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INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT
INTERNATIONAL DEVELOPMENT ASSOCIATION

APPRAISAL OF GURI POWERHOUSE EXTENSION
C. V. G. ELETRIFICACION DEL CARONI C. A.
VENEZUELA

June 4, 1969

EDELCA's Fiscal Year Coincides with the Calendar Year

CURRENCY EQUIVALENTS

US\$1.00 = Bolivares (Bs) 4.50
Bs 1.00 = US\$0.22
Bs 1 Million = US\$222,222

ABBREVIATIONS AND ACRONYMS

EHV	Extra-high-voltage
MW	Megawatt, 1,000 kilowatts
Gwh	Gigawatt hours, 1 million kilowatt hours
m ton	Metric ton, 1,000 kilograms, 2,204 pounds
ALCASA	Aluminio del Caroni Sociedad Anonima
CADAFE	Compania Anonima de Administracion y Fomento Electrico
CAFRECA	Cambio de Frecuencia Compania Anonima
Consortio	Consortio Guri (general contractor)
CVG	Corporacion Venezolana de Guayana
EDELCA	C.V.G. Electrificacion del Caroni Compania Anonima
Harza	Harza Engineering Company International
La Electricidad	Compania Anonima La Electricidad de Caracas
OP SIS	Operacion de Sistemas Interconectados
SIDOR	Planta Siderurgica del Orinoco

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This report was prepared by F. H. Howell.

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C.V.G. ELECTRIFICACION DEL CARONI C.A.

SUMMARY

i. C.V.G. Electrificación del Caroni C.A. (EDELCA) has requested a Bank loan of US\$31 million equivalent to assist in financing the foreign exchange costs of extending the powerhouse structure of the Guri hydro-electric project from the present three unit capacity to the full ten unit capacity contemplated; installing the fourth unit; and installing the embedded parts for the remaining six units. The total estimated cost of the proposed Project is US\$62 million equivalent including interest and other charges payable during the construction period, of which about \$36 million would be foreign exchange. The Bank has made two Loans to EDELCA aggregating US\$100 million equivalent for the initial phase of Guri and extra-high-voltage facilities to transmit the power to the Caracas market area. Guri Dam and the three-unit powerhouse are essentially completed, and the transmission system is well advanced and on schedule.

ii. The proposed Project has been satisfactorily designed and engineered, and the cost estimates contain a large contingency allowance, prudent in view of past experience with major civil works in the same river. Even when this generous allowance is taken into account, EDELCA's expansion program is economically justified, with an internal return on the additional investment estimated at about 17-18%, valuing output at current tariffs.

iii. The total Project cost of \$62 million equivalent would be met by the proposed Bank loan (50%), government investments (27%) and retained earnings (23%). The loan would finance only the foreign exchange costs of the civil works, the equipment, and the engineering. EDELCA will finance interest charges during construction. Procurement will be on a broad international basis. Any surplus loan funds would be cancelled.

iv. EDELCA continues to be capably managed by executives and staff well known to the Bank. Past and short-term future financial performance have not been and are not expected to be as good as originally forecast. This is attributable principally to the failure of sales to other utilities to develop as anticipated. This in turn stems from delays in converting the private system serving Caracas from 50 to 60 cycle operation, and the delays in completing Guri precluding sales to another government-owned power agency. However, the performance criteria established in the first two Loans should be met, although with a delay of two years, approximately commensurate with the lag in projected power sales. The frequency conversion is well underway, and a long-term power sales agreement was recently signed by EDELCA and its two principal utility customers.

v. The proposed Project would form a suitable basis for a Bank loan of US\$31 million equivalent for a term of 20 years including about 5 years of grace.

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APPRAISAL OF GURI POWERHOUSE EXTENSION

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I. INTRODUCTION

1.01 In September 1963 and in January 1967, the Bank made two power-development Loans to C.V.G. Electrificación del Caroni C.A. (EDELCA) of US\$85 million (353-VE) and US\$15 million equivalent (482-VE) for the construction of the initial stage of the Guri Hydroelectric Project, and for an extra-high-voltage (EHV) transmission system to the Caracas market center, respectively. The first stage of Guri is nearing completion with three 175 MW units as planned, although a little more than a year behind the original schedule because of difficulties experienced by the general contractor. Power generation began November 8, 1968. The EHV system, under construction from Guri to Caracas, is expected to be in service during the third quarter of 1969 as initially scheduled.

1.02 The Guri Project and associated EHV transmission system are designed to serve primarily the north-central population and industrial center comprising the Caracas-Maracay-Valencia area and environs, and the rapidly growing industrial center of Ciudad Guayana whose development is being aggressively promoted by the autonomous regional agency, Corporación Venezolana de Guayana (CVG), the parent of EDELCA. In the north-central area EDELCA will wholesale power to two other power systems, while in the Ciudad Guayana area the principal customers are major foreign-owned industrial companies and electrometallurgical subsidiaries of CVG. These several regions, as well as intermediate zones, form the logical market area for Guri power, and it is now clear that Guri will be the prime source for this growing market over the next decade.

1.03 The Caroni River is one of the major rivers of Latin America, its annual average flow being about 5,000 cubic meters per second at the Guri site. The topography of the area upstream of the Guri project is such that a large reservoir has been created, some 11,000 million cubic meters. This feature together with the Caroni's large flow enable the development of some 1,600 MW of dependable power. The regulation of the river also guarantees the capability of an existing 365 MW downstream installation, Macagua.

1.04 Guri is designed to be expanded in several stages over several decades, by installing additional generating units and later raising the height of the dam proper twice. The original design took this into account, and contemplated the installation of ten 175 MW units during the late 1960's and the 1970's before raising the dam. As noted, three units are now installed. (An additional 400 MW can be developed in the first 10 machines by raising the dam modestly. A second powerhouse would be constructed in connection with raising the dam the second time.) EDELCA now plans to extend the existing powerhouse to its full size as soon as possible, and to purchase and install the remaining seven units between now and 1980. The

basic powerhouse construction would be completed during 1969-72, with the first additional unit, No. 4, coming into service in 1973. The remaining units would be erected and placed in service one each year except 1974.

1.05 The total cost of completing the entire powerhouse and installing the last seven units is estimated to be about US\$91 million equivalent, of which about US\$61 million would be in foreign exchange, including interest charges on the proposed Bank loan. (This compares with a total of approximately US\$187 million EDELCA will have invested to complete the initial phase of Guri with three units, and the EHV facilities.) EDELCA has requested Bank assistance in financing the civil engineering works of the powerhouse extension, Unit No. 4, and the embedded parts of Unit Nos. 5-10. The total cost of this phase, to be carried out during 1969-73, is estimated to be equivalent to US\$62 million (including interest charges on the proposed Bank loan during the construction period) of which US\$36 million would be in foreign exchange. A loan of US\$31 million equivalent is proposed, with EDELCA financing the approximately US\$5 million of interest charges during the construction period.

1.06 During the construction of Guri dam, certain difficulties were experienced by the general contractor Consorcio Guri, a group of U.S. and Danish firms managed by Kaiser Engineers & Constructors Inc. These difficulties not only contributed to the delay in execution of the work, but have also given rise to claims, not yet settled, of substantial magnitude. Consorcio Guri and EDELCA completed financial arrangements in mid-1967 under which EDELCA has made certain payments to Consorcio (including disbursements from Loan Account 353-VE) the final disposition of which may not be known for five years. This situation is discussed more fully in Chapter II, "The Borrower".

1.07 This report was prepared by F. H. Howell, and is based upon information obtained from engineering studies by EDELCA and its consultants; a continuous liaison with CVG and EDELCA since mid-1962; an appraisal in Venezuela in November 1968; and upon a visit to Venezuela in March 1969 to review recent developments.

II. THE BORROWER

2.01 EDELCA is a wholly-owned subsidiary of CVG, the nationally chartered regional authority responsible for development of the area known as the "Guayana" surrounding the confluence of the Orinoco and Caroni Rivers. The Guayana has considerable natural resources, among them abundant hydroelectric potential, natural gas, high-grade iron ore and vast areas of land which could be made productive by control of the Orinoco. CVG is active in many fields:

- (i) Iron and steel production through another wholly-owned subsidiary Planta Siderurgica del Orinoco (SIDOR) which operates an electric iron smelter, steel conversion facilities, a pipe factory and has under construction a rolling mill.

- (ii) Aluminum production through another subsidiary jointly owned with Reynolds Metals Company, Aluminio del Caroni S.A. (ALCASA) operating a 12,500 m ton aluminum smelter; capacity is now being doubled, and rolling facilities are being planned.
- (iii) Land reclamation in the Orinoco delta, as part of a general plan to encourage migration to the Guayana.
- (iv) Urban development, centered around expansion of the new Ciudad Guayana, embracing the communities of Puerto Ordaz and San Felix.
- (v) Tourism, through construction with Intercontinental Hotels of a new hotel in Ciudad Guayana.

CVG's promotional activities are important to EDELCA's market, because the Guayana is expected to account for 36% of EDELCA's revenues during 1969-80.

2.02 EDELCA was created in August 1963 to assume ownership and operations of CVG's electric power properties, then principally the 365 MW Macagua hydroelectric plant constructed to serve SIDOR. EDELCA's Charter and By-Laws were drafted in close consultation with the Bank. The Charter requires that the President must at all times be a person of proven experience and executive capacity: breach of this provision would constitute a default under both Loan Agreements. This provision will be continued in the proposed loan. The current President has been in charge of EDELCA since its creation, and has as well continuously directed CVG since its founding in December 1960. He is a very capable man, in large measure responsible for the cooperation between the public and private power sectors. He is assisted by a competent staff who are successfully operating Macagua, completing construction of Guri and the EHV system, and planning the proposed expansion of Guri powerhouse. Suitable personnel have been appropriately trained to operate Guri and the EHV facilities, and CVG has furnished key personnel for operation of the interconnected systems discussed in Chapter III, "Power Sector".

2.03 EDELCA (and CVG before it) has retained the services of Harza Engineering Company International (USA) throughout the design and construction of Guri. EDELCA intends to continue to employ Harza in connection with the expansion of the powerhouse. Certain specialized engineering and supervisory services necessary to carry out construction of the EHV system are being provided by Kennedy & Donkin (UK) and Techint (Italy). These arrangements have proven satisfactory, and with them EDELCA is capable of executing the proposed program of expansion. During negotiations assurances were obtained that these or similarly satisfactory arrangements will be continued.

2.04 In early 1967, the general contractor at Guri, Consorcio Guri, requested financial assistance from EDELCA, outside the scope of the contract, alleging changed conditions caused it to suffer grave damage. Consorcio

claimed it would otherwise be forced to abandon the job, its losses during 1963-67 having reached such proportions^{1/} that most members of the joint venture were unwilling to put more money into the contract. After considerable negotiations, during which the Bank offered its good offices, an agreement was reached under which Consorcio obligated itself to complete the job, and EDELCA obligated itself to make certain payments to Consorcio in contemplation of Consorcio's continuing to work. The principal features of this Financial Agreement are:

- (i) Consorcio would continue to work to completion, and EDELCA would pay Consorcio regular Contract Revenues in accordance with the provisions of the general contract.
- (ii) Consorcio would render an accounting of its costs to prosecute this work, and EDELCA would make Special Advances under the Financial Agreement equal to the amount Consorcio's costs exceeded Contract Revenues. That is, EDELCA would reimburse all Consorcio's expenditures.
- (iii) The aggregate amount of Special Advances would not exceed the face amount of Consorcio's performance bond of (about) US\$37 million. At the same time, the sureties who wrote the bond agreed to an amendment whereby they bound themselves to promptly reimburse EDELCA directly for the Special Advances if Consorcio abandoned the work prior to its completion.
- (iv) Any claims presented by Consorcio and accepted by EDELCA would cancel a corresponding obligation of Consorcio to repay the Special Advances.
- (v) Any Special Advances outstanding upon completion of the contract would be repaid promptly by Consorcio, except for amounts equal to unresolved claims. Two years would elapse during which an attempt would be made to settle claims. Following this period, Consorcio would be obliged to repay the unsettled balance of the Special Advances in three equal annual payments.

^{1/} During inauguration of the work November 8, 1968, Edgar Kaiser representing Consorcio stated in his public address that losses had reached more than US\$60 million. The estimated original value of the general contract was about US\$72 million.

At the present time the work required by the General Contract is almost complete, but the full extent of Consorcio's claim is not yet known, nor can EDELCA estimate how much it is likely to accept.

2.05 As of March 1969, EDELCA had made aggregate Special Advances to Consorcio of US\$26.9 million, and expects to make additional Advances of about US\$0.4 million by June 1969 when the works will have been completed. Following the accord reached by EDELCA and Consorcio which led to the Financial Agreement in mid-1967, the Bank agreed to disburse from Loan Account 353-VE an amount up to US\$13.4 million pari passu with EDELCA, for purposes of the Special Advances.^{1/} EDELCA has in turn agreed that one-half of any repayments made by Consorcio under the Financial Agreement will be applied to reduce Loan 353-VE by prepaying the last maturities.

2.06 It would be imprudent to speculate as to the extent of Consorcio's claims and how much EDELCA would accept. Therefore, while it is obvious the settlement of claims may have a major impact on EDELCA's future financial position, it cannot be quantified. For purposes of making the financial projections in this report it has been assumed that Consorcio will present and EDELCA will accept claims equal to the total amount of Special Advances, i.e. US\$27.3 million. This would seem to be the most pessimistic view.

III. THE POWER SECTOR

3.01 Located on the Caribbean coast of South America, Venezuela had a population estimated at 9,351,600 at the end of 1967. Per capita GNP was equivalent to US\$984 in 1966 (measured at market prices); petroleum continues to be the largest sector (26% of GDP at factor costs). The nation is rapidly industrializing, and produces a range of basic metal products, automobiles, electrical appliances, construction materials, etc. More than 65% of the total population, which tends to be concentrated in the major cities, has electric service available. Per capita use, excluding the petroleum sector, was 750 kwh in 1967, ranking Venezuela among the highest in Latin America.

Composition of the Sector

3.02 Public power supply in Venezuela is provided both by privately-owned companies, and by government agencies at the municipal and federal level. The more important enterprises are the following:

- (i) EDELCA, serving directly the industrial Guayana market and providing bulk power for the utilities serving the eastern and central regions of the country.

^{1/} These funds were available in the Loan Account from the usual provision for contingencies, as well as the considerable savings realized by purchasing the Project's electro-mechanical equipment under extremely favorable market conditions. The full US\$13.4 million has been disbursed, and future payments will be borne entirely by EDELCA.

- (ii) Compañía Anónima de Administración y Fomento Eléctrico (CADAFE), a government-owned agency providing service throughout most of the country, which operates 568 MW of thermal generating plants, as well as transmission, and distribution facilities. CADAFE serves 466,000 customers directly, and a large number of municipal systems at wholesale. Except for the industrializing Maracay and Valencia areas, the market is primarily smaller communities and rural areas so that load density is inherently low, while investments and operating expenses are inherently high. CADAFE operates a 230-kv transmission system financed by Loan 391-VE, which integrates its eastern and central systems with EDELCA's plants on the Caroni River and forms an important link in the transmission of Caroni power to the Caracas market.
- (iii) Compañía Anónima La Electricidad de Caracas (La Electricidad), a wholly-Venezuelan privately-owned company which has been supplying Caracas and its environs for nearly 70 years. La Electricidad operates a 620 MW, 50 cycle system now being converted to 60 cycle operation, the national frequency standard.
- (iv) C.A. Energía Eléctrica de Venezuela and C.A. Energía Eléctrica de Barquisimeto, Canadian-controlled companies which operate in the major cities of Maracaibo and Barquisimeto, respectively. There are other Venezuelan-owned private companies operating in Ciudad Bolívar, Valencia, Anaco and Puerto Cabello.
- (v) The municipal systems which buy bulk power from CADAFE.

Total public supply capacity was about 2200 MW at the end of 1968. In addition, the petroleum sector owns and operates nearly 500 MW in captive plants, which provide power for well and refinery operation, but whose production is not generally available to the public. In 1967, these plants accounted for about 17% of all electricity produced in the country. Average annual growth in public supply production during 1962-68, exclusive of captive plants, was over 15%.

3.03 La Electricidad and the Canadian companies operate large thermal plants, as does CADAFE to serve its central market area which lies within the Caracas-Valencia-Puerto Cabello area, and includes the large water-pumping load of the Caracas water-supply system operated by the Instituto Nacional de Obras Sanitarias. Except for the EDELCA hydroelectric plants on the Caroni, most of the rest of the country is served from smaller, old conventional steam plants, gas turbines, or isolated diesel units. CADAFE in particular has a long-range program of interconnecting isolated communities at 115 kv and

integrating regions at 230-kv so that service can be provided from larger, more efficient central stations. It is anticipated that this will be the pattern in the east and west of Venezuela.

The Frequency Unification Problem

3.04 On the other hand, market development in the north-central industrial zone and the Caracas area itself as well as in the Guayana will be met from Guri. In 1963, at the time of making Loan 353-VE for the initial phase of the Guri Project, the Bank noted that its economic justification hinged upon the inclusion of the important Caracas load in the market to be served. The Government agreed, and through a series of executive and legislative measures arranged to have La Electricidad's system converted to 60 cycle operation, and provided the funds to defray the cost of doing so. At the same time La Electricidad agreed to limit its expansion of generating capacity when Guri power became available, and to buy its future requirements from EDELCA. The studies and negotiations leading to these results proved to be more complex and difficult than had been visualized. The work of frequency conversion has started only recently, and will not be complete until mid-1971 instead of 1968 as had been planned in 1963. In spite of these delays, the working out of the agreements and the actual beginning of the physical conversion must be considered an outstanding example of cooperation between the public and private sectors.

3.05 Based upon conversion of La Electricidad's system, EDELCA, CADAPE and La Electricidad have entered into a long-term power sales agreement whose fundamental feature is to require CADAPE and La Electricidad to cease the acquisition of generating capacity in the Guri market area, and purchase power from EDELCA until the first stage 1,750 MW capacity of Guri is completely absorbed, now expected about 1980. This agreement was not reached until all parties--particularly CADAPE and La Electricidad--had been satisfied such a program was in their own best interests. La Electricidad will purchase power at the northern terminal of EDELCA's EHV system, while CADAPE will purchase there, and at Macagua and El Tigre as well.

3.06 The task of analyzing, programming, and actually carrying out the work of frequency conversion is complex and difficult. La Electricidad has formed a subsidiary company for this purpose alone, Cambio de Frecuencia Compania Anonima (CAFRECA). A census of consumers and their equipment was taken, and a program of conversion drawn up. Work began in mid-1968, and is progressing well. Three 25 MW generating units have been converted, as has about 75 MW of load (as of March 15, 1969). A 60 cycle tie-line is in service between La Electricidad and CADAPE. At present about 7 MW of load are being converted monthly, and when full-scale operations are achieved, a rate of about 20 MW per month is anticipated. La Electricidad's load is now about 400 MW, and is growing about 3 MW per month. The regions experiencing the most rapid growth are being converted first.

3.07 The three interconnecting parties are setting up an operating arm, the final legal status of which has not yet been determined. It will be responsible for daily operation of the interconnected pool under the terms of the power agreement, and is currently called Operacion de Sistemas Interconectados (OP SIS). At present, OP SIS has only a skeleton staff, but is training operators in Venezuela and abroad. When frequency conversion is complete and full pool operation achieved, OP SIS will direct the generation of the three interconnected parties in accordance with system requirements.

IV. EDELCA'S PROGRAM AND THE PROJECT

The Program

4.01 The three-party interconnection agreement is based upon the continuous expansion of Guri to meet market growth until the first stage (ten 175 MW units) is complete. At present, it is estimated this will be required by 1980. At that time, the overall load/capacity situation will be critically reviewed, and it is likely new thermal generating facilities will be constructed in the north-central region before the Guri dam is raised for the second stage expansion. Thus EDELCA's expansion program over the next 12 years will consist of:

- (i) immediate expansion of the existing powerhouse to its ultimate size for ten units;
- (ii) sequential installation of generating units 4 through 10 during 1973-80;
- (iii) construction during 1973-75 of a second 400-kv (EHV) transmission system, from Guri to the north-central region, possibly west of Caracas; and
- (iv) construction as required of lower voltage transmission facilities to serve major industrial customers in the Guayana region.

4.02 EDELCA and its consultants Harza have studied the possibility of extending the powerhouse civil works piecemeal as additional units are required, and compared the costs with carrying out the complete extension now. Their studies indicate that the differences among the present values of the costs (calculated at a discount rate of 12%) of the several schemes are smaller than the margin of error inherent in making engineering estimates.^{1/} Thus the timing of the work is a matter of indifference as regards its costs. EDELCA plans to initiate the entire extension in the immediate future and the Bank agrees with these plans. EDELCA will, however, run the risk of having

^{1/} The maximum difference in present value is equal to little more than 1% of the estimated total construction cost. The present value of the different cost estimates is remarkably insensitive to the discount rate.

a prematurely completed powerhouse in the event there should be slackening of demand in the late 1970's. The magnitude of this risk is reduced by the operation of the interconnection agreement which in effect fixes five years in advance the amount of power and energy CADAFE and La Electricidad are obliged to purchase. (See paragraph 5.04.) Thus, for example, they will be obligated to purchase in 1975 amounts determined by a forecast to be made in 1970.

4.03 EDELCA proposes to purchase all seven additional generating units in the immediate future. There is likely to be a price advantage over buying units singly or in pairs, and there is an obvious advantage in standardization. The contracts would provide for phased delivery, and would contain corresponding provisions for payments over the entire delivery period of 1969-80. EDELCA would control the timing of the delivery of future units. Certain of the embedded parts of all the turbines and generators would be delivered early and be erected and installed by the general contractor for the powerhouse civil works.

4.04 The total estimated cost of all the components of the program is equivalent to US\$129.5 million. The new work to be undertaken will cost the equivalent of about US\$116 million, while during 1969 EDELCA will be spending about US\$13.5 million equivalent on the completion of the two Bank-financed projects, i.e., the initial phase of Guri and the first 400-kv transmission line. Details are shown in Annex 5.

The Project

4.05 The Project for which Bank financing is proposed would include the following:

- (i) Complete civil works for the full ten-unit powerhouse;
- (ii) Installation of Unit No. 4 complete;
- (iii) Installation of embedded parts for Units 5-10; and
- (iv) Engineering and supervision during procurement and construction.

4.06 The existing three-unit powerhouse, located at the toe of the main concrete gravity dam, will be extended completely across the river. Openings have been provided in the dam to accommodate the penstocks for the future units. The powerhouse foundation is on rock in the river bed, the downstream area being flooded by the tailrace and spillway. The area in which the extension will be made is under water, and so must be isolated by cofferdamming between the existing powerhouse and the spillway. The excavation and construction would take place in the dry behind the cofferdam.

4.07 The general contract for the civil works would be placed on a unit price basis after international competition among prequalified contractors or

consortia of contractors. (Consortio would be included, but it is not certain the sponsors would wish to participate in the bidding.) The electro-mechanical equipment would also be procured on a broad international competitive basis. The estimated cost of the work proposed for Bank financing is summarized below and presented in more detail in Annex 2.

Estimated Cost of Proposed Project

	<u>Expressed in Bs Millions</u>			<u>Expressed in US\$ Millions</u>		
	<u>Local Currency</u>	<u>Foreign Exchange</u>	<u>Total</u>	<u>Local Currency</u>	<u>Foreign Exchange</u>	<u>Total</u>
Civil Works	96.2	70.2	166.4	21.4	15.6	37.0
Turbine/Governor/Misc.						
Mech. Equip.	1.4	24.8	26.2	0.3	5.5	5.8
Generator/Accessories	0.6	12.8	13.4	0.1	2.8	2.9
Transformers/Switchgear	0.5	3.8	4.3	0.1	0.8	1.0
	<u>98.7</u>	<u>111.6</u>	<u>210.3</u>	<u>21.9</u>	<u>24.7</u>	<u>46.7</u>
Contingencies	13.7	15.8	29.5	3.0	3.5	6.6
	<u>112.4</u>	<u>127.4</u>	<u>239.8</u>	<u>24.9</u>	<u>28.2</u>	<u>53.3</u>
Engineering/Supervision	5.0	11.5	16.5	1.1	2.6	3.7
TOTAL	117.4	138.9	256.3	26.0	30.8	57.0

Disbursements from the loan account would be made for foreign exchange costs of the general contract and equipment, and the consultants' services. Funds determined to be surplus at such time as the works are sufficiently advanced would be cancelled.

4.08 The civil works and erection of Unit No. 4 would be completed by mid-1973. To maintain this schedule, which is fairly tight, the process of selecting the general contractor will have to begin soon to enable him to move in before the low water period occurs in the Caroni, beginning around January 1970. EDELCA plans to purchase with its own funds local sheet piling and have it on-site before the contractor moves in. This is the critical material for placing the cellular cofferdam needed to permit excavation in the dry. EDELCA plans to erect Units 5-10 by force account under the direction of factory engineers. An undertaking has been obtained that EDELCA will carry out this work as market developments require.

V. JUSTIFICATION OF PROJECT

The Market Forecast

5.01 The load/capacity situation in the Guri market area at the end of 1968 was as follows:

<u>Company</u>	<u>Installed Capacity MW</u>	<u>Peak Demand MW</u>
La Electricidad	518	414
CADAFE	319	310
EDELCA	545	310

La Electricidad's market is heavily urban in nature, and has experienced a long-term rate of growth which has exhibited remarkably little tendency to vary. The Company's planning division has found that forecasts based upon past trends yield results fully as accurate as more elaborate techniques. Their forecast is based upon a continuation of the historic rate of nearly 10% per year for the next several years, but assumes that this will fall to the equivalent of only 7.5% in the later 1970's. Thus, the estimate of La Electricidad's market development is probably pessimistic over the long run. La Electricidad has under construction now a 60 MW jet-engine-powered 50/60 cycle unit expected in service late June 1969. This unit was purchased when it became known Guri would be delayed. In addition, certain modifications are being made to the boilers in two plants to permit supplemental firing which may develop as much as 35 MW additional capability. Both these factors reduce La Electricidad's requirement to buy from EDELCA in the future.

5.02 CADAPE's market on the other hand includes industrial operations, and as new industries are connected, load growth occurs in steps imposed upon the general trend. There has been a tendency in the past to plan power facility expansion around the expectation of load increases without obtaining contractual commitments from the potential customers. CADAPE's management is aware of the dangers in this approach to system planning, particularly in view of the obligation it now has towards EDELCA, explained in paragraph 5.04. The long-term growth trend of CADAPE's major market area has been estimated to be about 10% per year for the next six years, and then decreasing linearly to 7% by 1981.

5.03 EDELCA's direct consumers include only the industrial operations in the Guayana, and in particular CVG's steel and aluminum facilities SIDOR and ALCASA. Both are presently undergoing expansions: SIDOR's load will increase modestly, while ALCASA's will double in 1969, and is expected to double again in the mid-1970's as production increases from the present 12,500 m tons per year to 25,000 and finally 50,000. Concurrently, general use in the Ciudad Guayana area will grow as the city itself grows. Population has increased from 2-3,000 in the early 1950's before CVG began intensive operations to over 75,000 today.

5.04 EDELCA's sales will thus be related to the growing requirements of CADAPE, La Electricidad, and its own immediate customers. Since they are prohibited from adding capacity of their own, EDELCA's market is in a sense guaranteed, so long as there is growth in the markets served by La Electricidad and CADAPE. Given the nature of these markets one would have to postulate a general stagnation of the economy to assume no growth in EDELCA's sales. The three parties must agree each year on a five-year sales forecast which commits the purchasing parties to "take or pay" for the amounts forecast.

5.05 During negotiations, it was deemed prudent to obtain an undertaking from the Government that it will require its own agency CADAPE promptly to pay its accounts with EDELCA. In the past CADAPE has had difficulty in collecting from other government enterprises, notably the Caracas water supply system, and there is a general tendency to overlook delinquent intragovernmental accounts.

5.06 EDELCA's estimated sales and corresponding capacity are shown below in condensed form. Annex 1 presents more detail.

Estimated Sales - Power & Energy

	(Actual)				
	1968	1971	1974	1977	1980
	Power - MW				
CADAFE	40	248	366	544	677
La Electricidad	-	26	121	326	522
Guayana Region	290	341	379	485	618
Total	330	615	866	1,355	1,957
EDELCA Capability - Gross	545	805	971	1,469	1,957
	Energy - Gwh				
	1968	1971	1974	1977	1980
CADAFE	516	1,800	2,483	3,249	3,837
La Electricidad	-	1,477	2,197	3,117	3,748
Guayana Region	1,897	2,355	2,823	3,514	4,110
	2,413	5,632	7,503	9,880	11,695

EDELCA's sales will apparently grow at a rate greater than those of CADAFE and La Electricidad because the base year - 1968 - shows very modest sales and nearly all the growth of load in the other systems will be furnished by EDELCA.

5.07 The market forecast summarized above was arrived at by the three parties jointly, and corresponds very closely to an independent survey made by International Middle West Company (US), consultants to the interconnecting parties. It differs from the forecast made in September 1966 in connection with the appraisal for Loan 482-VE principally in that frequency conversion has been delayed, and certain loads expected by CADAFE have failed to materialize. The two forecasts are in fact closely parallel, but the later lags the earlier by somewhat less than one year. The present forecast is reasonable under current circumstances, and forms a suitable basis for planning. In any event, the power sales agreement assures EDELCA that CADAFE and La Electricidad will pay for Guri generating capability once they have scheduled future purchases based on its availability, whether or not they use it.

Internal Rate of Return

5.08 Based upon the jointly-accepted market forecast, the operation of the interconnection agreement would require all ten generating units to be in service by 1980. This compares with a projected schedule made in 1966 during the appraisal of the EHV facilities as shown in the table below.

Expected In-Service Date

<u>Unit No.</u>	<u>1966 Forecast</u>	<u>Current Forecast</u>
4	1971	1973
5	1972	1975
6	1974	1976
7	1975	1977
8	1975	1978
9	*	1979
10	*	1980

* - not estimated in 1966.

The present schedule represents a delay of between two and three years. This is attributable to several principal factors:

- (i) The delay of about 16 months in completion of Guri dam itself and initial commercial operation of the first three generating units;
- (ii) The delay in initiating frequency conversion of La Electricidad's system, and the purchase of the 60 MW aviation-engine gas turbine plant;
- (iii) The failure to materialize of certain loads projected by CADAPE, and the installation of gas-turbine peaking capacity in the Guri market area.

The delays in market development and the installation of the gas turbines have led to commensurate deferments in making the investments in the additional units at Guri.

5.09 A calculation was made of the internal rate of return on all the additional investment in the powerhouse and Units 4-10. Expenditures were assumed to occur over the 12 years 1969-80, and sales to continue for 20 years until 1988 in accordance with the contract La Electricidad entered into with the Government in which it so obligated itself, in return for the guarantee that the costs of conversion would be paid by the Government. These assumptions should lead to a pessimistic view of the probable return since the life of the facilities exceeds 20 years and sales based upon their capacity will continue well beyond 1988. Using contractual prices for power and energy, the calculation indicates the return lies between 17% and 18%. Such a high return is of course, due to the fact that the dam is treated as a "sunk cost".

VI. FINANCIAL ASPECTS

Past Performance

6.01 At the time Loans 353-VE and 482-VE were made in 1963 and 1967, it was not expected that EDELCA's sales, revenues, or income would be significant until the initial three Guri units had been completed, and La Electricidad's system converted to 60 cycle operation. As seen, Guri is somewhat more than a year behind schedule, and frequency conversion a further 1-1/2 years. These two effects have of course combined to produce operating results somewhat less favorable than had been forecast earlier. Results of 1968 operations are condensed below, together with comparable figures forecast in October 1966.

	1968	
	<u>Condensed Income Statement</u>	
	Bs Millions	
	<u>Actual</u>	<u>1966 Forecast</u>
Sales - Gwh	2,413	2,201
Operating Revenues	32.7	33.2
Operating Expenses		
Operation & Maintenance	<u>5.3</u>	<u>2.9</u>
Depreciation	5.0	4.7
General Expenses	<u>2.0</u>	<u>2.1</u>
	<u>12.3</u>	<u>9.7</u>
Operating Income	20.4	23.5
Interest	<u>18.9</u>	<u>24.1</u>
Interest Charged to Construction	<u>18.9</u>	<u>24.1</u>
Interest Expense	-	-
Net Income	20.4	23.5
Rate of Return	9.9%	12.1%

EDELCA's accounts are audited by Price Waterhouse and are kept on an acceptable and consistent basis.

6.02 Financial resources have been sufficient for the execution of both Guri and the EHV Project. A temporary shortage of funds developed in mid-1967 as a consequence of EDELCA's obligations to Consorcio under the Financial Agreement (paragraphs 2.04 - 2.05) but this was swiftly corrected with CVG borrowings in the U.S. which allowed it to make advances to EDELCA. Both CVG and EDELCA have enjoyed access to the federal budget for investment funds.

EDELCA is making on-time interest payments on Loan 482-VE and repayments of Loan 353-VE.

6.03 EDELCA's position as of December 31, 1968 is shown below in condensed form.

EDELCA
Condensed Balance Sheet
December 31, 1968
Bs Millions

Assets

Plant in Service	243.8
Depreciation Reserve	34.7
	<u>209.1</u>
Work in Progress	692.4
	<u>901.5</u>
Cash	20.1
Other Current Assets - Net	8.3
Advances to Consorcio	110.8
	<u>1,040.7</u>

Liabilities

Capital	
Paid-In	488.3
Earned Surplus and Reserves	58.2
	<u>546.5</u>
Long-Term Debt	
Loans 353-VE/482-VE	391.3
Other Liabilities	23.0
Retentions against Contracts	24.5
Advances from CVG	55.4
	<u>1,040.7</u>

The plant account includes the Macagua hydroelectric plant, and the minor transmission facilities in the Guayana area. "Work in progress" includes Guri dam and Units 1 - 3, as well as the EHV system under construction. "Advances to Consorcio" is the aggregate of the Special Advances made both from Loan Account 353-VE and through CVG's advances to EDELCA (paragraph 6.02). As noted in paragraph 2.05, to the extent these "Advances" are recovered from Consorcio, EDELCA will repay the Bank.

Projected Operations

6.04 Except for certain industrial operations not yet firmly committed, EDELCA's revenues from sales will be developed from contractual tariffs. The principal tariffs are:

- (i) La Electricidad and CADAFE, which contain prices for demand and firm energy, and economy^{1/} (or fuel replacement) energy. The levels represent the result of the bargaining leading to the interconnection agreement.
- (ii) SIDOR and ALCASA, which are based solely on energy consumption.

Until the mid-1970's when sales to CADAFE and La Electricidad become more important, average sales revenue will be equivalent to about US3 mills per kwh. From then on, average revenue will be about US4 mills. Details of the tariffs in effect are shown in Annex 3.

6.05 Projected Income Statements are shown in Annex 4. Operating expenses are projected from experience at Macagua, plus estimates for Guri and the EHV transmission system. Depreciation is calculated in accordance with rates agreed upon in connection with Loan 353-VE.

6.06 Both Loans 353-VE and 482-VE contain performance criteria that require EDELCA to earn not less than 8% on its average net plant in 1973 and later years. It is unlikely this target will be met, due primarily to two factors:

- (i) the failure of sales to develop as forecast earlier; and
- (ii) EDELCA's decision to complete the powerhouse in one step, making what had been originally conceived of as a fairly well spread investment into a "lumpy" one.

The projections in this report assume all the civil works will be placed in the plant account when completed in 1973.^{2/} The 8% target should, however, be achieved in 1975 and later years. This estimated performance is consistent with the several-year delay in market development. It would be reasonable to waive the requirement for 1973 and 1974, particularly since the events leading to the delays were beyond EDELCA's control.

^{1/} Energy that is supplied on a "when available" basis, not under contract. Its use generally enables the purchaser to reduce generation by thermal units.

^{2/} If adjusted to prorate the investment in civil works over the last seven units, the 8% target would still not be achieved. Results would be about 7.1% in 1973 and 7.5% in 1974.

Financing Plan 1969 - 1980

6.07 The twelve-year period extending to the completion of the first stage of Guri with 1,750 MW installed in 1980, can be conveniently divided at the end of 1973 when the civil works for the powerhouse are expected to be completed. The Project proposed for Bank financing will be executed in the first five years of this period. The financing plan is presented below in summary form and in detail in Annex 5.

Financing Plan 1969-1980
Bs Millions

	<u>1969-1973</u>	<u>1974-1980</u>	<u>1969-80</u> <u>Total</u>
<u>Sources</u>			
Operating Income	224.6	867.7	1,092.3
Depreciation	83.3	181.3	264.6
	<u>307.9</u>	<u>1,049.0</u>	<u>1,356.9</u>
Debt Service	(205.9)	(364.7)	(570.6)
Net Internal Cash	<u>102.0</u>	<u>684.3</u>	<u>786.3</u>
Government Investments	80.7	30.0	110.7
CVG Advance	<u>3.2</u>	<u>-</u>	<u>3.2</u>
	83.9	30.0	113.9
<u>Borrowings</u>			
Loan 353-VE	37.5	-	37.5
Loan 482-VE	21.3	-	21.3
Proposed Loan	<u>138.9</u>	<u>-</u>	<u>138.9</u>
	<u>197.7</u>	<u>-</u>	<u>197.7</u>
 TOTAL SOURCES	 <u>383.6</u>	 <u>714.3</u>	 <u>1,097.9</u>
<u>Applications</u>			
<u>Construction</u>			
Guri 1-3	44.1	-	44.1
EHV Project	27.4	-	27.4
Proposed Project	256.3	-	256.3
Guri 5-10	-	129.5	129.5
EHV Expansion	43.3	57.9	101.2
Guayana Transmission	<u>15.7</u>	<u>8.8</u>	<u>24.5</u>
	<u>386.8</u>	<u>196.2</u>	<u>583.0</u>
Advances to Consorcio	6.4	-	6.4
Increases in Working Capital	6.0	15.5	21.5
Dividends to CVG	<u>-</u>	<u>495.0</u>	<u>495.0</u>
	<u>399.2</u>	<u>706.7</u>	<u>1,105.9</u>
Increase (Decrease) in Cash	(15.6)	7.6	(8.0)

6.08 EDELCA will require additional Government investments in 1970, 1971 and 1974, aggregating Bs 65.2 million, or equivalent credits.^{1/} These could be on fairly short term, provided repayments were fixed for 1975 and later. The proposed third Bank loan would complete the financing plan. The future construction program beyond 1974 could be financed wholly from internal sources, while at the same time EDELCA could begin to pay a cash dividend on CVG's very large investment. This would be possible beginning 1975, and during 1975-80 would represent an average return of a little over 9%.

6.09 The financing plan is satisfactory. During negotiations an undertaking was obtained as to the sources of the funds needed in 1970-71. It is expected that a law authorizing EDELCA to borrow from the Bank will contain specific provisions for these funds.

6.10 The special provisions included in the previous Loans would be maintained:

- (i) A prohibition on cash dividends to CVG; this will be extended to 1975;
- (ii) The tariff covenant requiring a rate of return of 8% in 1973 and later years; this will be waived for 1973 and 1974;
- (iii) The debt limitation covenant, with an historic earnings vs future maximum debt service coverage of 1.4 times.

VII. CONCLUSIONS

7.01 The proposed Project has been satisfactorily engineered, and the cost estimates are conservatively stated. This is prudent in view of the experience in the execution of the civil works for the initial phase of Guri.

7.02 Current construction programs for Guri Units Nos. 1-3 and the first EHV system are proceeding satisfactorily. It is unlikely the final cost of Guri, or the disposition of EDELCA's Special Advances to the general contractor will be known for several years. The projections in this report assume the most pessimistic (and unlikely) view that none of the Advances will be recovered.

7.03 Past operating results have not been as good as anticipated, but have not affected EDELCA's ability to carry out its large construction program. Projected results are in general satisfactory, but the 8% rate of return target of Loans 353-VE and 482-VE will not be met in 1973 as required. This will be waived until 1975.

^{1/} The 1969 funds shown in Annex 5 as "Government Investment" for that year are already budgeted.

7.04 The Project would form a suitable basis for a third loan of US\$ 31 million equivalent, for a term of 20 years including a period of grace of about five years. During negotiations, EDELCA and the Government confirmed that:

- (i) satisfactory engineering arrangements will be continued (paragraph 2.03);
- (ii) EDELCA will complete the installation of Units 5 through 10 in a reasonable time (paragraph 4.08);
- (iii) CADAFE will promptly pay EDELCA for all purchases under the power sales agreement (paragraph 5.05);
- (iv) funds to complete the financing plan in 1970 and 1971 will be arranged on satisfactory terms (paragraph 6.08);
and
- (v) the special provisions of Loans 353-VE and 482-VE relating to the President's capabilities (paragraph 2.02) and financial performance (paragraph 6.10) will be maintained with appropriate amendments in the proposed loan.

June 4, 1969

V E N E Z U E L A

EDELCA

Estimated System Loads, Capabilities, and Purchases
MW

	<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>	<u>1978</u>	<u>1979</u>	<u>1980</u>
<u>LA ELECTRICIDAD</u>												
Peak Load - November	446	481	515	555	598	643	690	738	796	855	918	987
Capability	618	618	618	618	618	618	618	618	618	618	618	618
Purchases from EDELCA	-	-	26	48	117	121	183	250	326	403	471	522
<u>CADAFE</u>												
Peak Load - November	341	375	412	453	498	538	581	627	671	718	768	822
Capability <u>1/</u>	282	267	267	252	252	252	252	252	252	252	252	252
Purchases from EDELCA	144	202	248	291	360	366	423	485	544	605	659	697
<u>EDELCA</u>												
Peak Load - November	347	365	370	386	401	421	457	482	505	525	564	638
Sales	144	202	274	339	477	487	606	735	870	1,008	1,130	1,219
TOTAL	491	567	644	725	878	908	1,063	1,217	1,375	1,533	1,694	1,857
Capability <u>2/</u>	805	805	805	805	971	971	1,137	1,303	1,469	1,635	1,801	1,957
Number of Guri Units	(3)	(3)	(3)	(3)	(4)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Reserve Margin MW	314	238	161	80	93	63	74	86	94	102	107	100
Percentage of Load	64	42	25	11	11	7	7	7	7	7	6	5

Notes

1/ Capability decreases as gas-turbine units are relocated outside EDELCA's market

2/ Based on hypothetical dry-year

December 4, 1968
Revised March 24, 1969

V E N E Z U E L A

EDELCA

Estimated Peak Demands and Energy Sales
MW and Gwh

	<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>	<u>1978</u>	<u>1979</u>	<u>1980</u>
<u>PEAK DEMANDS</u>												
Purchases by												
La Electricidad	-	-	26	48	117	121	183	250	326	403	471	522
Cadafe	144	202	248	291	360	366	423	485	544	605	659	697
Guyana Region												
Sidor	250	250	250	260	275	275	275	285	300	310	325	325
Alcasa	50	50	50	50	50	50	100	100	100	100	100	100
Other Industries	27	38	41	45	48	54	62	77	85	95	119	193
TOTAL 1/	471	540	615	694	850	866	1,043	1,197	1,355	1,513	1,674	1,837
<u>ENERGY SALES</u>												
Purchases by												
La Electricidad												
Primary	-	-	136	252	615	636	962	1,314	1,713	2,118	2,475	2,743
Secondary	133	535	1,341	1,490	1,216	1,561	1,643	1,589	1,404	1,174	879	1,005
Cadafe												
Primary	757	1,061	1,303	1,529	1,892	1,924	2,223	2,549	2,859	3,180	3,463	3,663
Secondary	649	469	497	522	308	559	559	503	390	280	137	174
Guyana Region												
Sidor	1,547	1,754	1,708	1,909	2,028	2,113	2,148	2,200	2,234	2,240	2,240	2,240
Alcasa	324	430	430	430	430	430	856	856	856	856	856	856
Other Industries	177	203	217	237	251	280	318	378	424	482	615	1,014
TOTAL	3,587	4,452	5,632	6,369	6,740	7,503	8,709	9,389	9,880	10,330	10,665	11,695

Note

1/ Differs from p.1 figures by transmission losses

December 4, 1968
Revised December 23, 1968

V E N E Z U E L A

EDELCA

Estimated Operating Revenues
Bs millions

	<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>	<u>1978</u>	<u>1979</u>	<u>1980</u>
<u>SALES TO</u>												
La Electricidad												
Contract Demand	-	-	3.9	7.1	17.4	18.0	27.2	37.1	48.4	59.8	69.9	77.5
Secondary Energy	0.8	3.2	8.0	8.9	7.3	9.4	9.8	9.6	8.4	7.0	5.3	6.0
Cadafe												
Contract Demand	14.3	20.0	24.5	28.9	35.5	36.2	41.9	48.0	53.9	59.9	65.2	69.0
Secondary Energy	3.2	2.3	2.5	2.6	1.5	2.8	2.8	2.5	1.9	1.4	0.7	0.9
Guyana Region												
Sidor	21.7	24.6	23.9	26.7	28.4	29.5	30.0	30.8	31.7	31.4	31.4	31.4
Alcasa	3.2	4.3	4.3	4.3	4.3	4.3	8.6	8.6	8.6	8.6	8.6	8.6
Other Industries	5.3	6.1	6.5	7.1	7.6	8.4	9.5	11.3	12.7	14.5	18.4	30.3
TOTAL	48.5	60.5	73.6	85.6	102.0	108.6	129.8	147.9	165.6	182.6	199.5	223.7

December 4, 1968

VENEZUELA

EDELCA

Project Cost Estimate & Construction Expenditure Schedule

(Expressed in Bs Millions)

	<u>1969</u>	<u>1970</u>	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>Total</u>
Civil Works						
Local Currency	13.6	33.1	34.0	15.5		96.2
Foreign Exchange	<u>9.9</u>	<u>23.9</u>	<u>24.6</u>	<u>11.8</u>		<u>70.2</u>
	23.5	57.0	58.6	27.3		166.4
Turbine/Governor/Misc. Mechanical Equipt.						
Local Currency		0.4	0.4	0.5	0.1	1.4
Foreign Exchange		<u>7.6</u>	<u>7.9</u>	<u>7.8</u>	<u>1.5</u>	<u>24.8</u>
		8.0	8.3	8.3	1.6	26.2
Generator & Accessory Electrical Equipt.						
Local Currency		0.2	0.1	0.1	0.2	0.6
Foreign Exchange		<u>3.1</u>	<u>3.2</u>	<u>2.6</u>	<u>3.9</u>	<u>12.8</u>
		3.3	3.3	2.7	4.1	13.4
Transformer & Switchgear						
Local Currency			0.1	0.2	0.2	0.5
Foreign Exchange			<u>0.6</u>	<u>1.2</u>	<u>2.0</u>	<u>3.8</u>
			0.7	1.4	2.2	4.3
Total Direct Cost						
Local Currency	13.6	33.7	34.6	16.3	0.5	98.7
Foreign Exchange	<u>9.9</u>	<u>34.6</u>	<u>36.3</u>	<u>23.4</u>	<u>7.4</u>	<u>111.6</u>
	23.5	68.3	70.9	39.7	7.9	210.3
Contingencies						
Local Currency	2.0	4.7	4.6	2.1	0.3	13.7
Foreign Exchange	<u>1.4</u>	<u>4.7</u>	<u>4.8</u>	<u>3.0</u>	<u>1.9</u>	<u>15.8</u>
	3.4	9.4	9.4	5.1	2.2	29.5
Engineering & Supervision						
Local Currency	1.0	1.0	1.1	1.5	0.4	5.0
Foreign Exchange	<u>4.0</u>	<u>3.0</u>	<u>2.9</u>	<u>1.5</u>	<u>0.1</u>	<u>11.5</u>
	5.0	4.0	4.0	3.0	0.5	16.5
Interest on Proposed Loan	1.5	3.1	5.6	7.7	4.0	21.9
Total Project Cost						
Local Currency	16.6	39.4	40.3	19.9	1.2	117.4
Foreign Exchange	<u>16.8</u>	<u>45.4</u>	<u>49.6</u>	<u>35.6</u>	<u>13.4</u>	<u>160.8</u>
	33.4	84.8	89.9	55.5	14.6	278.2

December 5, 1968
Revised December 23, 1968

VENEZUELAEDELCATariff Structure1. Interconnected System

EDELCA will furnish firm power (contract demand) to both CADAFE and La Electricidad in accordance with 5-year load forecasts as provided for in the interconnection agreement. This power carries with it

5,256 hours use of demand annually, corresponding to 60% load factor. In addition, CADAFE and La Electricidad may purchase secondary hydroelectric energy at a much reduced price. The prices fixed by the agreement are summarized below:

	<u>Contract Demand</u> <u>Bs per kw per month</u>	<u>Secondary Energy</u> <u>centimos per kwh</u>
CADAFE	8.250	0.495
La Electricidad	12.375	0.600

These prices are, in the case of La Electricidad, equivalent to US\$33 per kw-year, and US1.3 mills per secondary kwh. CADAFE's prices are lower on two accounts:

- (i) CADAFE is providing 230-kv transmission facilities between the Guayana region and the north-central market area; and
- (ii) CADAFE's fixed charges for alternate thermal generating facilities are less than La Electricidad's by virtue of CADAFE's lower earnings and lower taxes on income.

2. Guayana Industries

Industrial sales in the Guayana are based on simple energy tariffs, without regard to demand. The principal tariffs are shown below, with their equivalents in United States currency.

	<u>Price per kwh</u>	
	<u>Centimos</u>	<u>US mills</u>
SIDOR	1.4	3.1
ALCASA	1.0	2.2
Other Industries	3.0	6.7

December 5, 1968

VENEZUELA

EDFELCA

Actual & Estimated Income Statements 1963-1980

(Bs millions)

	ACTUAL					ESTIMATED												
	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Sales - Gwh	918	1019	1193	1202	1493	2443	3587	4452	5632	6369	6740	7503	8709	9309	9880	10,330	10,665	11,695
Operating Revenues	5.8	16.8	20.3	20.6	22.8	32.7	48.5	60.5	73.6	85.6	102.0	108.6	129.8	147.9	165.6	182.6	199.5	223.7
Operating Expenses																		
Administration	0.2	1.6	1.2	1.2	1.0	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Generation	(
Transmission	1.3	3.9	4.5	6.5	7.6	0.3	0.6	1.0	1.0	1.0	1.0	1.0	1.0	1.6	1.6	1.6	1.6	1.6
OPSSIS	(
General Expenses						2.0	3.3	3.8	4.1	4.4	4.5	4.6	4.7	4.7	4.7	4.7	4.7	4.7
Depreciation	1.4	4.5	4.2	4.5	4.6	5.0	9.9	17.9	18.1	18.1	19.3	19.3	21.5	25.7	26.9	28.1	29.3	30.5
Total	2.9	10.0	9.9	12.2	13.2	12.3	20.6	30.0	30.8	31.3	32.9	33.2	36.3	41.3	42.7	44.1	45.5	46.9
Operating Income	2.9	6.8	10.4	8.4	9.6	20.4	27.9	30.5	42.8	54.3	69.1	75.4	93.5	106.6	122.9	138.5	154.0	176.8
Interest	-	4.6	6.8	8.7	11.8	18.9	24.4	24.8	28.7	29.9	29.9	29.4	28.2	27.0	25.6	24.2	22.8	21.2
Interest Charged to Construction	-	4.6	6.8	8.7	11.8	18.9	14.5	3.1	5.6	7.7	4.0	-	-	-	-	-	-	-
Interest Expense	-	-	-	-	-	-	9.9	21.7	23.1	22.2	25.9	29.4	28.2	27.0	25.6	24.2	22.8	21.2
Net Income	2.9	6.8	10.4	8.4	9.6	20.4	18.0	8.8	19.7	32.1	43.2	46.0	65.3	79.6	97.3	114.3	131.2	155.6
Rate of Return on Average Net Plant in Service	-	3.4%	5.2%	4.3%	4.8%	9.9%	5.3%	3.4%	4.6%	5.9%	6.7%	6.5%	8.1%	8.9%	9.8%	11.1%	12.5%	14.4%

December 5, 1968
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VENEZUELA

EDELCA

Estimated Sources and Applications of Funds 1969-1980

(Bs Millions)

	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
SOURCES												
Operating income	27.9	30.5	42.8	54.3	69.1	75.4	93.5	106.6	122.9	138.5	154.0	176.8
Depreciation	9.9	17.9	18.1	18.1	19.3	19.3	21.5	25.7	26.9	28.1	29.3	30.5
Total Internal	37.8	48.4	60.9	72.4	88.4	94.7	115.0	132.3	149.8	166.6	183.3	207.3
Loan 353-VE	37.5	-	-	-	-	-	-	-	-	-	-	-
Loan 482-VE	21.3	-	-	-	-	-	-	-	-	-	-	-
Proposed Loan	15.3	42.3	44.0	27.9	9.4	-	-	-	-	-	-	-
	74.1	42.3	44.0	27.9	9.4	-	-	-	-	-	-	-
Government Investment	45.5	10.0	25.2	-	-	30.0	-	-	-	-	-	-
CVG Advances	3.2	-	-	-	-	-	-	-	-	-	-	-
Total External	122.8	52.3	69.2	27.9	9.4	30.0	-	-	-	-	-	-
TOTAL SOURCES	160.6	100.7	130.1	100.3	97.8	124.7	115.0	132.3	149.8	166.6	183.3	207.3
APPLICATIONS												
Construction												
Guri Project 1-3	44.1	-	-	-	-	-	-	-	-	-	-	-
EHV Project	27.4	-	-	-	-	-	-	-	-	-	-	-
Powerhouse Extension	31.9	81.7	84.3	47.8	10.6	-	-	-	-	-	-	-
Guri Units 5-10	-	-	-	-	-	22.2	23.0	23.5	23.9	24.3	12.6	-
EHV System Expansion	-	-	-	-	43.3	47.0	10.9	-	-	-	-	-
Guayana Transmission	4.9	5.1	1.9	1.9	1.9	1.9	1.9	1.0	1.0	1.0	1.0	1.0
	108.3	86.8	86.2	49.7	55.8	71.1	35.8	24.5	24.9	25.3	13.6	1.0
Debt Service												
Interest 353/482-VE	22.9	21.7	23.1	22.2	21.4	20.5	19.5	18.5	17.4	16.3	15.2	13.9
Interest Proposed Loan	1.5	3.1	5.6	7.7	8.5	8.9	8.7	8.5	8.2	7.9	7.6	7.3
	24.4	24.8	28.7	29.9	29.9	29.4	28.2	27.0	25.6	24.2	22.8	21.2
Amortization 353/482-VE	10.6	12.4	14.2	15.1	15.9	16.8	17.8	18.8	19.9	21.0	22.1	23.4
Amortization Proposed Loan	-	-	-	-	-	5.9	6.1	6.3	6.6	6.9	7.2	7.5
	10.6	12.4	14.2	15.1	15.9	22.7	23.9	25.1	26.5	27.9	29.3	30.9
Total Debt Service	35.0	37.2	42.9	45.0	45.8	52.1	52.1	52.1	52.1	52.1	52.1	52.1
Advances to Consorcio	6.4	-	-	-	-	-	-	-	-	-	-	-
Increase in Working Capital	1.0	1.0	1.0	1.5	1.5	1.5	2.0	2.0	2.0	2.5	2.5	3.0
Dividends to CVG	-	-	-	-	-	-	25.0	50.0	70.0	85.0	115.0	150.0
TOTAL APPLICATIONS	150.7	125.0	130.1	96.2	103.1	124.7	114.9	128.6	149.0	164.9	183.2	206.1
Increase (Decrease) in Cash	9.9	(24.3)	-	4.1	(5.3)	-	0.1	3.7	0.8	1.7	0.1	1.2
Year-End Cash-on-Hand	30.0	5.7	5.7	9.8	4.5	4.5	4.6	8.3	9.1	10.8	10.9	12.1

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VENEZUELA

EDELCA

Condensed Actual & Estimated Balance Sheets 1963-1980

(Bs millions)

	1963	1964	ACTUAL 1965	1966	1967	1968	1969	1970	1971	1972	1973	ESTIMATED 1974	1975	1976	1977	1978	1979	1980
ASSETS																		
Fixed Assets																		
Gross Plant in Service	207.7	220.5	210.1	220.7	232.6	243.8	884.7	1003.9	1003.9	1003.9	1282.1	1282.1	1313.2	1436.0	1457.6	1479.2	1500.8	1527.3
Depreciation Reserve	9.8	14.5	18.5	24.3	29.7	34.7	44.6	62.6	80.7	98.8	118.1	137.4	158.9	184.5	211.6	239.8	269.1	299.6
Net Plant in Service	197.9	206.0	191.6	196.4	202.9	209.1	840.1	941.3	923.2	905.1	1164.0	1144.7	1154.3	1251.5	1245.9	1239.4	1231.7	1227.7
Works in Progress	77.2	154.6	254.1	362.8	517.3	692.4	154.3	125.0	216.8	274.2	55.8	126.9	131.6	33.3	36.6	40.3	32.3	6.8
Total Net Fixed Assets	275.1	360.6	445.7	559.2	720.2	901.5	994.4	1066.3	1140.0	1179.3	1219.8	1271.6	1285.9	1284.8	1282.5	1279.7	1264.0	1234.5
Current Assets																		
Cash	6.7	23.0	63.2	39.4	7.6	20.1	30.0	5.7	5.7	9.8	4.5	4.5	4.6	8.3	9.1	10.8	10.9	12.1
Other Current Assets - Net	1.8	8.2	7.4	6.3	10.3	8.3	9.3	10.3	11.3	12.8	14.3	15.8	17.8	19.8	21.8	24.3	26.8	29.8
	8.5	31.2	70.6	45.7	17.9	28.4	39.3	16.0	17.0	22.6	18.8	20.3	22.4	28.1	30.9	35.1	37.7	41.9
Other Assets 1/	-	0.1	0.2	0.1	57.0	110.8	117.2	117.2	117.2	117.2	117.2	117.2	117.2	117.2	117.2	117.2	117.2	117.2
Total Assets	283.6	391.9	516.5	605.0	795.1	1040.7	1150.9	1199.5	1274.2	1319.1	1355.8	1409.1	1425.5	1430.1	1430.6	1432.0	1418.9	1393.6
LIABILITIES																		
Equity																		
Capital	198.0	296.8	348.1	363.9	400.0	488.3	538.3	548.3	573.5	573.5	573.5	603.5	603.5	603.5	603.5	603.5	603.5	603.5
Retained earnings	2.9	9.3	19.3	26.9	35.9	55.3	72.4	80.8	99.5	130.0	171.0	214.7	251.7	277.3	299.7	323.3	332.9	330.8
Legal reserves	0.2	0.5	1.0	1.4	1.9	2.9	3.8	4.1	5.1	6.7	8.9	11.2	14.5	18.6	23.2	28.9	35.5	43.2
	201.1	306.6	368.4	392.2	437.8	546.5	614.5	633.2	678.1	710.2	753.4	829.4	869.7	899.4	926.4	955.7	971.9	977.5
Long Term Debt																		
Loans 3537482-VE	33.6	69.1	117.3	173.2	285.6	391.3	439.5	427.1	412.9	397.8	381.9	365.1	347.3	328.5	308.6	287.6	265.5	242.1
Proposed Loan	-	-	-	-	-	-	15.3	57.6	101.6	129.5	138.9	133.0	126.9	120.6	114.0	107.1	99.9	92.4
	33.6	69.1	117.3	173.2	285.6	391.3	454.8	484.7	514.5	527.3	520.8	498.1	474.2	449.1	422.6	394.7	365.4	334.5
Retentions against contracts	5.0	9.9	13.9	20.0	20.2	24.5	-	-	-	-	-	-	-	-	-	-	-	-
CVG Advances to be converted	39.0	0.2	2.5	0.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CVG Advances for Consorcio	-	-	-	-	28.5	55.4	58.6	58.6	58.6	58.6	58.6	58.6	58.6	58.6	58.6	58.6	58.6	58.6
Other Liabilities	4.9	6.1	14.4	18.9	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0
Total Liabilities	283.6	391.9	516.5	605.0	795.1	1040.7	1150.9	1199.5	1274.2	1319.1	1355.8	1409.1	1425.5	1430.1	1430.6	1432.0	1418.9	1393.6

1/ Includes advances to Consorcio.

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VENEZUELA PROPOSED EXTENSION OF GURI POWERHOUSE

