

**ELECTRIC POWER DEVELOPMENT PROGRAM, STAGE III
(CR-0036)**

EXECUTIVE SUMMARY

BORROWER: Instituto Costarricense de Electricidad (ICE)

GUARANTOR: The Republic of Costa Rica

AMOUNT AND SOURCE:

IDB:	US\$320.0 million (OC)
EIB:	US\$ 51.0 million
GEF:	US\$ 3.3 million
Local counterpart funding:	US\$141.1 million
Total:	US\$515.4 million

TERMS AND CONDITIONS:

Amortization period:	20 years
Disbursement period:	5-1/2 years
Interest rate:	variable
Inspection and supervision:	1%
Credit fee:	0.75%

COFINANCING: European Investment Bank (EIB)

Amortization period:	15 years
Disbursement period:	4 years
Interest rate:	6.1%

GRANT: Global Environmental Facility (GEF)

OBJECTIVES: The purpose of the electric power development program, Stage III, is to make the needed investments in the 1994-1999 period, in all areas of the electric power subsector, to maintain the quality and reliability of service, expand coverage and consolidate the country's efforts in energy conservation.

DESCRIPTION: The program includes projects designed under the least-cost expansion plans for the generation, transmission and distribution of electric power. The program also includes a series of concurrent activities consisting of studies for the preparation of future projects and the institutional strengthening of the ICE. The following projects are included: (a) the Angostura 177-MW hydroelectric project; (b) the Tejona 20-MW wind power project; (c) an electric power transmission works program; (d) an electric power distribution works program; (e) the energy conservation program; and (f) the concurrent costs program.

**ENVIRONMENTAL
CLASSIFICATION:**

The Environmental Management Committee, at its meeting of August 23, 1992, classified this as a Category IV operation. The environmental brief drawn up on the basis of the consulting studies contracted by the Bank was approved by the EMA on August 10, 1993.

BENEFITS:

Benefits will accrue under the program in connection with: (i) expanding the country's electric power infrastructure to offer Costa Rican consumers a reliable energy supply, as a prerequisite for sustained economic growth; (ii) extending service to low-income areas not covered by the current system; (iii) more rational use of the country's energy resources as a consequence of the energy conservation program; and (iv) reduced overall pollution as a result of the Tejona wind power project.

RISKS:

As in the execution of past projects, the principal risks have to do with bidding-related matters in view of the frequent appeals permitted under prevailing legislation. Reducing these risks will hinge on finding a solution to the problem in conjunction with the Office of the Comptroller General.

**EXCEPTIONS TO
BANK POLICY:**

As an exception to the Bank's procurement policy, it is proposed, based on the justification derived from the analysis performed (see paragraphs 3.13 to 3.28), that the force account procedure be used for several works projects for the Angostura hydroelectric project (tunnel, powerhouse, penstock, roads, etc.), for the assembly of equipment under the same project, and for the construction and assembly of expanded facilities in the existing electricity network. It is also proposed that for hiring the consulting firm for supervision of the works by force account a single event be held to carry out the prequalification and call for bids simultaneously.

**COUNTRY AND SECTOR
STRATEGY OF THE
BANK:**

The Bank has undertaken to support economic recovery in Costa Rica by: (i) consolidating trade and financial liberalization by eliminating barriers to private investment and exports; and (ii) improving service levels for basic social needs under a comprehensive social program. In line with the Bank's medium-term strategy to bolster the private sector, Stage III of the electric power development program would finance a study on private-sector participation in electric power sector investments. The purpose of the study would be to assess various approaches that could be taken to private participation once the current legal restrictions to national and foreign investment in the sector have been lifted.

I. THE FRAME OF REFERENCE

A. An overview of recent economic developments

- 1.1 After two years of sluggish economic performance, Costa Rica's economy expanded by 7.3% in 1992 as the manufacturing and services sectors responded to growth in national investment and nontraditional exports. GDP will rise 5% in 1993.
- 1.2 In 1992 and the first three quarters of 1993, the authorities managed to bring down inflation, eliminate the nonfinancial public-sector deficit and build up international reserves. Accordingly, inflation will likely run at less than the 12% goal set by the Central Bank of Costa Rica (BCCR) for 1993. Although the non-financial public sector posted a small surplus (equivalent to approximately 0.8% of GDP) in the first half of 1993, high interest rates and greater open-market activity by BCCR could lead to losses.
- 1.3 Imports outpaced exports in 1992 and the first three quarters of 1993, despite a surge in export activity. In 1992 the trade deficit equalled 8.1% of GDP and showed a 50% year-on-year increase for the first three quarters, based on preliminary data. This deficit was financed by an improvement in the services balance, especially in tourism, and by inflows of foreign capital.
- 1.4 In order to slow growth in imports and curb inflationary pressures, BCCR has restricted credit expansion by raising legal reserve requirements and undertaking more open-market transactions. These policies have pushed up interest rates, attracting short-term foreign capital. Once the authorities lift monetary restrictions, the devaluation of the colon can be expected to accelerate.
- 1.5 Costa Rica's external debt indicators have improved over the past 10 years. External debt as a percentage of GDP has come down gradually from 122% in 1983 to 70% in 1992. Over the same period, debt service has dropped from 60% to 14% of the value of exports. In current dollars, the country's indebtedness at the end of 1992 (\$4,145 million) was close to its 1983 level (\$4,181 million). The current composition of the debt, however, shows a higher proportion of debt to multilateral institutions, at 29.5% in 1992 as opposed to 13.5% in 1983.
- 1.6 At year-end 1992, Costa Rica's debt to the Bank was \$663 million, approximately 16% of its total debt. Its debt service to the Bank in the same year was equivalent to 3% of exports of goods and services. Projections show the IDB increasing its share as Costa Rica's major creditor over the medium term. By conservative estimates, under the current lending program Costa Rica's debt service to the Bank can be expected to reach 4.3% of the value of its exports of goods by 1997.

- 1.7 The loan proposed herein would increase Costa Rica's external indebtedness significantly. Preliminary projections show debt service to the IDB taking a 4.3% share of exports by 1997. The same projections show Costa Rica with a significant level of debt to the Bank by the year 2001. The Bank would account for one third of all service on the Costa Rican public debt, which is considered a risk associated with the project under consideration.

B. The Bank's country strategy

- 1.8 The Bank's strategy in Costa Rica seeks to support the country's economic recovery, in a manner consistent with the government's current development strategy, by means of: (i) consolidating trade and financial liberalization by emphasizing the elimination of sector obstacles to private investment, identifying new areas for private investment, and overhauling and expanding infrastructure; and (ii) improving service levels for basic social needs under a comprehensive social program.
- 1.9 Stage III of the electric power development program (PDE-III) is congruent with Costa Rica's strategy for economic recovery, since it would ensure that anticipated growth in demand for electric power could be met. Timely execution of the program would prevent electric power shortages from standing in the way of the country's sustained economic growth, by guaranteeing adequate industrial, commercial and domestic consumption. Also, the electric power distribution component (peripheral expansion) would allow service to be extended to low-income areas not covered by the current electricity system, resulting in a better quality of life. The energy conservation program would promote a more rational use of the country's energy resources.
- 1.10 In line with the Bank's medium-term strategy to bolster the private sector, a study on private-sector participation in electricity sector investments would be financed under PDE-III. The study, to be performed during execution of PDE-III, would assess various approaches that could be taken to private participation in the power generation projects prepared by the ICE, as well as private power generation, transmission and distribution projects, once the current legal restrictions on national and foreign investment in the sector have been lifted.

C. The electric power subsector

1. Current structure

- 1.11 The institutions in the subsector are as follows: the Costa Rican Electric Power Authority (ICE), the principal executing agency in the sector; Compañía Nacional de Fuerza y Luz [National Power Company] (CNFL), a subsidiary of the ICE; two municipal companies, i.e. Empresa de Servicios Públicos de Heredia [Heredia Public Utility Company] (ESPH) and Junta Administrativa del Servicio

Eléctrico de Cartago [Cartago Electric Service Management Board] (JASEC); and four rural electrification cooperatives, i.e. Coopeguanacaste, Coopelesca, Coopesantos and Coopealfaro. The cooperatives belong to the private sector, and their shareholders are the subscribers themselves.

2. The Costa Rican electrical system

- 1.12 As of December 1992, installed generating capacity was 1,043.4 MW, of which 968.5 MW was located at the ICE and the remaining 74.9 MW at the other electric companies operating in the sector. Of total installed capacity, 75.6% pertains to hydroelectric plants and the remaining 24.4% to thermal electric plants. Current installed generating capacity, in addition to capacity now under construction, is sufficient to meet growth in demand for energy until 1999, when the Angostura hydroelectric plant, the major component of PDE-III, will come on stream. ^{1/} The transmission system comprises 589 km in single-circuit lines (413 km in 230-kV lines and 176 km in 138-kV lines) and 373 km in double-circuit lines (130 km in 230-kV lines and 243 km in 138-kV lines). The system now extends from Peñas Blancas (at the Nicaraguan border) to Paso Canoas (at the Panamanian border), where Costa Rica is interconnected with those countries at 230-kV tension. Distances vary at between 130 and 230 km. Given these features, transfers between the interconnectors are confined to a range of between 90 and 140 MW. Both in Costa Rica and in the neighboring countries with which they are interconnected, the electric systems are subject to restrictions given the limited capacity of certain system elements, as in Costa Rica with the consolidation of the northern and the southern systems through the 138-kV system. Under the PDE-III, it is proposed that a 230-kV line be built between the San Miguel, Este and Río Macho substations in order to overcome that restriction.
- 1.13 The control center, where monitoring and dispatching takes place for the national electric system's major facilities and where exchanges with neighboring countries are monitored, is encountering difficulties in acquiring spare parts for maintenance owing to equipment obsolescence. This has recently caused delays in restoring service after system failures. A subproject to update the center is included under PDE-III.
- 1.14 The distribution systems of the ICE and remaining distribution companies comprise approximately 16,000 km of distribution lines. Distribution circuits consist mainly of 34.5/19.9-kV primary feeders, although there are still circuits using operating voltages of 4.16/2.4 kV and 13.2/7.6 kV. These are gradually being converted

^{1/} PDE-III includes the Tejona wind power plant, which is to begin operating in 1997. Without Tejona the system's additional requirements could be served, but at a higher cost given the additional fuel that would be used in thermal electric plants.

to the standard voltage of 34.5 kV indicated. Under the existing distribution systems, 742,758 subscribers are served, for national coverage of 92%. With PDE-III, coverage of 94% should be attained, with 100% of urban dwellers connected to the system. Coverage is normally expanded in areas served by the ICE, CNFL and the municipal companies JASEC and ESPH (which will participate in financing the PDE-III distribution program), but not in the areas served by the electrical cooperatives, which have difficulty participating with Bank loans from the ordinary capital.

- 1.15 The quality of the electrical service provided by the ICE can be measured principally in the average availability of service as observed by consumers, which has held steady at 99.7% over the past three years. This is considered very reasonable, especially at a time when other countries in the region have resorted to energy rationing. System losses, at 10.5%, are also indicative of a system operating within the normal range, in which the network is being expanded and tailored to growth in demand.

3. Regulation of the electric power service

- 1.16 Electric power service is governed by Law 258 of 1941. The National Electricity Service (SNE), created under that law, is responsible for setting rates for the electric, telephone and water utilities, as well as regulating service, including establishing quality guidelines. 2/
- 1.17 As set forth in one of the conditionalities for the investment sector program (loan 742/OC-CR), the SNE should be strengthened and made an autonomous, independent and effective regulatory body with a legal structure that clearly defines rules and procedures for setting rates and prices for service in a manner that is transparent and consistent with a market economy. The reform of the SNE is also intended to inspire confidence in private investors and encourage competitiveness among them in developing electric power generation within the framework of Law 7200 (see the following paragraph), and to promote the reforms agreed upon under the program.

4. Participation by the private sector

- 1.18 In response to rising demand by electric utilities for investment and debt service financing - traditionally met through operating surpluses and new indebtedness - the Government of Costa Rica supported the adoption of Law 7200 of October 18, 1990 and its regulations (Decree 20346-MIRENEM). As a result of those provisions, a program has been set up to purchase electric power produced by power plants having a capacity of up to 20 MW per plant, which use

2/ The establishment of quality guidelines has not been implemented in practice.

the country's renewable energy resources and are built and operated by private companies with at least 65% Costa Rican capital, up to a program ceiling of 15% of total installed capacity in all electric power plants within the national electrical system. That ceiling at the present time is 156 MW. Under the investment sector program, the Bank reached an agreement with the government to lift the above-mentioned restrictions, which are considered barriers to private-sector participation in electric power generation in Costa Rica. (During preparation of the program the regulations were amended to increase the number of operations that may be declared eligible within the 15% limit established in the law.)

- 1.19 Beyond the reforms noted, no major changes are expected in the current institutional model in the short and medium term. Under this model, ICE is responsible for ensuring that sufficient electric generating capacity, as well as the necessary capacity for power transportation and distribution, is available in the country at all times. The financial analysis performed by the Bank (see chapter V) indicates that the ICE would not have any financial difficulty in funding the investments called for under the PDE-III (investments for projects required to the year 1999), and for the ensuing development program (investments for projects required to year 2003). However, the major projects contemplated thereafter are the Guayabo (245 MW) and Siquirres (206 MW) hydroelectric projects, with estimated financing needs of US\$530 million and US\$770 million, respectively. Given the magnitude of those needs, the ICE and the Bank have agreed to examine the country's alternatives for broader private-sector participation. There is no legal framework at present, for instance, that would allow a private company to associate with the ICE on a generating project. A study on this subject is included in the PDE-III.

5. Demand for electric power

- 1.20 Total demand for electric power in Costa Rica has increased from 1,597 GWh in 1978 to 3,652 GWh in 1992, for an annual average growth rate of 6.1%. The economic crisis in the early 1980s slowed growth in demand for electric power, especially in the industrial sector. Subsequently, with economic recovery and lower electricity rates in real terms as a result of inflation between 1983 and 1987, average growth in demand rose to 7.8% yearly. Over the ensuing five years (1987-1992), electricity rates increased substantially (although they did so in real terms only commencing in 1989), 3/ and in October 1987 a publicity campaign was launched to promote rational energy use. These measures contributed to bringing down the average annual increase in overall demand to 4.75%. Total consumption per subscriber began to level off beginning in 1988.

3/ Rates as of December of each year: 1988-5.56, 1989-5.80, 1990-6.35, 1991-6.62, 1992-7.21 (expressed in cents in terms of December 1992 prices).

- 1.21 Despite the drop in average industrial consumption per subscriber, and partly as a result of the substantial increase in the number of industrial subscribers, economic growth in this sector has been accompanied by an increase, rather than a decrease, in the intensity of electric power consumption in terms of value added. The energy conservation policies included in this operation would encourage the development of commercial mechanisms to take advantage of energy use for productive development while at the same time improving energy efficiency. Greater competitiveness in Costa Rica overall as the productive sector comes under the influence of the market forces liberated by many aspects of the current economic reform process - including reforms in the areas of trade, the public sector, and finance - will also be key to stimulating energy efficiency.

a. Demand projections

- 1.22 The demand projections have been drawn up keeping in mind the need for electricity rates in the coming years to reflect the marginal cost of service. Rates set at those levels will ensure an economically efficient expansion of the electricity market and system in Costa Rica. The energy conservation program will contribute to the efficient development of demand in reaction to those rate levels.
- 1.23 According to the marginal cost study prepared this year for the ICE, average rates come very close to the average marginal cost of the service at US\$0.0751/kWh (at December 1992 prices). Still to be done under the study is the phase relating to preparation of a program to adjust electrical rates to bring them into line, in both level and structure, with marginal service costs. Annex I-1 shows the structure of marginal cost and compares it with the rate structure at the end of 1992. It is apparent that the most significant weakness in the current rate structure with respect to marginal cost structure is in residential rates. Demand projections reflect the assumption that, after the rate increases already approved, additional small increases will be made in this sector in real terms as necessary to ensure coverage of the average marginal cost and improve the economic efficiency of residential rates. In view of the foregoing, it is recommended that, as a condition precedent to disbursement, the ICE, based on the results of the rate study (continuing the marginal cost study), which is to be drawn up with the help of the same consultant (financed under loan 535/OC-CR), should present for Bank approval a rate adjustment plan whereby average residential rates represent at least 85% of marginal cost by 1997 (see proposed resolution).
- 1.24 Annex I-2 presents the basic assumptions used in drawing up demand projections. The results of the demand study indicate moderately strong growth in overall demand for electric power in Costa Rica, reflecting basically expectations for sustained economic growth, renewed vigor in trade and industry, a 1.8% rate of population

growth, and completion of the country's electrification. Nevertheless, projected growth in demand for electric power is well below the average for the past 10 years and far below the annual increases in order owing to low rates in the mid-1980s. The projections include the long-term effect of rate increases already made and anticipated, which substantially tempers growth in demand. The energy conservation program will bolster this process of adjusting demand to rate increases.

- 1.25 The average rate of increase in overall projected demand between 1993 and 2010 is 5.1% in the base scenario, 4.5% in the low-growth scenario, and 5.7% in the high-growth scenario. Total demand would rise from 3,872 GWh in 1993 to 5,639 GWh in the year 2000 in the base case. With estimated electricity losses of 10.5% of net power generated and a system load factor up slightly at 60%, the requirements for electric power generating capacity would rise from 837 MW in 1993 to 1,211 MW in the year 2000, for an increase of 374 MW.
- 1.26 The projections under the base scenario indicate growth in demand of 4.7% in the residential sector, 5.5% in the general sector and 5.8% in the industrial sector between 1993 and 2010. The residential sector's share in total demand would fall from 45.2% in 1993 (47.3% in 1991) to 42.1% in 2010. On the other hand, the industrial sector's share would rise from 30.2% in 1993 (28.4% in 1991) to 30.4% in 2010. The general sector's portion would rise slightly from 20% in 1993 to 21.2% in 2010, reflecting anticipated growth in trade activities such as tourism and financial services, and the possible downsizing of the public sector.
- 1.27 According to projections under the base scenario, residential consumption in Costa Rica would increase from 1,751 GWh in 1993 to 2,513 GWh in the year 2000. Consumption by the general sector (which includes principally commercial consumers) would rise to 1,173 GWh by 2000 from 775 GWh in 1993. Finally, the industrial sector would increase its consumption from 1,169 GWh in 1993 to 1,750 GWh in 2000.

D. The Bank's experience in financing the subsector

1. Loans granted

- 1.28 The Bank has granted Costa Rica a total of 13 loans, totaling US\$603.8 million, to finance projects in the energy sector. The first 10 projects financed have been completed satisfactorily in terms of both cost and execution time. The financial and technical conditions of contract for these loans have been fulfilled. 4/

4/ An analysis of compliance with financial contractual conditions is presented in chapter IV hereof.

2. Loans in execution

- 1.29 Loans 200/IC-CR, 535/OC-CR and 572/OC-CR - the last three loans granted by the Bank - are in the process of being disbursed. The execution status of the projects funded with those loans is described below.
- 1.30 Loan 200/IC-CR was approved in March 1986 for US\$74 million, and entered into effect in March 1987. The project consists of the following: (i) construction of the first 55-MW unit for the Miravalles geothermal plant, including drilling for 20 wells; (ii) conduct of additional exploratory studies for the Miravalles geothermal field and feasibility studies for units three and four; (iii) implementation of a staff training program in operating and maintaining the plant; (iv) evaluation of the risk posed by the Arenal volcano, including monitoring its activity; (v) conduct of a series of studies on the stability of the ICE's electrical system; and (vi) conduct of a study on insurance of ICE assets. Weighted physical progress of the project is approximately 70%, and the equivalent of US\$31.1 million has been disbursed. Miravalles I is expected to begin operations in March 1994. The physical execution of the generating component has been delayed, especially in connection with contracts for well drilling services. Yet to be done, in addition to completing Miravalles I, are phase II of the studies on the risk associated with the Arenal volcano and the design and installation of a real-time monitoring system for it; as well as feasibility studies for units three and four at Miravalles. It is estimated that the disbursement period will need to be extended to September 1995.
- 1.31 Loan 535/OC-CR, for US\$94.6 million, was approved in November 1987 and the loan contract entered into effect in March 1989. The program has been approximately 85% executed, and US\$82.1 million of the loan proceeds have been disbursed. The program funds are being used to finance: (i) construction of the 32-MW Sandillal hydroelectric power plant; (ii) a transmission project that includes the Arenal-Ciudad Quesada-San Miguel, San Miguel-La Caja and Siquirres-Leesville transmission lines and an expansion of the metropolitan loop; (iii) a distribution project that consists of circuit reconstruction, peripheral development, vertical development and upgrading the efficiency of public lighting. The major component (the Sandillal hydroelectric plant) has been completed satisfactorily and is now in commercial production. The electric power transmission component has been delayed owing to: (i) suspension of Article 14 of Law 6313 as a result of the appeal before the constitutional tribunal (see chapter III, section B); (ii) appeal of the bidding procedures for hiring manpower for the lines and for a mobile substation. The deadline for the final disbursement will need to be extended by an estimated seven months, to December 1994.

- 1.32 Loan 572/OC-CR was approved in June 1989 for US\$182.8 million, and entered into effect in September 1990. The equivalent of US\$10 million has been disbursed to date. The program has the following components: (i) generating projects consisting of the construction of the second unit for the 55-MW Miravalles geothermal plant and the 24-MW Toro I and 66-MW Toro II hydroelectric plants; (ii) a transmission project covering the construction and expansion of substations, stringing of lines, replacement of reserve equipment; (iii) a distribution project that includes line reconstruction or conversion, secondary circuit upgrading, feeder construction and peripheral network development; and (iv) a project to overhaul thermal electric plants. The major electric power generating components (the Toro I and Toro II hydro plants and the Miravalles II geothermal plant) are progressing satisfactorily. The construction of the Toro I powerhouse is 35% complete, and construction has begun on the Toro II powerhouse. On Miravalles II, work has begun on drilling the geothermal wells, and a call for bids is about to be issued for the procurement of electromechanical equipment. Implementation of the feasibility study for a geothermal project in a field other than Miravalles (Tenorio or Rincón de la Vieja) has been affected by the procedure followed by the ICE with the Italian government and the United Nations revolving fund to finance the feasibility study in the Tenorio geothermal field, and thus the Bank's financing will be used for a feasibility study for the Rincón de la Vieja geothermal field. In order to complete the program work still outstanding it will be necessary to extend the disbursement period by 12 months, to September 1996.
- 1.33 The Bank's experience in financing projects in the electricity sub-sector in Costa Rica has been satisfactory overall, although there have been delays in bidding procedures and in the procurement of land and easements, which are problems of a general nature deriving from legislation prevailing in the country. From the point of view of the ICE's management within its sphere of competence, it has demonstrated broad technical expertise in executing projects similar to the one proposed.

II. THE PROGRAM

A. Program objectives

- 2.1 The objectives of the Electric Power Development Program, Stage III, are: (i) to make the needed investments in the electric power subsector between 1994 and 1999 to enable the country to meet increasing demand for energy and power from the National Interconnected System (SNI) and maintain the quality and continuity of the electrical service; (ii) to expand the electrical service into low-income areas not now covered by the existing system; (iii) to continue and consolidate the country's efforts at energy conservation and achieve consumer energy efficiency; (iv) to prepare the future projects called for under the expansion plan; (v) to develop a program to strengthen the ICE in the environmental area; (vi) to study plans and reforms needed to enable the private sector to participate in future ICE investments and construction activities; (vii) to achieve overall environmental benefits by harnessing wind energy to generate electric power.

B. Program description

- 2.2 As a program of investments in the electricity subsector, the Electric Power Development Program, Stage III, combines projects that are part of least-cost expansion plans in virtually all areas of activity within the subsector, such as generation, transmission, system control, and distribution. Also included are a number of concurrent activities to strengthen the subsector's institutions, to enhance the ICE's capacity to manage environment-related matters, to assist preparation of priority projects for future loans and to study the options available for private sector participation in future ICE projects and construction activities. The following is a brief description of the projects and concurrent activities under the program.

1. Electric power generation works

a. Angostura 177-MW hydroelectric project

- 2.3 The Angostura project will harness the waters of the Reventazón River (average flow of 96 m³/second), the Tuis River (5.1 m³/second) and the Turrialba River (4.5 m³/second) in the middle portion of the Reventazón River basin. Built over the Reventazón River, at its highest point the main dam will be 38 meters high while its crest will be 240 meters long. Behind the dam will be a weekly regulated reservoir with a useful volume to 10.9 hm³ and a length of 2.46 km² (246 hectares). The waters of the Tuis and Turrialba rivers will be carried to the reservoir via channels that begin at small diversion dams.

- 2.4 The water will be carried from the reservoir to the powerhouse via a 6.4-km tunnel: 4.7 km will be concrete-encased (internal diameter 6.8 meters) and 1,730 meters will be metal-lined (diameter 5.8 m). At the end of the tunnel will be a narrow-mouthed surge tank 20 meters in diameter and 76 meters high; 47% will be underground. For high waters, the project includes two spillways: a main 5,500-m³/second-capacity frontal spillway with five radial gates, and a 1,500-m³/second-capacity secondary spillway with breaching section. When these spillways are coupled with the 300-m³/second-capacity scouring tunnel, total evacuation capacity will be 8,300-m³/second, which is equal to the volume of the maximum likely high-water flow. After the surge tank come 729 meters of exposed steel pressure pipeline (diameter 5.8 - 3.1 m) and the pumping station housing 3 vertical-shaft Francis turbines with an installed capacity of 177 MW. Annual generation will be an estimated 915 GWh in an average year and 663 GWh in a dry year. The water will be returned to the Reventazón River by way of a rectangular conduit (15 x 13.9 m) that follows the river bed for a distance of ten kilometers from the intake works.

b. Tejona 20-MW wind power project

- 2.5 The Tejona wind power project would harness part of the energy potential at Tejona, located near Lake Arenal. The ICE has had this site under study since 1976 and estimates that it has the potential to generate at least 60 MW. Therefore, the installation proposed under the Electric Power Development Program, Stage III, would be the first stage in harnessing that potential. The project would consist of installing a sufficient number of wind turbines (between 40 and 100 units, depending on each unit's capacity) to generate 20 MW. The resource is of such magnitude that the project would have a plant factor of 52%, which means that the anticipated annual average net generation would be 93.5 GWh.
- 2.6 In addition to the wind turbines, the project would add a control center for the wind power plant. The control center would have a remote control at the Arenal hydroelectric plant located 7 km from the wind field. The connection to the electric system would be from the Tejona substation using a double-circuit 34.5-kV line stretching as far as the Arenal substation. A 34.5/230-kV, 30/40-MVA transforming section would be added to the Arenal facility.

2. Transmission works

- 2.7 This component consists of those works that, under the least-cost transmission expansion plan, would have to go into operation between 1996 and 1999 in order to adapt the electric power system and be able to sell the electric power generated at the new plants, i.e. the Tejona WP and the Angostura HP, and the energy exchanges planned with neighboring countries, especially Panama. The works planned under the electric power transmission program are of three

types: (a) Works associated with Angostura HP 5/ consisting of: (i) a 138-kV line between the Angostura substation and the Cóncevas substation, (ii) a link between the Angostura substation and the existing Cachi-Siquirres 138-kV line and (iii) Angostura substation, 13.8/138 kV, 3 x 77 MVA; (b) Additional transmission works. These include the following additional or new facilities (lines and substations) needed to deliver power from the new plants and from energy exchanges with neighboring countries to centers of consumption: (i) Alajuelita substation (another 75 MVA), the Cóncevas substation (another 30 MVA), the San Miguel substation (another 45 MVA), (ii) extending the Río Macho substation with a section of 230 kV line and a base section, (iii) construction of the new Escazú substation, 138/34.5/13.8 kV, 45 MVA, (iv) construction of the 138-kV Desamparados-La Caja line, and (v) construction of the Río Macho-Este-San Miguel 230-kV transmission lines, 42 kilometers on steel towers; (c) an increase of the substations' capacity because of the increased demand. These are the substations whose maximum demand will exceed their installed capacity: (i) San Isidro substation, 30 MVA, (ii) Guayabal substation, 30 MVA, (iii) La Garita substation, 30 MVA; (d) Miscellaneous. Included here are what the system requires for: (a) 90 MVAR of reactive power compensation at 34.5 kV, (b) replacement of transformers, (c) standby autotransformers, and (d) substation testing and maintenance equipment.

3. Distribution works

- 2.8 Included under the distribution works program are the following: (i) vertical development works (reinforcement of secondary circuits) consisting of 500 ICE circuits, 200 CNFL circuits and 50 ESPH circuits, (ii) peripheral development works (expanding the systems), consisting of 600 km of primary line, installation of 994 kVA in distribution transformers and connection of 11,282 new subscribers, (iii) voltage conversion and rebuilding of primary circuits whereby obsolete voltage distribution circuits (4.16, 13.2 kV) will be converted to 34.5 kV: 203.7 km of three-phase circuits, 102.8 km of single-phase circuits, and 18,557 kVA in transformer changes, (iv) construction of new primary feeders, 205 km of 34.5-kV three-phase circuits, which will connect circuits from different substations; (v) distribution works associated with transmission works, which will add the following primary feeders to connect the new substations built under the program to the existing system: 14.5 km of the 34.5-kV Toro-Cariblanco circuit, 22 km of

5/ The transmission works associated with the Tejona wind power project are included as part of that project and hence are not regarded as part of the transmission works program. They will be funded with the GEF grant, not the EIB cofinancing.

34.5-kV primary lines associated with the Escazú, San Miguel and Alajuelita transmission substations; (vi) operating equipment for the electric power companies participating in the program (ICE, CNFL, ESPH, and JASEC), including control and supervision systems (SCADA) for two of the ten regional distribution centers.

4. Energy control center modernization project

- 2.9 Under the energy control center modernization project, the center's system - consisting of obsolete computers difficult to maintain because replacement parts are scarce - will be replaced with a modern, open-ended and decentralized system based on a local area network (LAN). Computer programs in real time for economical operation of the national interconnected system will also be purchased under the project. The majority of the remote units (located at those points where supervision and control are most crucial, such as generation plants and transmission substations) will remain unchanged, although several will be added to monitor new strategic points within the system.

5. Energy conservation program

- 2.10 The energy conservation program is a combination of measures to encourage consumers to be energy efficient, and direct measures taken by electric power companies. This is a pilot project to support commercial development of energy efficient services and equipment. With the emphasis on improving the economic message that subscribers receive, the program involves a number of activities carried out in two stages. Phase I involves: (i) a component to develop economically efficient rate structures; (ii) a project to strengthen the econometric model used to project demand; (iii) a study of the market barriers to specific investments in energy conservation; (iv) a study to assemble a data base on end uses of electric power; (v) projects to demonstrate efficient equipment in all consumer sectors; (vi) installation of an energy measurement and efficiency laboratory for the national equipment standardization and labeling program; (vii) public awareness programs and programs to provide technical assistance to the public and to industry. Phase II involves detailed design studies of a program to invest in projects in energy efficiency and implementation of the projects developed under Phase I. The method of implementation and system for recouping costs will also be established, as will the final combination of programs to install meters to implement rate reforms, load management equipment, and other energy efficient equipment for residential, commercial and industrial subscribers.

6. Program of concurrent activities

- 2.11 The following are included as concurrent programs: 6/ (1) a program of project studies, among them: (a) studies of three hydroelectric projects: the Pirris HP, the Guayabo HP - to ensure that the studies for these two projects' studies are as far along as the Angostura HP study is - and the Boruca HP. These studies will analyze new construction methods, especially the use of roller compacted concrete, and tailor the project to national needs, without in any way impairing the possibility of eventually expanding the project to address regional needs; (b) a study of the feasibility of a second stage of the Tejona wind power project, an evaluation of the wind resources at three sites other than Tejona, and a prefeasibility study of a new wind power project at the most promising of the three sites evaluated; (c) evaluation and improvement of the organization and method used to plan electric power transmission, including the standards and (rate) contracts whereby third parties are permitted to use the national electric power system; (d) studies on the feasibility of modernizing hydroelectric plants that are over 15 years old, which would include adding to and improving the data base and procedures used to maintain the hydroelectric plants; (2) environmental studies that include: (a) institutional strengthening of the ICE's environment and alternative energy department and a study on the feasibility of environmental management in the Reventazón River basin (mitigating measures 13 and 14 of the program's environmental summary); (3) studies on plans and reforms to enable the private sector to invest in the ICE's power generating projects and studies of the institute's future construction options; (4) strengthening of the ICE's electric power sector by means of: (a) purchases of assorted equipment and instruments and (b) training programs for technical and professional staff; (5) a vehicle procurement program for the projects and for the ICE's electric power offices.

C. Program cost and financing

1. Cost of the program

- 2.12 The estimated total cost of the program is US\$515,400,000 including contingencies, escalation and finance charges. The contingency factor used was 10%, except in the case of the external equipment components and the local component associated with the works and installation, electromechanical and construction equipment, and the transmission works of the Angostura HP, where the contingency factor was 5%. For the underground works associated with the Angostura HP, the contingency factor was 15%. Cost escalation was determined on the basis of data supplied by the Bank's Economic and Social Development Department as of July 28, 1993.

6/ A justification of concurrent expenses appears in chapter V.

- 2.13 The direct construction cost of the projects and, ultimately, of the program was prepared on the basis of price levels as of December 31, 1992. The ICE drew upon recent experience when it prepared its cost estimates for the Angostura HP, the transmission works project and the distribution works program. The estimate is based on the quantities and features of the works. Unit and global prices for the equipment are based on an analysis of construction procedures, bids or contracts recently awarded whenever possible, or inquiries to reputable manufacturers. In the case of the energy conservation and efficiency program, the control center modernization project and the Tejona wind power project, the ICE was assisted by consultants who drew upon their own experience and records, as well as recent price quotations and offers from equipment manufacturers. The estimate is considered reasonable and adequate for purposes of determining the amount of the financing proposed in this document.
- 2.14 The cost of engineering and administration was calculated on the basis of the role that the ICE and the outside consultants will have in executing each project and an estimate of the general support that the ICE will provide for the program's administration and supervision. The figures are reasonable and in line with recent experience in Costa Rica in other Bank-financed programs now in execution.
- 2.15 The table below itemizes the cost of the program and its financing.

2. Financing plan

- 2.16 As the table shows, the proposal for financing the program involves financing from the Bank, cofinancing from the European Investment Bank (EIB), based in Luxembourg, and a grant from the Global Environmental Facility (GEF) administered by the World Bank. These three agencies would each finance a group of projects, so that their respective funding would not be used in combination. This will allow each of the three institutions independently to apply its own policy on retaining consulting services and procurement. The following is a description of the financing from each of the external sources mentioned above and an itemization of the local counterpart funding required for the program's execution.

a. IDB loan

- 2.17 The Bank's financing will be provided in the form of a loan in the amount of US\$320 million from the Bank's ordinary capital. That loan would cover the financing needed for the following projects: (i) the Angostura HP; (ii) the Tejona wind power project; (iii) the distribution works program, and (iv) the energy conservation and efficiency program. Bank financing for the direct costs of the projects mentioned above totals the equivalent of US\$195.1 million,

broken down as follows: (i) Angostura HP, 1/ US\$157.7 million; (ii) Tejona wind power project, US\$19.9 million; (iii) distribution works program, US\$12.9 million; (iv) energy conservation and efficiency program, US\$5.6 million.

- 2.18 Under item 1.1, the amount of US\$6,500,000 would be financed from the Bank loan for the following: (a) the services of consulting firms for the Angostura HP, for US\$3,800,000, which breaks down as follows: (i) advisory services in supervision during construction and construction method (US\$2,630,000), (ii) advisory services in civil engineering for construction designs (US\$500,000), (iii) advisory services in efficiency testing and cavitation of the turbines (US\$45,000), (iv) advisory assistance in plant automation (US\$35,000), and (v) the costs of the advisory group of experts (US\$590,000); (b) the operating costs of the vehicles used for engineering and supervision of the construction works, including the vehicles of the workshops (US\$1,400,000); (c) ICE field office equipment (computers, medical equipment and medicines) (US\$1,100,000), and (d) consulting services during implementation of the Tejona wind power project, in the amount of US\$200,000.

1/ This includes the environmental costs specified in the environmental summary approved by the Bank's Environmental Management Committee on August 10, 1993.

ESTIMATED COST AND FINANCING PLAN (US\$ millions)						
Category	Source of financing					
	IDB	EIB	GEF	ICE	TOTAL	%
1. Engineering and administration	6.5	0.2	0	54.7	61.4	11.9
1.1 Engineering and supervision	6.5	0.2	0	36.2	43.0	8.3
1.2 Administration and general expenses	0	0	0	18.4	18.4	3.6
2. Direct construction costs	195.1	41.9	2.8	51.7	291.5	56.5
2.1 Angostura HP	156.7	0	0	40.7	197.4	38.3
2.2 Tejona wind power project	19.9	0	2.8	2.5	25.2	4.9
2.3 Transmission works	0	38.2	0	0	38.2	7.4
2.4 Distribution works	12.9	0	0	7.3	20.2	3.9
2.5 Modernization energy control center	0	3.7	0	0	3.7	0.7
2.6 Energy efficiency and conservation program	5.6	0	0	1.2	6.8	1.3
3. Associated costs	14.1	0	0	3.9	18.0	3.5
3.1 Project studies	3.7	0	0	0.3	4.0	0.8
3.2 Environmental matters (strengthening and study for comprehensive management of the Reventazón River basin)	1.1	0	0	0.1	1.2	0.2
3.3 Strengthening electric power sector (training and equipment)	7.4	0	0	0.1	7.5	1.5
3.4 Purchase of vehicles	1.6	0	0	3.4	5.0	1.0
3.5 Study of the ICE construction department's options	0.3	0	0	0	0.3	0.1
4. Unallocated expenses	46.9	8.9	0.5	15.1	71.4	13.9
4.1 Contingencies	18.6	2.6	0.1	11.6	32.8	6.4
4.2 Escalation cost	28.3	6.3	0.4	3.5	38.5	7.5
5. Finance charges during construction	57.4	0	0	15.7	73.1	14.2
5.1 Interest	54.2	0	0	8.6	62.8	12.2
5.2 Credit fees	0	0	0	7.1	7.1	1.4
5.3 Inspection and supervision	3.2	0	0	0	3.2	0.6
GENERAL TOTAL	320.0	51.0	3.3	141.1	515.4	100.0
Percentages	62.1	9.9	0.6	27.4	100.0	

2.19 Item 3 includes the sum of US\$14,100,000 to finance the program's associated costs. These include: (a) a program of studies on projects and systems which includes: (i) additional engineering for the Guayabo HP (US\$690,000) and Pirris HP (US\$1,015,000) projects; study of the Boruca HP project (US\$1,397,700); the wind

power studies at Tejona and an evaluation of the wind energy resource at other sites (US\$47,400); studies on ways to improve the transmission system's organization and planning methods (US\$140,000); and the studies for modernization of hydroelectric power plants that are over 15 years old, including studies on ways to improve the methods and procedures used to maintain the hydroelectric power plants (US\$400,000); (b) a program addressing environmental issues, which includes strengthening of the ICE's environmental and alternative energy department (US\$63,300) and examining the feasibility of comprehensive management of the Reventazón River basin (US\$1,000,000); (c) a program to strengthen the ICE's electric power sector by means of: (i) a program to purchase equipment and instruments for all the ICE's electric power areas (US\$5,299,000); (ii) a training program for the areas that concern the PDE-III also including the geothermal area (US\$1,861,000), and (iii) a study on the private sector's future role in ICE projects (US\$202,800), (d) a study on future construction plans (US\$280,000); and (e) the vehicles procurement program (US\$1,580,000).

- 2.20 Finally, the Bank loan would cover contingencies and escalation costs for the above-mentioned items (US\$46,900,000), the finance charges during the construction period (interest and inspection and supervision fee - ISF) which are associated with the Bank loan (US\$57,400,000), and the costs associated with the financing for contingencies and escalation costs under each category.
- 2.21 The Bank loan, in the amount and in the categories described above, would account for 62.1% of the program's total cost, less than the 70% that the Bank's present system allows for energy projects in Group C countries like Costa Rica. The difference is due to the GEF grant and the EIB loan. In this case, the percentage represented by the Bank's loan is the maximum allowable since it would otherwise be financing local inputs like land, easements, personnel costs, use of company equipment and local materials, which the local counterpart funding should cover.

b. Loan from the EIB

- 2.22 As mentioned earlier, the EIB has informed the Costa Rican government and the Bank of its interest in cofinancing the program. The EIB loan would go toward covering the total cost (engineering, direct costs, contingencies and escalation) of the following components of the PDE-III: (i) the transmission program and (ii) the energy control center modernization project. The EIB loan would be the equivalent of US\$51,000,000, which is 9.9% of the program's total cost.
- 2.23 The EIB Management Committee approved the loan on September 15 and its Board of Directors on October 6, 1993. It is nonetheless recommended that as a condition precedent to the first disbursement

the borrower be required to show evidence that it has entered into an agreement with the EIB to secure the additional funding needed to carry out the program, up to an amount equivalent to US\$51,000,000, and that said loan has been declared eligible for disbursement (see proposed resolution).

c. GEF grant

- 2.24 The GEF has tentatively approved a grant for the equivalent of US\$3.3 million to cover part of the cost of the Tejona wind power project. The GEF grant was approved in consideration of the following: (i) the project would replace thermoelectric generation and ultimately reduce the gases that would otherwise be released into the atmosphere and cause global warming. In a study on the subject it was estimated that a 20-MW plant could reduce the amount of CO₂ being released into the environment each year by approximately 60,000 metric tons; (ii) the grant would add this project to the others in the plan for expanding least-cost power generation and would thus help it to qualify for a loan from an international lending institution like the IDB; and (iii) it would cover infrastructure costs that would not have to be incurred again in subsequent projects, thus ensuring the technical-economic viability of those projects without having to rely on subsidies and/or grants. Given these considerations, the GEF grant was earmarked to cover the following; (a) the direct cost (US\$2,791,000) of the equipment and materials of the electric power system of the wind energy plant and (b) the contingencies and price escalations in these categories (US\$509,000). The GEF grant was approved by the participants in the facility in Abidjan in December 1992; under the terms of the agreements negotiated between the World Bank (trustee of the GEF) and the IDB (which will administer the funds during execution of the project) the grant will be considered approved definitively when the IDB's Board of Executive Directors approves the loan for the PDE-III, which includes the Tejona wind power project. The agreement between the World Bank and the IDB must be signed, at the latest, along with the IDB's loan contract with the ICE and its guarantee contract with the government (see Recommendations).

d. Local counterpart funding

- 2.25 The local counterpart funding needed to complete the financial resources to carry out the program is the equivalent of US\$141.1 million, i.e. 27.4% of the program's total cost. These resources will cover the following: (i) the local costs of the engineering, administration and general expenditures; (ii) certain direct costs of the project (particularly those that stem from construction of the Angostura works) and associated expenses; (iii) contingencies and escalation associated with the above categories, and (iv) the credit fee on the Bank loan. Starting in 1994, the ICE's net operating income would be used to cover the local counterpart funding (see chapter V).

III. EXECUTION OF THE PROGRAM

A. Organization for execution of the program

- 3.1 The executor would be the ICE, which for execution of the program projects and other activities would use its present organizational structure; in addition to the ICE, the distribution companies CNFL, ESPH, and JASEC would enter into subsidiary loan contracts with the ICE to carry out the distribution works within their respective service areas. Each project has a designated project coordinator or project chief, who would rely primarily on the professional staff within his or her own office, but would also receive support from other ICE offices, as dictated by the needs of the project.
- 3.2 The ICE's operational capacity to carry out the projects was evaluated and found to be adequate; the only support and technical advisory assistance it would require would be for specific, specialized aspects of the execution of the Angostura and Tejona projects, which were included in the cost of each project. The distributing companies that will be participating in the electric power distribution program have satisfactorily executed similar Bank-financed projects in the past and have the operational capacity to carry out their assigned works. Consulting firms or individual consultants would have to be retained to carry out the project studies included as associated costs. Several ICE offices and some offices in other agencies (the CNFL, the Energy Sector Directorate, the Chamber of Industry, etc.) would have a role in carrying out the energy conservation program. This arrangement could leave some areas of responsibility uncovered, which could delay program execution. It is therefore recommended that prior to the first disbursement, it be demonstrated, to the Bank's satisfaction, that a coordination committee has been created to carry out the energy conservation program and that a full-time project chief or program coordinator has been appointed (see proposed resolution).
- 3.3 The arrangement also calls for retaining three experts to form the advisory group for the Angostura hydroelectric project, with the accent on the following areas: (i) construction methods; (ii) engineering designs; (iii) hydraulic operation and monitoring of the works. The experts in the advisory group must be retained as a condition precedent to the first disbursement (see proposed resolution).
- 3.4 The ICE must enter into separate contracts with the distribution companies CNFL, 8/ JASEC and ESPH concerning the distribution works each will build. The contracts must specify how the transfer

8/ The CNFL also participates in the energy conservation program.

of the proceeds of the Bank loan will be effected and stipulate that the proceeds would be transferred on the same terms and conditions as the ICE receives them from the Bank. The contracts must also contain a clause stipulating that the participating companies undertake to carry out their work in the manner specified herein. In view of the foregoing, it is recommended that one of the clauses in the contract be that the contracts between the ICE and the participating distribution companies must have Bank approval before bids can be invited for the electric energy distribution projects and energy conservation projects (see Recommendations).

B. Land and easements

- 3.5 Under the provisions of Law 6313, of January 4, 1979, the ICE can acquire and/or expropriate the property and easements it must have to accomplish its objectives, either by arrangement with the owners/holders thereof or through forced expropriation. Under articles 14 and 16 of that ICE's Expropriation and Easements Law, a judge may authorize the ICE to take possession of the property once the amount of the assessed value as set administratively by the ICE has been deposited, and for as long as the procedure to establish the property assessment continues. Following an appeal before the constitutional court challenging the ICE's right to take possession of property before reaching an agreement with the owner as to its value and paying that sum, articles 14 and 16 of the law were suspended until September 2, 1993, when the court ruled in favor of such action only with respect to article 14, so that ICE may not take possession of an expropriated property solely by depositing the administratively appraised amount without the person subject to expropriation having first conveyed consent, either expressly or by withdrawing the said amount. This could cause additional delays of two to three months in taking possession of land for construction where no such agreement has been reached. The loan contract would stipulate that before initiating a call for bids or, if a call for bids is not to be issued, before the works are initiated, the ICE must submit to the Bank evidence that it is in legal possession of the land on which construction is to take place, or holds easements or other pertinent rights thereto (see Recommendations).

C. Program of execution

- 3.6 The ICE has developed a computerized program of execution for each component of the program to allow the ICE and the Bank to monitor execution of the projects. It is recommended, therefore, that within six months of the effective date of the loan contract and once those programs have been adjusted to show the status of each project as of that date, those programs be presented to the Bank for approval, together with the information that is routine in Bank-required progress reports and the requisite EIB and GEF information. Thus, the programs can be consulted when presenting the periodic (six-month) and follow-up reports on each project's

execution (see Recommendations). The overall schedule for execution of PDE-III was prepared on the basis of each project's program of execution. As that table shows, the critical element is the most important project in the program, the Angostura hydroelectric power plant, which is the project that determines the execution timetable and disbursement period until December 1999.

D. Method of project execution

- 3.7 Procurement with resources from the Bank loan would be contracted for by means of international public bidding according to the Bank procedures to be included as an annex to the prospective loan contract (see proposed resolution). Bids will be invited for anything whose features are such that it must be contracted with a single firm or manufacturer, or anything so complex that it is best combined in a single contract, as in the case of the supply and installation of the turbines at the Tejona wind power project.
- 3.8 The ICE would carry out and install the following works with its own staff (by force account): 2/ (a) Angostura hydroelectric power plant: the access roads, operator encampments and settlement, earthworks, tunnel construction, powerhouse, penstock, the Tuis and Turrialba works, and electromechanical installations; (b) Tejona wind power plant: access roads, control house, construction and outfitting of the substations, and the 34.5 kV Tejona-Arenal line; (c) distribution works: the works and installations for the subprograms involving conversion and reconstruction, vertical development and installation and assembly of new equipment (reclosers, sectionalizers, and equipment associated with each regional distribution system) as was the case with earlier development programs. The cost of the portion of the construction work that will be carried out by force account is the equivalent of US\$30,685,000; of that amount US\$28,638,000 is for the Angostura HP; US\$1,082,000 is for the distribution works program, and US\$965,000 is for the Tejona wind power project. The local counterpart funding fully cover these costs.
- 3.9 Bids will be invited for packages of materials and equipment that share similar features. Contracts will be awarded on either an item-by-item basis or for complete packages and will go to those firms whose offers not only meet the technical specifications but have also been found to have the lowest weighted cost. Two special cases arise in the procurement of equipment and materials for projects backed by Bank financing: one in the investment phase of the energy conservation program, when purchases are made of energy-efficient equipment, lighting and electric appliances for industrial firms, businesses or for selected residential consumers,

2/ All equipment and materials used in the works built with Bank financing will be acquired through international public bidding.

which must be duly regulated; ^{10/} hence, it is recommended that prior to approval of a call for bids for entities other than the electric power companies, the institutional mechanisms and procedures for transferring loan proceeds to those agencies should be established and that those mechanisms should be approved in advance by the Bank (see Recommendations). The other special case concerns the equipment and materials for the electric power works at the Tejona wind power plant, which will be purchased with the proceeds from the GEF grant. Therefore, under the agreement that the IDB and the World Bank will conclude, the bidding must conform to World Bank procedure, but be administered by the IDB.

- 3.10 The main construction contracts for which bids will be invited to carry out projects that will use the proceeds from the Bank loan will be for the following: (a) the Angostura HP: construction of the dam-spillway-intake works; supply and installation of the tunnel lining, the surge tank, the penstock and jenny; (b) the Tejona wind power project: the turnkey contract for the supply and installation of the wind turbines (towers and machinery), crane, foundation construction work, transformer platforms, installation and testing of the monitoring system, construction of the shoots, and laying of the control and power cables and their connection to the Tejona substation. The bidding would be a single procedure, using the two envelope system; (c) for the distribution works, contracts for the works for the subprograms for peripheral development, new feeders, and transmission system expansion.
- 3.11 Once the packages were put together, they were examined to determine whether the prequalification required under Bank policy in the case of a costly or complex contract would be necessary. The finding was that prequalification would be required for the following contracts, listed by project: a) Angostura hydroelectric project: the contract for the dam-spillway-intake works; and b) the Tejona wind power project: a turnkey contract (a single procedure by the two-envelope system) to supply the wind turbines, do the related construction work and install the turbines (towers and machinery). ^{11/} (See Recommendations.)

E. Justification of force account construction work

- 3.12 In previous operations, the Bank has permitted some of the construction work (tunnels and powerhouses) to be done by force account. The results have been satisfactory in the sense that the

^{10/} The mechanisms will be examined in Phase I of the energy conservation program and will be the basis for the decisions taken in that regard.

^{11/} Since they are EIB-financed, modernization of the control center and the contract for installing the transmission lines will be handled according to EIB procurement policy.

construction work was completed within the estimated budget and time frame and the quality has been very good. The ICE, with the backing of the government, has again requested the authority to do some of the construction work and installations under the Electric Power Development Program, Stage III, by force account. These include the tunnel, the powerhouse and the penstock for the Angostura hydroelectric power plant.

- 3.13 The Bank's procurement policy allows the force account method to be used in exceptional cases, when it is clear that it will mean savings.
- 3.14 The findings of the analysis done by the project team were presented in an extensive document titled "Angostura Hydroelectric Power Project, Force Account Work, Justification", dated August 19, 1993. ^{12/} These findings, like the recommendation presented at the end of this section, incorporate the suggestions made by the Legal Department and the Procurement Unit of the Operations Department, which were obtained as a result of the review conducted pursuant to the Loan Committee's instructions (Minutes 20/93). Annex III-1 contains a summary of those findings.
- 3.15 The findings presented in Annex III-1 may be summarized as follows: (i) the cost of the works on force account would be 14.5% of direct project costs, lower than in the previous projects; (ii) ICE has adequate experience and capacity to execute the works it proposes to carry out by force account; (iii) the cost and time differences favor the approach whereby the proposed works are done by force account (differences of US\$24.3 million in terms of cost and nine to 12 months in execution time).
- 3.16 Considering: (i) that under Bank policy force account works are one of the exceptional methods that can be used when properly justified and (ii) that as demonstrated above, this is the case with the proposed force-account works, the recommendation is that the ICE be authorized to perform the construction work listed in section D of this chapter by force account ^{13/} (see Recommendations). It is worthwhile noting that the ICE is an exceptional case that would be very difficult to find elsewhere in the region. The ICE's present construction capacity and efficiency are the result of over 30 years of constant effort for which it had the support of international lending agencies. Given the present trend toward increasing private-sector participation in activities in the energy sector, the construction capability that the ICE has developed could never be matched in any other electric power company in

^{12/} A copy of the document is available in the Energy Division's files.

^{13/} For obvious reasons, the practice has been for the Bank to authorize the construction and installation of transmission and distribution works when they are additions to existing facilities that are already transmitting and/or distributing power.

the region. Even in the case of the ICE, proceeds from the loan would finance a study to determine whether the construction work the ICE still performs should be removed from under the ICE and a new construction company created.

- 3.17 Despite the views expressed on the ICE's competence to carry out works on force account, given the magnitude and the number of fronts on which works would be carried out simultaneously, it is considered advisable to hire a specialized consulting firm for supervision of such works on force account. The consulting firm would have the support of ICE professionals with experience in technical supervision. In addition, the services of the other specialized consulting firms to be hired for the project would be available (consultants specializing in construction techniques and civil works designs). Finally, all activities would be supported at the highest level by the project advisory group, which would be composed of internationally renowned experts. In view of the foregoing, it is recommended that before the Bank approves the contract for procurement of construction equipment for the works to be carried out by force account, the ICE be required to have demonstrated, to the Bank's satisfaction, that it has hired the consulting firm for supervision of those works (see Recommendations).

F. Consulting services

- 3.18 For the execution phase of the investment projects, plans are to retain consulting services for the following projects: (a) Angostura HP: (i) a consulting firm to supervise construction, (ii) a firm specializing in construction techniques which could be the same firm as the one mentioned in the preceding point, (iii) a consulting firm to advise the ICE on civil engineering designs, and (iv) the experts in the advisory group; (b) Tejona wind power project: a consulting firm; (c) energy control center modernization: a consulting firm.
- 3.19 A consulting firm will be retained for each of the project studies included under associated costs. These services must be retained according to a plan that the ICE is to submit to the Bank for approval prior to the first loan disbursement. That plan is to set forth the expanded terms of reference and the date by which or events for which those services must be available in order to complete the general programming of each project on time. Therefore, the functions of the consultants must be spelled out in the contract, and not in work orders as was the ICE's practice in the past (see proposed resolution).

G. Training

- 3.20 The ICE staff training that is a concurrent activity under the program will be given through the staff's association with the consultants and advisors planned for the special areas. In the

case of the Tejona wind power project, one of the clauses in the main contract will call for the staff (staff that the ICE has engaged for plant maintenance) to take part in installing five complete units.

H. Status of preparation

- 3.21 Specifications and designs are available for the projects in the program to the feasibility level, and are considered appropriate to the method adopted to execute each one. The recommendations in the environmental impact study have been incorporated into the designs and specifications. The preparations for the projects are far enough along to ensure that they will be carried out within the budget and time frame indicated in this document, especially given the safeguards incorporated as a result of the recommendations.

I. Timetable of investments and disbursements

- 3.22 Based on the program of execution for each project and their estimated costs, a general timetable of investments and disbursements for the program was prepared and is shown in the table on the following page.
- 3.23 The table indicates that approximately 91% of the investments will be made during the period from 1995 to 1998. The 4.8% made in 1994 represents the initial construction works (access roads, encampments and excavations) for the Angostura, Tejona and transmission projects. Some 4.2% of the investments will be made in 1999, for completion of the construction work on the main project. One of the main factors determining whether the investment and disbursement timetable is followed are the activities involved in prequalifying consulting firms and contractors before the loan is declared eligible and for which prior authorization from the Office of the Comptroller General of the Republic will be required. Once the loan is declared eligible, the prequalified firms will be asked to submit offers and some calls for bids will be issued for procurement of goods where no prequalification is required.

INVESTMENT AND DISBURSEMENT TIMETABLE (US\$ millions)							
I. INVESTMENTS	Total	1994	1995	1996	1997	1998	1999
1. Engineering and administration	61.4	7.9	15.4	14.5	13.6	7.8	2.2
2. Direct construction cost	291.4	10.7	39.6	101.3	92.3	44.0	3.6
2.1 Angostura HP	197.4	10.2	37.5	47.4	61.1	38.8	2.4
2.2 Tejona wind power project	25.2	0.3	0.3	20.6	4.0	0	0
2.3 Transmission works	38.2	0	0	12.1	23.2	2.8	0
2.4 Distribution works	20.2	0	0	17.5	2.4	0.3	0
2.5 Modernization control center	3.7	0	0.6	2.8	0.4	0	0
2.6 Efficiency program	6.8	0.3	1.1	1.0	1.3	2.1	1.1
3. Associated costs	18.0	0	3.9	5.4	5.1	3.6	0
3.1 Project studies	4.0	0	0.8	1.2	1.2	0.8	0
3.2 Environmental matters	1.2	0	0.2	0.4	0.4	0.2	0
3.3 Training and equipment	7.5	0	2.3	2.3	1.5	1.0	0
3.4 Purchase of vehicles	5.0	0	1.2	1.5	1.3	1.0	0
3.5 Study/ICE's construction department	0.3	0	0.2	0.1	0	0	0
4. Unallocated expenses	71.4	3.1	10.1	22.2	22.3	12.5	1.2
5. Finance charges during construction	73.1	2.7	5.1	10.1	17.2	23.2	14.8
TOTAL INVESTMENTS	515.4	24.4	74.1	153.5	150.5	91.1	21.8
II. DISBURSEMENTS							
1. IDB-OC loan	320.0	10.4	46.4	92.6	88.1	66.9	15.6
2. EIB loan	51.0	0	0.7	18.0	28.6	3.7	0
3. GEF grant	3.3	0	0	2.9	0.4	0	0
4. ICE local contribution	141.1	14.0	27.0	40.0	33.4	20.6	6.2
TOTAL DISBURSEMENTS	515.4	24.4	74.1	153.5	150.5	91.1	21.8
Percentages	100	4.8	14.4	29.8	29.2	17.7	4.2

J. Recognition of expenditures

- 3.24 Subsequent to presentation of the loan request and prior to approval of the prospective loan, the ICE will invest an estimated US\$2 million in the engineering, administration and works for the program. It is recommended that once it has been established that those investments were made within the 18 months prior to approval of the loan, they be recognized as part of the local counterpart funding (see Recommendations).

K. Advance of funds

- 3.25 To execute the program, funds will have to be available promptly. It is therefore recommended that disbursement of an advance of up to 10% of the loan be authorized. This advance would gradually be replenished as the documents justifying its use are submitted.

L. The environmental impact of the projects in the program

- 3.26 An environmental impact study has been prepared for each project in the program, either by the consultants or by the ICE's qualified staff. The Bank's Environmental Management Committee classified the program under Category IV. Based on the findings of the studies done by the ICE and the consultants hired by the Bank, the environmental summary for the program was approved when presented to the Environmental Management Committee last August 10. The mitigating measures for the Angostura Hydroelectric Power Project have been included either as part of the cost of the project per se or under the program's concurrent activities. Taken together, those measures constitute the Environmental Management Plan and include: (a) restoring vegetation at the loan sites (loans of materials for construction of the works); (b) protection of the reservoir embankments; (c) creation of a supervisory committee on which the community of Turrialba will be represented; (d) an inventory of the biodiversity in what remains of the primary forest; (e) stabilization of slag heaps; (f) establishment of communication between the ICE and the community of Turrialba; (g) hydrogeological research and verification of the area that replenishes the enclosed aquifer (already done); (h) a biological study of the reservoir; (i) research into the quality of the water; (j) a sediment study (already partially completed by the ICE; the rest has already been contracted with the firm of AB Hydroconsult of Sweden); (k) institutional strengthening of the environment and alternative energy department, which involves instruction of its staff, development of an environmental data center, and purchase of equipment for environmental monitoring, principally for geographic data systems; (l) reforestation of the area surrounding the reservoir and (m) a legal study on how to finance possible compensation paid to rafting businesses that are adversely affected by the project's construction, including the possibility of assisting the affected businesses to enable them to use the upper stretch of the river immediately downstream from the Cachí dam.
- 3.27 The mitigating or corrective measures recommended for the Tezona wind project, transmission works and distribution works will be implemented as an integral part of the designs of these projects and in the construction processes that had been adopted to build the works.
- 3.28 One measure to improve the environment is a feasibility study on comprehensive management of the Reventazón River basin, including creation of a data base to be used for the study.

- 3.29 To implement the Environmental Management Plan described above, a program of execution (Annex 3 of the environmental summary) was devised. The costs of the measures in that Environmental Management Plan (excluding those already carried out) are estimated at US\$4,270,758 and have been included in the cost of the PDE-III, shown in chapter II, as follows: US\$3,070,258 under the direct costs of the Angostura HP, and US\$1,200,000 as subcategory 3.2 of the associated costs. To ensure that the program is carried out, it is recommended that the ICE: (i) prepare six-month progress reports on the program and (ii) prepare an interim report once the feasibility study for comprehensive management of the Reventazón River basin is available (see Recommendations).

M. Operation and maintenance

- 3.30 Elements and instruments will be installed with the main works at the Angostura Hydroelectric Project to monitor them during their useful life. Two years after completion of the project, the ICE is to submit a report on the readings obtained from the instruments installed to monitor the works and the advisory group's interpretation of those readings in terms of the quality of the completed works and their safety. Should corrective measures be considered necessary, they will be implemented within the period recommended by the advisory group, but the construction designs and procedure to be followed must be adopted within six months of the Bank's approval of the monitoring report (see Recommendations).
- 3.31 Once built, the Angostura hydroelectric plant, the Tejona wind power plant and the energy control center would be operated by professionals, technicians and operators who would be assigned and hired before the facilities go into service. The main contracts for the Tejona plant and the energy control center will require that the personnel be trained by the contractor with the consultant participating. The training programs and the list of personnel who are to be trained must be included in the plan that the ICE is to submit to the Bank within 24 months of the effective date of the loan contract. Within the ensuing 12 months it must also submit a report on the status of the implementation of those programs (see Recommendations).
- 3.32 For the Tejona project, the ICE must include within the specifications for the energy control center the elements and programs needed to monitor the wind power plant operation, including computation of the thermoelectric energy displaced by the power generated under the project and the amount of gas pollutants avoided that cause global warming, principally CO₂. ^{14/} (See Recommendations.)

^{14/} The polluting gases emitted when fossil fuels are burned in thermoelectric plants to generate 1MWh consist of roughly 641.71 kg of CO₂, 5.35 kg of SO₂ and 4.28 kg of NO_x.

N. Precautions against natural risks

- 3.33 It is a well-known fact that Costa Rica's geology, like that of the other Central American countries, is one of intensive tectonic activity, with a number of active volcanoes. This is conducive to considerable seismic activity, causing tremors and earthquakes with some frequency, volcanic eruptions, and other phenomena associated with land instability. In designing these works, the active faults nearby have been studied carefully as have records of seismic activity, so as to adopt the coefficients of acceleration that are appropriate to modern techniques of anti-seismic design.
- 3.34 For all of the projects in PDE-III, geotechnical surveys have been conducted to find unstable slopes. The findings of those surveys were considered when locating the construction sites and laying the electric transmission lines. In the past the potential volcanic risk necessitated studies involving anything from installing seismographic networks to placing digital inclinometers to monitor volcanic activity constantly. In the case of the PDE-II projects no active volcanoes were found that could jeopardize the safety of the construction works involved.
- 3.35 Based on the foregoing, the occurrence of the kind of natural phenomena that could affect the works built under the projects in the program has been factored into the construction designs using the most advanced techniques that science and engineering currently have to offer.

O. Inspection and supervision

- 3.36 The Bank will establish the inspection procedures it deems necessary to ensure that the program progresses satisfactorily and the borrower must provide all cooperation needed to achieve that end. Out of the loan, the sum of US\$3.2 million will be earmarked for the Bank's inspection and supervision accounts (see proposed resolution), and the program's inspection and supervision will be the responsibility of the Bank's office in Costa Rica.
- 3.37 The borrower has undertaken a commitment with the Bank to draw up an ex post evaluation of the program using its own resources. This evaluation will take place three years after the last of the projects under the program begins operating.

IV. THE BORROWER AND EXECUTING AGENCY

A. The borrower and executing agency

- 4.1 The borrower and executing agency will be the Instituto Costarricense de Electricidad [Costa Rican Electric Power Authority] (ICE).

1. Objectives and functions

- 4.2 The ICE was established by Decree 449 of April 8, 1949, as an autonomous institution reporting to the executive branch, with juridical personality, its own equity capital, and the authority to acquire rights and assume obligations. The ICE's functions are to operate the electricity and telecommunications services and to survey, explore and develop geothermal resources.

2. Administrative structure

- 4.3 The Board of Directors is responsible for administering the ICE, and consists of seven members appointed by the Cabinet. The Executive President, who is also chairman of the Board of Directors, is responsible for managing the ICE's activities. The ICE's administrative structure has been examined by the Bank on several occasions and has been found suitable for the performance of its functions. An analysis of the ICE's organization can be found in the files. The ICE has satisfactorily executed 13 projects partially financed with IDB loans. A plan of action for administrative and financial separation of the Telecommunications Division from the Electric Power Division will be drawn up in the next few months with the assistance of a specialized consultant. The preparation and implementation of this plan of action will not affect the organization for execution of the electric power development program.

3. Personnel

- 4.4 As of December 31, 1992, the permanent payroll of the ICE consisted of 9,024 individuals, with an additional 1,904 employees on fixed-term contracts assigned to project construction. This represents an increase of 230 employees (2.6%) over the 8,794 employees on payroll as of December 31, 1990. Forty-two percent of the personnel works in the electric power sector and 54% are professionals. The sales/employee ratio in the electric power sector of the ICE was 1,069, 1,154, 1,201 and 1,324 kWh/employee, respectively, in 1989, 1990, 1991 and 1992; and was 1,617, 1,680, 1,711 and 1,789 kWh/employee in the CNFL for the same period, which indicates a steady improvement in the efficiency of management of both companies.

4. Internal and external auditing

- 4.5 The internal auditing unit reports to the Office of the Executive President of the ICE. There is an organizational manual and an operating manual. The unit performs its activities on the basis of an auditing program that is prepared independently. The auditing reports are performed at an appropriate level.
- 4.6 The ICE is subject to inspection by the Office of the Comptroller General of the Republic, the Budget Authority and the National Electricity Service.
- 4.7 External auditing is conducted by an independent firm of public accountants, acceptable to the Bank, that examines the ICE's financial statements each year. The internal and external control mechanisms were deemed appropriate for operation of the company.
- 4.8 With respect to this operation, it is recommended that the prospective loan contract should include a clause whereby the ICE would be obliged to present annually, within 120 days of the close of each fiscal year, the financial statements of the project during its execution and those of the executing agency during the life of the loan, both with the formal opinion of a firm of independent accountants acceptable to the Bank (see Recommendations).

5. Financial administration

- 4.9 The Administration and Finance Division is responsible for financial administration of the ICE. Financial administration includes the use and control of the resources needed for operation of the institution. The existing administrative systems and procedures are adequate for operation of the institution. The accounting system produces timely and accurate information for decision-making. The information system is appropriate, and timely data is available.

6. Insurance systems

- 4.10 The ICE's insurance policy was drawn up on the basis of recommendations made in a study conducted in 1990 by a specialized international consulting firm. The policy consists in maintaining insurance coverage of its assets valued at over C 20 million (US\$143,000), with the exception of the transmission system, against major risks and on the basis of replacement values of the goods insured. The company's insurance policies were examined by the external auditors in their report on the consolidated financial statements as of December 31, 1992. The analysis conducted indicates that the ICE has adequate insurance coverage.

B. Past financial analysis

- 4.11 Annex IV-1 contains the Management Report 15/ and the Summary of Financial and Operating Ratios, based on the principal data from the comparative consolidated financial statements of the ICE with its subsidiaries. Annex IV-2 contains the same information for the electricity subsector (ICE/CNFL). The following conclusions are drawn from the analysis conducted.

1. The ICE and its subsidiaries

- 4.12 The ICE, consolidated with its subsidiary companies, shows a satisfactory financial position as of December 31, 1992, even though its foreign-currency debt is sizeable. The total of foreign-currency loans indicates that the sector is exposed to the risk of exchange rate fluctuations. Adjustments made to the value of foreign-currency liabilities to reflect the devaluations of the Costa Rican currency in 1990 and 1991 were high compared with the profits generated by operations and as a result primarily of this factor, the ICE consolidated with its subsidiary companies saw lower net profits in those fiscal years. The policy on rates for electricity and telecommunications services that has been applied in recent years has consisted in making periodic adjustments, which in the case of electricity have been agreed through April 1994. This policy has allowed operations to yield a reasonable rate of return in 1989, 1990, 1991 and 1992. During this period, internal cash generation was sufficient to cover operating costs and loan servicing, leaving an appropriate surplus of funds to finance the local-currency counterpart contribution to investment projects in the sector. The principal financial ratios show that, in recent fiscal years, the ICE consolidated with its subsidiary companies has maintained appropriate coverage of its short-term liabilities and that the debt/equity ratio is decreasing.
- 4.13 The financial analysis of the ICE consolidated with its subsidiary companies is expanded upon in Annex IV-3. Section D of this chapter describes compliance with the financial conditions in previous contracts that are applicable to the financial standing of the ICE and its subsidiaries.

2. The electric power subsector in Costa Rica

a. Income statements

- 4.14 The activities of the consolidated electric power sector showed net losses of US\$12 million and US\$24 million equivalent in 1990 and 1991 and profits of US\$88 million equivalent in 1992. The net

15/ Includes a summary of past and projected trends in the income statements, balance sheets and statements of sources and application of funds.

losses recorded in 1990 and 1991 were primarily due to the effects of exchange losses stemming from devaluation of the Costa Rican currency against the U.S. dollar, as explained in the historical financial analysis of the consolidated ICE (Annex IV-2). In 1992, however, the value of the Costa Rican currency fluctuated less.

- 4.15 In terms of operating results, before finance charges and non-operating transactions, the operations of the consolidated electric power sector generated positive net income during the period from 1989 to 1992. This was attributable to the fact that revenue from the electricity service was sufficient to cover operating costs and generate surpluses that, moreover, steadily increased from 1991. The revenue from sales of electricity rose during the period because both the sales expressed in kWh and the average rates showed annual increases. In this regard, the increases in average selling prices expressed in terms of kWh of electric power were 28% and 23%, in real terms, respectively in 1991 and 1992. Finance charges continued to show a downward trend during the period.

b. Statements of sources and applications of funds

- 4.16 The flow of funds in the Costa Rican electric power sector was balanced in 1991 and 1992. Total resources available in the sector totaled US\$197 million equivalent and US\$267 million equivalent in 1991 and 1992, respectively, and the proportion from internal sources was on average 60% of the total. The internal sources of funds are reported in the analysis of the operating results. The external sources varied and include disbursements from OECF and IDB financing, applied primarily to the Miravalles geothermal project. Debt servicing in the period under review represented on average 43% of all applications of funds. The works program accounted for the equivalent of US\$89 million and US\$163 million respectively in 1991 and 1992 and was financed with an appropriate proportion of internally generated funds and long-term borrowing.

c. Financial standing

- 4.17 The sector has maintained a satisfactory level of collections on its accounts for the sale of electric power in recent fiscal years. The company collected 96%, 89% and 94% of outstanding balances in 1990, 1991 and 1992, respectively.
- 4.18 With regard to the operation under consideration, it is recommended that the loan contract should include the condition stipulated in previous contracts whereby the borrower undertakes to ensure that the electric power subsector maintains a level of collections on the services it renders of not less than 85% of outstanding balances. For this purpose, outstanding balances include accounts receivable that became due during the respective fiscal year plus outstanding accounts from previous fiscal years (see Recommendations).

d. Financial ratios

- 4.19 Current liquidity ratios show a favorable trend throughout the period, although they are less than one in all years. The long-term debt ratio declined during the period from 0.63 to 0.52. The variation seen in 1992 is due to an upward restatement of liabilities. Debt service coverage was satisfactory during the 1989-1992 period, and was greater than one in all years. The rate of return on fixed assets in service was very favorable, and showed an uptrend as a result of the rate increases approved. In terms of the evolution of the ratio of contribution of net generation to construction, a positive trend is also seen, with high participation in 1992.

D. Compliance with contractual conditions

- 4.20 The financial conditions stipulated in the current contracts with the ICE apply as follows: (a) Clauses that apply to the consolidated ICE and relate to: (i) the long-term debt/equity ratio must not exceed the amount of its equity; (ii) long-term debt service coverage must not be less than 1.5 times; and (iii) the current ratio must not be less than 1. The trends in these ratios during the period 1989 through 1992 shows that the ICE complied with the pertinent clauses; (b) Clauses that apply to the electric power subsector and relate to: (i) Rates - Rate of return. The rate of return on electric power subsector operations was 7.89%, 8.28% and 9.31%, respectively, in 1990, 1991 and 1992, compared with the minimums of 8.3% in 1990, 9.8% in 1991 and 10.2% agreed in the loan contract. Consequently, the rates of return obtained in those years did not attain the minimum rates agreed in the loan contracts, although they do show an increasingly positive trend and the margins of deviation are not significant. (ii) Rates - Contribution to financing of investments. This clause was met in 1990, 1991 and 1992, when the percentage of net internal cash generation to the total construction program for 1990, 1991 and 1992, respectively, was 35%, 19% and 50%. The percentages required under the clause are as follows: no less than 30% in 1989 and at least 17% in subsequent years. (iii) Rates - Between 1990 and 1992 they must reach an average price consistent with the economic cost of the service. This clause was met, since according to the external auditors' report, the average rate was US\$0.0642/kWh compared with the target for December 31, 1992 of US\$0.0618/kWh (at December prices), and (iv) Collections. This clause was met since the collection of outstanding balances of the electric power subsector was 96%, 89.05% and 94.5%, respectively, in 1990, 1991 and 1992 compared with the 85% target agreed in the loan contract.

V. FEASIBILITY AND RISKS

A. Technical feasibility

- 5.1 The program herein proposed is the result of careful studies conducted by the ICE, a group of consulting firms and individual consultants in preparing the feasibility studies, designs and bidding documents for the projects (the services of the firm for the study of the Tejona wind-driven project were contributed by the Bank through technical cooperation funding under the project preparation facility). The above professionals used recognized criteria, standards and procedures consistent with modern engineering practices, used by both public and private electric power companies, including the results of research into the natural risks that could affect the works.
- 5.2 In addition to its experienced personnel, the ICE will be assisted by specialized firms and/or individual consultants to execute each of the principal projects under the program (except for the electricity transmission and distribution projects, in which it has extensive experience).
- 5.3 Execution costs and times for the different projects are consistent with the studies and the physical and institutional setting in which they will take place. Accordingly, they are considered realistic and reflect a viable mix of national and external resources.
- 5.4 Maintenance of the ICE's electric power installations has been deemed acceptable. There will be improvements for the operation and maintenance of the new facilities to be financed under the program, as a result of: (i) the training programs that will be included in the principal contracts; and (ii) the programs that have been included in the associated program activities.
- 5.5 Special attention has been given to the potential impact of the new projects on the environment. For this purpose, the necessary measures have been adopted in the specifications and procedures to be included in the contractual documents. The ICE's environment and alternative energy department will be strengthened and trained under the proposed loan. This department will be responsible for monitoring implementation of the environmental protection measures both during and after construction, and during operation of the facilities.
- 5.6 Based on the above, it can be said that the projects to be financed under the program, from the viewpoint of knowledge of the setting in which they will take place, their level of preparation, and compliance with the conditions included in the recommendations set

forth in this document, are technically viable for execution, subject to normal contingencies typical of this type of project.

B. Economic feasibility

1. Least-cost expansion plans of the electric power sector

a. Generation expansion plans

- 5.7 The ICE uses the LOGOS model developed by Électricité de France for optimum planning of the expansion of national electricity generation, a predominantly hydroelectric system. This dynamic stochastic programming model optimizes the use of different types of resources and hydroelectric reservoirs (multiyear regulation, minor regulation, run-of-river) in a more individualized and sophisticated manner than the WASP-3 model used previously. The model optimizes both the expansion of the system and the management of resources based on economic criteria, in other words, the optimum planning directly reflects the marginal costs of electricity generation.
- 5.8 The development of the optimum expansion plan was based on the three demand study scenarios (including the effect of rate increases and conservation programs) outlined in the first chapter of this document. This plan considers an extensive list of potential projects for hydroelectric, geothermal, wind-powered and thermal generation (including private generation). The least-cost expansion plan, based on the basic demand projection, is shown in the following table.
- 5.9 The optimum expansion plan for the basic demand scenario considers the hydroelectric projects (Toro I and II and Daniel Gutiérrez) and geothermal projects (Miravalles I and II) under construction through 1996 to be firm commitments. To meet the requirements of the basic demand scenario through 1997, a contribution from private generation of 38 MW will be required in addition to the 20-MW wind-powered Tejona plant.

EXPANSION PLAN - BASE SCENARIO		
YEAR	PROJECT	CAPACITY (MW)
1994	Miravalles I GP	55
1995	Private generation HP Toro I HP Toro II HP	8 24 66
1996	Daniel Gutiérrez HP Miravalles II GP	20 55
1997	Tejona WP Private generation HP	20 30
1999	Angostura HP	177
2001	Private generation HP Miravalles III GP	35 55
2003	Gas TP	2 x 36
2004	Gas TP	2 x 36
2005	Guayabo HP	245
2007	Tenorio GP	55
2008	Siquirres I HP	206
2010	Pirris HP	128
2012	Gas TP	2 x 36

- 5.10 The Angostura hydroelectric project, using the mixed construction method, is included in the optimum expansion plan in mid-1999. According to the sensitivity analyses conducted, the result of assuming that construction is conducted under contract would be a delay of almost one year and an increase in the present value of the expansion plan.
- 5.11 The projects that are included in the expansion plan after the year 2000 are the Miravalles III geothermal project and a further significant increase in private generation in 2001, four 36-MW gas turbine units in 2003 and 2004 and one in 2012, the Guayabo, Siquirres I and Pirris hydroelectric projects in 2005, 2008 and 2010, respectively, and the Tenorio geothermal project in 2007.
- 5.12 The low demand scenario does not alter the optimum expansion plan before 2001, since the Angostura project is still needed at the end of 1999 (about six months later). The Miravalles III and Siquirres I projects are delayed by two years, and instead of six gas turbine units, only three are necessary. The Pirris project does not appear in the planning horizon that ends in 2012.
- 5.13 The only change in the high demand scenario before 2003 compared with the base scenario is the addition of two gas turbine units in 1999. In 2003, a coal-fired plant (125 MW) is required which has

the effect of shifting the Pirris project outside the planning horizon. The Tenorio and Siquirres I projects are also advanced by two years and one year, respectively. The Siquirres II hydroelectric project is needed in 2010 and instead of six gas turbine units, 12 are necessary.

- 5.14 The optimum expansion plan during the execution period of the proposed program, and for several years thereafter, is not affected significantly by the variations in demand scenarios. The ICE is fine-tuning the cost estimates of the hydroelectric and thermal electric projects that figure in the plan during the first decade of the next century. These studies (partially financed under this operation) will clarify the existing uncertainty as to the date of entry into service of the Pirris project and a coal-fired plant as well as other future projects.

b. Transmission expansion plan

- 5.15 For each of the transmission works projects an optimization study was conducted for the purpose of designing the expansions so as to minimize the costs of investment, operation and maintenance, electric energy losses and outages, without exceeding the technical limits specified in the planning criteria. Detailed analyses of load flows and stability were conducted. In terms of costs, a series of sensitivity analyses were conducted, for example, varying the kWh value of losses avoided for each option, based on the marginal cost of generation and transmission. The least-cost solution incorporates the works included in the program, and has been described in chapter II.
- 5.16 The studies of the design and cost of the high-voltage Río Macho-El Este-San Miguel transmission line (230 kV) included several analyses of other options for that region, including the alternative - which meets only the growth in residential demand - of strengthening the 138-kV system between Cóncevas and the central valley. At this time there is no 230-kV link between San Miguel and Río Macho. This situation limits potential energy exchanges with Panama. Since the limit of possible future international energy transfers without the construction of the 230-kV line is low, this option was adopted, subject to verification that the benefits are greater than the costs. (See section 2 in this chapter for a cost-benefit analysis of the PDE-III projects.)

c. Distribution works

- 5.17 The components of the electricity distribution program described in chapter II have been designed to meet the growing demand while maintaining acceptable service quality. The proposed capacities for transformers and circuits take into account the need to minimize not only the costs of investment, operation and maintenance, but also losses of energy and power. An important part of

the program is also geared to increasing service reliability, by reducing the frequency and duration of outages.

d. Modernization of the control center

- 5.18 It has been clearly shown that the existing control center is technologically obsolete and too small in view of the growth of Costa Rica's national electricity system. A comparison was conducted between the cost of the new center and the cost of the alternative of continuing to use the existing center and accepting deterioration in system reliability, especially after the year 2000. The software and hardware selected for the new center (described in chapter II) reflects complete modernization and a major initiative to upgrade the quality of the operation to international levels. At the same time, the quality and scale of the equipment proposed are not excessive for the country's real needs.

e. Energy conservation program

- 5.19 The energy conservation program (described in chapter II) consists of a series of experiments and rate reforms, demand and market studies, equipment demonstrations, and information projects, technical assistance and standardization (in phase I) and marketing of the process of investment in energy efficiency measures (in phase II). The program represents an initial effort to resolve the commercial problems that hinder the efficient use of electric energy.
- 5.20 The objective of this initiative is to help develop market efficiency, taking into account electric power consumption patterns. Conceptually, the ultimate goal of an effort of this type is to maximize the net benefits associated with the consumption of electric power, meeting the needs for energy services such as motive power, lighting or refrigeration at minimum cost that includes not only the costs of the electricity company but also the costs to users of the purchase and use of electrical equipment. Maximization of economic well-being is not assured by merely demonstrating that the cost of equipment financed by an electricity company, but not recovered from the users of that equipment, is less than the benefits associated with the value of the energy saved. The reason is that it does not take into account the preferences of the users of the electrical equipment nor the costs associated with its use. Therefore, although it has been confirmed that the equipment that will be supplied in phase II of the conservation program represents the least-cost alternative, it is extremely important to also consider the costs incurred by the user during program implementation.
- 5.21 The cost-benefit analysis (see section 2 below) of the conservation program investment component shows the ratio of the value of energy saved to the cost of the equipment. These results must also be

understood bearing in mind the additional costs to users of the equipment. The investments in phase II will be designed so as to reflect the difficulties of marketing efficient equipment, considering the preferences of users who will eventually assume the entire cost of purchasing and using the equipment.

2. Cost-benefit analysis of the electric power development program, stage III

- 5.22 The timeliness of the projects has been verified for all program components. The following table summarizes the results of the cost-benefit analysis. Annex V-1 includes the assumptions of the cost-benefit analysis, and Annex V-2 the sensitivity analyses.
- 5.23 In the case of the Angostura plant, it was confirmed that the optimum entry into service of the project in 1999 is unaffected by variations in the parameters of demand and costs used in the planning model. The economic rate of return on the project is 17% and, as shown in Annex V-2, can withstand a 15% increase in investment cost and a low demand scenario. The sensitivity analyses of the project also demonstrate that its economic justification is not sensitive to a reduction in projected future petroleum prices.
- 5.24 The economic benefits of the Tejona wind-powered project justify its economic costs. In other words, the project has a satisfactory rate of return (13.3%) without taking into account the grant from the GEF. This result is not affected by variations in the cost of investment and in demand.

RESULTS OF THE ECONOMIC AND DISTRIBUTIONAL IMPACT ANALYSIS						
PROJECT	PV INV.	PV COST	PV BENE.	NPV	IRR	DIST. IMP.
(US\$ millions)						
<u>Generation</u> Angostura	134,058	171,653	235,543	63,890	16.7	8.5
Tejona	15,334	18,140	18,346	1,206	13.3	1/
<u>Transmission</u> San Miguel SS	1,783	48,822	62,631	13,809	39.0	11.2
Escazú SS	2,007	53,345	75,604	22,259	54.1	5.6
Alajuelita SS	2,031	49,743	65,929	16,186	43.4	9.9
Garita SS	692	38,505	53,777	15,272	118.0	8.3
Cóncavas SS	1,287	56,491	77,090	20,599	70.2	6.2
Guayabal SS	868	16,012	21,086	5,074	40.1	10.5
San Isidro SS	1,109	17,798	23,018	5,220	35.1	6.9
Río Macho-San Miguel TL	4,050	8,676	23,968	15,292	46.0	0.0
<u>Distribution</u> Conv./reconstruction	4,136	23,475	40,601	17,126	52.2	9.2
New feeders	4,280	20,514	43,865	23,351	58.5	14.3
Vertical development	1,202	1,202	2,476	1,274	27.2	0.0
Peripheral development	5,671	19,870	24,414	4,544	21.0	100.0
Equipment	1,014	1,014	4,957	3,943	59.9	9.1
<u>Control center</u>	2,655	2,693	5,092	2,399	22.5	7.6
<u>Energy conservation</u>	2,387	2,387	9,380	6,993	78.1	13.3

1/ Distributional impact pertains mainly to unskilled labor.

- 5.25 For the transmission works, the economic rate of return of the substations was calculated at between 35.1% and 118.2% and for the Río Macho-El Este-San Miguel transmission line at 46%. These results are unaffected by variations in the investment cost and in demand. For the said transmission line, it was verified that a reduction in net exports of 63% could be absorbed without adversely affecting the economic justification of the project.
- 5.26 For the distribution works component, the results are as follows. The economic rate of return of the vertical development component (analyzed circuit by circuit of the sample of 30% of the works) is 27.2%. The rate of return of the conversion and reconstruction works ranges from 14.9% to 68.5%. The rate of return of the new feeders is between 20% and 86%. For the peripheral development projects, the rate of return on the works is estimated at between

12% and 50.7% (based on a sample of 58%). The investment in equipment is profitable for both the ICE and the CNFL (59.9%). In short, all the program projects attain the minimum rate of return required. The analysis is unaffected by variations in investment costs and in demand, except for five of the peripheral development projects, where the rate of return falls slightly below 12%. However, these cases do maintain their rate of return in the face of fluctuations in costs and demand if other benefits of electrification are taken into account, both economic (incentives for least-cost productive activities with higher product quality) and social (improvement in health and education services).

- 5.27 The rate of return calculated for the investment in the new control center was 22.5%. Variations in the parameters that determine the rate of return of this project were analyzed (percentage of saving of the cost of thermal generation and percentage of reduction in losses from optimization of the load flow), producing a range between 15.8% and 28.7%. The rate of return of the project is unaffected by increases in costs and reduction in demand and there are other unquantified benefits stemming from increased safety of the system equipment, savings in maintenance and optimization of reservoirs.
- 5.28 For the energy conservation program, the investment component (phase II) was studied on the basis of six different options for the use of available funds. The economic internal rates of return (analyzed for each conservation measure individually) of the six combinations of investment analyzed are between 48% and 87%. These calculations are unaffected by variations in program costs (including costs of marketing and costs faced by the user) and in demand (and consequently the energy savings).
- 5.29 The table showing the results of the economic analysis also includes estimates of the distributional impact of the projects. These coefficients represent the percentage of all net benefits to the private sector that accrue to the low-income population. The net benefits relate to incremental consumption (consumer surplus), reduction in energy needs not served, substitution of lower-quality and higher-cost energy, net transfers to unskilled labor, and savings to subscribers as a result of rate increases avoided. The distributional impact of the program overall is estimated at 9.4%. Annex V-2 presents a breakdown of net benefits. For low-income groups, the program includes a peripheral development component of benefit to communities currently without electricity service. The electric generation projects transfer resources to low-income workers. Another benefit would come from the energy conservation program, which would contribute to lowering market barriers to rational energy use, particularly significant for low-income groups.

C. Justification of associated costs

1. Project studies

- 5.30 Inclusion of the studies of the Guayabo, Siquirres and Pirris hydroelectric projects is justified in that due to their characteristics (cost and energy output) defined in the studies produced thus far, these projects have been included in the least-cost expansion plan for generation (see first table in this chapter). The Boruca HP with Bank and World Bank financing was studied to the level of bidding designs 12 years ago. At that time, the optimum solution for development of the site included a rockfill dam with impermeable core of 1,520 MW, which makes the project, as designed, too large for the requirements of the national market. Based on current advances in knowledge and use of roller compacted concrete dams, or rockfill with a concrete core wall, which were not considered in the studies conducted, the plans for conducting the project in stages can be reformulated and optimized. To confirm that a work of the type indicated might be attractive to the country, the costs and construction programs were drawn up, followed by verification that they are in line with the optimization model used for generation planning. The result indicates that there is a high probability that Boruca HP, conducted in stages, with a roller compacted concrete dam and first stage of 460 MW, will be included in the expansion plan in the year 2005, displacing Siquirres HP. This justifies the proposed studies.

2. Other studies and training program

- 5.31 The other studies that would be financed under PDE-III as part of the associated costs of the program correspond to needs defined during the process of identification and analysis by the Bank as important in order to improve the methodological systems used in planning electricity transmission, in programming the planning of maintenance of the installations, to strengthen the institutional aspects of the ICE in managing environmental issues, and support for seeking alternatives for future investments and those that correspond to the use of the ICE's construction capacity. The training program proposed under PDE-III covers training required by personnel in the institution to conduct current activities (especially in the field of geothermal power) and those that will be required during construction and subsequent operation of the PDE-III projects.

3. Procurement of instruments, equipment and vehicles

- 5.32 The instruments, equipment and vehicles included in the program were defined in a careful analysis of the needs of the program projects and the electric power sector of the institution following a review of the status of existing equipment and vehicles.

D. Institutional and financial feasibility

1. Institutional

- 5.33 The organization and administration of the ICE and its systems and procedures are appropriate for meeting its objectives. Its internal and external controls are satisfactory. The ICE has satisfactorily executed 13 projects with partial Bank financing, demonstrating that it has a staff of professionals with experience in the execution of projects similar to the components of PDE-III.
- 5.34 As regards execution of this program, each project is assigned, respectively, to the Development, Electricity System or Planning and Institutional Development Divisions, as considered appropriate. The capacity of the units which have been assigned responsibility for execution of the Angostura and Tejona projects will be complemented with advisory assistance from a group of specialized experts. Consequently, the organization of the ICE with the support of technical advice in specialized areas will be sufficient to execute the projects as scheduled.

2. Financial

a. Financial projections

- 5.35 A series of financial projections has been prepared in order to evaluate the financial viability of the ICE as borrower and of the electric power subsector in Costa Rica including execution of PDE-III. Annexes IV-1 and IV-2 contain the Management Report and Summary of Financial and Operating Ratios, including the principal data from the projected income statements, statements of sources and application of funds, and pro forma balance sheets, respectively, for the ICE and its subsidiaries and for the electric power subsector in Costa Rica, and Annex V-4 contains the assumptions used. The projections are based on data from the audited financial statements of 1992 converted to dollars at the exchange rate prevailing on that date.

(i) ICE and subsidiaries

- 5.36 A summary of the principal historical data and of the results of the financial projections is contained in the Management Report and Summary of Financial and Operating Ratios (see Annexes IV-1 and IV-2).
- 5.37 Provided the forecasts prepared hold true, the financial performance of the ICE and its subsidiaries will be satisfactory during the period. From 1993 to 2002, the projected flow of funds of the ICE and its subsidiary companies shows gradually increasing annual surpluses. Internal cash generation will increase steadily and will be the principal source of funds for expansion of the activities of the ICE and its subsidiaries, after payment of

service on loans, which will increase through 1997. The annual surpluses of funds will increase from 1998 and at the end of the period will be significant according to projections.

- 5.38 As regards the operation under study, it is recommended that the loan contract should include the condition stipulated in the previous contract whereby the borrower undertakes to ensure that during the life of this contract: (i) the ratio of its current assets to its short-term debt (commercial and bank debt) must not be less than one (excluding from current liabilities the current portion of long-term liabilities and accrued bonuses and vacations); (ii) it shall not assume, without prior Bank approval, any new financial liabilities with maturities greater than one year as a result of which the ratio of its long-term debt to equity would be greater than one or its long-term debt service coverage would be less than 1.5 times, except in 1989 when the ratio may be less than 1.5 but not less than 1.2; (iii) during execution of the electric power subsector program the ICE must not invest in any new works other than those of this program, or those included in other Bank-financed programs, if such annual investments exceed the average of net fixed assets in service in the subsector by more than 1% (see proposed resolutions).

(ii) Electric power subsector of Costa Rica

- 5.39 A summary of the principal historical data and results of the financial projections is contained in the Management Report and Summary of Financial and Operating Ratios (see Annex IV-1).
- 5.40 The sector sales volumes correspond to those used in the economic evaluation of the projects. The rates for electricity service include the increases authorized for 1993 and 1994. The revenue thus projected will enable the sector to cover the operating costs of the system, including depreciation, and will also generate an appropriate surplus to contribute to financing the local counterpart of the investment program.
- 5.41 As regards the operation under study, it is recommended that the loan contract should include the condition stipulated in the previous contract whereby the borrower undertakes to ensure that the electric power subsector will comply with the following: "The borrower shall undertake appropriate measures to ensure, to the satisfaction of the Bank, that revenues from the rate-schedules of the electric subsector, after covering its normal operating costs and its debt service, shall contribute in a reasonable proportion towards financing its investment program. If such measures should fail to cover all financial liabilities of the subsector, the borrower shall take such additional measures as may be necessary, which may include increasing rates, to achieve that purpose." (See proposed resolution and Annex A).

- 5.42 Contribution to the investment program. The reasonable proportion of contribution to the investment program referred to in the previous clause will be agreed annually with the Bank. To that end, the borrower shall present to the Bank within the last two months of the previous fiscal year a proposal as to the contribution for the following year. In any case, the agreement must be reached within the first two months of each fiscal year starting with 1995. That proportion will be determined by determining net internal cash generation in a year in relation to the total construction program for the same year, including finance charges. The proportion for fiscal year 1994 will be no less than 35% and in subsequent years shall be at least 30%. (See proposed resolution and Annex A.)
- 5.43 Annex IV-2, page 3, shows the comparison for the period 1993-2002 between the rate and the total cost per kWh sold, consisting of the amount of the contribution to the investment program, debt service and operating costs excluding depreciation, all at net present value. It can be seen that with discount rates of 8%, 10% and 12%, the rate is higher than the kWh cost.
- 5.44 The projected flow of funds for the subsector shows that it will obtain surpluses in moderate amounts during the initial years. The flow of funds indicates that in the second five-year period, there will be annual fund surpluses that will result in a significant cumulative balance for financing future investments. Internal cash generation in the electric power sector will steadily increase during the period from 1993 to 2002 and will be the principal source of funds for the expansion of sector activities. The external sources of funds include disbursements from loans from the IDB and the EIB and the GEF grant. The electric power sector will be able allocate a sufficient proportion of its internally generated funds to cover the servicing of the loans and from 1999 there will be an acceptable margin of available resources to finance other investments by the company.

3. Conclusions of the financial analysis

- 5.45 The financial projections of the ICE and of the electric power sector, based on the premises included in Annex V-3 that are considered acceptable, demonstrate that the financing of the sector's investment program is viable. Projected internal cash generation will be sufficient to cover all financial obligations and maintain a balanced cash flow during the period.
- 5.46 Based on compliance with the various contractual recommendations of a financial nature proposed in this report and on the projected results, it is anticipated that the ICE will have the counterpart funds required for execution of the projects and for financing its activities during the period analyzed. In addition, based on the prospective analysis conducted, it is concluded that appropriate measures have been taken to ensure that the electric power

subsector of Costa Rica can perform its activities in accordance with appropriate standards of financial administration and will be able to comply with the stipulations contained in the loan contracts with the IDB.

E. Risks of the operation

- 5.47 As seen in the execution of previous projects, the principal risks lie in issues relating to the bidding processes due to the frequent appeals that are allowed under existing legislation. Reduction of this risk will hinge on finding a solution with the Office of the Comptroller General of the Republic in the areas mentioned. Since a consultation is now before the constitutional court on the ICE expropriations law governing the acquisition of land and rights of way, a risk has arisen in relation to the eventual ruling by the constitutional court. A further risk is the fact that under the Bank's current lending program with Costa Rica, by 1997 the ratio of Costa Rica's debt service with the Bank to its exports of goods will be close to 4.3%.

F. Conclusion and recommendation on the program

- 5.48 On the basis of the information contained herein, the Management of the Bank considers this program viable from the technical, economic, financial, institutional, legal and environmental standpoints. Accordingly, it is recommended that the loan be approved, to which end the related normative documents are placed before the Board of Executive Directors, including the proposed resolutions amending previous loans to the ICE. In addition, it is recommended that Management be authorized to make such changes as may be necessary to the recommendations and annexes to the aforesaid previous loans to the ICE in order to make them consistent with the provisions on rates set forth in paragraph 8(e) of Appendix I and in chapter VII of Appendix III hereto.

COMPARISON OF RATES AND MARGINAL COSTS

Comparison of marginal cost structure and rate structure ^{1/}			
	Marginal cost ^{2/} (cents/kWh)	Rate ^{3/} (cents/kWh)	Difference (%)
LOW TENSION	8.1	6.9	-15.4
Residential	8.1	6.1	-24.8
Non-residential (commercial)	8.2	9.7	18.0
Public lighting	7.8	3.0	-61.9
MEDIUM TENSION (Industrial, commercial, rural cooperatives)	6.8	8.6	26.9
HIGH TENSION ^{4/} (Rural cooperatives, municipal electric utilities, large industries)	6.4	4.8	-24.0
OVERALL AVERAGE	7.5	7.2	-4.0

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- ^{1/} Based on the costs and rates of the two major electric utilities, ICE and CNFL
- ^{2/} Calculated at December 1992 prices
- ^{3/} December 1992
- ^{4/} Excludes sales from ICE to CNFL

BASIC ASSUMPTIONS UNDERLYING DEMAND PROJECTIONS

1. The base scenario assumes a future residential rate increase of 1% per year during the period until the year 2000. This increase will produce an average rate level very similar to the estimated average marginal cost. The low-demand scenario incorporates the assumption of a residential increase of 2% per year during this period and 1% per year from 2001 to 2010, and also a 1% annual increase for the general sector and 0.5% per year for the industrial sector up to the year 2000. These assumptions reflect marginal cost levels at low and medium tension that are slightly higher than the levels estimated in the recent study. The high-demand scenario assumes no future rate increase.
2. The second key assumption in determining future demand scenarios is Costa Rica's rate of economic growth, which is taken into account via the growth rates (for the 1994-2010 period) in GDP (GDP per residential unit is used to project consumption per household, which is then multiplied by the projected number of households connected, or subscribers), commercial value added (commercial value added per business establishment is used to project consumption per business in the general sector, which is then multiplied by the projected number of businesses), and industrial value added (industrial value added is used to project total industrial consumption).
3. In addition, in the residential projections for all scenarios, it is assumed that the rate of electrification will rise from 92% of households in 1993 to 95% in 2005.
4. Finally, the sector models for demand projection use long-term elasticities and schemes to adjust demand to changes in values for the independent variables.
5. The following tables show the above-mentioned basic assumptions.

Rates of growth in GDP, commercial value added and industrial value added (% per annum)			
	Low-demand scenario	Base scenario	High-demand scenario
GDP	4.00	4.50 (average rate 1983-1992, 4,569)	4.25 (4.75 in 1994)
Commercial value added	5.25	5.25 (average rate 1983-1992, 5.48%)	5.75
Industrial value added	5.25	5.25 (average rate 1983-1992, 5.07%)	5.75

Annual % change in price of other variables: (A) Price of household appliances – residential sector (B) Price of refrigeration equipment – general sector						
Period	Low-demand scenario		Base scenario		High-demand scenario	
	(A)	(B)	(A)	(B)	(A)	(B)
1993-1996	-4.00	-3.00	-4.00	-4.00	-5.50	-6.00
1997-2000	-3.00	-2.50	-3.50	-3.50	-5.00	-4.00
2001-2010	-3.00	-2.00	-3.00	-3.00	-4.00	-3.50

Annual % change in the price of liquified gas			
Period	Low-demand scenario	Base scenario	High-demand scenario
1993	-2.00	-1.75	-1.50
2000	0.00	1.00	1.00

	Elasticity
GDP per residential unit	0.20
Commercial value added per business (subscriber), general	0.50
Total industrial value added	1.25
Price of electricity:	
Residential sector	-0.45
General and industrial sectors	-0.40
Price of liquified petroleum gas:	
Residential sector	0.45
Price of household appliances	-0.35
Price of commercial refrigeration equipment	-0.35

Adjustment schemes (% according to time in years)						
	1	2	3	4	5	6
Price of electricity: residential	40	20	20	10	10	
general	50	25	15	10		
industrial	35	25	15	10	10	5
Price of liquified gas: residential	40	20	20	10	10	
Price of household appliances	40	30	30			
Price of refrigeration equipment, general	40	20	20	10	10	

ELECTRIC POWER DEVELOPMENT PROGRAM, STAGE III

JUSTIFICATION FOR CONSTRUCTION OF WORKS BY FORCE ACCOUNT

- 1 In previous operations, such as the Corobici hydroelectric power plant (loans 34/IC and 22VF-CR), the Ventanas-Garita hydroelectric power plant (loan 67/IC-CR), the Miravalles I and II geothermal electric power plant (loans 200/IC and 572/OC-CR), the Sandillal hydroelectric power plant (loan 535/OC-CR), and the Toro I and II hydroelectric power plants (loan 572/OC-CR), the Bank has permitted some of the construction work (tunnels and powerhouses) to be done by force account. The results have been satisfactory in the sense that the construction work was completed within the estimated budget and time frame and the quality has been very good. The ICE, with the backing of the government, has again requested the authority to do some of the construction work and installations under the Electric Power Development Program, Stage III, by force account. These include the tunnel, the powerhouse and the penstock for the Angostura hydroelectric power plant.
- 2 The Bank's procurement policy allows the force account method to be used in exceptional cases, when it is clear that it will mean savings. When the profile II of the operation was submitted, the Loan Committee (item 4 in the minutes of the Committee RLC-20/93 of March 4, 1993) "...recommended the Project Team, the Procurement Unit and the Legal Department to review this request and to attempt to keep the force account work to the minimum."
- 3 The findings of the analysis done by the project team were presented in an extensive document titled "Angostura Hydroelectric Power Project, Force Account Work, Justification", dated August 19, 1993, which was submitted on the same date to the Infrastructure Subdepartment and the Office of the Chief of the Energy Division of the Project Analysis Department. ^{1/} These findings, like the recommendation presented at the end of this section, incorporate the suggestions made by the Legal Department and the Procurement Unit of the Operations Department, which were obtained as a result of the review conducted pursuant to the Loan Committee's instructions. What follows is a summary of those findings.
- 4 First, force account work would represent 14.5% of the direct cost of the project which, as the following table shows, is less than the ICE's force account construction work under other hydroelectric projects. The force account costs are entirely covered by the local counterpart funding.

^{1/} A copy of the document is available in the Energy Division's files.

Force account as a percentage of direct cost			
Project	Direct cost	Force Account	
	(a) US\$ millions	(b) Cost US\$ millions	(c) = (b)/(a)x100 %
1. ARENAL Hydroelectric Project	50.44	23.2	46.0
2. COROBICI Hydroelectric Project	62.5	25.1	40.2
3. VENTANAS GARITA Hydroelectric Project	93.7	44.3	47.3
4. SANDILLAL Hydroelectric Project	35.3	11.1	31.6
5. TORO I and II Hydroelectric Project	52.5	10.9	20.8
6. ANGOSTURA Hydroelectric Project (proposed project)	197.3	28.6	14.5
Notes: (i) The amounts of the force account costs under column (b) were obtained from the Bank's project reports. While it is certain that the criteria used to compute these costs were the same for the last three projects, the same cannot be said of the projects that predated the three most recent projects; (ii) since there were cost overruns in the Arenal hydroelectric project, most of which were for direct or force account works covered with local funds, the force account works percentage of total cost was in reality much higher than the percentage shown in the table.			

- 5 As for the ICE's experience and capacity to perform and oversee construction work and installations similar to those that it is suggested be built by force account in the Angostura hydroelectric plant, the findings were as follows: (i) as the next table shows, the ICE has considerable construction experience and capacity, since it has built 45.9 kilometers of tunnel, 8 powerhouses, 6,817 meters of penstock; (ii) that experience will be useful in the Angostura project because the same construction techniques used in the past will be used again, 2/ including problems and lessons learned. Here, it is important to recall that during execution of the Arenal Project there were delays and cost overruns 3/ because the raceway failed after it was built (see report PPR 9/82 of the Operations Evaluation Office - OEO - of the Bank's Office of the Controller). This happened because the design did not specify lining, but not because of the construction process. The

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- 2/ The possibility that a contractor might use more advanced techniques to excavate the tunnel by mechanizing the process using tunnel boring machines (TBM) was examined. The finding in the study of the ICE was that the variable geological conditions and the length of the tunnel are such that the TBM method cannot be used. That finding was corroborated by the experts in the ICE advisory groups.
- 3/ According to the OEO report the cost overrun was 96.7% and the project was completed two years after the date initially anticipated. It also points out that the installed capacity was 157 MW rather than 137 MW, in other words an additional 20 MW.

construction of the tunnel *per se* was completed on schedule and there were no problems that could be blamed on the construction process. To repair the tunnel, the ICE had to build an access well to the tunnel to introduce the lining along the damaged stretch. Because of its ability to perform this work, the corrections were made within nine months; it is also important to note that the ICE has not had difficulties of this kind in any of the construction work done since the Arenal project; quite the contrary, the works have been built within the approved budget and within the time period set; (iii) the ICE has done as much if not more concrete and excavation work under previous projects as it will do by force account with the Angostura Hydroelectric Project; and (iv) the quality of the work has been satisfactory, even in the case of the Arenal Hydroelectric Project, as indicated by the OEO report. 4/

- 6 The ICE's competence to build works by force account notwithstanding, given the scale of the construction work and number of simultaneous construction sites, a specialized consulting firm should be retained to supervise those sites (the force account works). That consulting firm would be assisted by the ICE professionals who have experience in technical supervision. The services of the other specialized consulting firms to be retained for the project will be available as well. Finally, all the activities will be supported at the highest level by a project advisory group consisting of internationally renowned experts.
- 7 As for the construction equipment for the critical work that must be underway before the loan is declared eligible, the finding was that the equipment left upon completion of construction work already in progress (Miravalles I and the Toro hydroelectric project I and II) will be sufficient until the equipment imported with proceeds from the prospective loan arrives. By the time the construction work under the Angostura hydroelectric project has been completed, depreciation of the equipment purchased for it will total US\$7.67 million, which is 45% of the original total cost of the equipment (US\$17 million); this means that the remaining equipment will have a useful life and residual value of US\$9.6 million.

4/ The ICE's capacity and experience is recognized internationally, as attested to in a recent letter from Dr. James W. Libby, a world expert in the construction of hydroelectric works and a member of the advisory team for more than 30 hydroelectric projects financed by the World Bank and the IDB.

ICE experience in construction by force account						
Project	Cap.	Tunnel		Powerhouse	Penstock	
	MW	Length (m)	Diameter (m)	Dimension (m)	Length (m)	Diameter (m)
1. GARITA HP	30	4,378	3.35	15 x 25	489	2.9
2. RÍO MACHO/TAPANTI HP	120	21,092	3.6	15 x 90	100	3.0
3. ARENAL HP (1)	157	6,780 580	5.0 6.5	21 x 55	658	4.6
4. COROBICI HP	174	4,785	5.2	22 x 78	803	4.4
5. VENTANAS-GARITA HP	95	6,757	4.2	12 x 40	1,270	3.9
6. SANDILLAL HP	32	298	6.5	31 x 49	231	6.5
7. TORO I AND TORO II HP	23 66	1,014 170	2.3 2.1	20 x 30 18 x 34	1,685 1,577	2.1 2.0
TOTALS		45,865			6,813	
ANGOSTURA HP (proposed)	180	6,430	6.9	26 x 64	535	4.5
Notes: (1) Presented here are the main tunnel and the Arenal River diversion tunnel. (2) At the Cachi Plant the ICE built two tunnels to divert the Reventazón River, 6.5 meters in diameter and 110 and 130 meters in length.						

- 8 The following should be added in connection with the earlier point: (a) first, the equipment left from previous projects will not be sufficient to execute new projects but will be used for the preliminary work done in preparation for projects that will begin in the future so that the new plant can go into operation that much sooner. This would be the case with the Angostura plant where available, Bank-financed construction equipment used in earlier projects (especially the Sandillal, Toro I and Toro II hydroelectric projects) can be used to excavate the spillway area and to produce a series of concrete aggregated prior to mobilization of the contractor so that the river can be diverted by the summer of 1998. ^{5/} If this diversion equipment is not available, construction will be postponed one year, which will delay plant start-up; (b) secondly, the remaining equipment will be used to maintain plants and handle emergencies. In a country prone to earthquakes, with young soil (from the geologic standpoint) and subject to heavy rains, land slips and faults occur with some frequency and must be dealt with immediately. Without the necessary heavy equipment, the institution would be unable to fulfill its objectives.

^{5/} The construction program calls for diversion of the river in the summer of 1998 in order to be able to build the most critical part of the dam during that dry period; these works are difficult to build in rainy season.

- 9 A study to determine how many and what type of construction equipment the ICE should keep once the Angostura construction work is completed and what to do with the equipment it does not keep has been included as one of the program's associated costs. One of the options to be examined is to use the remaining equipment to set up an independent construction firm that could bid for future construction contracts in the country and the region.
- 10 To compare estimated costs and execution periods using the two methods of execution, various alternative models were devised using the possible combinations of the three main construction works that the ICE plans to perform by force account - whether those works be done by force account or on contract. For each model studied, both the cost and the schedule for the project were calculated. 6/ It is important to underscore the fact that the analyses of the various alternatives use "estimated" costs and schedules of execution and are based on hypothetical costs for the basic inputs and the volume of construction work, the latter based on present knowledge and designs presently available.
- 11 Two types of analyses were done. The first was by the traditional critical path method (CPM), which is deterministic and in most cases produces optimistic dates for construction completion; the second type of analysis was by the PERT method (probabilistic) to find the anticipated execution on time for the main alternatives. The results obtained by the first method are shown in the table below.
- 12 As the table shows, there are significant cost differences in favor of the system where some of the work is done by force account (differences of US\$24.3 million in the cost of the project and up to US\$30.7 million if escalation and finance charges are factored in). The figure of US\$24.3 million is the net difference between the hypothetical cost of the works for each of the two methods, but consists mainly of the contractor's general expenditures (bidding costs, additions to the contract, local registration of the company, finance charges and guarantee costs, advisory services for the company, and the contractor's profit).

6/ The Chilean firm ENDESA provided advisory services for this study. The role of this advisory firm focused on confirming the cost and execution periods for construction of the tunnel, the powerhouse and the penstock on contract. The results of the ENDESA study confirmed the ICE's own findings. Also, ENDESA does not recommend that (to abbreviate the period of execution) construction work commence and then be turned over to a contractor.

Angostura hydroelectric project Costs and times according to method of execution (CFM method)							
No.	Method	A Total cost of the project (US\$ millions)	B Difference with (A-1) (US\$ millions)	C Financing Requirements (US\$ millions)	D Difference with (C-3) (US\$ millions)	E Start-up	F Differ. (Months)
1	Combined	276.6		349.3		17 MAY 1999	
2	All done by contract	300.9	24.3	380.0	30.7	27 JAN 2000	9
3	Powerhouse by contract	279.2	2.6	352.6	3.3	27 JAN 2000	9
4	Penstock by contract	277.8	1.2	350.8	1.5	19 JUL 1999	2
5	Tunnel by contract	290.7	14.1	367.0	17.7	27 JAN 2000	9
NOTE: Column C includes all financial costs required to build the project. Hence, in addition to the project's direct and indirect costs, it includes price escalation and finance charges during construction.							

- 13 According to the above table, there is a nine-month difference between the two methods in the period of project execution. The difference lies in the bidding process (a process like that required to contract for the dam-spillway-intake works) for construction of the tunnel, the powerhouse and the penstock, which postpones construction start-up from March 1995 to February 1996.
- 14 The results if the PERT (probabilistic) method is applied are illustrated in the following table. ^{1/} According to the results shown, for the same level of probability there is practically one year's difference between the combined base method and the contract methods. The difference is greater if it is the tunnel that is done on contract. Therefore, this analysis corroborates the findings obtained by the CPM method.

PERT Analysis - Estimated expected execution times		
Option	Expected Date	Standard Deviation
Mixed-base	10-18-1999	3.43
All on contract, powerhouse critical	09-10-2000	3.54
All on contract, tunnel critical	11-09-2000	3.43

- ^{1/} With the probabilistic PERT method each activity in the critical project under the CPM method is assigned an optimistic, probable and pessimistic time in which it can be executed (a normal distribution is assumed) in order to calculate the expected time of each activity. This method reflects the difference of the degree of risk between the various methods of execution.

- 15 The following table summarizes the advantages and disadvantages of the two methods of execution. The conclusion is that the most economical solution and the one that provides the best assurance that the Angostura Hydroelectric Power project will be carried out within the planned time frame and within budget is the one where the construction is done by force account.

Method for construction of the ANGOSTURA HP	Advantages	Disadvantages
1. Mixed method	<ol style="list-style-type: none"> 1. Less costly 2. Shorter period of execution 3. Less risk of overruns in project execution 4. Employment of the ICE's capacity and experience 5. International competition for procurement of construction equipment and materials 6. Broader competition in purchasing the equipment and materials for the works 	<ol style="list-style-type: none"> 1. Exception to the Bank's policies on procurement 2. Narrower international competition for execution of the construction works
2. All by contract	<ol style="list-style-type: none"> 1. Less effort by the Bank's Country Office in project management, but manageable as demonstrated under earlier projects. 2. Does not require approval of an exception to the Bank's procurement policy 3. Allows competition among contractors in member countries of the Bank 	<ol style="list-style-type: none"> 1. More costly 2. Longer period of execution 3. Greater risk of cost overruns during execution 4. Contrary to Bank policy regarding economic analyses of project: independent studies show that it is not the least-cost option and hence not the option that generates the highest net economic return for the country (see paragraph 5.10) 5. Dismantling of the country's operational and professional capacity for construction of major works and the attendant economic/financial loss 6. No bidding on construction equipment and materials

- 16 Considering: (i) that under Bank policy force account works are one of the exceptional methods that can be used when properly justified and (ii) that as the above table shows, this is the case with the proposed force-account works, the recommendation is that the ICE be authorized to perform the construction work listed in paragraph 3.9 by force account 8/

8/ For obvious reasons, the practice has been for the Bank to authorize the construction and installation of transmission and distribution works when they are additions to existing facilities that are already transmitting and/or distributing power.

ASSUMPTIONS FOR COST-BENEFIT ANALYSIS

1. Several general assumptions were used in estimating the benefits and costs of the program investments. Benefits were calculated in relation to the willingness to pay for additional energy, assuming that the real future rate remains, on average, at the level of the marginal cost of the service, and estimating the consumer surplus on the basis of long-term demand price elasticity in Costa Rica (-0.45 on average) according to the econometric studies currently available. Other benefits include the benefits of loss reduction (evaluated according to the appropriate level of marginal cost), the benefits of failure reduction (evaluated at US\$1.20/kWh according to past studies), cost savings from substituting other energy sources, fuel savings in wind or hydroelectric generation (or use of reservoirs) and in optimizing thermal plant efficiency, benefits from optimizing the operation of the electric system in connection with regional energy exchanges, benefits from savings of energy and power with energy conservation, and environmental benefits.
2. Investment, operation, maintenance and fuel costs were calculated for each program component according to the outcomes of the applicable planning models, and all the costs and benefits were converted to border prices in accordance with conversion factors computed in earlier studies. A standard conversion factor of 0.93 was applied, reflecting the gradual liberalization of the Costa Rican economy. The conversion factor for unskilled labor plays a significant role only in generation projects; in these cases, a conversion factor of 0.83 was applied. At the present time, although open unemployment is low, there are thought to be significant distortions still existing in the labor market, as well as distortions in the wage scales of the public sector as compared to the private sector.
 - a. Assumptions for the projects
3. For the Angostura hydroelectric project, the economic benefits calculated include the willingness to pay for the additional energy supplied to the system, savings in the cost of operation and maintenance (fuels) for thermal generation, the increase in the volume of catchment water, exported energy and the net change in reliability. The costs include a major associated transmission component, as well as the expenditures for environmental impact mitigation. This mitigation program is designed to address all the environmental impacts of the project. The value of other environmental benefits included in the environmental studies, such as diminished environmental pollution at thermal plants and the construction of new roads with access to farmlands, have not been included in the cost-benefit analysis of the project.

4. For the Tejona wind-generation project, the economic benefits consist mainly of the replacement of thermal generation, in addition to a possible net increase in energy supplied to the system while maintaining reliability standards. The environmental benefits of the project related to the reduction of environmental pollution from thermal generation were not quantified.
5. The cost-benefit analyses for the transmission projects take into account the willingness to pay for the additional energy supplied to the system by the substations and an estimate of the value, in terms of operation of the electric system, of the net export of energy to neighboring countries via the 230-kV line. (This project would increase exports to Panama and slightly reduce exports to Nicaragua.) The projects were designed to minimize losses of electricity and failures, but the results are not contingent upon the additional benefits related to these impacts.
6. For each component of the distribution works program, different types of economic benefits were taken into account. For the conversion and reconstruction and new feeder components, the benefits quantified were related to the willingness to pay for the additional energy, loss reduction and failure reduction. For the peripheral development component, benefits were calculated on the basis of the willingness to pay for the additional supply of electricity and the savings from replacement of other energy sources (gasoline, candles, batteries, firewood, etc.). For the vertical development component, benefits were calculated for reduction of electricity losses based on a random sample of 30% of a total of 2,500 secondary distribution circuits of ICE, CNFL and ESPH. To estimate the benefits of the equipment component, calculations were made for the future decrease in the index of the average duration of interruption in the system attributable to the protection equipment, the SCADA systems and the trucks.
7. For the new control center, three types of benefits were taken into account in the economic evaluation: benefits from optimizing the economic efficiency of the system's generating plants by saving fuel, benefits from the optimized load flow program that reduces transmission losses, and benefits from the reduction of partial and total system failures.
8. In the case of the investments for phase II of the energy conservation program, the calculations take into account the cost of investing in the equipment and an estimate of the economic value of the energy and power saved. The value used for energy and power saved reflects the marginal cost of electric service calculated in the new study. Not all the costs of distribution and installation of equipment and other costs reflecting the possible marketing of conservation services were included. The costs also do not reflect the possible cost of inconvenience to subscribers in connection with different options. There are also costs related to economic

distortions caused by possible equipment subsidies. The final design studies for phase II of the conservation program will consider all these additional costs of the measures chosen (and also other benefits related to incentives for the consumption of energy services).

SENSITIVITY ANALYSIS AND DISTRIBUTION OF NET ECONOMIC BENEFITS

Sensitivity analysis of economic evaluation		
Project	Investment +15%	Low demand
	Internal rate of return (%)	
<u>Generation</u> Angostura	14.9	15.6
Tejona	12.0 ^{1/}	12.9
<u>Transmission</u> San Miguel SS	36.9	34.8
Escazú SS	51.5	50.1
Alajuelita SS	41.1	39.7
Garita SS	105.0	99.3
Cóncavas SS	66.1	63.2
Guayabal SS	38.2	35.9
San Isidro SS	33.4	31.5
Río Macho San Miguel TL	43.3	40.9
<u>Distribution</u> Conv./Reconstruction	46.7	48.3
New feeders	52.9	54.5
Vertical development	23.9	25.9
Peripheral development	18.6	19.0
Equipment	53.5	57.7
<u>Control Center</u>	20.2	21.6
<u>Energy Conservation</u>	67.8	74.2

^{1/} Investment + 8%

**BREAKDOWN OF NET BENEFITS OF THE PROGRAM AND RATE INCREASE AVOIDED
(US\$ millions)**

	Private Sector		Public Sector	Total
	Low Income	Other		
Generation	5,891	16,756	42,449	65,096
Transmission	6,968	80,619	26,124	113,711
Distribution	7,206	19,889	23,143	50,238
Control center	0.154	1,882	0.363	2,399
Energy conservation	0.930	6,063	0	6,993
Rate increase avoided	30,432	372,323	-402,755	0
Total	51,581	497,532	-310,676	238,437

Distributional impact of the program: 9.4% (Estimated minimum program impact. The coefficient would rise with the inclusion of indirect flows in respect of electricity consumption by the private sector.)

PROPOSED RESOLUTION¹

COSTA RICA. LOAN ____/OC-CR to the INSTITUTO COSTARRICENSE
DE ELECTRICIDAD (ICE)
(Electric Development Program III)

The Board of Executive Directors

RESOLVES:

That the President of the Bank, or such representative as he shall designate, is authorized, in the name and on behalf of the Bank, to enter into such contract or contracts as may be necessary with the Instituto Costarricense de Electricidad (ICE), as Borrower, and the República de Costa Rica, as Guarantor, for the purpose of granting the former a loan to cooperate in the financing of the Electric Development Program III, hereinafter referred to as the "Program". This Financing shall be subject substantially to the following conditions:

1. Amount and currencies: Up to US\$320,000,000 or its equivalent in other currencies, except that of Costa Rica, which are part of the Ordinary Capital resources of the Bank, to pay for goods and services acquired through international competition in the member countries of the Bank and for such other purposes as may be specified in the loan contract. Payments of amortization and interest shall be made in the currency or currencies specified by the Bank, in a quantity equivalent to the corresponding amount owed, calculated in units of account in terms of dollars of the United States of America, in accordance with the provisions to be incorporated in the loan contract.
2. Source of funds: The Ordinary Capital resources of the Bank.
3. Guarantee: Joint and several guarantee of the República de Costa Rica.
4. Credit fee: 0.75% per annum on the undisbursed portion of the Financing, which fee shall commence to accrue 60 days after the date of the loan contract and shall be payable in dollars of the United States of America on the same dates as the interest.

¹ The provisions established in this Appendix and in Appendices II, III, IV, V, VI, VII, VIII and IX, will be final only when the Board of Executive Directors has approved the loan proposal.

5. Amortization: The Borrower shall amortize the loan in a period of 20 years from the date of the loan contract, by means of semiannual, consecutive and, insofar as possible, equal installments. The first installment shall be paid on the first interest payment date, six months after the date scheduled for the last disbursement of the Financing.
6. Interest: The Borrower shall pay interest semiannually on the daily outstanding balances of the loan. The first payment shall be made six months after the date of the loan contract. The Bank shall determine the rates of interest to be applied during the life of the loan, in accordance with the lending rate policy of the Bank. At the request of the Borrower, resources of the Financing may be used to pay interest during the period of disbursement thereof.
7. Disbursement: The term for disbursement of the Financing shall expire 5 and a half years after the effective date of the loan contract.
8. Special Conditions:
 - (a) The execution of the Program and the utilization of the resources of the loan shall be carried out in their entirety by the Borrower and, for the distribution works, in coordination with the Compañía Nacional de Fuerza y Luz [National Power and Light Company], the Empresa de Servicios Públicos de Heredia [Public Services of Heredia] and the Junta Administrativa del Servicio Eléctrico de Cartago [Managing Board of the Cartago Electric Service] (hereinafter referred to as "CNFL", "ESPH" and "JASEC", respectively, or the "coexecutors").
 - (b) The resources of the loan shall be used to participate in the execution of a Program, the total cost of which is estimated at the equivalent of US\$515,400,000. Consequently, the loan contract shall contain the appropriate provisions to ensure that such additional resources as may be necessary, in addition to the loan, for the complete execution of the Program shall be duly provided, in accordance with an investment plan satisfactory to the Bank, in an amount estimated at the equivalent of US\$195,400,000, which may include financing from the European Investment Bank (hereinafter referred to as "EIB") in an amount estimated at the equivalent of US\$51,000,000; from the Global Environmental Trust Fund (hereinafter referred to as "GET") in an amount estimated at the equivalent of US\$3,300,000, and/or from other sources of financing.
 - (c) Prior to the first disbursement of the Financing, the Borrower shall present to the satisfaction of the Bank:

- (i) evidence that it has entered into an agreement with the EIB, to secure resources additional to the Financing necessary for the execution of the Program in an amount of up to the equivalent of US\$51,000,000, and that such financing has been legally formalized;
 - (ii) evidence that it has created a Coordination Committee for the energy conservation program in accordance to that previously agreed with the Bank, and that it has appointed a program coordinator to work exclusively on the program;
 - (iii) evidence that it has contracted three experts to make up the Consultative Group for the Angostura Hydroelectric Project, with emphasis on the following areas: (A) construction methods; (B) civil engineering designs; (C) hydraulic operation;
 - (iv) a plan and timetable for hiring the consulting services necessary for the execution of the Program, previously agreed with the Bank, setting forth the terms of reference and the dates or events for which the consulting services will be necessary for the timely implementation of the overall programming of each project; and
 - (v) a tariff structure program for low tension users, which reaches on average 85% of the economic cost prior to December 31, 1997.
- (d) Following the effective date of the loan contract, the Borrower shall agree that, unless the Bank agrees otherwise:
- (i) during the execution of the Program, investments in works within the electric energy subsector approved after the effective date of the loan contract shall not be made other than those of this Program or any other program financed by the Bank, if such annual investments exceed the average of net fixed assets in service in said subsector by more than 1%; and
 - (ii) during the life of the loan contract, the ratio between the current assets of the Borrower and its short-term debt (commercial and bank debt) shall not be less than 1, and it shall not assume, without the prior approval of the Bank, any new financial liabilities with maturities greater than one year, as a consequence of which the ratio of its long-term debt to equity is greater than 1 and its long-term debt service coverage is less than 1.5.

- (e) The Borrower and the Guarantor shall take appropriate measures to ensure, to the satisfaction of the Bank, that the revenues from the electricity subsector tariffs, after meeting its normal operating expenses, including those related to administration, operation, maintenance and depreciation, and the debt service, contribute in a reasonable portion to financing its investment program. If the application of the foregoing is not sufficient to cover all the financial obligations of the subsector, the Borrower shall take the necessary measures, which may include tariff rate increases to achieve this purpose.
- (f) In the acquisition of machinery, equipment and other goods for the Program, and in the awarding of construction contracts, the system of public bidding shall be followed in each case in which the value of such acquisitions exceeds the equivalent of US\$250,000 or the value of such contracts for the execution of works exceed the equivalent of US\$1,000,000. The bidding shall be subject to the procedures to be appended as an annex to the loan contract. This provision shall not apply to acquisitions made with resources from suppliers' credits or from other financing sources.
- (g) Notwithstanding the provisions of the preceding paragraph (f), the Borrower may execute works through force account in an amount up to the equivalent of US\$30,680,000, charged to the local counterpart, not including the cost of materials and equipment to be bid and incorporated into the works nor contingencies nor price escalation, consisting of the works and installations detailed below:
 - (i) Angostura Hydroelectric Power Plant: access roads, workers' camps and settlement, earth moving, civil works for powerhouse, penstock and underground works, Tuis and Turrialba works, and electromechanical installations;
 - (ii) Tejana Wind Power Plant: access roads, control house, civil works and installation of substations and the 34.5 KV Tejana-Arenal line; and
 - (iii) Conversion and reconstruction works; vertical development and the installation and assembly of new equipment (reclosers, sectionalizers and equipment associated with the supervision and control systems).

- (h) The Bank shall establish such inspection procedures as it deems necessary to assure the satisfactory execution of the Program, and the Borrower and the Guarantor shall extend all cooperation which is required for the most effective accomplishment of this purpose. From the amount of the Financing the sum of US\$3,200,000 shall be allocated for credit to the accounts of the Bank to meet expenses of general inspection and supervision.

RECOMMENDATIONS:

- A. It is recommended that the following conditions, to be met to the Bank's satisfaction, be included in the loan and guarantee contracts, in addition to the conditions set forth in the proposed resolution:
1. Unless the parties agree otherwise, prior to issuing each call for public bids, or if there is no need for public bids, prior to the acquisition of the goods or the initiation of the works, the Borrower shall submit to the Bank:
 - (a) the general plans, specifications, budgets and other documents needed for the acquisition or construction and, where applicable, the specific requirements and other documents needed for the call for bids;
 - (b) in the case of works, evidence that it has the legal possession, easements or other pertinent rights to the lands required for their construction;
 - (c) for electric power distribution projects, evidence that it has entered into contracts with CNFL, JASEC and ESPH, respectively, according to models previously agreed upon with the Bank, which shall establish: (i) the mechanism for the transfer of the resources of the Financing on the same financial terms as the Borrower receives them from the Bank; (ii) the manner in which the participating utilities agree to execute the electricity distribution works; and (iii) the provisions relating to the maintenance of the works, in accordance with paragraph 6.04 of Appendix III; and
 - (d) for the Energy Conservation Program, the definition of the institutional mechanisms and system for the transfer of the resources of the Program for the procurement of goods, lights and domestic electric appliances which are efficient for industrial or commercial businesses, selected residential consumers or other entities other than the electric utilities.
 2. The Bank may recognize as part of the local counterpart resources of the Program, expenditures of up to the equivalent of US\$2,000,000 for engineering, administration and works of the Program, incurred prior to the date of Resolution DE-___/93 but after _____, 1993, provided that requirements substantially similar to those set forth in the resolution and in the loan contract have been fulfilled.

3. Within six months after the effective date of the loan contract, the Borrower shall submit to the Bank for approval a computerized execution schedule for each component of the Program, together with any other information the Bank may require for the progress reports, accompanied by the information requirements of the EIB and GET, for the Borrower and the Bank to monitor execution of each project.
4. Within the first quarter of each calendar year during Program execution, the Borrower shall submit to the Bank evidence that it is complying with the plan and timetable for hiring consulting services referred to in clause 8(c)(iv) of Appendix I, according to the terms of reference and procedures approved by the Bank.
5. Prior to the Bank's approval of the contract for the procurement of construction equipment for the works to be executed by force account, identified in clause 8(g) of Appendix I, the Borrower shall demonstrate to the Bank that it has contracted the consulting firm for the supervision of these works. A single process shall be used to contract the firm in which prequalification and the request for bids will be carried out simultaneously.
6. During the life of the loan contract, the Borrower shall submit to the Bank with its audited financial statements, evidence that it has received payment at least equal to 85% of the outstanding balances of the accounts receivable for electricity service to users for the year on the local market, "outstanding balances" being understood to mean the amount of the balance of accounts receivable for service at the beginning of each fiscal year, plus billings from January to November, inclusive, of that year.
7. The Borrower agrees to comply with the timetable for the implementation of the Environmental Management Plan previously agreed upon with the Bank, including the presentation to the Bank of: (a) semiannual progress reports on implementation of the Plan during the execution of the Program, beginning 6 months following the effective date of the loan contract; and (b) an intermediate report once the feasibility study on comprehensive management of the Reventazón River basin is available, and in no event later than 36 months after the effective date of the loan contract.
8. Within the period of 24 months after completion of the Angostura Hydroelectric Plant, the Borrower shall prepare a report on the readings obtained from the instruments installed to monitor the works during the useful life of such works, along with an interpretation of the readings by the Consultative Group referred to in subparagraph 8(c)(iii) of Appendix I, regarding the quality of the completion of the

works and their safety. If corrective works are deemed necessary, they must be carried out within the period recommended by the Consultative Group, on the understanding that the designs and construction procedures to be followed must be adopted within six months after the monitoring report is approved by the Bank.

9. Within the period of 24 months after the effective date of the loan contract, the Borrower shall submit to the Bank a plan for the training programs, together with a list of the professional staff, technicians and operators to be trained to operate the Tejana Wind Power Plant and the Energy Control Center, once constructed, prior to the entry into operation of such facilities. Within the 12 months after submittal of the plan, the Borrower shall also submit a status report on the implementation of the programs.
 10. For the Tejana Wind Power Project, the Borrower shall include in the specifications for the Energy Control Center, the elements and programs for monitoring operation of the Wind Power Plant, including calculation of the thermal electric energy displaced by project generation and the amount of pollutant gases, principally carbon dioxide, thus avoided.
 11. The Borrower shall assure that the works and equipment involved in the Program will be adequately maintained in accordance with generally accepted technical standards and submit to the Bank, during the 10 years following completion of the first works of the Program, and within the first quarter of each calendar year, the annual maintenance report for the works and equipment of the Program for that year, as well as a report on the annual maintenance status of such works and equipment, in accordance with the provisions set forth in Section IV of Appendix III. If the inspections conducted by the Bank, or reports it receives, reveal that actual maintenance is below the agreed upon levels, the Borrower shall take appropriate action to have the deficiencies fully corrected.
 12. The financial statements of the Program, during its execution, and those of the Borrower during the life of the loan contract, shall be presented annually to the Bank audited by an independent public accounting firm acceptable to the Bank.
- B. Prior to or concurrently with signature of the loan and guarantee contracts, the Borrower shall sign an agreement with the Bank for a donation equivalent to US\$3,300,000 million from the Global Environmental Trust Fund, to cover part of the cost of the Tejana Wind Power Project, or agree with the Bank on an alternative arrangement for the financing of this Program component.
- C. The loan contract shall contain an annex substantially similar to Appendix III, "The Program", of this document

THE PROGRAM

(Annex A to the Loan Contract)

I. Objective

- 1.01 The purpose of the Electric Development Program III is: (i) to make investments as required in every area of the electric power subsector, during the period 1994-1999, to maintain the quality and continuity of electric power service; (ii) to increase service coverage to low-income areas not covered by the existing electric power system; (iii) to continue and consolidate energy conservation efforts by the country; (iv) to prepare future projects at the feasibility level as required by the expansion plan; (v) to carry out an institutional strengthening program in ICE in the area of environmental protection; and (vi) to improve the global environment through the use of wind power to generate electric energy.

II. Description

- 2.01 The Program consists of an investment program in the electric energy subsector and a series of concurrent activities, as described below:

(a) Electricity Generation Works:

- (i) Angostura Hydroelectric Project-177 MW: Under this project, the waters of the Reventazón, Tuis and Turrialba Rivers will be used in the middle basin of the Reventazón River. On the bed of the latter, the main dam will be built with maximum height of approximately 38 meters and a length of some 240 meters when the river crests, which shall form a weekly regulated reservoir, with a useful volume of some 10.9 Hm³ and an area of approximately 2.46 km².

The reservoir waters will be conveyed to the powerhouse by some 6.4 kilometers of tunnels. At the end of the tunnel a small-orifice surge tank will be built, followed by steel pressure pipes and the powerhouse.

Two weirs will be included which, when supplemented by a bottom outlet, will reach a total evacuation capacity of approximately 8,300 m³/second. The powerhouse will have three vertical-axis Francis turbines with an installed capacity of some 177 MW. Average annual power generation will be an estimated 915 GWH. The water will be returned to the Reventazón River by means of a rectangular canal.

- (ii) Tejona Wind Power Project-20 MW: This project consists of the installation of a sufficient number of wind power turbines (between 40 and 100 units) to generate 20 MW. Expected net average annual generation would be 93.5 GWH.

The project will include a wind power plant control center, which would have remote control in the Arenal hydroelectric plant. The Tejona substation will be connected to the electric system with a 34.5-KV dual-circuit line to the Arenal plant substation, which will be expanded with a 34.5/230 KV, 30/40 MVA transformer bay.

- (b) Electric Power Transmission Works: This component consists of:
- (i) Works associated with the Angostura Hydroelectric Project (138 KV line, Angostura-Cóncava; connector 138 KV, S.E. Angostura-Cachí-Siquirres line; and the Angostura substation);
 - (ii) Complementary Transmission Works (230 KV line Río Macho-Este-San Miguel, 138 KV line Desamparados-La Caja, expansions of the Alajuelita, Cóncavas, San Miguel, Río Macho substations and the new Escazú substation 138/34.5/13.8 KV, 45 MVA; (iii) Expansion of substations through increased demand (San Isidro, Guayabal and La Garita, each with 30 MVA); (iv) reactive balancing at the level of 34.5 KV-90 MVAR; (v) replacement of various power transformers and increase in the number of reserve autotransformers; and (vi) testing and maintenance equipment for the substations.
- (c) Electric Power Distribution Works: The distribution works program shall include:
- (i) vertical development works (reinforcement of secondary circuits) consisting of approximately 500 ICE circuits, 200 of CNFL and 50 of ESPH;
 - (ii) peripheral development works (extension of the system) consisting of some 600 KMS of main lines, and the installation of approximately 1000 KVA in distribution transformers;
 - (iii) voltage conversion and primary circuits reconstruction works, by which circuits with obsolete distribution voltages (4.16, 13.2 KV) shall be converted to 34.5 KV: approximately 200 Kms of triple-phase circuits, some 100 Kms of single-phase circuits and 19,000 KVA transformer changes;
 - (iv) construction of new primary feeders, some 200 Kms of 34.5 KV triple-phase circuits;
 - (v) distribution works associated with the transmission works, in which are included the following main feeders to join the new substations to be built in the program with the existing systems: some 14.5 Kms of 34.5 KV circuit Toro-Cariblanco; and some 22 Kms of 34.5 KV main lines associated with the Escazú, San Miguel and Alajuelita transmission substations; and (vi) operation equipment, to meet the needs of the institutions participating in the Program (ICE, CNFL, ESPH and JASEC), including the supervision and control systems (SCADA) for two of the ten regional distribution centers.

- (d) Energy Control Center Modernization Project: This component consists of: (i) replacement of the Center's obsolete computer system with a modern, distributed one with an open design, based on a local area network; and (ii) procurement of computer programs in real time for economical operation and dispatch of the national interconnected system.
- (e) Energy Conservation Program: This program includes a series of activities in two phases. Phase I includes: (i) a program for developing economically efficient tariff structures; (ii) a project to strengthen the econometric model of demand projection; (iii) a study of the market barriers impeding investments specifically in conservation; (iv) a study to build a data base concerning final uses of electric energy; (v) demonstration projects of efficient equipment in all consumer sectors; (vi) installation of an energy efficiency measurement laboratory for the national standardization and equipment labelling program; and (vii) information programs to inform and provide technical assistance to the public and industry. Phase II includes: design studies and implementation of an investment program for efficient energy use projects and the implementation of those defined in Phase I.
- (f) Concurrent Activities Program: This program includes: (i) a program for feasibility studies on future projects (Guayabo, Siquirres, Pirris and Boruca) required under the expansion plan; (ii) environmental studies, including institutional strengthening of ICE's Environmental and Alternative Energy Department; (iii) study of alternatives for private investment in ICE's upcoming projects; (iv) study of future alternatives for ICE's Construction Department, including the creation of an independent enterprise; (v) strengthening of the electric power sector of ICE by means of a training program and the procurement of instruments and equipment; and (vi) a program for the procurement of vehicles for use by the electric energy sector of ICE.

III. Cost of the Program and Financing Plan

- 3.01 The total cost of the Program is estimated at the equivalent of US\$515,400,000, broken down by investment category and source of financing as follows:

Estimated Cost and Financing Plan (US\$ millions)						
CATEGORY	FUENTES DE FINANCIAMIENTO					
	BID	BEI	GET	ICE	TOTAL	%
1. Engineering and administration	6.5	0.2	0	54.7	61.4	11.9
1.1 Engineering and supervision	6.5	0.2	0	36.3	43.0	8.3
1.2 Administration and overhead	0	0	0	18.4	18.4	3.6
2. Direct cost of construction	195.1	41.9	2.8	51.7	291.5	56.5
2.1 Angostura Hydroelectric Plant	156.7	0	0	40.7	197.4	38.3
2.2 Tejona Wind Power Plant	19.9	0	2.8	2.5	25.2	4.9
2.3 Transmission works	0	38.2	0	0	38.2	7.4
2.4 Distribution works	12.9	0	0	7.3	20.2	3.9
2.5 Modernization of Energy Control Center	0	3.7	0	0	3.7	0.7
2.6 Energy Conservation Program	5.6	0	0	1.2	6.8	1.3
3. Concurrent costs	14.1	0	0	3.9	18.0	3.5
3.1 Project studies	3.7	0	0	0.3	4.0	0.8
3.2 Environmental protection (strengthening, study on comprehensive management of Reventazón River basin)	1.1	0	0	0.1	1.2	0.2
3.3 Electric energy sector strengthening (training and equipment)		0	0	0.1	7.5	1.5
3.4 Procurement of vehicles	.6	0	0	3.4	5.0	1.0
3.5 Study of Alternatives ICE Construction Department	0.3	0	0	0	0.3	0.1
4. Unallocated	46.9	8.9	0.5	15.1	71.4	13.9
4.1 Contingencies	18.6	2.6	0.1	11.6	32.9	6.4
4.2 Price Escalation	28.3	6.3	0.4	3.5	38.5	7.5
5. Finance charges for construction	57.4	0	0	15.7	73.1	14.2
5.1 Interest	54.2	0	0	8.6	62.8	12.2
5.2 Credit fees	0	0	0	7.1	7.1	1.4
5.3 Inspection and supervision	3.2	0	0	0	3.2	0.6
TOTAL	320.0	51.0	3.3	141.1	515.4	100.0
PERCENTAGE	62.1	9.9	0.6	27.4	100.0	

IV. Procurement

- 4.01 (a) When goods to be procured or services to be contracted for the Program, including those related to any form of transportation or insurance, are to be financed in whole or in part with foreign exchange from the Financing, the procedures and specific requirements for the bidding or other forms of contracting, shall permit the unrestricted participation of goods and services from member countries of the Bank. Consequently, no conditions that would prevent or restrict the offer of goods or the participation of contractors from such countries shall be established in such procedures or specific requirements.
- (b) When sources of credit other than the resources of the financing or the local counterpart are to be used, the Borrower may agree with the creditor upon the procurement procedure to be followed. However, upon the Bank's request, the Borrower shall demonstrate the reasonableness of both the price agreed upon or paid for the purchase of the goods and services and the financial conditions of the credits. The Borrower shall also demonstrate that the quality of the goods is in conformity with the technical requirements of the Program.
- (c) For the purposes of the provisions set forth in Section 3.18 of Annex B, "Tender Procedures," to the loan contract, the system of prequalification or registration of bidders shall be utilized in tender procedures for the execution of the following works:
- (i) Angostura Hydroelectric Project: Dam-Outlet-Intake Contract; and
 - (ii) Tejona Wind Power Project: turnkey contract for the supply, civil works and assembly of the wind power turbines (towers and machines).

V. Consulting Services

- 5.01 In the selection and contracting of consulting services financed in whole or in part with resources from the Financing: (a) the procedures agreed upon with the Bank shall apply; and (b) no conditions or provisions may be imposed that would restrict or prevent the participation of consultants from the Bank's member countries.
- 5.02 With respect to consulting services financed with resources of the local counterpart, the Bank reserves the right to review and approve, prior to the Borrower proceeding with the corresponding hire, the names and background of the firms or individual consultants selected, their terms of reference, and the agreed fees.

This provision does not apply when using resources from suppliers' credits or other sources of financing.

VI. Maintenance

- 6.01 The purpose of maintenance shall be to preserve all the Program works in the operating conditions they were in at the moment of their completion, at a level compatible with the services they should provide.
- 6.02 The first annual maintenance report shall correspond to the fiscal year subsequent to that in which the first work of the Program went into operation.
- 6.03 The annual maintenance report shall include: (i) details on the organization responsible for maintenance, the personnel involved, and the number, type and condition of maintenance equipment; (ii) the location, size and condition of the repair, storage and maintenance facilities; (iii) information pertaining to the resources to be allocated for maintenance during the current year and the amount to be allocated in the budget during the following year; and (iv) a report on the status of maintenance, based on the sufficiency evaluation system established by the Borrower.

VII. Tariffs

- 7.01 For the purposes of the provisions of Clause 8(e) of Appendix I, the reasonable portion of the electric subsector investment plan to which electric energy service tariffs shall contribute annually, shall not be less than 30% and shall be determined by relating the net internal generation of funds to the subsector's total investment program, including its financial expenditures.

Net internal generation of funds shall mean the difference between net internal generation of funds minus the total debt service. Internal generation of funds shall mean total operational revenues, not including depreciation and amortization costs, financial expenses and non-operational results.

The reasonable portion of contribution to the investment program referred to in Clause 8(e) of Appendix I and as previously established in this section, shall be agreed annually with the Bank, during Program execution, within the first 2 months of each calendar year, beginning in 1994. For this purpose, the Borrower shall present to the Bank prior to December 31 of each year, the projected financial statements covering a minimum of four years, from the effective date of the loan contract that include: (i) the tables with results; (ii) the statement of sources and uses of funds; and (iii) the projected balances. These financial statements shall include a detailed description of tariff and other proposed measures, for timely compliance with the financial obligations.

For the purpose of monitoring the goals and means established in the financial statements referred to in the preceding paragraph, prior to June 30 of each year, beginning in the first year of the life of the contract, the Borrower shall present to the Bank revised financial projections covering a four year period that take into account the financial statement figures for the preceding year.

7.02 Financial Reports

(a) The reference in this contract to commitments regarding financial information on the electric subsector refer to consolidated information or reports of the energy subsector of ICE and CNFL.

(b) For the purpose of the provisions of Clause 8 (d)(i) of Appendix I, the percentage referred to shall apply separately to investments during the year in rural generation, transmission and electrification works.

PROPOSED RESOLUTION

COSTA RICA. LOAN 572/OC-CR TO THE INSTITUTO
COSTARRICENSE DE ELECTRICIDAD (ICE)
(Amendment of Resolution DE-75/89)

The Board of Executive Directors:

RESOLVES:

That paragraph (e) of clause 8 of Resolution DE-75/89 of July 19, 1989, is amended as follows:

Clause 8:

- "(e) The Borrower and the Guarantor shall take appropriate measures to ensure, to the satisfaction of the Bank, that the revenues from the electricity subsector tariffs, after meeting its normal operating expenses, including those related to administration, operation, maintenance and depreciation, and the debt service, contribute in a reasonable portion to financing its investment program. If the application of the foregoing is not sufficient to cover all the financial obligations of the subsector, the Borrower shall take the necessary measures, which may include tariff rate increases to achieve this purpose."

PROPOSED RESOLUTION

COSTA RICA. LOAN 535/OC-CR TO THE INSTITUTO
COSTARRICENSE DE ELECTRICIDAD (ICE)
(Amendment of Resolution DE-122/87)

The Board of Executive Directors:

RESOLVES:

That paragraph (e) of clause 8 of Resolution DE-122/87, as amended, of November 11, 1987, is further amended as follows:

Clause 8:

- "(e) The Borrower and the Guarantor shall take appropriate measures to ensure, to the satisfaction of the Bank, that the revenues from the electricity subsector tariffs, after meeting its normal operating expenses, including those related to administration, operation, maintenance and depreciation, and the debt service, contribute in a reasonable portion to financing its investment program. If the application of the foregoing is not sufficient to cover all the financial obligations of the subsector, the Borrower shall take the necessary measures, which may include tariff rate increases to achieve this purpose."

PROPOSED RESOLUTION

COSTA RICA. LOAN 200/IC-CR TO THE INSTITUTO
COSTARRICENSE DE ELECTRICIDAD (ICE)
(Amendment of Resolution DE-38/86)

The Board of Executive Directors:

RESOLVES:

That paragraph (d) of clause 8 of Resolution DE-38/86, as amended, of March 18, 1986, is further amended as follows:

Clause 8:

- "(d) The Borrower and the Guarantor shall take appropriate measures to ensure, to the satisfaction of the Bank, that the revenues from the electricity subsector tariffs, after meeting its normal operating expenses, including those related to administration, operation, maintenance and depreciation, and the debt service, contribute in a reasonable portion to financing its investment program. If the application of the foregoing is not sufficient to cover all the financial obligations of the subsector, the Borrower shall take the necessary measures, which may include tariff rate increases to achieve this purpose."

PROPOSED RESOLUTION

COSTA RICA. LOAN 67/IC-CR TO THE INSTITUTO
COSTARRICENSE DE ELECTRICIDAD (ICE)
(Amendment of Resolution DE-188/80)

The Board of Executive Directors:

RESOLVES:

That paragraph (d) of clause 8 of Resolution DE-188/80, as amended, of December 4, 1986, is further amended as follows:

Clause 8:

- "(d) The Borrower and the Guarantor shall take appropriate measures to ensure, to the satisfaction of the Bank, that the revenues from the electricity subsector tariffs, after meeting its normal operating expenses, including those related to administration, operation, maintenance and depreciation, and the debt service, contribute in a reasonable portion to financing its investment program. If the application of the foregoing is not sufficient to cover all the financial obligations of the subsector, the Borrower shall take the necessary measures, which may include tariff rate increases to achieve this purpose."

PROPOSED RESOLUTION

COSTA RICA. LOAN 598/SF-CR TO THE INSTITUTO
COSTARRICENSE DE ELECTRICIDAD (ICE)
(Amendment of Resolution DE-184/79)

The Board of Executive Directors:

RESOLVES:

That paragraph (d) of clause 8 of Resolution DE-184/79, as amended, of November 29, 1979, is further amended as follows:

Clause 8:

- "(d) The Borrower and the Guarantor shall take appropriate measures to ensure, to the satisfaction of the Bank, that the revenues from the electricity subsector tariffs, after meeting its normal operating expenses, including those related to administration, operation, maintenance and depreciation, and the debt service, contribute in a reasonable portion to financing its investment program. If the application of the foregoing is not sufficient to cover all the financial obligations of the subsector, the Borrower shall take the necessary measures, which may include tariff rate increases to achieve this purpose."

PROPOSED RESOLUTION

COSTA RICA. NONREIMBURSABLE FINANCING FOR THE TEJONA WIND POWER
PROJECT OF THE ELECTRIC DEVELOPMENT PROGRAM III TO THE INSTITUTO
COSTARRICENSE DE ELECTRICIDAD (ICE)

The Board of Executive Directors

RESOLVES:

1. That the President of the Bank, or such representative as he shall designate, is authorized, in the name and on behalf of the Bank, to enter into such agreement or agreements as may be necessary and to adopt such other measures as may be pertinent with: (a) the International Bank for Reconstruction and Development, as trustee of the Global Environmental Trust Fund, for the administration of the resources of this Fund which are transferred to the Bank for the financing of the Tejona Wind Power Project (hereinafter referred to as the "Project"), of the Electric Development Program III referred to in Document PR- ; and (b) the Instituto Costarricense de Electricidad, to grant it a financing to cooperate in the execution of the Project referred to in subparagraph (a) above.
2. That up to the equivalent of US\$3,300,000, is authorized for the purposes of this resolution, proceeding from the Global Environmental Trust Fund.
3. That the above-mentioned sum is to be provided on a nonreimbursable basis.
4. That the conditions included in paragraphs 1(b), 2 and 3 of this resolution shall enter into effect only when the Bank's General Counsel determines that the agreement referred to in paragraph 1(a) above, has entered into effect.