 10 years, energy consumption in El Salvador has grown at an average annual rate of 11.6%, with the main impulse coming from a strong expansion in use by the industrial sector. This sector utilized 44% of the energy consumed in 1971, and use grew at an annual rate of 15.3%. Next in order of importance is the residential sector which absorbed 27.2% of this total and registered an annual increase of 9.7% during the decade. The commercial sector, which used 14% of energy in 1971, increased consumption at the annual rate of 11.5% and the government sector absorbed 14.8%, showing an annual rate of increase of 8.9%.
- 4.38 The consumption of energy in 1971, by category of consumers, is shown in the following table:

Consumption by Category of Consumers

Electric Energy Distributors

(GWh)

<u>Category</u>	<u>Energy Consumption in 1971</u>	<u>Percentage</u>	<u>Average Annual Increase (10 years)</u>
Residential	169.9	27.2	9.7
Commercial	87.3	14.0	11.5
Industrial	274.7	44.0	15.3
Governmental	92.4	14.8	8.9
Total	624.2	100.0	11.6

4.39 As for the projected growth rate of 11% in the future demand for electric power, it is believed that it is conservative in comparison with the economic and demographic growth foreseen for the period. Within these assumptions, it is calculated that the per capita consumption in 1985 would rise to 460 kw-h per year, <sup>1/</sup> and losses of 5% and 2%, respectively, are forecast in transmission and distribution, which conforms reasonably to the ECLA estimates for the period.

4.40 For purposes of appraisal of the project, the aforesaid rate of approximately 11% was adopted, together with a constant load factor of 57%. The historical and forecast values are shown in the following table:

Sales, Production and Demand for Power

	<u>1969</u>	<u>1970</u>	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>
Sales (gw-h)	499.0	538.4	598.7	671	744	827	920	1.024	1.140
Losses <sup>2/</sup>	35.8	49.6	57.0	63	72	79	94	102	99
Production	534.8	588.0	655.7	734	816	906	1.014	1.126	1.239
Demand for Power	109	121	133	148	164	182	202	225	250

4.41 According to demand projections, taking into account the peak demand, the installed capacity of the system will be saturated by 1976, in case the Cerrón Grande project is not implemented and, therefore, no reserve level (technically measured by the capacity of the largest generator) would be left to ensure the continuance of service in case of failures in other plants.

<sup>1/</sup> Compared with a per capita consumption of 175 kw-h in 1971.

<sup>2/</sup> A losses/sales ratio of up to 10% is considered acceptable.

(b) Seasonal Variations in National Demand

- 4.42 The production peak in the system of CEL, occurs during the month of December. The monthly variations are rather limited and tend to increase gradually during the year, in part because of increase in total demand. This trend partially changes between January and June because of the drop in the power generation of the private hydroelectric plants, the majority of which depends on the flow of the rivers, since dams and water reserves are not to be reckoned with. In this sense, the increase in the production capacity of CEL, would reduce this factor of variation, since the capacity of the hydroelectric plants in its system would be much more stable, given the control of flows that would be accomplished with the dam in Cerrón Grande.
- 4.43 Given the existing installations and the recent growth, it is believed that the expansion of electric services in El Salvador and the increase in generating capacity, would not be limited by the distribution system. In this respect, it has been possible to verify that the distribution system has maintained a rate of development consistent with that of generation, particularly in urban areas. In rural areas there are limitations on the distribution system which restrict the possibilities of bringing the benefits to an important part of the population. Consequently, the Government and CEL provide special impetus to programs of rural electrification (see Paragraph 2.41 and Conclusions and Recommendations).

#### 4. Economic Analysis of the Project

##### (a) Background

- 4.44 The Cerrón Grande project would develop the hydroelectric resources of that part of the Lempa River which flows from the Lempira Bridge on the Northern Highway "5 de Noviembre" dam. Originally, the cost of construction of the project was estimated at U.S.\$66.8 million, including the basic items plus the cost of land that would be flooded and of the relocation of business and families which are presently to be found in these localities. According to a review of the costs carried out by technicians of the Bank and the IBRD, the total investment will rise to U.S.\$75.2 million, excluding financing charges during construction. The principal changes, compared with the original calculations made by the consultants of CEL, concern the price estimates of goods and services which will be purchased both in member countries of the Bank and in other countries which are members of the IMF, and Switzerland.

##### (b) Alternatives for Election Energy Production Hydroelectric Alternatives

- 4.45 The table presented below shows the relative costs of power from other hydroelectric projects compared with that of Cerrón Grande.

Comparative Costs of Hydroelectric Alternatives

Project	Installed Capacity MW	Annual Power gw-h	Total Investment 1/ Million ¢	Cost of Electricity ¢ per kw-h
Zapotillo y Paso del				
Oso (Río Lempa)	140	310	153	0,052
Astillero (Río Lempa)	120	198	140	0,074
Expansión de 5 de Noviembre	80	201	50	0,027
La Pintada (Río Lempa)	60	246	78	0,033
San Esteban y El Delirio (Río Grande de San Miguel)	55	216	141	0,067
Lago Ilopango-Jiboa	40	150	77	0,053
Río Sonsonate	12	63	25	0,043
Cerrón Grande	270	726	220	0,032

1/ Including costs of construction and interest during construction.

4.46 The costs of electricity were determined on the basis of return on capital investment of 10% annually, and assuming that the investment will be amortized in 50 years, including annual costs of maintenance and operation during the period. Except the projects of La Pintada and the 5 de Noviembre Expansion, the Cerrón Grande system will provide electric energy at substantially lower costs than any other hidroelectric project yet developed in El Salvador. However, the adequate development of these two projects in the Lower Lempa is possible only to the extent that the regulation of the waters upstream can be improved by constructing a dam in the place known as "Cerrón Grande" since its reservoir will permit an increase in streamflow of the Lempa River in the dry season, so as to ensure constant energy production. In conclusion, the construction of the Cerrón Grande dam is fundamental for any future hidroelectric development in the Lempa River.

(c) Non-Hidroelectric Alternatives other than Conventional Thermal Energy

4.47 As for other energy generation alternatives, it is believed that nuclear plants would not be economical until such time as the maximum load of the CEL system reaches one million, because the smallest economical nuclear unit available for commercial operation is rated at 500 HW. Similarly, CEL will develop existing geo-thermal resources in Ahuachapán, whose future use for energy generation has been possible to verify by means of a study conducted in that area by CEL, with the collaboration of specialized firms contracted with resources provided by UNDP. As for the 33 kw capacity of the gas turbine in Soyapango which will be incorporated into the CEL system in 1972, it is intended for use only for peak load requirement and as reserve capacity.

(d) Conventional Thermal Alternatives

4.48 The only practical existing alternative to the Cerrón Grande hidroelectric project, would be the expansion of the CEL system with plants of similar capacity which operate with fuel oil. To study the relative advantages of both alternatives, a comparison was made of: (i) an expansion program for the CEL system incorporating the Cerrón Grande project during the period 1976-88, in such a way that the installed capacity and the firm power supply would be equal to or greater than projected demand; and

(ii) an equivalent program for thermal development, adjusting the capacity of the last unit, in such a way as to obtain a power generation capacity similar to that determined for the Cerrón Grande project.

- 4.49 The costs of each type of expansion program (hydroelectric or thermal) included costs relating to construction of generation and transmission facilities, operation and maintenance, as well as fuel to be consumed by the system plants, both existing and new ones. At the same time, consideration was given to the increase of energy generation of the "5 de Noviembre" plant, which would result in better water management through the Cerrón Grande dam. This difference of firm power production averages 142 gw-h, which would increase to 161 gw-h in the six driest months of the year.

(e) Rate of Return of the Project

- 4.50 As a result of the comparative analysis of the different technical alternatives for the provision of electric energy in El Salvador, a clear advantage is established for the hydroelectric solution, which is reflected in an internal rate of return of 16.8%, for the Cerrón Grande project, based on aspects related exclusively to the generation of energy and its utilization. Similarly, the project will yield other important benefits at the reservoir site and downstream on the Lempa River, not related to the generation of electricity, particularly in the farm sector. It is believed that, with the inclusion of other additional benefits and costs, the return on the project would be greater than 16.8%.

5. Other Benefits of the Project

- 4.51 Besides the benefits of the project in terms of power and those not related to power in terms of the effects downstream (see paragraph 4.58), it is necessary to mention others which would originate at the reservoir site of the Cerrón Grande project and which are indicated below:

(a) Employment Opportunities in the Construction

- 4.52 Employment opportunities in the construction of the project, would benefit both the local and national economy. It is estimated that around one-third of the resources in local currency, required for the construction of the project, will be used for payment to the local labor force. More than half of this sum would be used for payment of workers unskilled in this type of construction. It is estimated that an average of 1,400 unskilled workers <sup>1/</sup> will be needed during the four years of project construction. Taking into account the fact that there would be no other

<sup>1/</sup>It is calculated that most of these would come from the 1,000 workers who would be displaced from others farm activities at the reservoir.

there would be no other employment alternative for these unskilled workers, their employment in the project area represents a net benefit for the economy. In addition, construction of the project will provide jobs to another 450 skilled workers.

(b) Employment Opportunities in Operation and Maintenance

- 4.53 Operation and maintenance of the project, once construction has been completed, will also create new job opportunities. It is expected that at least 150 workers (including 100 unskilled) would be employed full-time in these activities throughout the life of the project.

(c) Employment Opportunities in Fishery Activities

- 4.54 The Cerrón Grande dam will create opportunities for the development of commercial fishery. In many aspects, the new lake will be similar to that existing at the "5 de Noviembre" dam site. Recent studies in Lake Guija, in Coatepeque as well as in Ilopango, provide grounds for estimates that the 13,500 hectares of the area of Lake Cerrón Grande at elevation 243, would produce more than 500,000 kilograms of fish per year (at a commercial price of about the equivalent of U.S.\$240,000 annually). Given its advantageous location and with roads constructed for access to the project, the Cerrón Grande dam will have greater accessibility to the principal consuming markets than many other existing areas where commercial fishing is being successfully developed. Besides the new jobs related to the administration and management of this activity and those related to the marketing of fish, it is estimated that the activities will provide income to about 400 full-time fishermen. This new employment in the fishing industry may be considered as a net gain for the country's economy.

(d) Agricultural production

- 4.55 Seasonal crops may be produced in much of the project, each time the reservoir recedes yearly. The production of annual crops is common at other damsites, reservoirs and rivers of El Salvador. A strip of land of 15 meters up to elevation 228 would signify approximately 1,500 hectares of land available for cultivation along the shores of the lake, which

could open up employment opportunities for approximately 250 persons full-time.

(e) Transport and Communications

- 4.56 The Cerrón Grande project will create new means of transport in the project area. The road that traverses the dam will permit the transit of buses towards the main roads to the North as well as to the South of the Lempa River. At the same time, the dam will permit access by boat or ferry to many of the villages which are presently isolated.
- 4.57 In spite of the fact that it is difficult to evaluate these services in monetary terms, the economic and social dividends of a hydroelectric project to a rural community, can be observed from the history of towns such as Dulce Nombre de Jesús, near the "5 de Noviembre" project. In fact, the Lempa River to the North of Ilobasco, could be reached only by mule or on foot in 1947, as a result of which the agricultural economy of the area was stagnant as it was not possible to carry the produce to market centers. Nowadays, buses and trucks make daily trips, electricity is available and the local standard of living has improved many times, due to the "5 de Noviembre" project. Similar results are expected from the Cerrón Grande project.

(ii) Downstream Benefits

- 4.58 Apart from the benefits related to the improvement in the firm generating capacity of the "5 de Noviembre", plant as a result of more efficient water management made possible by the Cerrón Grande dam, which were included in the estimate of benefits directly related to energy generation, the project will yield important downstream benefits as a result of more efficient water management which the Cerrón Grande dam will permit.

The most immediate benefit is that of flood control in the vicinity of the Lower Lempa riverbed, since most floods occur between May and September, when the reservoir is replenished. It is estimated that this control measure would provide benefits that could be important in the middle term future, in the improvement of irrigation possibilities. The Cerrón Grande project will increase the minimum streamflow in the dry season, from 65 to 125 cubic meters per second, which would benefit some 40,000 hectares of irrigable land. Without the construction of the Cerrón Grande dam, the irrigation of these lands would imply the installation of costly diversion dams and long main canals. With water regulation facilitated by the Cerrón Grande project, the river will have doubled the volume of water necessary for such irrigation during the dry season, which would permit the utilization of pumping stations, shorter canals and investment by stages, all of which would signify considerable savings of country's the resources.

Sensitivity Analysis of the Project

4.59 The initial rate of return of the Cerrón Grande Project (16.8%) is based mainly on estimates of the construction costs, demand projections and fuel prices. If there were changes in these estimates, the return of the project would also vary. The effect of these changes on the internal rate of return has been analysed in the following manner:

- i) In case the cost of construction, with the two units installed, increases by 10%, the internal rate of return would be reduced to some 14%. If on the contrary, there is reduction of 10% in these costs, the profitability of the project would increase to 21%;
- ii) As for fuel prices, wider variations in their levels were considered. As is verified in the table below, even in case the price utilized for economic appraisal were increased by 20%, the project would still show an economic yield of 15%; and
- iii) The growth of demand, on the other hand, was projected at 11%. If this rate were reduced to 9%, the internal rate of return of the project would fall to 14.9%.

Sensitivity Analysis

<u>Description</u>	<u>Internal rate of Return (%)</u>
Basic Program	16.8
Increase of 10% in cost of construction of Cerrón Grande	14.0
Decrease of 10% in cost of construction of Cerrón Grande	21.0
Increase of 10% in cost of construction of thermal alternative program	19.6
Decrease of 10% in cost of construction of thermal alternative program	14.9
Increase of 10% in cost of fuel	17.9
Increase of 20% in cost of fuel	18.8
Reduction of 10% in fuel prices	15.9
Reduction of 20% in fuel prices	15.0
Growth in demand of 9% instead of 11%	14.9

- 4.60 This analysis demonstrates the soundness of the project which, even with significant changes in important parameters, continues to show a very acceptable yield.
- 4.61 The increase in hydroelectric power generation represents one of the items of major interest for Central American countries, particularly El Salvador, since it implies a displacement of fuels derived from petroleum, utilized in the generation of electricity. In this sense, the Cerrón Grande project limits the import needs of these fuels where prices have shown rising trends which, it is believed, will persist in the middle term, thus contributing to the alleviation of the country's balance of payment situation. In this respect, it is estimated that the import saving of Bunker Coal will be in the neighborhood of US\$3 million annually.
- 4.62 From the analysis of various technical alternatives for generation of electric energy in El Salvador, there emerges the clear advantage of the hydroelectric alternative, which is reflected in a rate of return of 16.8% without taking into account downstream agricultural benefits derived from additional irrigation and flood control in the vicinity of the Lempa River bed. In addition, it is believed that the project would have favorable effects on employment opportunities in construction, operation and maintenance of the dam, as well as in terms of fishery, forestry, and seasonal farming crops along the lake shore.

D. Commentary of CIAP

- 4.63 The Sub-Committee of CIAP, in the final report of its last meeting held during October 18-22, 1971, emphasized that, in spite of the low growth which the economy experienced in that year, the increase achieved in the level of public investment compares very favorably with the level of 1970 and reveals, at the same time, an improvement in administrative capacity for the execution of those programs. It also pointed out the increases registered in certain basic agricultural items such as cereals and cotton, and the approval of the Law for the Promotion of Exports. As for prospects of economic development in 1972, it indicated possible actions of a priority nature, such as: expediting the process of preparation and formulation of projects; increase in fiscal resources by means of tax and administrative reforms. ...

## V. CONCLUSIONS AND RECOMMENDATIONS

- 5.01 According to the analysis made in the preceding chapters, the project is feasible from the technical, economic and financial standpoints and there are no legal impediments to its execution. Consequently it is recommended that a loan of up to US\$38,100,000, or the equivalent, be granted to the Republic of El Salvador from the Fund for Special Operations.
- 5.02 It is also recommended that, in addition to the conditions in the proposed resolution, the following special conditions, to be performed to the satisfaction of the Bank, be included in the loan and guarantee contracts:
- (a) Within a period of six months from the date of the contract, the borrower shall agree to submit to the Bank, through CEL, the recommendations presented by the consultants referred to in paragraph 9 (e) (ii) of the resolution.
  - (b) Within a period of not more than three years from the effective date of the loan contract, the borrower shall agree to take appropriate measures so that ANDA will proceed to pay, in monthly installments, the amounts it owes CEL for services rendered.
  - (c) Within 12 months from the date of the contract with the consultants referred to in (a) above, the borrower shall submit evidence through CEL that it has put into practice the recommendations of the consultants, or, if not, has adopted alternative measures which the Bank has accepted and which have the same purposes.
  - (d) The borrower agrees that, during the entire period of project execution, CEL will have available the services of a firm of consulting engineers acceptable to the Bank, for direction of construction work and for other technical services required by the project.
  - (e) Prior to each invitation for public bids, the borrower shall: (1) obtain the Bank's approval of the studies, designs, plans, specifications and budgets, bidding requirements and other documentation necessary for the invitation for bids; and (2) submit evidence that the property rights and/or easements permitting construction and operation of the respective works have been obtained.
  - (f) The Bank may recognize as local contribution and/or as contributions from other sources to the project investments made by CEL in the project prior to the date of the loan contract but after May 19, 1972, up to an amount equivalent to US\$2,000,000, provided that requirements substantially similar to those of the resolution and the loan contract have been fulfilled.

- (g) The borrower shall commit itself to adopt such measures as may be necessary for the appropriate relocation of the persons displaced with the execution of the project, including the granting of credits, extension and other support services to such persons, and to inform the Bank of the plan which it shall use to carry out such purpose within a year from the effective date of the loan contract. The responsibilities of the various participating entities and the measures to be taken to assure proper coordination among them shall be specified in this plan. The plan shall be financed with (i) resources of the borrower up to the equivalent of US\$700,000, for training of settlers, to be charged to the resources, in addition to the loan, referred to in subparagraph 9 (b) of the proposed resolution; (ii) other resources of the borrower, different from those of the additional contribution referred to in said subparagraph 9 (b). Likewise, the borrower agrees to keep the Bank informed as to the execution of said plan.
  - (h) Within 24 months from the effective date of the loan contract, the borrower shall present evidence to the Bank that it has taken out insurance adequately covering the current value of its insurable assets. The borrower shall maintain insurance policies on such assets throughout the life of the loan.
- 5.03 The manner in which the financial statements of the borrower and the accounting records relating to the project are to be audited, taking into account the provisions of paragraph 3.66 of this document, shall be set forth in the loan contract.
  - 5.04 The amount of US\$381,000 of the resources of the loan shall be allocated to the corresponding Inspection and Supervision Fund of the Bank.
  - 5.05 The contents of Appendix A to this document shall be incorporated in substance in an annex to the loan contract.
  - 5.06 The United States dollars to be utilized in the loan shall be drawn from the resources contributed to the Fund for Special Operations by virtue of the increases approved by Resolutions AG-2/65 and/or AG-10/67.

APPENDIX A

Description of Project

(Annex B to the Loan Contract)

1. Purpose: The purpose of the project is construction of the Cerrón Grande Hydroelectric Plant, related facilities and the corresponding transmission lines.
2. Description: The project consists of: (i) a rock-fill dam across the Lempa River; (ii) apron type spillway; (iii) intake structures in the spillway approach channel; (iv) a powerhouse on the left bank of the river, with two 67.5 MW generating sets; (v) a step-up substation on the right bank of the river with two three-phase transformers; (vi) a two circuit transmission line from the step-up substation to the Nejapa substation; (vii) a single circuit transmission line from the step-up substation to the 5 de Noviembre substation; and (viii) a diversion tunnel.
3. Total cost and financing: The resources of the project shall be apportioned approximately as follows:

Financial Plan

Classified by Investment Categories

(thousands of US\$)

	<u>IDB</u>		<u>IDBR</u>	<u>CEL</u>		<u>Total</u>	
	<u>Foreign</u>	<u>Local</u>	<u>Foreign</u>	<u>Foreign</u>	<u>Local</u>	<u>Foreign</u>	<u>Local</u>
	<u>currency</u>	<u>1/currency</u>	<u>currency</u>	<u>currency</u>	<u>currency</u>	<u>currency</u>	<u>current</u>
1. <u>Engineering and administration</u>							
1.1 Engineering	-	-	6,110	-	-	6,110	-
1.2 Administration	-	-	-	-	1,910	-	1,910
Total 1.	-	-	6,110	-	1,910	6,110	1,910
2. <u>Direct cost</u>							
2.1 Generation							
2.11 Lands, easements, relocations, etc.	-	-	-	-	14,270	-	14,270
2.12 Preliminary work	-	-	440	-	1,480	440	1,480
2.13 Main Civil items	21,420	5,830	-	-	4,040	21,420	9,870
2.14 Mechanical equipment for the plant	-	-	2,850	-	-	2,850	-
2.15 Turbines and generators	5,470	-	-	-	-	5,470	-
2.16 Ancillary electric equipment	-	-	280	-	-	280	-
2.2 Transmission Facilities	-	-	1,770	-	550	1,770	550
Total 2.	26,890	5,830	5,340	-	20,340	32,230	26,170
3. <u>Finance charges</u>							
3.1 Interest	850	150	2,780	-	-	3,630	150
3.2 Commitment fee	-	-	320	500	-	820	-
3.3 Contribution to IDB Inspection and Supervision Fund	381	-	-	-	-	381	-
Total 3.	1,231	150	3,100	500	-	4,831	150
4. <u>Associated costs</u>							
4.1 Training of settlers	-	-	-	-	700	-	700
Total 4	-	-	-	-	700	-	700
5. <u>No specific allocation</u>							
5.1 Contingencies	3,999	-	1,380	-	2,550	5,379	2,550
Total 5	3,999	-	1,380	-	2,550	5,379	2,550
Expenditures by type of currency	32,120	5,980	15,930	500	25,500	48,550	31,480
Total expenditures	38,100		15,930	26,000		80,030	
Percentajes	47.6%		19.9%	32.5%		100.0%	

4. Source and Application of Funds

(Equivalen in thousands of US\$)

	<u>Currency of Origin</u>		<u>Expenses to be made in</u>		<u>Total</u>	<u>%</u>
	<u>Foreign</u>	<u>Local 3/</u>	<u>Foreign 1/</u>	<u>Local 3/</u>		
BID	32,120 1/	5,980	32,120 1/	5,980	38,100	47.6
BIRF	15,930	-	15,930	-	15,930	19.9
CEL	500 2/	25,500	500 2/	25,500	26,000	32.5
Total	48,550	31,480	48,550	31,480	80,030	100.0
%	60.6	39.4	60.6	39.4	100.0	

5. International Invitation for Bids

The requirements applicable to international public bidding for the procurement of goods or contracting of services to be charged to the loan shall be such as to permit unrestricted participation of bidders of or from member countries of the Bank. Accordingly, no conditions impeding or restricting the participation of such bidders shall be set in such requirements.

6. Financial Return Rate

Unless the borrower and the Bank agree to do otherwise, the borrower agrees to take all necessary measures to set and maintain rate schedules charges for electric energy from the CEL system at a level high enough to yield an annual rate of return of no less than 9 percent on the average value of fixed assets in service, as set forth in paragraph 9 (h) of the Resolution, provided that in fiscal years 1976, 1977 and 1978 of CEL a rate of return of less than 9 percent may be authorized, but in no circumstances may such rate be less than 6 percent.

- 1/ No loan proceeds in foreign currency will be used to finance local costs.  
 2/ Estimate of finance charges payable in U.S. dollars.  
 3/ Salvadorean colones.

# EL SALVADOR COMISION EJECUTIVA HIDROELECTRICA DEL RIO LEMPA(CEL)

Approximate limits of service area for the distribution companies.

115 KV Existing or under construction --- New

115 KV Under project

69 KV

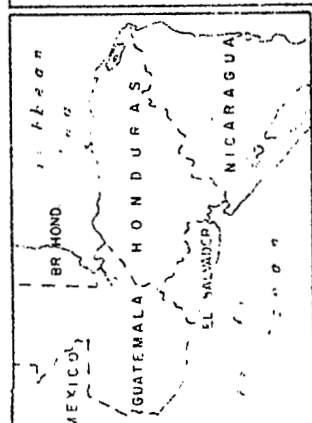
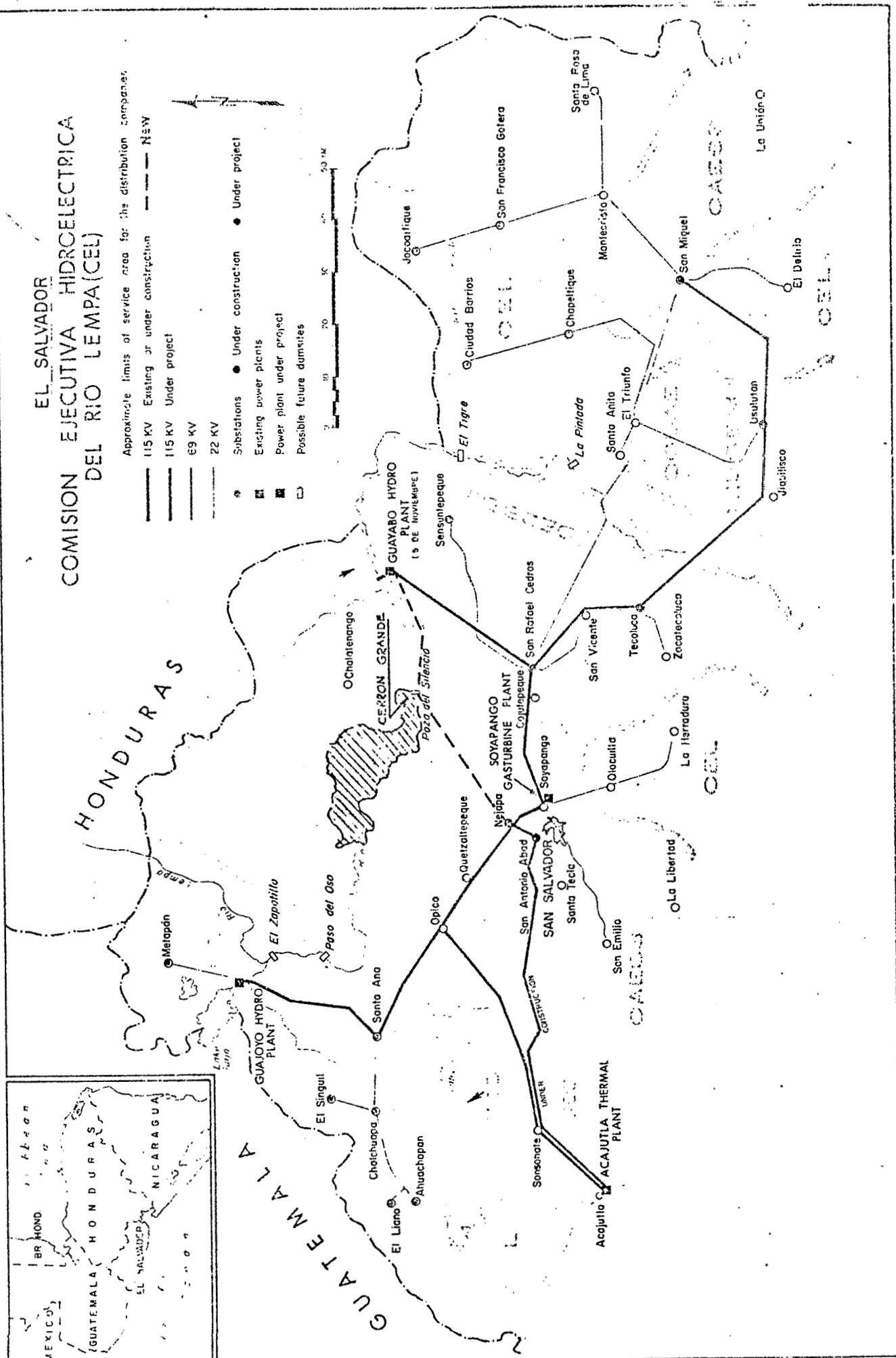
22 KV

Substations • Under construction • Under project

Existing power plants

Power plant under project

Possible future damsites





Una breve descripción de las principales empresas de distribución en servicio público clientes de la CEL aparece a continuación:

Compañía de Alumbrado Eléctrico de San Salvador (CAESS)

La CAESS tiene el mayor volumen de ventas entre todas las empresas distribuidoras (485 GWh en 1971). Esta empresa sirve la región central del país y sus principales centros de consumo, como San Salvador, Santa Tecla, La Libertad, Cojutepeque y Chalatenango. En el año 1967 esta empresa compró la Compañía Eléctrica de Oriente (CEO) que tiene el servicio de distribución en la zona oriental del país, abarcando los centros de consumo de San Miguel, la Unión, San Francisco Gotera, San Vicente y Zacatecoluca.

La distribuidora CAESS tiene instalaciones generadoras con una capacidad total instalada de 11,8 MW; 7,4 MG en plantas térmicas y de combustión interna (diesel) y 4,4 MW en plantas hidroeléctricas. En 1971 la CAESS compró a la CEL 484 GWh, o sea, el 81% de las ventas de esta última empresa.

Compañía de Luz Eléctrica de Santa Ana (CLESA)

Esta empresa sirve las zonas occidentales principales del país; la ciudad de Santa Ana y áreas aledañas y el pueblo de Metapán. La CLESA tiene instalaciones generadoras con una capacidad total instalada de 3,2 MW; 2,4 MW en planta hidráulicas y 0,8 MW en plantas de combustión interna (diesel).

Compañía de Luz Eléctrica de Sonsonate (CLES)

La CLES tiene el servicio de distribución en las ciudades de Sonsonate, Acajutla y pueblos aledaños. Esta empresa compra energía de la CEL y de la Compañía Eléctrica Cucumacayán S. E. (CECSA).

Distribuidora Eléctrica de Usulután, S.E.M. (DEUSEM)

La DEUSEM sirve a los pueblos de Usulután, Jiquilisco, Puerto el Triunfo y varias villas del Departamento de Usulután.

Otras Empresas

Además de las empresas descritas en el sistema interconectado, hay otras cinco con pequeño volumen de ventas que sirven los pueblos de Ahuachapán (CLEA), Sensuntepeque (DESSEM), Santiago de María (COSAESA), San Sebastian (LESS) y Guayua (RMCO), y que en conjunto compraron el 2% de la producción de la CEL en 1971.

GENERACION Y CONSUMO

SECTOR Y CEL

(1962 - 1971)

AÑO	SECTOR			CEL			PORCENTAJE DE LA GENERACION APOR- TADO POR LA CEL
	GENERACION (GWh)	CONSUMO (GWh)	PERDIDAS %	GENERACION (GWh)	CONSUMO (GWh)	PERDIDAS %	
1962	300,4	263,0	12,5	240,5	229,6	4,5	80,1
1963	339,5	298,4	12,1	261,3	248,5	4,9	77,0
1964	379,4	329,4	13,2	281,5	271,0	3,7	74,2
1965	417,5	356,9	14,5	329,7	316,2	4,1	79,0
1966	476,9	406,6	14,7	396,3	374,0	5,6	83,1
1967	525,5	447,5	14,8	449,9	418,7	6,9	85,6
1968	582,4	496,1	14,8	501,3	466,0	7,0	86,1
1969	619,4	523,8	15,4	534,7	-	-	86,3
1970	670,8	566,4	15,6	588,0	538,4	8,4	87,7
1971	742,7	645,5	13,1	655,7	598,0	8,8	88,3

PROYECTO "CERRON GRANDE"

PLAN GENERAL DE TRABAJO DE TRATAMIENTO Y RE-UBICACION DE FAMILIAS

CRONOGRAMA DE EJECUCION DE ACTIVIDADES

ACTIVIDADES	1 9 7 2				1 9 7 3				1 9 7 4				1 9 7 5			
Actividades																
Actividades Económicas			XXXXXXXXXX	XXX												
Actividades de Afectadas					XXXXXXXXXXXX	XXXX	XXXX	XXXX	XXXX	XXXX						
Actividades de Adjudicarse						XXXXXXXXXXXX	XXXX	XXXX	XXXX	XXXX	XXXX					
Actividades de Asesoría						XXXXXXXXXXXX	XXXX	XXXX	XXXX	XXXX	XXXX					
Actividades de Asesoría									XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
Actividades de Asesoría									XX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX

CUADRO DE FECHAS

Actividad.	Inicia	Termina
1	1º/VIII/72.	28/II/73.
2	2/I/73.	31/VII/73.
3	JULIO/72.	MARZO/74.
4	ABRIL/73.	SEPTIEMBRE/74
5	OCTUBRE/73.	OCTUBRE/74.
6	ABRIL/74.	SEPTIEMBRE/75
7	MARZO/74.	-

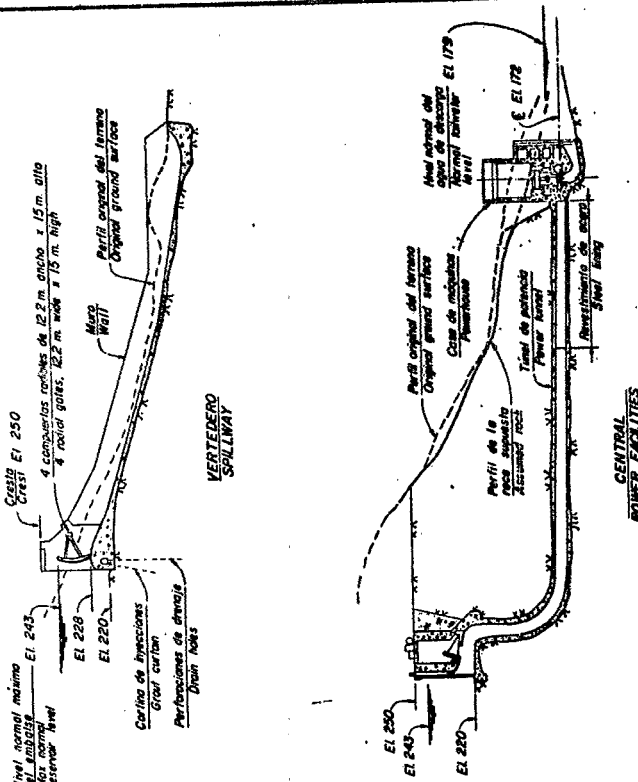
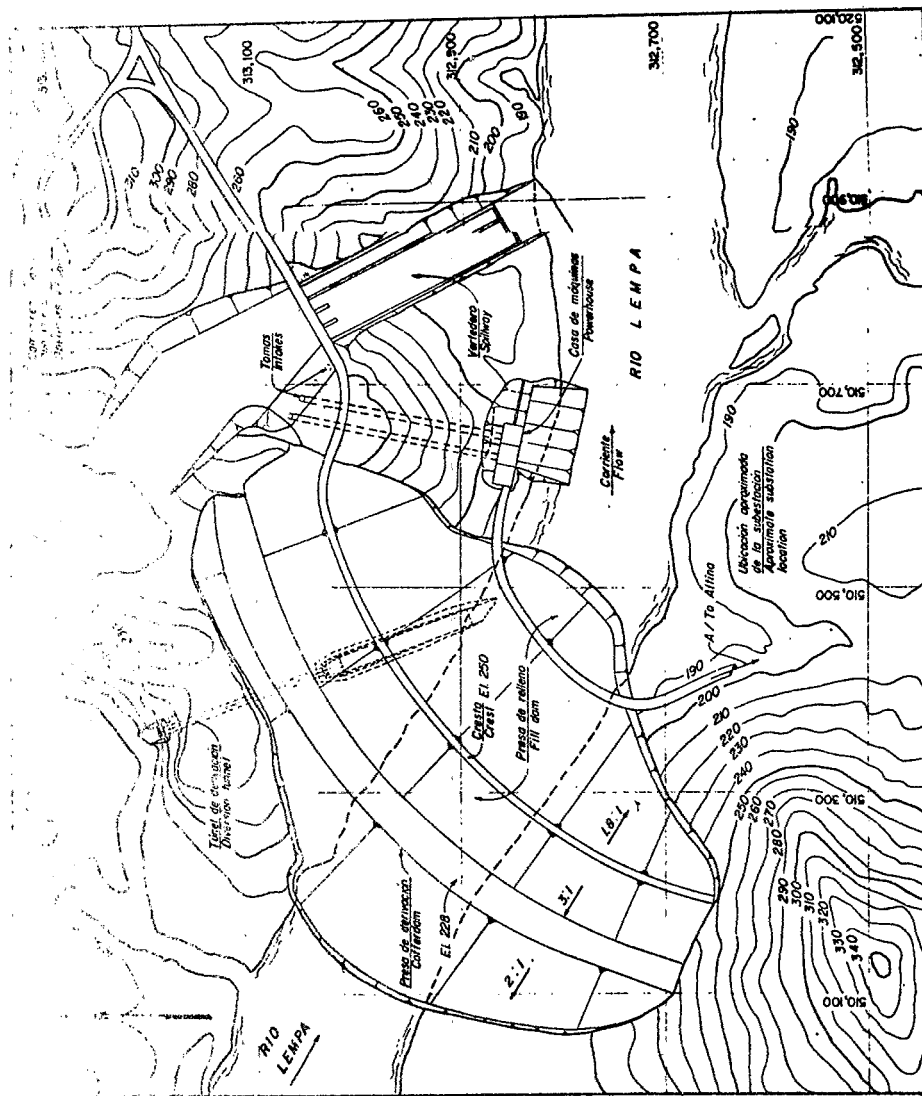
COMISION HIDROELECTRICA DEL RIO IEMPA - CEL  
PROYECCIONES DE FUENTES Y USOS DE FONDOS - PERIODO 1972/1978  
Miles de US\$ 1/

	1972	1973	1974	1975	1976	1977	1978	Total
<u>FUENTES DE FONDOS</u>								
Generación Interna:								
Utilidad neta antes de intereses	6.472	6.343	7.362	6.632	7.207	9.694	11.359	55.569
Depreciación	1.715	2.178	2.324	3.126	3.182	4.784	4.725	22.034
<u>Total Generación Interna</u>	<u>8.187</u>	<u>8.521</u>	<u>9.686</u>	<u>9.758</u>	<u>10.389</u>	<u>14.478</u>	<u>16.584</u>	<u>77.603</u>
Préstamos:								
Préstamo IDA # 227-ES	5.220	380	-	-	-	-	-	5.600
Préstamos propuestos	-	5.836	8.966	7.767	3.514	1.717	-	27.200
BIRF	-	1.544	9.110	14.425	9.290	3.731	-	38.100
BID	-	-	500	1.600	1.500	-	-	3.600
Préstamos locales (Bonos)	-	6.780	18.576	23.792	14.304	5.448	-	68.900
Total préstamos propuestos	-	-	-	-	829	2.962	4.212	8.003
Préstamos futuros para expansión de Cerrón Grande y Geotérmicas	-	-	-	-	-	-	-	-
<u>Total Préstamos</u>	<u>5.220</u>	<u>7.160</u>	<u>18.576</u>	<u>23.792</u>	<u>15.133</u>	<u>8.410</u>	<u>4.212</u>	<u>82.503</u>
Contribución del Gobierno - Programa Electrificación Rural	-	520	520	520	520	520	520	3.120
<u>TOTAL FUENTE DE FONDOS</u>	<u>13.407</u>	<u>16.201</u>	<u>28.782</u>	<u>34.070</u>	<u>26.042</u>	<u>23.408</u>	<u>21.316</u>	<u>163.226</u>
<u>USO DE FONDOS</u>								
Programas de Construcciones								
Programa en ejecución: Turbina a Gas Soyapango y Línea San Rafael Cedros-San Miguel	3.866	438	-	-	-	-	-	4.354
Programa Propuesto BIRF/BID	2.014	258	-	-	-	-	-	2.272
Cerrón Grande: Unidades 1 y 2	440	4.435	19.807	26.843	18.674	5.179	-	75.398
Planta Geotérmica Ahuachapan-Unidad 1	1.935	4.238	7.571	1.556	-	-	-	15.300
Centro de Control	-	200	200	-	-	-	-	400
Estudios y entrenamiento	-	40	320	560	480	-	-	1.400
<u>Total Programa Propuesto 2/</u>	<u>2.375</u>	<u>8.933</u>	<u>27.898</u>	<u>28.959</u>	<u>19.159</u>	<u>5.179</u>	<u>-</u>	<u>92.498</u>
Otros Programas								
Planta Geotérmica Futura	-	-	-	-	-	-	400	400
Cerrón Grande: Unidad 3	-	-	-	-	800	3.200	4.300	8.000
Electrificación Rural	200	720	720	720	720	720	720	4.520
Otros Programas de distribución	200	200	200	200	200	200	200	1.400
Otros estudios	80	80	80	80	260	460	460	1.500
<u>Total del Programa de Construcciones</u>	<u>8.735</u>	<u>10.672</u>	<u>28.898</u>	<u>29.959</u>	<u>21.134</u>	<u>9.759</u>	<u>5.780</u>	<u>114.944</u>
Servicio de Deuda								
Amortización al Gobierno Préstamo BID	-	-	-	-	-	-	3.200	3.200
Intereses y comisiones 3/	1.003	1.639	2.021	2.626	3.262	3.671	4.101	18.323
Amortización	3.038	2.233	2.121	1.540	918	2.178	2.356	14.884
<u>Total Servicio de Deuda</u>	<u>4.041</u>	<u>3.872</u>	<u>4.142</u>	<u>4.166</u>	<u>4.180</u>	<u>5.849</u>	<u>10.157</u>	<u>36.407</u>
Incrementos de capital de trabajo								
Caja	486	1.531	(4.379)	(256)	(113)	7.114	5.098	9.486
Otros diferentes de caja	145	117	121	201	841	681	281	2.386
<u>Total Incrementos de Capital de Trabajo</u>	<u>631</u>	<u>1.650</u>	<u>(4.258)</u>	<u>(55)</u>	<u>728</u>	<u>7.800</u>	<u>5.379</u>	<u>11.875</u>
<u>TOTAL USO DE FONDOS</u>	<u>13.407</u>	<u>16.201</u>	<u>28.782</u>	<u>34.070</u>	<u>26.042</u>	<u>23.408</u>	<u>21.316</u>	<u>163.226</u>
Saldo de Caja al inicio del año	3.027	3.513	5.044	665	409	296	7.115	
Saldo de Caja a fin de año	3.513	5.044	665	409	296	7.415	12.513	

1/ Tasa de cambio utilizada: ¢ 2.50 = US\$ 1.

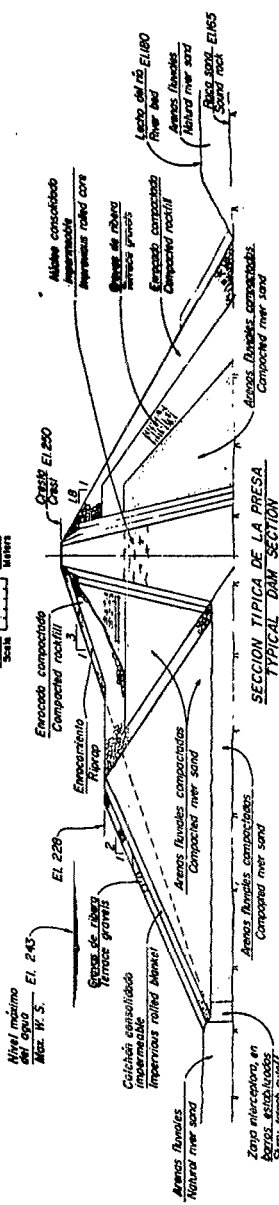
2/ No incluye cargos financieros durante la construcción.

3/ Incluye cargos financieros de los préstamos BIRF/BID durante la construcción.



PLANO GENERAL  
GENERAL PLAN

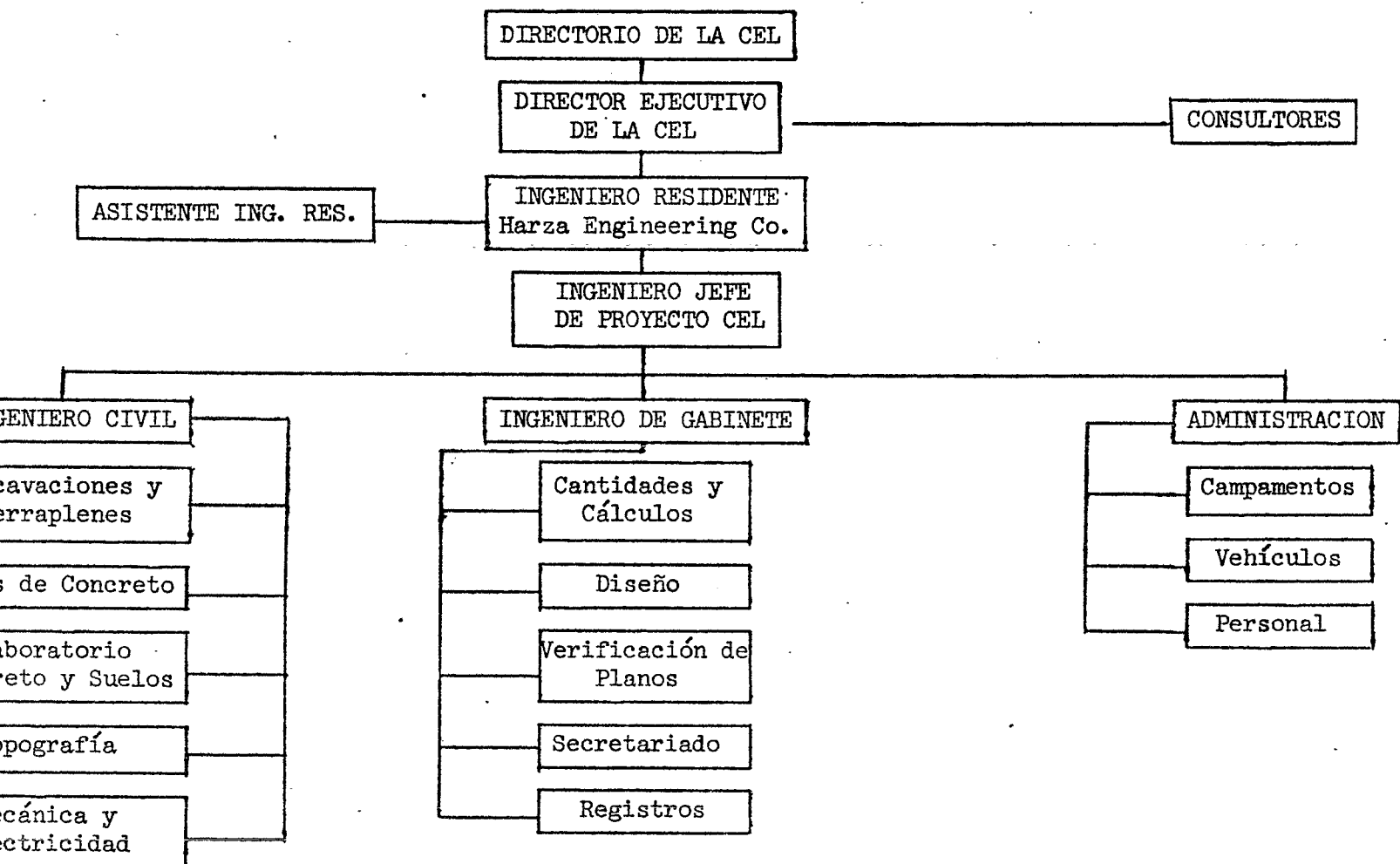
Escala 0 50 Metros  
Scale  
Con las excepciones indicadas  
Except as noted



SECCION TYPICA DE LA PRESA  
TYPICAL DAM SECTION

Escala 0 50 Metros  
Scale  
Con las excepciones indicadas  
Except as noted

PROYECTO CERRON GRANDE - ORGANIGRAMA



EL IADOP  
**MAIN BULK AND RETAIL POWER RATES**  
(In Colones)

Company 1/	CEL		CAES		CIESA		CLES		DEUSEM	
<u>Bulk Sale Tariffs</u>										
CEL to CAESS, CIESA, CLES, CLEA, DEUSEM and DESSEM	all kWh per kW year	0.03 45.00								
CEL to all other companies, the Government Water Supply Companies and the Minas Montecristo	all kWh per kW year	0.03 50.00								
<u>Retail Sale Tariffs</u>										
Domestic	first 70 kWh next 40 kWh excess kWh minimum	0.15 0.10 0.05 1.00	first 150 kWh next 145 kWh excess kWh minimum	0.08 0.07 0.04 1.60	first 70 kWh next 40 kWh excess kWh minimum	0.12 0.10 0.05 1.00	first 100 kWh next 150 kWh excess kWh minimum	0.11 0.09 0.04 1.00	first 70 kWh next 40 kWh excess kWh minimum	
Commercial	first 50 kWh/kW next 50 kWh/kW excess kWh minimum	0.17 0.12 0.05 3.00	first 100 kWh/kW next 125 kWh/kW excess kWh minimum	0.11 0.09 0.04 5.00	first 100 kWh/kW next 100 kWh/kW next 100 kWh/kW excess kWh minimum	0.14 0.12 0.07 0.06 6.00	first 60 kWh/kW next 30 kWh/kW next 85 kWh/kW excess kWh minimum	0.18 0.16 0.11 0.04 6.00	first 50 kWh/kW next 50 kWh/kW excess kWh minimum	
Industrial (low voltage connection)	first 50 kWh/kW next 50 kWh/kW excess kWh minimum	0.14 0.06 0.04 5.00	first 50 kWh/kW next 50 kWh/kW excess kWh no minimum	0.14 0.06 0.04 -	first 60 kWh/kW next 40 kWh/kW next 75 kWh/kW excess kWh minimum	0.14 0.12 0.10 0.05 6.00	first 50 kWh next 80 kWh next 100 kWh excess kWh minimum	0.15 0.10 0.05 0.04 7.50/kVA	first 50 kWh next 50 kWh excess kWh no minimum	
Industrial (high voltage connection)	first 100 kWh/kW excess kWh per kW demand no minimum	0.06 0.045 5.00 -	first 100 kWh/kW excess kWh per 0-300 kVA excess kVA minimum	0.06 0.035 5.25 4.25 5.25-4.25/kVA	first 100 kWh/kW excess kWh per kW 3/ minimum	0.065 0.05 6.50 6.50/kW	first 100 kWh/kW excess kWh per 0-300 kVA excess kVA no minimum	0.06 0.035 5.25 4.25 -	first 100 kWh excess kWh per kW minimum	

1 Company names see Annex D  
charges for tariffs G4, F5 (excepting CLES) and F6 are expressed in kWh per kW year  
and, which, at the option of the supply company, is either calculated on the basis  
of connected capacities or metered.  
Preference is made for low or high voltage connection, from 0-15 kW the higher  
tariff applies.

DEUDA PUBLICA INTERNA BONIFICADA

Miles de Colones

<u>Año</u>	<u>Colocación</u>	<u>Amortización</u>	<u>Incremento</u>
1961	4.944	2.013	2.931
1962	1.554	2.045	- 491
1963	10.016	2.426	7.590
1964	3.821	3.050	771
1965	--	3.672	- 3.672
1966	2.943	3.863	- 1.030
1967	3.824	4.105	- 281
1968	17.153	4.251	12.902
1969	30.003	5.616	24.387
1970	10.724	7.252	3.472
1971	15.000	6.596	8.404
1972	23.000	10.061	12.939
1973	22.000	12.381	9.619
1974	22.000	15.306	6.694
1975	24.000	14.246	9.754
1976	28.000	15.932	12.068
1977	34.000	11.210	22.790
1978	20.000	13.870	6.130
1979	20.000	13.870	6.130
1980	20.000	15.970	4.030

Notas: 1) La amortización es una cifra bastante aproximada, se basa en las tablas de amortización y otros indicadores.

2) Los montos posibles de colocaciones anuales, se basan en los planes de inversión de cada institución y comprende solamente aquellos valores de colocación libre, así:

<u>Institución</u> <u>Emisora</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>
Gobierno	15	5	10	10	15	15
CEPA	5	5	3			
INSAFI	3	3		4	3	5
ICR			2	2	3	2
ANTEL						3
IVU					2	
ANDA		3	5	4	5	5
FNV		6	2	4		4
T o t a l	<u>23</u>	<u>22</u>	<u>22</u>	<u>24</u>	<u>28</u>	<u>34</u>

1121-

APENDICE I

TITULOS VALORES DEL GOBIERNO CENTRAL  
E INSTITUCIONES AUTONOMAS

	Emisión o Autorización	Monto Autorizado Miles de ¢	Plazo	Vencimiento	Tipo de Interés %
<u>Gobierno Central</u>					
Bonos Valle de La Esperanza "A"	1955	1.600	21	15/12/76	5
Bonos Valle de La Esperanza "B"	1955	9.550	26	15/12/81	5
Bonos de Tesorería	1963	10.000	15	1/ 6/78	6
Bonos Equipamiento Militar	1968	10.000	10	16/ 7/78	7
Bonos Proyectos de Desarrollo	1969	7.500	15	16/ 2/85	7
Bonos Mercados de San Salvador	1969	10.000	10	31/ 7/79	7
Bonos Dignidad Nacional	1969	30.000	20	1/ 8/89	5
Bonos para Inversiones Públicas	1971	25.000	5	1/11/76	6
Bonos Instituto Regulador de Abaste- cimiento	1971	7.300	10	16/12/80	2
Bonos para Inversiones Públicas	1972	23.000	15	1/ 6/87	7.5
<u>Comisión Ejecutiva Portuaria Autónoma</u>					
Bonos Construcción Muelle - Acajutla	1956	18.750	20	3/ 6/76	6
Bonos Construcción Muelle - Acajutla	1960	12.500	20	6/ 6/80	6
Bonos adquisición y ampliación Muelle de La Libertad	1964	3.000	10	4/ 6/74	6
Bonos Ampliación Muelle de Acajutla	1967	10.000	20	1/12/87	7
Bonos Construcción nuevo Rompeolas en Puerto de Acajutla	1971	6.000	10	30/ 6/81	7
		8.000	14	30/ 6/85	7.5
<u>Comisión Ejecutiva Hidroeléctrica del Río Lempa</u>					
Bonos construcción Planta 5 de Noviembre	1950	13.100	25	15/ 6/75	5
Bonos Obras Control Laguna de Guija	1953	5.000	16-1/2	15/ 7/69	5
Bonos Ampliación Planta 5 de Noviembre	1955	3.500	9	15/ 7/64	5
Bonos Ampliación Planta 5 de Noviembre	1956	3.000	4	15/ 7/60	5
<u>Administración Nacional de Telecomunicaciones</u>					
Bonos Modernización Sistemas	1963	7.500	10	12/12/73	6
<u>Instituto Salvadoreño de Fomento Industrial</u>					
Bonos Hipotecarios	1967	2.000	3	1/ 6/70	7
Bonos Hipotecarios	1971	3.000	10	1/ 1/81	7
Bonos Hipotecarios 1/	1971	25.000	10		7
<u>Instituto de Colonización Rural</u>					
Bonos serie "A" Adquisición Terrenos	1968	1.200	5	1/ 6/73	6
Bonos serie "B" Adquisición Terrenos	1968	1.680	10	1/ 6/78	6
Bonos serie "C" Adquisición Terrenos	1968	3.120	15	1/ 6/83	6
<u>Instituto de Vivienda Urbana</u>					
Bonos Adquisición Terrenos	1968	5.000	2/ 10	1/ 6/78	6

- 1/ Solicitud de Autorización  
2/ Emitidos sólo \$2.0 millones.

72/77#2

MEMORANDUM OF UNDERSTANDING

between

INTER-AMERICAN DEVELOPMENT BANK

and

INTERNATIONAL BANK FOR RECONSTRUCTION AND  
DEVELOPMENT

Re: El Salvador. Electrification Project  
Cerrón Grande

The Inter-American Development Bank, ("IDB") and the International Bank for Reconstruction and Development ("IBRD") have agreed to assist the Comisión Ejecutiva del Río Lempa ("the Borrower"), a public corporation of the Government of El Salvador, in financing the Electrification Project Cerrón Grande ("the Project") consisting of the construction of: (i) the dam "Cerrón Grande", (ii) the diversion tunnel, (iii) spillway, (iv) intake and power tunnels, (v) powerhouse, (vi) transmission line to Nejapa; (vii) tie-line with "5 de noviembre" plant. For such purpose, the Inter-American Development Bank (IDB) has agreed to make a loan to CEL in the amount of thirty eight million one hundred thousand Dollars (US\$38,100,000) or the equivalent in other currencies which form part of its Fund for Special Operations, on the terms and conditions set forth in the Loan Contract between IDB and CEL and in the Guarantee Contract between IDB and the Republic of El Salvador ("IDB Loan Documents"), all of even date herewith, and the International Bank for Reconstruction and Development (IBRD) has agreed to make a loan to CEL of which an amount

in various currencies equivalent to fifteen million nine hundred thirty thousand Dollars (US\$15,930,000) is allocated to the Project, on the terms and conditions set forth in the Loan Agreement between IBRD and CEL and the Guarantee Agreement between the Republic of El Salvador and IBRD ("IBRD Loan Documents"), all of even date herewith.

IDB and IBRD ("the Banks") being cognizant of their common interests in the successful carrying out of the Project, desire to cooperate closely in the administration of their loans and in the supervision of the execution and operation of the Project. To that end, the Banks hereby agree to implement the measures more fully set forth hereinafter.

A. INFORMATION AND CONSULTATION

1. The Banks shall promptly inform each other of any event which may affect the execution of the Project, the services of either loan or the fulfillment of any obligation under the respective Loan Documents.

2. The Banks shall keep each other currently informed of all amounts disbursed under their respective loans and shall send each other copies of all notification of charges to the respective loan accounts.

3. The Banks shall consult one another and exchange views before taking any measures of common interest with respect to the Project, and the loans including (a) notifying the Borrower that the conditions precedent to the initial disbursement under the IDB Loan Contract or the conditions for effectiveness under the IBRD Loan Agreement have been fulfilled; (b) extending the terminal date for fulfillment of said conditions; (c) extending the date specified in the IDB Loan Contract or the IBRD Loan Agreement

as of which the Borrower's right to withdraw from the respective loan accounts may be terminated; (d) taking any action with regard to the suspension, cancellation or prematuring of the loans or any part thereof; (e) amending, abrogating or waiving any provisions of the IDB Loan Documents and the IBRD Loan Documents, (f) approving accounting and reporting systems, bidding procedures and appointments of personnel, consultants, contractors, auditors as provided in the IDB and IBRD Loan Documents. Approvals and actions to be taken hereunder shall, to the extent possible, be taken jointly by the Banks. In the event of a difference of views with reference to any matter, each of the Banks shall use its best efforts to reach a mutually acceptable resolution of such difference before taking any action on such matter and shall notify the other Bank prior to taking such action. However, each of the Banks shall retain its respective independent right of decision and action under its respective Loan Documents, including the right to permit continued withdrawal of the proceeds of its loan in case of suspension or cancellation by the other Bank.

4. According to the terms of the IDB Loan Contract and the IBRD Loan Agreement, the Borrower has undertaken to submit information, as therein provided, to each of the Banks, and each of the Banks has rights of supervision of the execution of the Project. In order to avoid duplication of effort it is contemplated that IDB, to the extent possible, will review matters of common interest to the Banks in connection with the construction of the Project with a view to suggesting appropriate action to be taken by the Banks and will act as coordinator in dealing

with the Borrower in connection with such construction. For its part, the IBRD to the extent possible will review matters of common interest to the Banks in connection with the operation of the Project, will assume responsibility for suggesting appropriate action to be taken by the Banks in connection with such matters and will act as coordinator in dealing with the Borrower and other parties to the arrangements in connection with such matters.

#### B. SUPERVISION

5. The Banks will cooperate with each other in regard to the supervision of the Project and will agree on specific arrangements for coordinating their actions. Nothing in this Memorandum in any way limits the rights of the Banks to supervise the Project in accordance with the provisions of their respective agreements with the Borrower.

INTERNATIONAL BANK FOR  
RECONSTRUCTION AND DEVELOPMENT

By

INTER-AMERICAN DEVELOPMENT BANK

By

72/7782