

YACYRETÁ TRANSMISSION SYSTEM

(PR-0030)

EXECUTIVE SUMMARY

BORROWER AND GUARANTOR: Republic of Paraguay

EXECUTING AGENCY: Administración Nacional de Electricidad

AMOUNT AND SOURCE: IDB: US\$50.0 million (OC)
Local counterpart funding: US\$16.4 million
Total: US\$66.4 million

FINANCIAL TERMS AND CONDITIONS: Amortization period: 20 years
Disbursement period: 4 years
Interest rate: variable
Inspection and supervision: 1%
Credit fee: 0.75%

OBJECTIVES: The present operation is intended to help raise the standard of living and contribute to the development of productive sectors in Paraguay by making optimal use of available electric generating capacity. The aim of the project is deal efficiently with increasing demand for electric power - especially in the eastern part of the country - using the newly installed capacity of the Yacyretá hydroelectric generating station. As well, the project will provide support for studies and programs to promote efficient use of electric energy. The country's urbanization process, which is constantly adding new users, and rising power consumption by those already hooked up to the system has caused demand for electricity to grow rapidly. Failure to make the necessary investment in a transmission system immediately will reduce the quality and reliability of Paraguay's electric power utilities, increase energy losses, and limit the system's capacity to serve new users.

DESCRIPTION: The project includes an investment component and a component for related studies. The investment component consisting of a project to expand the ANDE transmission system can be divided into two groups of specific works scheduled to go on line at different times. The first group, which will come into operation in 1998, includes construction of a transmission line that will complete a ring between generating

plants on the Paraná River and the Asunción area and allow the transmission of power from the Yacyretá hydroelectric generating station to the eastern part of the country. It also includes related transmission and transformer works. The second group of works is aimed at expanding and strengthening the existing transformer and reactive compensation system in the same region, and is due to go into service in 1999. The studies component will include preparing a schedule of activities to be carried out by ANDE to ensure energy savings and efficient use of electricity, together with studies on optimizing and expanding the transmission system. Additional support for this program will be provided under a MIF operation (ATN/MT-4983-PR) approved on August 9, 1995, to supply financial assistance to the Government of Paraguay so that it can make structural reforms and introduce new policies in the electricity and hydrocarbons sectors aimed at improving their overall performance and strengthening the capacity of government policy-setting regulatory agencies. In particular, the project will enable the government to design and implement new legal, institutional, and regulatory frameworks to encourage greater private investment in the energy sector.

**ENVIRONMENTAL
CLASSIFICATION:**

The Environment Committee (CMA), at its meeting of July 10, 1995, classified this as a Category III operation. The environmental summary was approved by the CMA on November 21, 1995, and forwarded to the PIC on November 22, 1995.

EXPECTED RESULTS:

By placing its two components in operation, the project will make it possible to achieve the following results: (i) the new transmission capacity will boost the supply of electric energy to the metropolitan system from 645 MW in 1995 to around 925 MW in 1999; (ii) energy losses at peak demand in the transmission and subtransmission system (at the 220-kV and 66-kV levels) will be reduced from 9% in 1995 to approximately 8% in 1999; and (iii) the reliability of the transmission system will be consistent with international standards by 1999 – the failure rate in the 220-kV system will not exceed the level of 2.0 interruptions of three minutes' duration or more for every 100 km/year in 1999 (compared to 3.0 in 1994).

RISKS:

The project does not entail any major technical or environmental risks. The principal risk associated with the project and operation has to do with ensuring continuity in the rate policy approved by the Bank. The government has begun taking steps to

achieve rate levels in line with the economic cost of electricity. The loan contract will include tariff and financial commitments to ensure that the necessary steps are taken to achieve this goal.

**THE BANK'S
COUNTRY AND
SECTOR STRATEGY:**

The Bank's strategy for Paraguay seeks to consolidate reforms in the country's public and financial sectors, gearing them toward modernization of the economy in general. In the energy sector, the Bank is supporting those projects which help to raise the standard of living of the population and develop the productive sectors, encouraging efficient use of the abundant electric generating capacity available.

This operation and that of the MIF are in line with the above-mentioned strategy and complement one another. Financing for high-priority investments will make it possible to meet the steep rise in demand while maintaining adequate conditions in the public electric utility service which, in turn, will facilitate the introduction of reforms in an orderly fashion. As well, reaffirming a tariff policy based on cost recovery will help to create a favorable climate for private investment.

**POLICY CRITERIA
RELATING TO
POVERTY AND SOCIAL
ASPECTS:**

In accordance with the Eighth Replenishment document (AB-1704), the proposed project does not meet the criteria of an operation that targets the poor, either geographically or in terms of beneficiaries; nor is it aimed specifically at women.

**SPECIAL
CONTRACTUAL
CONDITIONS: 1/**

As a condition precedent to the first disbursement of the financing, the following conditions must be fulfilled to the Bank's satisfaction: (i) the signature of an agreement, whereby ANDE agrees to act as the executing agency for the project (paragraph 4.1); (ii) the adoption of the measures required to ensure fulfillment of the commitments agreed with the Bank with regard to tariff policy (paragraph 5.23(a)); (iii) the hiring of the necessary consultants for supervision of environmental management plan (paragraph 5.24).

Sufficient provision will also be made in the loan contract to ensure that the Bank's regulations are duly observed with respect to: (i) the procurement of goods and services, and the contracting of consulting services (paragraphs 3.2, 3.5, 3.9, 3.10, and 3.11); (ii) the setting of rates, collection levels, conditions governing new borrowings, and the current

1/ The draft loan contract for this operation is available to Executive Directors on request.

ratio (paragraphs 4.20 and 5.23(b)); (iii) operation and maintenance of the project works and equipment (paragraphs 3.17 and 3.18); (iv) auditing of financial statements (paragraph 4.8). Measures will also be agreed on to mitigate the adverse environmental effects (paragraph 5.24); supervision of the work (paragraph 3.2); proposed tariff policy based on a new study of electricity costs and rates (paragraph 5.23(c)); and actions for sector reform (paragraph 1.24) and for recognition of expenses in amounts up to the equivalent of US\$290,000. The approval of the final environmental management plan will be recorded in the loan contract.

Procurement will be done by international public bidding for construction contracts valued at US\$3 million or more, for goods valued at US\$250,000, and for consulting services valued at US\$200,000 (paragraph 3.11).

I. FRAME OF REFERENCE

A. The energy sector in Paraguay

- 1.1 Paraguay finds itself in the unique position of having to import all of the hydrocarbons it uses while exporting large amounts of electrical power thanks to its significant hydroelectric potential developed jointly with Brazil and Argentina. The country's annual per capita energy consumption of 5.3 barrels of oil equivalent (boe) remains low in comparison with the Latin American average of 5.9 boe.
- 1.2 The most important problems facing energy authorities are the need for continuing the electrification process and expanding the utilization of electric power to take advantage of its availability; the relatively high cost of storing imported hydrocarbon-based fuels; the creation of conditions to encourage oil exploration in the country; and the high consumption of fuelwood by households and industry.
- 1.3 With these problems in mind, the government is intent on overhauling the regulatory and institutional framework of the energy sector, attempting to ensure greater transparency by separating the regulatory and business functions of the State, which has had a virtual monopoly in this sector until now. It is being assisted in this effort by the Bank under the "Program for restructuring Paraguay's energy sector", financed by the Multilateral Investment Fund (MIF) through operation ATN/MT-4983-PR. This program includes activities in the electricity, oil, and gas sectors – particularly, to develop the necessary regulatory, institutional, and technical conditions for creating a favorable climate for private investment.

B. The electricity sector

1. Current status

- 1.4 Paraguay's electric generating capacity far exceeds its needs. Its share of the installed capacity represented by the Itaipú Hydroelectric Generating Station (CHI) – 6,300 MW under a bilateral agreement with Brazil – together with that which will be available from the Yacyretá Hydroelectric Generating Station (CHY) – 1,350 MW under a bilateral agreement with Argentina – is equivalent to approximately 15 times the country's maximum current demand. For this reason, the program to expand the electricity sector will be limited to the transmission and distribution systems.
- 1.5 Despite its relative abundance of generating capacity, Paraguay has the least developed electricity sector among the MERCOSUR countries. Annual per capita electric power consumption in 1994 1/ was 646 kWh, compared to rates of 1,439 kWh for Argentina, 1,463 kWh

1/ Source: OLADE.

for Brazil, 1,479 kWh for Uruguay, and an average annual per capita rate of 1,193 kWh for Latin America and the Caribbean. Some 64% of Paraguayans currently have access to electricity and while this percentage is growing, it is still low compared to the rest of the MERCOSUR countries. In Uruguay and Argentina, for instance, over 90% of the population has access to electric power; and in Brazil the rate is up to 77%.

2. The electrification process in Paraguay

- 1.6 Since the CHI began operating, the availability of electrical power has been an engine of growth in Paraguay's electricity sector, which has seen demand increase sharply and steadily at an overall rate of around 13% per year over the past five years. This brisk growth is reflected in the following statistics: (i) between 1982 and 1994, the number of connections more than tripled, with coverage rising from 38% to 64% of the population, and 80% of communities within the country now having electrical service; and (ii) consumption per customer connected to the grid also increased significantly, from 3,401 kWh to 4,866.3 kWh. As a result of these factors, total electricity consumption in Paraguay quadrupled over this same period.
- 1.7 While demand for electricity in Paraguay has risen faster than in other countries in the region, it is safe to assume that the electrification process will continue at a steady pace since the level of coverage is still relatively low and the country has an abundant supply of installed generating capacity. Indeed, the development of Paraguay's electricity market demonstrates that growth in this sector is tempered only by the speed at which services can be expanded, which is consistent with the experience in other countries that have already undergone a similar process of rising urbanization.
- 1.8 In the immediate future, Paraguay's electricity sector faces the challenge of finding efficient ways in which to meet the strong demand for more and better service. At the same time, the operations of MERCOSUR will inevitably lead to greater integration of electrical power systems among member countries, and Paraguay is hoping to reduce the gap in degree of electrification and per capita consumption that separates it from other members of the group. In its effort to achieve these objectives, the government has established the following priorities for the sector: (i) increase efficiency, making better use of installed capacity and optimizing investments in the sector; and (ii) ensure the flow of resources for investments in new transmission and distribution capacity, making way for participation by the private sector.
- 1.9 According to the most recent available estimates, the electricity sector will make total capital investments - in addition to the present project - of some US\$780 million in the period up to 2004, of which US\$380 million will be invested between now and the year

2000. In making these investments, ANDE will be assisted by other international lending agencies, supplementing the support provided by the Bank. Currently, ANDE is arranging a loan with Japan's OECF to finance subtransmission and distribution works in the metropolitan system beginning in mid-1996, when loan 648/OC-PR is due to conclude. ANDE has also obtained financing from Germany's KfW for electrification works in the Chaco region, at a direct cost estimated at US\$35 million. These works are set to begin in 1996.

3. Incorporating the Yacyretá Hydrogenerating Station

- 1.10 Since 1994, Paraguay has also had at its disposal the electric power generated by the Yacyretá Hydrogenerating Station (CHY). This plant, located on the Paraná River between Argentina and Paraguay and built under a bilateral agreement between the two countries, was financed by the Argentine government and with loans from both the IDB and the International Bank for Reconstruction and Development (IBRD). The IDB has approved four regional loans to the Entidad Binacional Yacyretá (EBY) for a total of US\$790 million, with guarantees provided by the Argentine Republic, and the IBRD granted three additional loans for a total of US\$760 million. The plant is in the final stages of coming on stream and upon completion will have a total installed capacity of 2,700 MW and will generate 20,000 GWh annually. The governments of Paraguay and Argentina are currently working out the terms of reference for an agreement that will make it possible to grant concessions to the private sector for operation of the CHY.
- 1.11 Completion of the CHY and construction of the transmission line to connect it to the existing grid will enable Paraguay to incorporate a new power source and strengthen the country's electricity system by diversifying its sources of supply and making it possible to close the transmission network by means of a ring connecting the mammoth generating stations on the Paraná River and the market in the Asunción area. This will consolidate Paraguay's position as the major exporter of electricity in MERCOSUR.
- 1.12 By financing construction of the Ayolas-Guarambaré 220-kV transmission line, along with other related transmission, transformer, and compensation works, the present project will allow the Yacyretá hydroelectric generating station to be hooked up to the national electricity grid, and ensure proper operation of the expanded transmission system. The new line will make it possible to reinforce the metropolitan transmission system serving the Asunción area, which accounts for nearly 70% of Paraguay's electricity demand, and simultaneously improve the overall operation of the interconnected system by converting it from a radial system to a ring system, with less power loss and greater reliability and voltage control.

4. Pricing considerations

- 1.13 During execution of loan 648-OC/PR, a new pricing policy was adopted, whereby electricity rates would be based on the economic cost of supplying electric power, and a plan was developed for phasing in gradual adjustments that will raise these rates to a level that covers on average 89% of these costs by the year 1998. At the same time, certain modifications will be made to the tariff structure to help accomplish this objective. The above-mentioned loan contract also included pricing commitments based on the Bank's operating policies for public service entities which consisted of establishing levels of contribution from net internal generation of funds to the financing of the investment program. The electricity rates that users are charged in Paraguay are currently the lowest in MERCOSUR for all types of consumption (residential, commercial, and industrial) and cover only 70% of the economic cost of such power, on average. Despite this, and with the exceptions noted, ANDE was able to meet its financial obligations under the pricing provisions of the contract for loan 648/OC-PR, making net contributions to the investment program of 34.5% in 1992, 5.5% in 1993, and 46.3% in 1994 - taken entirely from operating funds. This compares with the contractual requirement that it contribute a minimum of 25%.
- 1.14 Maintaining and further tightening electric utility rates policy is vital to the reforms that the government is introducing in the energy sector. The medium term goal is to adjust these rates so as to better reflect the economic costs of the system, thus sending the right signals to attract prospective private sector operators. Meanwhile, the electricity sector will be generating sufficient resources to finance its expansion owing to the dynamic rise in demand for electrical power, and to meet the increase in the average cost of energy purchased from Itaipú beginning in 1997. Under an unusual arrangement, until mid-1997 ANDE will be receiving free electric power from Itaipú in amounts equivalent to roughly one-third of the total power contracted for from that generating station, a factor which currently buoys that Authority's financial position by lowering the average cost of its energy bill. This supply arrangement is intended to compensate Paraguay for the power used by Brazil during the testing stage of the CHI.
- 1.15 During preparations for this operation and owing to delays in implementing the adjustments called for under the new tariff policy, the Bank pointed out to the government the difficulties that this situation was creating for the loan being executed, and for the processing of the new operations to finance expansion of the transmission system and to support the reforms in the energy sector being financed by the MIF. The government reached agreement with the Bank on the need to resolve these problems and ordered rate increases in all consumption categories to take effect in May 1995. The measures taken made it possible to comply in 1995 with the rate provisions contained in loan contract 648/OC-PR.

5. Institutional framework of the sector

- 1.16 Electrical power is provided to consumers in Paraguay by the Administración Nacional de Electricidad (ANDE), an autonomous government agency which is authorized to operate a monopoly service under its charter (Law No. 966). ANDE is responsible for electricity transmission and distribution services throughout Paraguay, and electrical generating plants with the exception of Itaipú, which is operated jointly with Brazil, and Yacyretá, which is operated jointly with Argentina. ANDE also carries out other functions typical of the sector, including those that relate to planning, investment decisions and studies of rate-setting policy.
- 1.17 The Ministry of Public Works and Communications (MOPC), acting through the Subsecretariat of Mines and Energy (SME), is the government agency with overall responsibility for the energy sector. The economic team play a part in the determination of pricing policies in the energy sector, including decisions concerning electricity rates.
- 1.18 The medium-term goal of the government is to reorganize the electricity sector to boost efficiency and open the possibility of incorporating new resources for necessary expansion of services. The new rules for the sector will encourage separation of the state's policy-setting, regulatory and commercial functions, and promote participation by private capital - most likely in the area of distribution initially.
- 1.19 To do this the government, with the help of the program for restructuring Paraguay's energy sector financed by the MIF, is drafting a framework law for the electricity sector for submission to Congress. This law will regulate activities in the sector, setting out the obligations of public and private electric utility companies, the rights of consumers, and how disputes are to be resolved. At the same time, the government will work out the various technical aspects necessary for defining and establishing the sector's new organizational structure.
- 1.20 The proposed reforms must take account of the special nature of Paraguay's electricity sector. Here, the possibility of competition in energy generation, which has been tried recently in other countries, is virtually ruled out. The transmission and distribution of electric power are viewed as natural monopolies requiring eventual participation by private operators, a suitable regulatory framework, and a corresponding institutional framework, all of which need to be established.

C. The Bank's strategy and the basis of its participation

- 1.21 The Bank's strategy for Paraguay seeks to support the consolidation of changes made to that country's public and financial sectors, gearing them toward modernization of the economy in general. To

this end, sector investments are being carried out for the purpose, among other things, of developing a privatization program as one of the mechanisms for reform of the public sector.

- 1.22 In the energy sector, the Bank is supporting those projects which help to raise the standard of living of the population and develop the productive sectors by encouraging efficient use of its abundant generating capacity in the case of electricity, and at the same time contribute to the process of restructuring the sector.
- 1.23 The present operation and that financed by the MIF are well-suited to this strategy and mutually reinforce one another: financing for high-priority investments will enable the sector to accommodate sharply rising demand while maintaining adequate conditions in the country's public electricity service; this in turn will permit reforms to be carried out in an orderly manner, making it possible to establish new laws and regulations, and a new institutional framework designed to make operations in the electricity sector more transparent, improve efficiency, and attract more private investment. Reaffirming a policy of economic pricing will likewise help to create a favorable climate for private investment.
- 1.24 Accordingly, the loan contract should include a condition whereby the borrower undertakes to provide to the Bank within a period of nine months following the date on which the loan contract takes effect, and in conformity with provisions of the MIF project, proof that a draft framework law governing the electricity sector has been sent to Congress.

D. Experience of the Bank and other financial institutions with Paraguay's electricity sector

1. The Bank's activities in the electricity sector

- 1.25 The Bank has led the way in providing financing to help Paraguay develop its electric power system and has participated in the country's most important projects in the areas of power generation, transmission and distribution, and rural electrification, over the last 30 years. These projects include the Acaray (the first of its kind in Paraguay) and Yacyretá hydroelectric generating stations, part of the transmission system between Itaipú and the Asunción area, and development of the distribution networks in Asunción and the other major cities in Paraguay. These activities led to a significant increase in generating capacity, a rise in electricity consumption, and an expansion of electric utility coverage referred to in paragraph 1.6 above.
- 1.26 The Bank has extended 14 loans to the electricity sector for a total of US\$269.8 million, to finance 9 projects with a total cost of US\$425.8 million, and 20 technical-cooperation projects with a total cost of US\$4.3 million. ANDE has acted as borrower and executing unit for all of these projects, except for the program

financed by loan 648/OC-PR, which was granted in 1991. The Bank's experience with ANDE has been generally good and the projects have been executed satisfactorily, although appreciable delays were noted in the last two operations - particularly in the most recent operation approved.

- 1.27 The Bank's most recent operation in this area was loan 648/OC-PR for US\$100.0 million which is financing transmission, transformer, and distribution works and institutional strengthening of ANDE. There is at present no reason to anticipate problems with the specific transmission and transformer works scheduled under this project. The various distribution works, however, have encountered delays which are in the process of being overcome.
- 1.28 Concerning the Bank's support for institutional strengthening activities for ANDE, an important project is under way to improve its organizational structure, management, and planning capacity. Substantial progress has been made in preparing the corresponding assessments and in presenting various proposals to streamline its operations. When the proposed reforms have been completed, the Bank will have helped substantially to enhance the efficiency of ANDE.

2. Financing from other agencies

- 1.29 The World Bank has yet to directly finance projects in Paraguay's electricity sector. With a loan of 8.8 billion yen, Japan's Overseas Economic Cooperation Fund (OECF) financed the building of a fourth 220-kV transmission line between the Itaipú-Acaray grid and metropolitan Asunción, which entered into service in July 1990.
- 1.30 Financial assistance from the German government (DM25,171,400) was used to expand ANDE's transmission system and build a low-voltage distribution system serving nine towns in the department of Ñeembucú. In addition, the Kreditanstalt für Wiederaufbau (KfW) granted a loan in German marks equivalent to US\$5.25 million to fund the construction of a 66-kV line from Itakyry to Catueté, and 23-kV rural distribution lines to Salto del Guairá and Itakyry, as cofinancing for loan 520/OC-PR.

II. THE PROJECT

A. Objectives

- 2.1 The purpose of the project is to deal efficiently with increasing demand for electric power - especially in the eastern part of the country - using available generating capacity, primarily the newly installed capacity of the Yacyretá hydroelectric generating station. As well, the project will provide support for studies and programs aimed at promoting efficient use of electricity.
- 2.2 The expansion of the transmission system to be achieved under the project will make it possible to satisfy the precipitous increase in demand, which is expected to continue growing rapidly for several years. This growth is due primarily to the continuing urbanization of Paraguay which results in both the addition of new customers and an increase in energy consumption by current users. Failure to make the necessary investment in the transmission system at this time will diminish the quality and reliability of electric power utilities and increase resistance losses, curtailing extension of service to new users. This is because the facilities for transporting energy from the Itaipú and Acaray generating stations (which currently supply all electricity) to the eastern part of the country, where Asunción which accounts for 70% of Paraguay's electricity demand is situated, will reach the saturation point in the next few years.

B. Description of the project

- 2.3 The project includes: (i) an investment component; and (ii) a studies component (see breakdown in Annex II-2). The investment component consists of a project for expansion of ANDE transmission system which will be necessary by 1998. The project is divided into two groups of specific transmission line and substation works, according to the way in which the preparation and execution of the works has been organized. The first group of works includes construction of a transmission line that will complete a ring network between the generating plants on the Paraná River and the Asunción area and will supply power from those plants - primarily the Yacyretá hydroelectric generating station - to the eastern part of the country, and related transmission and transformer works which must be in operation by 1998. The second group of works is made up of projects to expand and strengthen the existing transformer and reactive compensation system in the same region, and is due to go into service in 1999. The studies component will include studies and other activities for preparing a program for energy savings and efficient use of electricity in the transmission and distribution systems, and determining the location and capacity of certain future works to expand the transmission system.

- 2.4 Additional support for this program will be provided under a recently approved MIF operation (see paragraph 1.3), by means of which financial assistance is provided for the Government of Paraguay to make structural reforms and introduce new policies in the electricity and hydrocarbons sectors intended to improve overall performance and strengthen the capacity of government agencies responsible for policy-setting and regulatory duties in these areas. In particular, the project will make it possible for the government to design and implement new legal, institutional and regulatory frameworks specially designed to attract more private investment in the energy sector.

C. Performance objectives

- 2.5 The project will make it possible to achieve the following performance objectives (see Annex II-1, Logical Framework):
- a. The additional transmission capacity will boost the supply of electrical power to the metropolitan system from 645 MW in 1995 to approximately 925 MW in 1999.
 - b. The energy losses at peak demand in the transmission and subtransmission system (i.e. in the 220-kV and 66-kV levels) will be reduced from 9% in 1995, to around 8% in 1999.
 - c. The level of reliability of the transmission system by 1999 will be consistent with international standards. The failure rate in the 220-kV system will not exceed a level of 2.0 interruptions of three minutes or more for every 100 km/year in 1999 (compared to a rate of 3.0 in 1994).

D. Results

- 2.6 The principal results of the project will be as follows:
- a. Prior to September 1998, two circuits of 220-kV transmission line must be added to the system between Ayolas and San Patricio, and one circuit between San Patricio and Guarambaré — including expansion of the existing stations at Ayolas, San Patricio, Paraguari, and Guarambaré to accommodate incoming and outgoing lines, with a total of 285 km of new line and 250 MVA of transmission capacity.
 - b. Prior to September 1998, the transformer capacity at the Paraguari and San Lorenzo stations must be expanded for a total capacity of 180 MVA, and the new 20-MVA station at San Antonio must be completed.
 - c. By mid-1999, expansion of the service yard at the Ayolas station, the addition of 41.5 MVA in transformer capacity at this same station, and construction of the San Juan Bautista 20-MVA station must be complete.

- d. Prior to September 1999, 90 megavars in 66-kV of reactive compensation must be available, along with a 220-kV static compensator of approximately 200 megavars. In both cases, the final location of the equipment will be determined during execution of the project.
- e. Studies for improvement of the existing transmission system, and a list of measures required to reduce losses in this system, must be submitted by mid-1997.
- f. Studies on options for very high voltage feed from Itaipú and/or Yacyretá must be submitted by mid-1998.
- g. The study of optimal use of electricity and reduction of distribution losses in the ANDE system must be submitted by the end of 1997. A pilot plan employing the measures indicated in this study must be implemented by the end of 1998.

E. Cost and financing

- 2.7 It is estimated that preparation and administration of the project will entail the following costs:

1. Engineering and administration (US\$3,950,000)

a. Engineering (US\$1,810,000)

- 2.8 Tasks under this heading include developing the detailed engineering for the transmission system and substations in Group I of the project works, and preparing the basic design (including the bidding documents) and detailed engineering for Group II.

b. Supervision (US\$1,200,000)

- 2.9 This heading covers supervision and inspection during manufacture of the main items of equipment, and during execution of field works. It also includes providing liaison between construction work in the field and the tasks carried out by the office for procurement of goods and services, and the office responsible for executive designs - in addition to supervision of the necessary studies.

c. Administration (US\$940,000)

- 2.10 This heading entails incremental costs for administrative personnel and other expenses incurred by the executing unit created by ANDE to administer the finances it receives from international lending agencies, which unit shall be assigned to oversee this project as well. It also includes costs of other departments of the Authority in providing administrative, accounting and legal services for the project.

2. Specific components (US\$48,770,000)

- 2.11 The project includes an investment component to expand the transmission system, divided into two groups of works and support studies:

a. Group I (US\$34,430,000)

- 2.12 Group I consists of works to complete the 235-km first circuit of the 220-kV transmission line which will enter into service in mid-1998 (prepared for double circuit), running from the San Patricio station close to the Yacyretá area to the Guarambaré station on the outskirts of Asunción. It will also change the conductors on the first circuit of the line between Ayolas and San Patricio, and install the second circuit of this same line over a total distance of 50 km. In addition, this component will include expansion of the step-down substations at San Patricio, Paraguari, Guarambaré, Ayolas and San Lorenzo, together with construction of the San Antonio station (220/23 kV).

b. Group II (US\$11,940,000)

- 2.13 Group II is made up of other works to upgrade the Ayolas and San Lorenzo stations, construction of the San Juan Bautista station (220/23 kV) station, and installation of 66-kV reactive compensation system (subtransmission) and a 220-kV static compensation system (transmission) in the Asunción area. These installations will enter into operation in mid-1999, and the work will include preparation of the basic designs and bidding documents.

c. Engineering studies (US\$1,400,000)

- 2.14 This component includes: (i) a study of design and construction characteristics of the lines and related equipment that make up the existing transmission system, identifying critical points and the measures to eliminate the conditions creating emergency overload capacity, and measures to reduce electrical losses (i.e. changing cable diameters, etc.); (ii) detailed study of very high voltage feeder alternatives using transmission lines to and from Itaipú and/or Yacyretá and the metropolitan system, identifying the optimal configuration for purposes of long-range expansion of the national electric power system, with subsequent confirmation (during the first stage of the works) of the final location of the 220-kV static compensator, due to come on stream in the Asunción area in 1999; and (iii) study of the physical aspects of ANDE's distribution system, a program of measures for control and reduction of electrical losses, and a study of the characteristics of ANDE customers with an assessment of potential energy savings by users, and preparation of a program to ensure efficient use of electricity. A pilot plan to promote these measures will be initiated by ANDE as part of this project.

d. Indirect costs (US\$1,000,000)

- 2.15 This includes cost expropriation expenses or the cost of purchasing additional rights of way, and of carrying out measures to mitigate adverse environmental effects.

3. Other costs (US\$13,650,000)

- 2.16 Contingencies have been estimated at around 5% of the direct and indirect costs of the project. The cost escalation was calculated on the basis of indices of domestic and international inflation used by the Bank for Paraguay. The two calculations total US\$5,420,000.
- 2.17 Financing charges total US\$8,230,000 and were estimated on the basis of the Bank's current lending conditions for loans, since the Bank is the sole source of funds for the project.
- 2.18 The project will have a total cost equivalent to approximately US\$66.4 million, which will be financed in the following manner: (i) up to US\$50.0 million from the ordinary capital resources, to be used exclusively to finance the purchase of equipment and materials for the construction and maintenance of the transmission line, to expand the substations, to install the reactive compensation system, to conduct support studies, to cover interest during construction, inspection, and supervision, and part of the costs of supervision and inspection during manufacture of the equipment and execution of work, to construct civil works and install the transmission line and substations, and to cover cost overruns due to contingencies; and (ii) the equivalent of US\$16.4 million out of ANDE's own resources to supplement the investments financed by the Bank and cover the entire cost of electrical engineering works involved in the construction and expansion of the substations, indirect costs, the credit fee, engineering works and supervision, and administrative expenses.
- 2.19 Table II-1 (Project costs) gives a breakdown of the project by cost and source of funding:

Table II-1 Project costs (US\$000s)				
DESCRIPTION		TOTAL	BANK	ANDE
1.	ENGINEERING AND ADMINISTRATION	3,950	460	3,490
1.1	Engineering	1,810	0	1,810
1.2	Supervision	1,200	460	740
1.3	Administration	940	0	940
2.	INVESTMENT COMPONENT	46,370	38,520	7,850
2.1	Group I	34,430	28,360	6,070
2.1.1	220 kV TL San Patricio-Guarambaré	19,520	15,040	4,480
2.1.2	Replace conductor and second Ayolas-San Patricio TL circuit	1,470	1,130	340
2.1.3	Expansion of San Patricio station	2,640	2,400	240
2.1.4	Expansion of Paraguari station	3,500	3,170	330
2.1.5	Expansion of Guarambaré station	810	740	70
2.1.6	Expansion of Ayolas station	320	290	30
2.1.7	Expansion of San Lorenzo station	4,260	3,860	400
2.1.8	Expansion of San Antonio station	1,910	1,730	180
2.2	Group II	11,940	10,160	1,780
2.2.1	Expansion of 220-kV yard at Ayolas	800	680	120
2.2.2	Expansion of 220/23-kV transformers at San Lorenzo	1,470	1,250	220
2.2.3	Construction San Juan Bautista station	1,900	1,620	280
2.2.4	Installation of 66-kV reactive compensation works	1,570	1,330	240
2.2.5	Installation of 220-kV static compensator	6,000	5,110	890
2.2.6	Special equipment	200	170	30
3.	INDIRECT COSTS	1,000	0	1,000
3.1	Rights of way	700	0	700
3.2	Environment	300	0	300
4.	SUPPORT STUDIES	1,400	1,400	0
4.1	Improvements to existing transmission line system	200	200	0
4.2	Very high voltage feeder alternatives	400	400	0
4.3	Savings/efficient use of energy	800	800	0
5.	CONTINGENT EXPENSES	5,420	2,100	3,320
5.1	Contingencies	2,370	1,930	440
5.2	Cost escalation	3,050	170	2,880
6.	FINANCING EXPENSES	8,230	7,520	710
6.1	Interest	7,020	7,020	0
6.2	Credit fee	710	0	710
6.3	Inspection and supervision	500	500	0
TOTAL AMOUNT		66,370	50,000	16,370
Percentage (%)		100	75	25

III. EXECUTION OF THE PROJECT

A. Executing agency

- 3.1 ANDE, an autonomous government agency, will be in charge of the technical, administrative, and financial aspects of project execution. The Office of Studies and Plans (GEP) will have basic responsibility for the project, receiving logistical support from the Commercial and Technical Department (GTC) and the Administrative Services Department (DSA).
- 3.2 ANDE has a good track record as executing agency for previous loans from the Bank, although in the last two operations (loan 520-OC/PR which has been fully completed, and loan 648-OC/PR which is still in progress) appreciable delays have been encountered. On the plus side, loan 648-OC/PR has been brought up to speed in the last year as a result of measures taken by ANDE in agreement with the Bank, and no further difficulties are anticipated during the final stage of the project. It should be mentioned as well that unlike the above-mentioned loans, the present loan will not entail multiple works such as those which gave rise to the main delays under those projects since in this project the engineering designs and bidding documents have already been prepared for the principal works. Moreover, ANDE, with partial financing from the Bank, will hire a consulting firm to assist the Authority with supervision and inspection during manufacture of equipment and execution of the 220-kV static compensator works with which it has less experience. Before calls for tenders are issued for supply and manufacture of the 220-kV static compensator equipment, ANDE must submit proof that the consultants have been hired.
- 3.3 The project executing unit, a branch of the GEP known as the Division of Coordination and Control (DCC), will continue to carry out all of the tasks relating to this project, just as was done so efficiently in the case of the contract for loan 648/OC-PR.

B. Status of preparations and project timetable

- 3.4 The preparation of the 220-kV transmission line and substation expansion works to be in operation by mid-1998 is well advanced. The basic engineering designs and corresponding bidding documents have been drawn up and the bidding process is ready to begin on all but the new San Antonio station, for which the basic designs and bidding documents are still in preparation. This means that the topographic studies, support structure design, specifications for engineering and electrical equipment, conductors, materials, and contract documents will be ready for contracts to be awarded and subsequent construction to begin on all of these works by the time this operation goes to the Board of Executive Directors of the Bank. As suppliers should have started building the towers,

equipment, conductors, and insulators by the end of 1996 at the latest, ANDE will have to begin issuing calls for tenders in early 1996 (second quarter). The actual construction will commence in mid-1997, with the bidding process beginning during the last quarter of 1996.

- 3.5 Preliminary designs have been drawn up for the second group of works which includes substation construction and expansion and installation of reactive compensation works, scheduled for operation by mid-1999, and the basic engineering designs and bidding documents for these works must now be done. Since it will take at least seven months to prepare engineering studies, using either outside consultants or in-house staff, procurement of the equipment cannot begin until around the third quarter of 1997 at the earliest. For this reason, within eight months of contract signature, ANDE shall demonstrate that these studies are under way, in accordance with the terms of reference approved by the Bank, as a guarantee that the necessary documentation has been prepared for procurement as well as for construction, erection, and assembly by the end of the second quarter of 1997. The construction of the works themselves will not begin until 1998.
- 3.6 Detailed terms of reference for the support studies are being drawn up and must be submitted to the Bank for review in February 1996, so that bidding on the contracts can begin by the end of the first quarter of 1996.
- 3.7 Annex III-3 includes a tentative program for procurement and contracting for the main project items: power transformers, switching equipment, safety equipment, miscellaneous structures, conductors and guard cables, suspension and anchor assembly, special equipment (tools, safety equipment, and special vehicles to boost capability to maintain transmission installations), civil and electrical works, engineering, and the studies planned.

C. Execution and bidding procedures

- 3.8 The project executing unit, which can draw on support from ANDE's engineering department and a unit that will deal exclusively with surveillance of adverse environmental and social effects of the project and measures to mitigate these effects, will also be responsible for financial planning, enforcement of contractual conditions, and submission of scheduled reports and disbursement requests, among its more important tasks.
- 3.9 ANDE has executed works similar to those called for under this project and has prepared engineering designs and bidding documents in the past. It has experience with the procurement of goods and services and supervision of construction of engineering and electrical works, and with the erection, testing, and commissioning of transmission systems. Before the bidding process begins, ANDE will hire an outside consultant to carry out the engineering work

for the placement of the transmission line structures. Detailed engineering and construction and erection of lines and substations will likewise be carried out under contract by companies with recognized experience and expertise, in accordance with ANDE policy and Bank procedures. ANDE will also be responsible for preparing the basic planning and bidding documents for the second group of works, with the aid of outside consultants where necessary.

- 3.10 The studies on upgrading the existing transmission system, extra-high voltage lines, and final placement of the 220-kV compensator, and those on efficient use of electricity and energy savings in the distribution system and on measures to reduce power loss, will also be put out to contract by companies with proven experience in this area and in accordance with the Bank's standards and procedures.
- 3.11 Contracts for procurement, construction, and consulting services financed by the Bank will be awarded as stipulated in Annexes B and C to the loan contract. International competitive bidding shall be used to award all contracts for consulting services valued at over US\$200,000; for procurement in excess of US\$250,000; and for construction works valued at more than US\$3 million. As well, all procurement charged to local counterpart funding must be done by local competitive bidding or by calls for bids from prequalified firms, as stipulated in Law No. 966 which regulates ANDE.

D. Recognition of expenses, advances, and schedule of expenses

- 3.12 To ensure that the transmission works adhere to the project timetable, it will be necessary to award contracts for engineering services relating to the placement of the tower structures, environmental studies, and eventual expenses incurred for preparation and cleanup of rights-of-way and land purchases even before the loan is approved by the Bank. These expenses, estimated at US\$290,000, will be recognized as part of the counterpart funding provided by ANDE.
- 3.13 The overall execution period of the project is estimated to be 34 months reckoned from the time contracts are let and the fabrication of the power equipment for the Group I works begins. The schedule of expenses is shown in Table III-1:

Table III-1 Overall execution period for the project							
Source	Preliminary expenses	1996	1997	1998	1999	Total	%
IDB	0	4,890	23,330	15,940	5,840	50,000	75
ANDE	290	1,280	7,530	5,840	1,430	16,370	25
TOTAL	290	6,170	30,860	21,780	7,270	66,370	100
%	0	9	47	33	11	100	

- 3.14 Annex III-4 presents a breakdown of project expenses by component and source of financing for the project's entire four-year duration.
- 3.15 Given the nature of the project, financial resources must be available to permit rapid and efficient execution of services and works. Accordingly, a fund in the amount of 10% of the total financing to be provided by the Bank should be established as an advance.

E. Land and rights-of-way

- 3.16 Virtually the entire strip of land forming the right-of-way along the line between San Patricio and Guarambaré has now been mapped out, and the process of compensating the various owners (all of whom have been identified) for the restrictions on this land, which will not affect its ownership, needs to be concluded. Few problems are anticipated in obtaining the necessary easements for this project. No additional land is required for the expansion of substations, and although it will be necessary to purchase land for the new stations at San Antonio and San Juan Bautista. These areas have already been identified and specific sites chosen.

F. Operations and maintenance

- 3.17 Within ANDE's organizational structure there are two units in charge of the operation and maintenance of Paraguay's electricity grid, one of which is specifically responsible for looking after the transmission system (power lines and substations). To date this system has been operated and maintained in a satisfactory manner, so that there is no reason to expect difficulty in providing the same service at the new installations to be built under the project.
- 3.18 Nonetheless, it is recommended that during the five-year period following completion of the project works, ANDE submit to the Bank for approval an annual report on the maintenance of the works and equipment, including results achieved, the organization of tasks, and the physical and human resources required to carry out the necessary maintenance each year.

G. Environmental considerations

- 3.19 The environmental effects of the works, in particular the construction of the new transmission line (235 km) and the expansion/construction of substations (Ayolas, San Patricio, Guarambaré, Paraguarí, San Lorenzo, and San Juan Bautista), were studied in detail in an environmental impact assessment. This study was and its conclusions were reviewed by ANDE's environmental unit and have been made public.
- 3.20 In general, the environmental effects of building the transmission line and expanding/constructing the substations are limited in magnitude and intensity, and bear only on the right-of-way and

areas in the immediate vicinity of the substations. Measures to mitigate adverse effects on the environment will be adopted as specified in the bidding documents and construction contracts. The execution of these works will be supervised and monitored by ANDE's environmental unit.

- 3.21 The transmission line runs largely through pastureland used for intensive livestock raising, occasionally crossing woodlands, riverside forest, and wetlands along certain stretches. The route avoids protected areas and fragile ecosystems, and specific steps will be taken to protect wetlands and tower access roads in areas with significant forest cover. The electromagnetic effects of the high-tension lines will be minimal (interference with telecommunications and radio broadcasts) and will not affect the people in these areas.
- 3.22 Specifically, protective measures will be taken during construction and operation of the new line to prevent damage to forests, wetlands, and birdlife. Steps will also be taken to avoid endangering crop dusters or encroaching on wildlife areas such as Lake Ypoá National Park and the Yabebyry Wildlife Refuge. No chemicals or devices employing toxic substances will be used in the maintenance of the right-of way. Construction of the power line will also affect some homes. These will have to be relocated and compensation negotiated.
- 3.23 The project will strengthen the technical and operating capacity of ANDE's environmental unit to ensure proper monitoring of the environmental aspects of the works and provide the Authority with the necessary capacity to carry out environmental management and supervision.

H. Ex post evaluation

- 3.24 In accordance with the Bank's policy and following discussion between the borrower and the executing agency, it was decided not to include an ex post evaluation as part of the project activities. However, it should be noted that an ex post evaluation could eventually be carried out with little difficulty since market, costs, and project performance data, and information on the other economic parameters needed for a study of this type, will be readily available.

IV. BORROWER AND EXECUTING AGENCY

A. The borrower

- 4.1 The borrower will be the Republic of Paraguay, which will onlend the resources to ANDE on the same terms and conditions as the contract with the Bank. Prior to the first disbursement, the borrower must submit to the Bank an agreement, whereby the Bank's resources will be transferred to ANDE subject to the aforesaid terms and conditions.

B. The executing agency

1. Institutional aspects

- 4.2 ANDE will be the executing agency for the project. The Authority is an autonomous agency owned by the State and reporting to the Executive Branch through the Mines and Energy Department (SME) under the MOPC. The mandate of ANDE is to satisfy the nation's needs in terms of electricity, and both its charter and its general organizational structure are designed with this mission in mind.
- 4.3 The objectives and specific duties of ANDE are established under Law No. 966 of August 12, 1964, which charges the Authority with the task of coordinating and directing the development of Paraguay's electricity sector. To this end, ANDE: (i) drafts plans and programs for development of the electrical power system; (ii) designs, builds, and operates publicly-owned facilities for generation, transmission, and distribution of energy; and (iii) participates in activities involving all other electric power facilities in which any government agency has an interest, in order to ensure coordination of national programs for development of the electricity sector. Similarly, ANDE is authorized to participate in the design, management, and financing of those private-sector projects for the supply of electrical power which are considered to be in the national interest. Finally, ANDE is also entitled to buy and sell electric power within Paraguay and outside the country.
- 4.4 The proceeds of loan 648/OC-PR will be used to help the Authority conduct a comprehensive study of its existing organizational structure, and of most of the systems and procedures relating to its administrative, commercial, technical, and financial management to its planning capabilities. This institutional strengthening program is being carried out by a consortium formed by a Brazilian electric utility company with a great deal of experience in the management and direct administration of electricity services. This company is developing its activities in accordance with the terms of reference approved by the Bank.

- 4.5 As of December 31, 1994, ANDE had a total staff of 2,603 employees - virtually unchanged from 1990. Productivity, on the other hand, has risen considerable since that year owing to the increase achieved in the volume of its operations. The Authority's production figures rose from an average of 162 customers served and 815 MWh in sales per employee in 1990, to 239 customers and 1,206 MWh per employee in 1994, for productivity gains of 47% and 48%, respectively. The 1994 figures compare favorably with those of other electric utilities in Latin America and the Caribbean.
- 4.6 ANDE's financial management is quite adequate. The accounting system it uses is acceptable, and is set out in detail in a manual. Financial statements are prepared on a monthly basis and the budgetary information required by law is kept up to date. The data provided is reliable and independent outside auditors have always issued favorable opinions on ANDE's financial statements.
- 4.7 Its procurement and contracting system is well-defined in the act creating ANDE, and in the standards and internal procedures set up by the company. The Authority's insurance coverage is being extended on the basis of a study conducted in 1990 under the contract for loan 520/OC-PR.

2. Audits

- 4.8 It is recommended that the proposed loan contract include a provision requiring the executing agency to submit annual financial statements to the Bank throughout the contract period, and those of the project during its execution, duly audited by an independent firm of certified accountants approved by the Bank and in accordance with the Bank's requirements. The first financial statements to be submitted will be those for the 1996 fiscal year.

3. Recent financial, operating, and equity position

- 4.9 The company's income statement for the period 1992-1994 shows the following:
- a. Annual growth in physical sales has averaged 13% over the period. Total energy losses increased to around 17% in 1994, as average electricity rates were up from US\$41.8 mills/kWh in 1992, to US\$42.1 mills/kWh in 1994. This combination of factors enabled operating revenues to grow from US\$99 million to US\$134 million over the three-year period, an increase of 35%.
 - b. The change in rates charged by the company during the period was due in part to adjustments for inflation, that included average nominal adjustments of 16.6% in January 1994 and 8.9% in April 1993. The latest proposed rate adjustment of 17.5% approved in May 1995 allows the company to comply with rate provisions of a financial nature contained in the loan contracts signed with the Bank.

- c. ANDE's operating costs rose from US\$94 million in 1992 to US\$125 million in 1994, representing a very slight rise in the nominal unit cost of electricity, from US\$39.2 mills/kWh (1992) to US\$39.8 mills/kWh (1994).
 - d. Net operating income rose in absolute terms from US\$5 million to US\$8 million over the 1992-1994 period. Nevertheless, operating revenues in 1993 were not enough to cover operating costs fully, resulting in an operating deficit of US\$1 million. This was because the rate increases approved for that year did not keep up with domestic inflation. ANDE's operating profit during the period represented a 1.2% return on investment in 1994, compared to 0.7% in 1992. Despite this unimpressive performance, the institution is on its way to overall financial recovery as will be pointed out below.
- 4.10 A particular feature of ANDE is its considerable earnings in the form of nonoperating income which, in 1994, included US\$12.9 million in profit and compensation from Itaipú, US\$1.7 million in compensation from Yacyretá, and US\$7.3 million in interest from banks. With total nonoperating income net of charges for exchange differences (US\$13 million), ANDE was able to cover almost all financial charges and turn a net operating profit for the year.
- 4.11 As of December 31, 1994, ANDE reported total assets equivalent to US\$1.025 billion. Fixed assets represent 76% of the total, working capital accounts for 14%, and deferred charges, other non-liquid assets, and investments, mainly Itaipú (US\$50 million) and Yacyretá (US\$17.5 million), for the remaining 10%. Collections have continued to improve, reaching a ratio of 92% in 1994, well above the figure specified in contracts with the Bank (85%) and exceeding normal practice in the industry.
- 4.12 It must be remembered that ANDE did not pay amounts owed for power purchased from Itaipú in 1993 and 1994. This was due to an energy cost saving initiative by the company in 1993 whereby ANDE purchases power from Itaipú under a Brazilian debt-transfer plan. In 1995, ANDE used this method to pay the entire balance owing for the period. This operation is reflected in the company's financial projections, analyzed below.
- 4.13 ANDE's leverage ratio is moderate (0.60 in 1993 and 0.55 in 1994, compared to the maximum of 1.0 permitted under loan 648/OC-PR) and its current ratio is acceptable (1.3 in 1994; 1.2 in 1993). The company's main creditors as of December 31, 1994, were the IDB (with a long-term debt of US\$104.9 million), Banco do Brasil (with US\$79.7 million remaining from the financing of ANDE's participation in Itaipú), the OECF (US\$71.8 million), and Banco de la Nación Argentina (US\$44.3 million relating to the financing of ANDE's investment in Yacyretá). Its total long-term debt as of December 31, 1994, was US\$320.7 million, of which US\$313.4 million was denominated in foreign currencies.

- 4.14 In terms of cash flow, ANDE reported internally generated funding of US\$13 million in 1992, US\$11 million in 1993, and US\$47.5 million in 1994. With the exceptions noted elsewhere, this enabled ANDE to meet its contractual obligations under loan 648/OC-PR: its net contribution to the investment program (entirely from operating funds) totalled 34.5% in 1992, 5.5% in 1993, and 46.3% in 1994 (versus a minimum level of 25% required under the contract).

4. Financial projections

- 4.15 ANDE's projected financial statements for the 1995-2004 period are calculated in current United States dollars, on the assumption that rates will be adjusted in real terms to 89% of long-term marginal costs by 1998. Owing to the estimated increase in the volume of energy sales, ANDE's operating income will grow rapidly, by 17% in 1995, and at a annual average rate of 12.6% over the entire period to 2004. Annual operating revenues will thus average some US\$320 million over the decade.
- 4.16 Average incremental operating costs will rise in constant terms by approximately US\$0.0528/kWh of sales in the period. As a result, ANDE's operating margin will increase beginning in 1995, in both absolute and relative terms, from approximately 4% to 5% of investment in services. Even without the discount on energy purchased from Itaipú under its special arrangements for payment of its energy purchases, ANDE will be able to cover any significant exchanges losses resulting from debt denominated in foreign exchange and still post a profit.
- 4.17 ANDE's total assets will grow during the period at a cumulative average annual rate of 4%, to US\$2.012 billion by the end of 2004. No major structural changes are likely in the composition of its assets or its financial mix, since no significant changes in the financial strategy it has been using are anticipated. Accordingly, ANDE's debt burden will continue to be moderate, with a debt-equity ratio edging up from 0.58 in 1995 to 0.62 by the year 2004 (still well below the company's borrowing power) and a current ratio remaining above 1.20. It is assumed as well that ANDE's collection of accounts payable will continue at its present average of 30 days.
- 4.18 The variables discussed above reflect positively on projected cash flow which indicates that the company has the potential to accumulate a cash surplus of approximately US\$52 million during the 1995-2000 period. The determining factor is the financing strategy pursued by the company to obtain US\$180 million from KfW, OECF, and other international agencies to cover its funding requirements for the rest of the investment program planned for the period. Although the company will thus incur substantial financial obligations, its cash flow from operations will be sufficient to service its long-term debt (with a coverage ratio of 1.9 on average and never below 1.5), while also making a major contribution to its investment program. The company's internal financing ratio for the

decade is projected to average 56%, although with considerable fluctuation from one year to the next, but never below 25% except in 1996 when the projection is for 19%.

- 4.19 Table IV-1 below summarizes ANDE's financial projections for the period 1995-2000:

<p style="text-align: center;">Table IV-1 ANDE Financial projections, 1995-2000 (in US\$ millions)</p>							
	1995	1996	1997	1998	1999	2000	Total
Internal financing	92	63	71	87	102	112	527
Debt service	39	40	43	50	52	54	278
Net generation of funds	53	23	28	37	50	58	249
Loans	32	88	60	41	36	42	299
All sources	85	111	88	78	86	100	548
Construction program	45	120	88	65	55	70	443
Change/working capital	21	-12	-7	9	12	14	37
Other uses	3	3	2	0	2	1	10
Annual surplus	16	0	5	4	17	15	58

- 4.20 From the above it can be seen that ANDE will maintain a comfortable level of solvency over the period analyzed, with good indicators and no major problems anticipated. To consolidate these results, however, it will be necessary to ensure that the company continues to abide by the operating and financial policies on which these projections are based. Accordingly, it is recommended that:

- a. ANDE's electricity rates be sufficient to cover its operating expenses and debt service, and, in addition, to contribute a reasonable proportion of the funding needed for its investment program. This proportion must be approved by the Bank on an annual basis, at least three months prior to the date on which the financial year begins.
- b. ANDE be required to show proof annually that it has collected at least 85% of its receivables during the year, including the initial balances owing.
- c. ANDE not incur new long-term debt which would result in: (i) a long-term debt/equity ratio above 1.0; or (ii) a coverage ratio for servicing long-term debt that is less than 1.5.
- d. ANDE maintain a current ratio of not less than 1.2.

V. FEASIBILITY OF THE PROJECT

A. Technical feasibility

- 5.1 The components of the project were defined on the basis of studies carried out by ANDE with the help of consultants, using acceptable standards and procedures, up-to-date data and generally accepted methods of analysis commonly used for technical evaluations of this type. The transmission works and substations have been designed according to the most appropriate technical solutions, and are compatible with existing installations in ANDE's electric power system. Final engineering designs have been prepared for all of the works in Group I, which represents 74.3% of total direct costs. A preliminary proposal has been prepared for the works in Group II, and the completion of all engineering studies necessary for their construction is also included as part of the present project.
- 5.2 Together with other construction already in progress and designed to expand and strengthen ANDE's existing transmission and transformer infrastructure, the works in this project will make it possible to meet the growing demand for electricity using power from the Itaipú, Yacyretá, and Acaray hydroelectric generating stations, while improving the quality of electric power service and maintaining it at acceptable levels. The hydroelectric stations just mentioned will provide sufficient energy to meet domestic demand for the foreseeable future, with a large surplus for export to Argentina and Brazil. Paraguay's electricity system will be highly flexible, with the capacity to supply electric power from these plants by the most economical route through the transmission system that will form a ring network passing through Asunción and interconnecting with these hydroelectric plants.
- 5.3 The estimates used to cost the project are reasonable, calculated according to the quantity of works to be built and existing designs, on the basis of foreign and domestic unit prices from the most recent bidding competitions held by ANDE for the construction of similar works. Technical, economic, and financial criteria acceptable to the Bank were used, and reasonable margins have been allowed for possible price escalation and contingencies.
- 5.4 No problems are anticipated with the purchase of land or rights-of-way needed for project works; nor should there be any difficulty in securing the timely provision of goods and services.
- 5.5 The methods used in carrying out the works under the supervision of ANDE are deemed adequate since the company has had a great deal of experience with similar works of this kind. There is every reason to assume, therefore, that the works can be built on time within the project schedule, which is considered realistic.

- 5.6 With regard to the operation and maintenance of the facilities, ANDE has qualified personnel and the necessary capacity and experience to exercise these functions. Thus, all components of the project are deemed technically feasible.

B. Institutional feasibility

- 5.7 ANDE will be responsible for execution of the technical, administrative, and financial aspects of the project. It has operated as an efficient executing agency in the past for projects financed by the Bank and other international lending agencies. Consequently, it has the necessary experience and expertise to carry out the proposed project in a timely fashion and within the budget presented.
- 5.8 The GEP will have basic responsibility for the project, and will have the logistical support of both the GTC and the DSA. The project executing unit, which reports to the GEP, will continue to carry out all tasks required for execution of the project, for which it has the necessary personnel and skills.

C. Financial feasibility

- 5.9 It is apparent from the financial projections that ANDE will generate sufficient resources during the execution period to cover the counterpart requirements of the project. At the same time, its financing and investment strategy will enable it to maintain a relatively solvent position. Virtually the only risk involved is the possibility of rates not being high enough. In 1994, the government submitted a formal proposal to the Bank concerning its policy in this area, indicating that rates are to be set on the basis of the economic cost of supplying electricity. Since then, it has been raising rates in keeping with this policy. The measures taken - which must be continued - are appropriate for achieving the restructuring of the sector.
- 5.10 By the same token, special attention is necessary during supervision of the project to verify strict compliance with recommendations that ANDE maintain its rates and financial policies within the parameters approved by the Bank. Assuming that ANDE complies, the financing for the project will be adequate and the financial standards used will be reasonable, conforming to the Bank's operating policies in this area.

D. Economic feasibility

- 5.11 The economic analysis of the project included a least-cost study and a cost-benefit analysis.
- 5.12 The demand projections used for the baseline study under the analysis suggest that national demand will rise by an average rate of 8.1% over the period 1994-2005, the same as the rate for the metropolitan system. These projections assume that the trend of the past five years will continue, but with growth gradually slowing.

- 5.13 The least-cost analysis, based on the results of various electrical studies, made it possible to identify the most economical alternative for accomplishing the objective, which is to find an efficient way of meeting the increasing expansion and concentration of demand in the Asunción area. The Ayolas-Guarambaré transmission line turned out to be the most economically efficient solution owing to its lower investment costs compared with the 500-kV or 220-kV lines from Itaipú.
- 5.14 The benefits of the project are derived primarily from the additional energy that will be delivered compared to the situation without the project. This is consistent with the main objective of incorporating these new installations into the grid: namely, to accommodate the growing demand with reasonable efficiency and quality of service (i.e. by keeping losses and voltage levels within acceptable limits). To put it another way, the essential benefits are seen to derive from the capacity of the system to meet increasing demand, while the reduction in losses and the increase in reliability are considered less significant.
- 5.15 Although the new line will serve the Asunción area primarily, it will benefit the entire interconnected system as well since it will permit more efficient operation throughout the grid. An important point to keep in mind is that this new line will be technically superior to the existing 220-kV lines connecting the Acaray and Itaipú stations to the metropolitan system, with 32% more capacity per circuit.

Table V-1 Cost-benefit analysis (net present value in US\$ millions/December 1994)		
Benefits		309.1
Incremental sales	755.4	
Consumer surplus	373.5	
less: cost of incremental energy	-848.8	
Benefit from lower losses and greater reliability	29.0	
Costs		56.4
Investment costs	49.7	
Incremental operations and maintenance	6.7	
Net benefit		252.7
Internal rate of return		41.2%

- 5.16 The present project has an internal rate of return (IRR) of 41.2% and a net present value (NPV) of US\$252.7 million, discounted at 12% and assuming a useful life of 25 years. A sensitivity analysis was conducted to observe the effect on profitability of possible changes in certain variables. The following cases were considered

in this analysis: (i) increases in investment, operating, and maintenance costs; (ii) electrical power rates remaining unchanged in real terms (remaining at the average level in 1995); (iii) reduction in incremental demand; and (iv) increase in the incremental cost of energy. The results obtained indicate that project profitability is particularly sensitive to rate levels (which determine the willingness to pay for incremental energy), showing that if rates remain at the current level without the increments in the real rate of electricity planned under the current tariff policy, the project's rate of return will become marginal.

Table V-2 Sensitivity analysis		
	IRR (%)	NPV (US\$ mill)
Constant rates (average level in 1995)	12.5	3.3
Cost of energy rising by 20%	22.7	83.0
Investment and operating & maintenance costs rising by 30%	35.2	235.8
Consumer surplus reduced by 50%	22.9	65.9
Fall in demand (incremental demand reduced by 20%)	31.3	136.9

- 5.17 The results of the sensitivity analysis confirm the need to maintain the course adopted by the government in the area of electricity rates. The planned adjustments not only ensure better allocation of resources and correct existing distortions in the rate structure, but also make it possible to generate additional financial resources required by the sector to maintain its operations and meet expansion requirements. Growth in demand for electricity in Paraguay appears to be limited only by supply, so that the requirement for investment in new transmission lines and distribution networks will remain at a high level well into the coming decade.
- 5.18 Under the terms of loan 648/OC-PR, overall electrical power rates in Paraguay must equate to 89% of the average long-term incremental cost of electricity by 1998 (this is the rate used in the baseline study for analysis of the project), and progress must be made in bringing the rate structure into line with actual costs of supplying electricity at different voltage levels. These goals provide suitable guidelines for the current policy, although they may be reviewed once results are in from a more extensive study of costs and rates being carried out under the project in progress.
- 5.19 Aside from changes in electricity rates, the profitability of the project is also sensitive to higher energy costs and a reduction in demand. In the first case, an increase of 20% in the incremental cost of energy would reduce the IRR to 22.7%, which is to be expected since energy (calculated on the basis of the long-term

incremental cost of electricity) is the principal cost under the project. As to a drop in demand (equivalent to a reduction of around 20% over the useful life of the project, compared to the baseline study), the IRR would be lowered to 31.3%. The impact of higher investment and operating and maintenance costs on IRR is of only minor significance. Finally, the assumptions of the baseline study are seen to produce a very healthy project since lowering the IRR by 12% would require a drop of 58% in demand, or an increase of 30% in the incremental cost of energy, or a 68% reduction in the consumer surplus.

- 5.20 An analysis was made of the timing of the project as well to determine the optimal time for bringing it into operation and therefore the best time to begin construction. This analysis, based on the benefits in the first year of operation, confirmed that the first circuit of the line should come into service in 1998 as scheduled under this project.
- 5.21 During the last stage of the analysis, the possibility (see paragraph 1.8) of the government's awarding a concession for operation of the CHY to a private operator (an initiative to this effect is currently being negotiated between Argentina and Paraguay) was explored. Although the exact terms of this concession have yet to be worked out, and it is not known therefore to what extent the prices paid by ANDE for energy from CHY will be affected, an analysis was conducted to assess the effects of an eventual rise in the price of energy on the economic benefits of the alternative selected. This analysis found that the project would be preferable to the least-cost alternative for the supply of energy from Itaipú, up to a value of US\$40/MWh - i.e. 30% more than the cost of energy used in the baseline study in the analysis. This value is high when compared to current prices on Argentina's wholesale market, which is the natural market for the CHY. These prices have been gradually dropping for several years, and this trend should continue in the medium term owing to current expansion of generating capacity (essentially, expansion of the CHY itself and thermal generating plants using natural gas).
- 5.22 In addition, the eventual exportation of energy from Yacyretá to Brazil will require major investment in the transmission systems of Argentina and Brazil. Considering that the marginal cost of expanding energy generation in Brazil is currently on the order of US\$42/MWh, with important hydroelectric resources yet to be tapped, the price of energy from Yacyretá is likely to reach the indifference value obtained in the analysis. It is worth adding, as well, that this analysis was based only on the investment costs and energy losses involved in each of the alternatives without considering the advantages that the selected alternative affords for Paraguay's electricity system in terms of greater flexibility of operation and diversification of energy sources.

5.23 Accordingly, based on the economic analysis of the project, it is recommended that:

- a. As a condition for disbursement, the borrower must demonstrate to the satisfaction of the Bank that the annual power rate targets have been updated in real terms and must be met to comply with the rate-policy objective agreed on with the Bank and evidence that the rate increases needed to achieve these targets for the year were approved.
- b. Unless otherwise agreed by the parties, prior to each call for bids or invitation to bid, if applicable, for the supply of goods or start up of the works for the works in the second investment component, the borrower through the executing agency shall demonstrate that the rate increases for the current year that are needed to meet the targets set out in the preceding paragraph have been approved.
- c. The borrower must provide the Bank with the preliminary results of the new study on electricity costs and rates by the end of 1996, together with a proposed tariff policy incorporating the study's recommendations so as to achieve the desired objectives in the most appropriate manner.

E. Environmental feasibility

5.24 The environmental aspects of the project have been analyzed and proper measures will be taken to prevent or mitigate possible adverse effects caused by the construction of the transmission line and substations. Moreover, the loan contract will state that measures which contractors must take to mitigate direct environmental impact (environmental specifications) have to be included in all bidding documents and construction contracts for the project. ANDE's environmental unit will supervise implementation and evaluate the effectiveness of such measures. The technical and operational capabilities of this unit will be enhanced by hiring an environmental expert for consultation on matters relating solely to the supervision of measures to mitigate any adverse environmental effects that may arise during project execution. This consultant must be hired prior to the first disbursement of the financing.

5.25 Based on the contents of chapter III and the recommendations put forward, it is our opinion that the project is viable from the environmental standpoint.

F. Risks

5.26 The project does not present any significant technical or environmental risks. As indicated earlier, the principal risk associated with the operation has to do with ensuring continuity in the application of the rates policy approved by the Bank. The government has begun taking steps to bring rates more in line with the economic

cost of electricity in the medium term. The proposed loan contract will include tariff and financial commitments to promote the necessary actions for achieving this goal.

- 5.27 It should be noted that parallel financing is being provided for the operation by the MIF, in support of the government's effort to reform the regulatory and institutional framework of the energy sector. Given the current situation in Paraguay's electricity sector, high priority is being placed on these reforms which are needed to attract private operators. The recent approval by Paraguay's Congress of new standards for the restructuring of the telecommunications sector, and the launching of a similar process in the areas of water and sanitation, are indications that conditions are right for reforms in the energy sector and for an electricity pricing policy consistent with the objectives sought here.

LOGICAL FRAMEWORK
YACYRETÁ TRANSMISSION SYSTEM
(PR-0030)

OBJECTIVES	INDICATORS	MEANS OF VERIFICATION	ASSUMPTIONS
GOAL 1. To help raise the standard of living and contribute to the development of productive sectors in Paraguay by making optimal use of the abundant electric generating capacity available.	1. The coverage of the country's electric utility service increases from 623,000 customers in 1994, to 950,000 in the year 2000. Consumption per residential user rises from 2,468 kWh in 1994, to 2,850 kWh in the year 2000, and total consumption in the industrial sector increases from 765 GWh in 1994, to 1,350 GWh in the year 2000.	1. Operational management report from ANDE.	(Goal to supergoal)
PURPOSE 1. Demand for electric power is met by the public utility in a timely and efficient manner.	1.1 Transmission and transformation capacity must permit the supply of electricity to the eastern part of the country to grow from 645 MW in 1995, to around 925 MW in 1999. 1.2 Energy losses at peak demand in the transmission and subtransmission system (at the 220-kV and 66-kV voltage levels) will be reduced from 9% in 1995 to approximately 8% in 1999. 1.3 The level of reliability of the transmission system will be consistent with international standards by 1999 — the failure rate in the 220-kV system will not exceed 2.0 interruptions of three minutes or more for every 100 km/year in 1999 (compared to 3.0 in 1994).	1.1 Operational management report from ANDE. 1.2 Operational management report from ANDE. 1.3 Operational management report from ANDE.	(Purpose to goal) 1. The government continues to apply the new rate policy for the electricity sector.

OBJECTIVES	INDICATORS	MEANS OF VERIFICATION	ASSUMPTIONS
<p>OUTPUTS</p> <p>1. Energy transmission and transformer works connecting the Yacyretá station with the metropolitan Asunción system completed and in operation.</p> <p>2. Works to reinforce the existing transmission system completed and in operation.</p> <p>3. Studies to optimize the existing transmission system, identifying measures to increase the use of available capacity.</p> <p>4. Detailed study of options for 500-kV feeder by means of transmission lines from Itaipú (Right Bank) and/or Yacyretá, to the metropolitan system, identifying the optimal configuration to be implemented in future.</p>	<p>1.1 By June 1998, two 220-kV transmission line circuits will be available for the system between Ayolas and Guarambaré, in the Asunción area, including expansion of the existing stations at Ayolas, San Patricio, Paraguari, and Guarambaré for incoming and outgoing lines, with a total of 285 km of extension, 250 MVA of transmission capacity, and an additional 180 MVA for expansion of the transformer capacity, of the stations at Paraguari and San Lorenzo.</p> <p>1.2 Expansion of the service yard at the Ayolas station, installation of an additional 41.5-MVA transformer at this same station, and construction of the San Juan Bautista 20-MVA station must be completed by the first quarter of 1999.</p> <p>2.1 By June 1999, around 90 megavars in 66-kV reactors must be available, along with a 220-kV static compensator of approximately 200 megavars.</p> <p>3.1 By mid-1997, the studies for optimization of the existing transmission system and the list of measures to be taken to increase the use of existing capacity must be submitted.</p> <p>4.1 During the first half of 1998, a proposed plan of action will be submitted for implementing the recommendations made in the studies on feeder options.</p>	<p>1.1 Inspection reports on works.</p> <p>2.1 Inspection reports on works.</p> <p>3.1 Inspection reports on works.</p> <p>4.1 Final report on the studies and plan of action.</p>	<p>(Output to goal)</p> <p>1. A new rate policy is approved and applied to bring electricity rates closer to the long-range marginal costs of supply in the medium term.</p> <p>2. The government undertakes the institutional and regulatory reforms developed for the electricity sector with financial support from the MIF.</p>

OBJECTIVES	INDICATORS	MEANS OF VERIFICATION	ASSUMPTIONS
<p>5. Study of physical aspects of ANDE's distribution system with a series of measures for the control and reduction of power losses, and survey of the characteristics of ANDE's consumers with an assessment of potential energy savings and preparation of a program of activities to ensure the efficient use of electricity on the part of consumers.</p>	<p>5.1 By December 1997, the study on the reduction of losses and optimal use of electricity in ANDE's distribution system must have been submitted.</p>	<p>5.1 It must be verified that the pilot plan with the measures recommended in studies on optimal use of electricity has been implemented by the end of 1998</p>	
<p>INPUTS</p> <p>1.1 See program schedule.</p>	<p>1.1 See detailed budget for the project.</p>		<p>(Input to goal)</p> <p>1. An environmental management plan will be developed and implemented consisting of:</p> <ul style="list-style-type: none"> (i) environmental specifications for the construction and operation of transmission lines; (ii) schedule and environmental protection activities to prevent mitigate the indirect effects of the works; and (iii) plan for relocation of housing units affected by construction of the line and substations.

PRINCIPAL CHARACTERISTICS OF PROJECT COMPONENTS

A. Investment component

The investment component consists of a project to expand ANDE's transmission system which is required to come into operation between 1998 and 1999. This component is divided into two groups of specific transmission line works, transformer stations and other equipment, arranged according to the project work schedule and the year in which the respective installations are to come on line.

1. Group I

This group includes construction of a transmission line that will complete a ringed network between generating plants on the Paraná River and the Asunción area, enabling the energy produced by these plants – mainly the Yacyretá hydroelectric generating station – to be supplied to the eastern part of the country by the southern and metropolitan systems, together with related transformer works – all of which is scheduled to come into operation in 1998.

The principal characteristics of these works are described below, together with anticipated benefits expected in each case:

a. Transmission lines

(i) Construction of San Patricio-Guarambaré 220-kV TL

This TL (prepared for double circuit) will stretch 235 km with an initial circuit, the construction of which will require installation of 647 structures and 750 km of 950-MCM conductor with 250-MVA transmission capacity.

Compared to the lines leaving the Itaipú and Acaray plants (five in all) which have 30% less capacity due to the type of conductor used (636 MCM), the San Patricio-Guarambaré line will have lower impedance than any of the aforementioned lines, and will therefore carry energy that will be regulated by the generators of the Yacyretá plant.

This line will add a new source of generating power to the system and is expected to yield the following benefits: (a) expand capacity to meet rising demand, particularly in the metropolitan system; (b) provide increased reliability throughout the terminal system; (c) ensure greater flexibility and versatility in the operation of the system; and (d) reduce losses in the system which, with the increase in transmission capacity, will have more suitable voltage levels (avoiding overloads).

(ii) Replacement of conductor and second Ayolas-San Patricio TL circuit

The existing 220-kV line (which entered into service in 1987) is part of the stretch that supplies the southern system with energy from the Itaipú/Acaray area and has of a circuit made up of 636-MCM conductors. This will create a bottleneck when energy from Yacyretá is supplied simultaneously to the southern and metropolitan systems once the Yacyretá-Ayolas and San Patricio-Guarambaré lines are ready. Accordingly, the existing typology will be adapted to the new line, and the present conductor will be replaced with one of greater diameter (950 MCM) and the existing towers adjusted to accommodate a second circuit, in order to support the new load. This line, together with the one from Yacyretá to Ayolas (scheduled to come into operation in September 1995 - having been built with IDB financing under loan 648) will enable the Authority to meet the additional demand from the southern system, in addition to the benefits to the San Patricio-Guarambaré TL as already mentioned.

b. Substations

Works will be required for expansion of existing substations (or those that will be in operation until the TL is placed in service) solely to accommodate the entry and exit of the new lines, along with works designed to also increase the transformer capacity of these stations. In addition, construction of a new 220/23-kV substation will be required as described below:

(i) Expansion of the Ayolas station

The existing 220-kV station is currently being expanded with resources from loan 648 to receive the line from Yacyretá. The work included under the present project is to prepare for the outgoing line to San Patricio, and to improve the switching capacity of the substation.

(ii) Expansion of the San Patricio station

This substation is being built under loan 648. It is due to come on stream at the end of 1996 to serve local demand. Its expansion in 1998 under the present project is intended to: (a) prepare the incoming TL from Ayolas and the outgoing line to Guarambaré; and (b) upgrade substation switching capacity through the addition of new equipment.

(iii) Expansion of the Guarambaré station

This station currently operates at 220/66/23 kV. Plans are included under the present project for installation of 220-kV positions for the incoming line, plus expansion of the substation's switching capacity.

(iv) Expansion of the Paraguari station

This is an existing 66-kV substation (66/23-kv - 20-MVA transformer). Under the present project, switching equipment will be installed for

interconnection with the new line and a bank of 220/66-kV transformers will be added (3 x 20 MVA for a total of 60 MVA) to meet the incremental demand and improve the quality of service in the area served by the project (better voltage profile in the substation and lower losses), since the process involves converting from a radial system to a ring system.

(v) Expansion of the San Lorenzo station

Under the present project, the existing 220/66-kV station will be expanded by replacing two banks of 60-MVA transformers with two banks of 120-MVA capacity transformers, which will: (a) increase the availability of power and improve the voltage profile, thereby reducing losses; (b) strengthen the 66-kV ring in the metropolitan region; (c) improve the operation of the 66-kV static compensator on the San Lorenzo substation (+150 megavars, -80 megavars) by eliminating the existing transformer overload; and (d) restore the old transformers that were replaced and reuse them in another substation so that they remain available to the system.

(vi) Construction of the San Antonio station

This will be a new 220/23-kV substation with a 20-MVA transformer to provide local service in a high-growth urban expansion area on the outskirts of Puerto de Villeta, which currently has a substation fed by a 66-kV line (industrial park). This is the area in which the southern access highway to the city of Asunción will be built in the near future (to be financed by the IDB). As an added bonus, this station will (partially) alleviate the load of the Tres Bocas station and, in general, of the area's 23-kV distribution system.

2. Group II

This group is made up of works to expand and strengthen the existing transformer and reactor system in the eastern region, which are scheduled to enter into operation in 1999.

a. Expansion of 220-kV yard at the Ayolas station

These works are designed to improve the operation of the new line, ensuring improved reliability and safety by replacing switching devices with a busbar configuration.

b. Expansion of 220/23-kV transformers at San Lorenzo

These works include the installation of a 220/23-kV transformer with 41.5 MVA of capacity (there are two at present) to meet the increase in demand within the area.

c. Installation of 66-kV reactive compensation system

The installation of a reactive compensation system with total capacity of around 90 megavars is necessary to improve voltage control at the 66-kV

level. With this added control, the voltage profile and utilization of equipment is improved throughout the system, and loss levels are reduced as well. In order to identify the optimal location in which to install these reactors, ANDE is completing a study of 66-kV and 23-kV voltage which will enable the Authority at the beginning of 1996 to develop the basic design and prepare the bidding documents under this heading of the project (this design work is included in the engineering costs for the project).

d. Installation of 220-kV static compensator

In 1999 a static compensator with capacity of around 200 megavars (the need for which was determined in planning studies conducted by FURNAS-ANDE for the period up to the year 2000) will be installed in an existing station within the Asunción area. In addition to controlling voltage and reducing losses, the compensator will improve the operation of the system under stand-by (loss of line) conditions, providing support for the system and avoiding an eventual collapse of voltage. The above-mentioned studies indicated that for a timeframe to the year 2000 the compensator should be located at Guarambaré, but to determine the optimal long-range location it is important that a study be done to cover the period to at least the year 2010. Determining the location and optimal configuration of the compensator will be made on the basis of the first stage of the study on lines carrying voltages above 220 kV, included as part of the present project.

e. Construction of the San Juan Bautista station

The construction of this new substation with a 220/23-kV transformer and 20-MVA capacity will meet the growth in local demand and avoid the alternative of building a 23-kV distribution line which would stretch 70 km from San Patricio, incurring considerable losses.

B. Studies component

This component includes: (i) a study on optimization of the existing transmission system, identifying measures required to achieve a reduction in electrical losses (i.e. by changing cable diameters); (ii) detailed study of the options for very high voltage feed by means of transmission lines between Itaipú and/or Yacyretá and the metropolitan system, identifying the optimal configuration for expansion of the national electrical power system using longer periods than those currently employed by ANDE planners, with subsequent confirmation during the first stage of the works of the capacity and final location of the 220-kV static compensator, which is due to come on stream in 1999; and (iii) study of the physical aspects of ANDE's distribution system, compilation of measures for control and reduction of electrical losses, and survey of characteristics of ANDE's consumers with an assessment of potential energy savings on their part, and preparation of a list of activities to ensure the efficient use of electricity. A pilot plan to promote these measures will be initiated by ANDE as part of this project.

TENTATIVE PLAN FOR PROCUREMENT OF PRINCIPAL ITEMS

Call for tenders on equipment, works, and studies

DESCRIPTION	DATE	PREQUAL? YES/NO	FORM OF BIDDING	AMOUNT (US\$000s) Dec. 94
A. GROUP I				34,430
1. Substations				13,440
Power equipment (transformers, switching, and protection, by subprogram)	06/96	YES	ICB <u>3/</u>	10,770
Miscellaneous structures (by subprogram)	09/96	YES	ICB <u>3/</u>	770
Civil works (by subprogram)	09/96	YES	ICB <u>4/</u>	910
Electrical works (by subprogram)	09/96	YES	LCB <u>5/</u>	390
Engineering works at San Antonio <u>1/</u>	03/97	YES	ICB <u>4/</u>	400
Electrical works at San Antonio <u>1/</u>	03/97	YES	LCB <u>5/</u>	200
2. Transmission lines				20,990
Purchase of structures <u>2/</u>	06/96	YES	ICB <u>3/</u>	6,620
Conductor, guard cable, anchor, and suspension assembly	06/96	YES	ICB <u>3/</u>	4,730
Works	12/96	YES	ICB <u>4/</u>	9,640
B. GROUP II <u>1/</u>				11,940
Power equipment (by subprogram)	08/97	YES	ICB <u>3/</u>	8,780
Engineering works (by subprogram)	12/97	YES	ICB <u>4/</u>	1,750
Miscellaneous structures (by subprogram)	12/97	YES	ICB <u>3/</u>	300
Electrical works (by subprogram)	12/97	YES	LCB <u>5/</u>	910
Special equipment	07/97	NO	ICB <u>3/</u>	200
C. BACKGROUND STUDIES				1,400
Optimization of the transmission system	04/96	YES	IS <u>3/</u>	200
Very high-voltage feed/static compensator	04/96	YES	IS <u>3/</u>	400
Savings/efficient use of energy	04/96	YES	IS <u>3/</u>	800
TOTAL				47,770

ICB = International competitive bidding with financing from the Bank

IS = International shopping

LCB = Local competitive bidding financed with counterpart funds

1/ Consultants will be hired with counterpart funds in March 1996 to prepare bidding documents for these items under LCB.

2/ Consultants will be hired with counterpart funds through local shopping in May 1996 to determine the locations for structures in the field.

3/ Items financed entirely by the IDB.

4/ Items partially financed by the IDB (50%).

5/ Items financed entirely with local counterpart funding.

DESCRIPTION	COST OF PROJECT (US\$000s)				SCHEDULE OF EXPENSES BY SOURCE OF FUNDING (US\$000s)							
	SHARE %	TOTAL	IDB	ANDE	PREPAID EXPENSES	1996		1997		1998		IDB
						IDB	ANDE	IDB	ANDE	IDB	ANDE	
PERSONNEL AND ADMINISTRATION	6.0	3,950	460	3,490	160	40	220	240	1,780	150	1,100	
Engineering		1,810	0	1,810	100		70		940		580	
Construction		1,200	460	740	50	40	60	240	360	150	220	
Administration		940	0	940	10		90		480		300	
COMPONENTS	69.9	46,370	38,520	7,850	0	4,120	230	20,280	3,700	11,830	3,090	2,140
ELEMENT I	51.9	34,430	28,360	6,070	0	4,120	230	18,390	3,700	5,850	2,140	
Transformers	20.2	13,440	12,190	1,250	0	1,660	40	8,690	800	1,840	410	
— equipment		6,100	6,100	0		0		6,100				
— miscellaneous		2,650	2,650	0		800		1,050		800		
— equipment		2,020	2,020	0		600		810		610		
— miscellaneous		770	770	0		230		310		230		
Equipment	17.4	11,540	11,540	0	0	1,630	0	8,270	0	1,640	0	
— works	2.0	1,310	650	660		30	40	420	420	200	200	
— works	0.9	590	0	590					380		210	
— lines	31.6	20,990	16,170	4,820	0	2,460	190	9,700	2,900	4,010	1,730	
— and guard cable		3,700	3,700	0		740		2,220		740		
— and suspension assembly		1,030	1,030	0		200		620		210		
— lines		6,620	6,620	0		1,320		3,970		1,330		
Equipment and Materials	17.1	11,350	11,350	0	0	2,260	0	6,810	0	2,280	0	
— works and Installation	14.5	9,640	4,820	4,820		200	190	2,890	2,900	1,730	1,730	
ELEMENT II	18.0	11,940	10,160	1,780	0	0	0	1,890	0	5,980	950	2,140
Transformers		1,300	1,300	0				0		1,300		
— equipment		4,880	4,880	0				970		2,930		
— equipment		2,600	2,600	0				780		1,040		
— miscellaneous		300	300	0				90		120		
— equipment		200	200	0				50		100		
— works	14.0	9,280	9,280	0	0	0	0	1,890	0	5,490	0	1,730
— works	2.6	1,750	880	870						490	490	
— works	1.4	910	0	910							460	
STS	1.5	1,000	0	1,000	90	0	400	0	360	0	150	
	1.1	700	0	700	90		310		210		90	
	0.5	300	0	300			90		150		60	
COMPONENTS	2.1	1,400	1,400	0	0	230	0	510	0	660	0	
Existing transmission		200	200	0		50		100		50		
— 220-kV compensator		400	400	0		110		150		140		
— use of energy		800	800	0		70		260		470		
EXPENSES	8.2	5,420	2,100	3,320	40	210	130	1,040	1,440	690	1,400	
— operating expenses		2,370	1,930	440	10	210	30	1,010	200	590	160	
— maintenance		3,050	170	2,880	30	0	100	30	1,240	100	1,240	
	87.6	58,140	42,480	15,660	290	4,600	980	22,070	7,280	13,330	5,740	2,140
STS	12.4	8,230	7,520	710	0	290	300	1,260	250	2,610	100	3,090
		7,020	7,020	0		165		1,135		2,485		3,090
— and supervision IDB		710	0	710			300		250		100	
		500	500	0		125		125		125		
	100.0	66,370	50,000	16,370	290	4,890	1,280	23,330	7,530	15,940	5,840	5,840
— breakdown (%)		100.0	75.3	24.7	0.4	7.4	1.9	35.2	11.3	24.0	8.8	
— percentage by source (%)					0.4	7.4	2.4	42.5	13.7	66.5	22.5	7.4

PROPOSED RESOLUTION

PARAGUAY. LOAN /OC-PR TO THE REPUBLIC OF PARAGUAY
TRANSMISSION SYSTEM OF YACYRETA PROJECT

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 Republic of Paraguay, as Borrower, for the purpose of granting it a financing to cooperate in the execution of a Transmission System of Yacyreta Project. Such financing shall be for the amount of up to US\$50,000,000 or its equivalent in other currencies, except that of Paraguay, which are part of the Ordinary Capital resources of the Bank and shall be subject to the "Special Contractual Conditions" and the "Terms and Financial Conditions" of the Executive Summary of the Loan Proposal.