DOCUMENT OF THE INTER-AMERICAN DEVELOPMENT BANK

NICARAGUA

NATIONAL TRANSMISSION INVESTMENTS FOR INTEGRATION WITH THE SIEPAC PROJECT

(NI-L1015)

LOAN PROPOSAL

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ABBREVIATIONS

CEAC	Consejo de Electrificación de América Central [Central American Electrification Council]
CNDC	Centro Nacional de Despacho de Carga [National Load Dispatch Center]
CNE	Comisión Nacional de Energía [National Energy Commission]
DGCE	Dirección General de Contrataciones del Estado [Public Procurement Directorate]
ENATREL	Empresa Nacional de Transmisión Eléctrica [National Electricity Transmission Company]
ENEL	Empresa Nacional de Energía Eléctrica [National Electric Power Company]
ENTRESA	Empresa Nacional de Transmisión Eléctrica SA
EPR	Empresa Propietaria de la Red S.A.
GDP	Gross domestic product
GTPIR	Grupo de Trabajo de Planificación Indicativa Regional [Regional Indicative Planning Task Force]
GTRT	Grupo de Trabajo de Refuerzos de Transmisión [Transmission Investment Task Force]
IDB	Inter-American Development Bank
IMF	International Monetary Fund
INE	Instituto Nicaragüense de Energía [Nicaraguan Energy Institute]
KFW	Kreditanstalt für Wiederaufbau
MARENA	Ministry of the Environment and Natural Resources
PCBs	Polychlorinated biphenyls
SIEPAC	Sistema de Integración Eléctrica para los Países de América Central [Central American Electric Interconnection System]

PROJECT SUMMARY

NICARAGUA
NATIONAL TRANSMISSION INVESTMENTS FOR INTEGRATION WITH THE SIEPAC PROJECT*
(NI-L1015)

Financial Terms and Conditions

Borrower: Republic of Nicaragua

Executing agency: Empresa Nacional de Transmisión Eléctrica (ENATREL)

Source	Amount (US$)	%
Financing (OC):	6,250,000	42.5
Financing (FSO):	6,250,000	42.5
Total financing:	**12,500,000**	**85.0**
Local:	2,187,000	15.0
Total:	**14,687,000**	**100.0**

	OC financing[1]	FSO financing
Amortization period:	30 years	40 years
Grace period:	5.5 years	40 years
Disbursement period:	4 years	4 years
Interest rate:	adjustable	0.25%
Inspection and supervision fee:	0%[2]	N/A
Credit fee:	0.25%[3]	N/A
Currency:	U.S. dollars, SCF[4]	U.S. dollars

Project at a glance

Project objective:

To ensure that Nicaragua's transmission system is adapted to accommodate the electrical interconnection with the SIEPAC line and, in particular, that energy may be sold in compliance with the safety and reliability standards established for the Regional Electrical System, thereby preventing service interruptions at the national and regional levels.

The amount of the loan indicated in the current country strategy (document GN-2251-8) is US$10 million. This amount was updated to US$12.5 million when the project was being mapped out, which is reflected in the new strategy to be placed before the Board for consideration (paragraph 1.20).

Special contractual conditions:

Conditions precedent to the first disbursement (see paragraph 3.5):

(i) An agreement must be signed between the borrower, acting through the Ministry of Finance, and ENATREL for execution of project activities, which will include: (i) the manner in which project resources are to be transferred and repaid, and (ii) ENATREL's commitment to execute project activities in accordance with the terms and conditions of the loan contract and other operational guidelines (see paragraphs 3.1 and 3.2).

(ii) The project coordinator, as well as the project liaisons in each supporting unit, must be designated in accordance with the terms of reference previously approved by the Bank (see paragraphs 3.2 and 3.3).

(iii) The plan for monitoring and acquisition of right-of-way extensions must be submitted (see paragraph 3.5).

Conditions for project execution

(iv) Before giving the order to begin transmission works under the transmission works component, evidence must be submitted that all right-of-way extensions have been acquired (see paragraph 3.5).

(v) Prior to installation of reactive compensation works under the transformation and compensation component (49 MVAR at 13.8 kV and 249.4 kV), the firm that will condition the oil sumps and PCB tanks must have been commissioned (see paragraphs 3.5 and 4.14).

(vi) During project execution, ENATREL must attain financial indicators and targets consistent with eventual recovery (see paragraph 4.8).

Exceptions to Bank policies: None.

Special disbursement prior to fulfillment to conditions precedent to first disbursement: None.

Project consistent with country strategy:	Yes [X]	No [ ]			
Project qualifies as:	SEQ [ ]	PTI [ ]	Sector [ ]	Geographic [ ]	Headcount [ ]

Procurement: See paragraph 3.6.

Verified by CESI on: 16 February 2007 and 11 May 2007

Environmental and social review: See paragraphs 4.11-4.15.

[1]The interest rate, credit fee, and inspection and supervision fee mentioned in this document for OC financing are established pursuant to document FN-568-3 Rev. and may be changed by the Board of Executive Directors, taking into account the available background information, as well as the respective Finance Department recommendation. [2]In no case will the inspection and supervision fee exceed 1%, and in a given six-month period it may not exceed the amount that would result from applying 1% to the loan amount, divided by the number of six-month periods included in the original disbursement period. [3]In no case will the credit fee exceed 0.75%. [4]Single Currency Facility.

* This operation is the first to be submitted to the Board of Executive Directors for consideration under the Bank's new concessional financing framework (Resolution AG-3/07 of 15 March 2007). A new contract model was prepared for these operations, which is available to the Executive Directors for information.

I. FRAMEWORK OF REFERENCE

1.1 The objective of this operation is to contribute to investments to strengthen Nicaragua's electricity transmission network to adapt it for integration with the Central American electricity network and market under the SIEPAC [Central American Electric Interconnection System] project. Ever since the Bank's action plan in Nicaragua was first discussed with the country's new administration, the President of Nicaragua stated that one of the main priorities for the Bank's support is recovery of the electricity sector. As a result of these discussions with national and sector authorities, it was agreed that the Bank's support for the 2007-2008 period would include three loan operations for the electricity sector. These operations, for a total amount of US$85.4 million, will be aimed at working with the government to make priority investments and provide institutional strengthening in order to foster the conditions needed in the sector over the medium term, thereby enabling the public and private sectors to continue building up the sector over the long term, as growing demand for energy requires.

1.2 Of the three operations agreed upon with the Government of Nicaragua for the electricity sector, Project NI-L1015—National Transmission Investments for Integration with SIEPAC—is a priority project to make the supply of electricity more reliable in Nicaragua and complying with the regional obligations that the country undertook as part of the process of Central American electrical integration. Based on its characteristics and specific objectives, as well as its high degree of readiness, it is being submitted to the Bank for consideration, at the same time that Nicaragua and the Bank have begun working on the Electricity Sector Support Program (NI-L1021 and NI-L1022), to be submitted for approval in late 2007 and 2008, respectively. These two operations are being structured to support the government in its strategy to regularize the sector and promote financial recovery, and will include the following: (i) strengthening of the recently created ministry and regulatory agency; (ii) a joint loss-reduction program for consumers in vulnerable urban settlements and another for large-scale consumers; and (iii) support for investment and modernization works over the medium term in the generation and transmission sectors.

A. Socioeconomic environment

1.3 In recent years the Nicaraguan economy has gotten back on the road toward positive growth. Between 1994 and 2006, the economy grew at an average annual rate of 4.1%—much faster than in the 1980s, but short of the growth rates it experienced in the latter half of the 1970s. Public finances have improved significantly, and all macroeconomic indicators have improved in this period. The current account deficit fell from 22% to 15% of gross domestic product (GDP), and per capita GDP rose from US$684 to US$889. External debt was cut from nearly 200% to 69% of GDP, and international reserves grew from US$64 million in 2002 to US$226 million in 2006.

1.4 The economic growth of recent years was jeopardized by the banking crisis of 2000-2001, which led the government to start and maintain the Poverty Reduction and Growth Facility with the International Monetary Fund (IMF) in 2002.

Nicaragua has achieved a reasonable degree of macroeconomic stability in this period and has gradually strengthened the state of its public finances, while benefiting from a significant reduction in its foreign debt within the framework of the Indebted Poor Countries (HIPC) Initiative and the Multilateral Debt Relief Initiative (MDRI).[1]

1.5 Despite Nicaragua's strong macroeconomic performance, per capita GDP grew at an average annual rate of only 1.82%, reaching US$910 in 2006. This is an indicator of Nicaragua's high levels of poverty; indeed, economic growth has been a necessary but not sufficient condition for improving the situation. Following the debt forgiveness initiatives, the country's external debt would be close to 30% of GDP.[2] Nevertheless, internal debt, estimated at 23.3% of GDP, remains an important risk factor. Even with the improved macroeconomic situation, continuing efforts are needed to consolidate public finances for internal debt reduction. Options to consider in this effort are: (i) widen the tax base without increasing existing taxes or creating new ones, but rather by enhancing collection efficiency; (ii) make public spending (current spending and investment) more efficient; and (iii) ensure fiscal neutrality in transfers to municipios under the decentralization process.

1.6 The current government is focusing on an effort the main principle of which is to continue economic growth while ensuring poverty reduction, and for this effort to succeed, macroeconomic variables must remain strong, financial risks must be removed from the economy, and public expenditure must be targeted and made more efficient in order to help reduce poverty through instruments such as enhanced education system coverage and quality, strengthening of the health care sector, and improved utility services such as potable water and electricity.

B. The electricity sector in Nicaragua and the transmission company

1.7 **Nicaragua's electricity sector combines public- and private-sector participation in a market arrangement that faces significant challenges.** Until 1992, when Law 271 made it possible to use independent energy producers, the Instituto Nicaragüense de Energía [Nicaraguan Energy Institute] (INE) was in charge of policy-making, planning, and operations in all segments of the electricity sector's supply chain. Driven by technological developments and the economically fragile state of public companies, these early reforms were, as in other countries, followed by reforms to separate out various functions in the sector within a climate of competition. Law 272 of April 1998, the Electric Industry Act, made the INE responsible for regulating the sector and established the Comisión Nacional de Energía [National Energy Commission] (CNE) as the policy-making entity. In

[1] For more details on the economic and social situation in Nicaragua, see the Policy Dialogue Paper, Inter-American Development Bank, December 2006.

[2] The country is benefiting from the HIPC and MDRI debt relief initiatives, which are scheduled to pardon debt in the amount of US$6.328 billion and US$827 million in nominal terms, respectively. Applied in full, the balance of the external debt went from 170% to 48% of GDP between 2002 and 2006. In addition to that debt relief, IDB debt forgiveness (US$984 million) brings the debt figure to about 30% of GDP.

addition, the Empresa Nacional de Energía Eléctrica [national electric power company] (ENEL) was structured into two thermoelectric generation companies (GECSA and GEOSA), a geothermal company (GEMOSA), a hydroelectric company (HIDROGESA), two distribution companies (DISNORTE and DISSUR), a transmission company (ENTRESA), and the Centro Nacional de Despacho de Carga [National Load Dispatch Center] (CNDC) as the entity responsible for system operation and the generation market that would bring together generation companies. This institutional structure represented a model and regulatory framework that was then considered a standard for reforming the electric industry.

1.8 **While the model introduced by Law 272 contained the proper components, implementing and managing it have posed a significant challenge.** In the distribution segment, not enough interest was generated among private operators, and as a result the two main concessions were awarded to a single investor. Success in the generation segment has been only partial, as investors were attracted only for GEMOSA and GEOSA; it was subsequently decided to suspend the process of transferring the other companies in the generation segment. When the electricity market began operations in 2000, its structure in the generation and distribution segments was very different than had been planned. A rate transition period was to take place from the start of market operations until 2004, at which time market prices were to be in effect and transmission rates were to be at the level needed to recover all costs. This transition period was extended with negative consequences, especially for the transmission company. Losses in the distribution segment, which were already high at 34.2% under the public sector, have not seen sufficient improvement under the private sector: in 2006 losses were a very high 26.6%, and this has caused financial problems in the electricity supply chain.

1.9 **The ongoing problems in the Nicaraguan sector have hindered development of the infrastructure needed to meet the demand for electricity.** Rising oil prices in 2005 and 2006 raised prices for final consumers, but they had an even bigger impact on the sector's institutions and regulatory framework, which experienced unprecedented difficulties in performing their functions. Law 554, the Energy Stabilization Act, passed on 18 November 2005, which provided for intervention in spot-market pricing, further delayed implementation of the new transmission rate schedules, and as a result ushered in a period in which the government had to issue direct and indirect subsidies (through public generation companies) to the sector. New investment has been lacking in the generation segment under both the public and private sectors; in 1998, when the electricity sector reforms were passed, this segment had an installed generation capacity of 473 MW, and while capacity was at 757 MW by the end of 2005, effective availability has ranged between 450 and 511 MW between the last quarter of 2006 and the first two months of 2007. This means that the system is operating with virtually no operational reserve margin, since peak demand in this period was 500 MW. Both the financial deficit and the resulting lack of development in generation and transmission led to the rationing of power, especially in the second half of 2006. In this period of deficit, Nicaragua enjoyed the benefits of integration by gaining access to energy imported from the

regional market, which mitigated the extent of the rationing;[3] imports totaled 25 GWh in 2005 and 53 GWh in 2006.

1.10 **Transmission investments are the responsibility of the government and have been limited, which has adversely affected service reliability.** Transmission activity in the entire region is in the hands of the public sector.[4] As a result of the aforementioned reforms in 1998, ENEL's transmission segment became the public company ENTRESA. This company was initially created as a public *sociedad anónima* (corporation). However, due to the tax implications of transferring transmission assets from the old integrated company to the new transmission company, a process was begun in 2004 to turn it into a decentralized State-owned public company. This process concluded on 5 January 2007 with the enactment of Law 583, which created the new Empresa Nacional de Transmisión Eléctrica [National Electricity Transmission Company] (ENATREL).

1.11 Investments by the public transmission company have been much less than what the sector needs. ENATREL invested US$71 million between 2001 and 2005. The national electrical network currently contains 334 km of 230 kV lines, 922 km of 138 kV lines, and 662 km of 69 kV lines. The transformation capacity of the transmission network is 1,779 MVA, making it the smallest electrical network in Central America. Transmission is regulated by Article 118 of Law 272 on the Electrical Industry and its implementing regulations, which establish that the fee for network usage must be approved by the INE on the basis of a proposal by ENATREL, and should be such that investment costs are recovered on the basis of new replacement value and in light of the costs of operating and maintaining an efficient model, using discount rates consistent with investments with similar risk levels. As part of the government's transition strategy for bringing the electricity market into operation in 2000, the INE decided that under the first rate schedule for 2000-2004, investment costs for transmission rate purposes would be absorbed, i.e., only operation and maintenance costs would be recognized for this initial period. As a result, the average transmission rate[5] during this period was US$4.10/MWh. Due to the overall problems in the generation and distribution sector (paragraphs 1.8 and 1.9), the new rate schedule for 2005-2009 did not enter into effect; thus, ENATREL's average rate remains at US$4.30/MWh. Investments for 2001-2005 were 33% less than the US$107 million in investments that were called for the same period in the 2001-2010 expansion plan, despite the fact that demand in the sector did increase as expected, at an average annual rate of 4.5% between 2000 and 2005. This has diminished the reliability and safety of the transmission system,

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[3] Scheduled rationing involved disconnecting approximately 1% to 2% of demand for periods of two to five hours.

[4] INDE in Guatemala, CEL in El Salvador, ENEL in Honduras, ICE in Costa Rica, ETESA in Panamá, and ENATREL in Nicaragua.

[5] Operation and maintenance costs also include the cost of operating the National Load Dispatch Center (CNDC). The rates for 2000 to 2004 were US$4.00, US$4.00, US$4.30, US$4.30, and US$4.30 per kWh, respectively.

which in turn has caused complete service interruptions in Nicaragua and limited the capacity for the regional electricity trade.

C. Central American electrical integration and national investments for SIEPAC

1.12 **While the Nicaraguan electricity sector was being reformed, the process of integrating the Central American electricity market with the SIEPAC project began.** Acknowledging that integrating the region's electricity markets is one of the best ways to foster a market of sufficient scale for sustained development of the region's electricity sector, the Framework Agreement for the Central American Electricity Market was signed in 1996, laying the legal basis for a market that would physically and commercially interconnect the electricity sectors of all six countries in Central America. The Bank approved the loans to build the main transmission infrastructure for the market, known as the line of the Central American Electric Interconnection System (SIEPAC), as well as loans to create the institutions and regulations both for operations and for market regulation, giving rise to the Ente Operador Regional [Regional Operating Agency] and the Comisión Regional de la Interconexión Eléctrica [Regional Electrical Interconnection Commission], respectively. The transmission line, which is 1,830 km long at 230 kV, is the core infrastructure for the physical electricity trade. In 1997 the Bank approved US$240 million in loans for national transmission companies in the six countries in the region.[6] Construction on these works began in 2006, with Empresa Propietaria de la Red S.A (EPR) responsible for execution. This is a regional public-private partnership, currently with two private investors, Endesa of Spain and Interconexión Eléctrica S.A. of Colombia. The interconnection will have the capacity to transfer more than 300 MW of power across national borders, which in some countries is equivalent to 40% of demand.

1.13 **The regional market is expected to drive the investments needed to meet the region's growing demand and to help make the national electricity sectors competitive and sustainable.** Generation capacity in Central America was 9,063 MW in 2005, of which 3,878 MW was from hydroelectric generation, 427 MW from geothermal generation, 68.6 MW from wind-based generation, and the remainder (51%) from conventional sources based on fossil fuels or cogeneration mainly using sugar cane bagasse. A total of 28,424 GWh of electricity was sold in the region, of which 58% was from renewable energy sources from the first group mentioned above.[7] The regional transmission system, which is currently interconnected with an approximate inter-country capacity of 40 MW, has more than 9,000 km of high-voltage lines ranging from 69 to 230 kV, and more than 13,000 MVA of transformation capacity in this transmission system. Thanks to the

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[6] INDE in Guatemala, CEL in El Salvador, ENEL in Honduras, ICE in Costa Rica, ETESA in Panama, and ENATREL in Nicaragua.

[7] For a broad, updated collection of statistics on the Central American electricity sector, see "Istmo Centroamericano: Estadísticas del Subsector Eléctrico, CEPAL", http://www.eclac.cl/mexico/.

provisional platform created by the regional electricity market of the SIEPAC project, imports and exports of electricity have been an important source of power for both the public and private sectors. These transactions began in 2002 with 200 GWh, reached as high as 1,000 GWh in 2004, and declined to 530 GWh in 2005 and to 196 GWh in 2006, primarily due to rising national demand, the lack of new developments in generation, and technical, operational, and safety limitations in transmission, mainly in the Nicaraguan and Costa Rican networks. The electricity sector in the region is very active and enjoys strong private-sector participation, especially in Guatemala, El Salvador, and Panama. Of the region's total installed generation capacity, approximately 58% is owned by the private sector, and the remainder—mainly large-scale hydroelectric production—is concentrated in the public sector in Costa Rica and Guatemala. In all, demand in the electricity sector has grown at an average rate of 4.5% since 2000 and is expected to continue growing at least as fast. Thus, installed capacity in the region needs to double in the next 15 years. According to the most recent predictions for regional indicative planning,[8] between 6,700 and 7,900 MW of new generation capacity—depending on the regional electricity trade and success in developing large-scale regional generation projects made possible by the future interconnection of SIEPAC—should be installed in the region by the year 2019. Nicaragua is the transmission link that currently allows for an incipient private electricity trade whereby producers in Guatemala export energy to Costa Rica and Panama through Nicaragua's network, and vice versa. This same pattern is expected for the large-scale investments to be facilitated by the integration project. Points of large-scale consumption in the triangle formed by Guatemala, El Salvador, and Honduras may be supplied from large-scale projects in Costa Rica, Panama, or Nicaragua, and vice versa.

1.14 **ENATREL, as the national transmission company, maintains all responsibilities assumed by the State under the SIEPAC regional integration project.** At the time that the interconnection of the electrical systems in Central America was designed, the investments that each national transmission company needed to make before the SIEPAC line went into operation, in order to ensure reliable operation of the integrated transmission network, were determined. These investments will allow the system to maintain the capacity to make transactions and to prevent service interruptions (blackouts) that may occasionally cause one or more of the national systems in Central America to collapse. These national investments—identified collectively by the Grupo de Trabajo de Refuerzos de Transmisión [Transmission Investments Task Force] (GTRT) of the Consejo de Electrificación de América Central [Central America Electrification Council]—are

[8] "Plan Indicativo Regional de Expansión de la Generación", Grupo de Trabajo de Planificación Indicativa Regional [Regional Indicative Planning Task Force] (GTPIR) of the Consejo de Electrificación de América Central [Central American Electrification Council] (CEAC), April 2005.

called "national transmission investments."[9] The objective of this loan operation is to finance investments for Nicaragua's ENATREL.

D. Country strategy in the sector

1.15 **A strategy is being devised to make the domestic model of the electricity sector sustainable.** The Government of Nicaragua is developing a strategy to make the electricity sector sustainable, and it has requested the Bank's support for this effort. This strategy must address the sector's internal problems caused by the transition from the model described in the previous section, which led the sector to financial disruption attributable to: (i) collection problems due to high rates of theft at the commercial level; (ii) technical losses at the distribution level; (iii) a weak transmission system that could not live up to its investment program; (iv) a generation market whose regulations leave room for improvement; (v) highly thermal generation plants with a market scale that does not allow for greater efficiency; and (vi) a regulatory framework and institutional landscape that are continuously in the process of being strengthened. The financial deficit caused energy shortfalls that led to service interruptions equivalent to 1.74% (73.3 GWh) of all net energy supplied in 2005. It is during these periods that the ability to import energy from the regional market was crucial to reducing the level of unsupplied energy.

1.16 The elements that the current administration is considering in its strategy to regularize domestic operations in the sector and to make these operations viable include, in the short term: (i) supporting distribution companies in penalizing theft; (ii) supporting programs to regulate users in neighborhoods with more dire social conditions; (iii) a broad dialogue with the regulatory agency to develop a plan to regulate rate adjustments, and predictable management of regulations in the sector; and (iv) for generation, short-term actions have been taken and medium-term plans are being developed to ensure joint supply by the public and private sectors with direct bilateral cooperation from other governments. Medium- and long-term aims include: (i) fostering the sustainability of public companies and their priority investments; (ii) attracting efficient sources of generation from hydroelectric and geothermal resources; (iii) fostering a culture of energy efficiency; and (iv) gaining access to the regional electricity market both for project development and to have other sources of supply that are efficient and make the sector more competitive. The government is in the process of strengthening the policymaking and regulatory bodies in the energy sector, and especially in the electricity subsector. In January 2007, Law 290 created the Ministry of Energy and Mines (MEM), which will be formed from the existing National Energy Commission (CNE), and which will be responsible for all policy-making in both the electricity and hydrocarbons sectors. The INE's regulatory activities will be focused on setting rates for both sectors, and issues related to the awarding and monitoring of concessions will fall to the newly created ministry.

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[9] The executive summary of these studies may be found in the online annexes to this document.

1.17 The government has already carried out important actions as part of this plan. In March 2007, Article 237 of the Criminal Code was amended to define the theft of energy as a crime, and this will aid distributors in reducing losses, especially at points of large-scale consumption. As final electricity rates have continued to recover, actual costs are now being recovered by transferring energy costs to final rates. The gap between actual energy prices and prices transferred to consumers, which had been at 17% in October 2005, disappeared by October 2006, and with the revenue from generation price differentials, in June 2007 the cumulative shortfall should be eliminated. Also in March 2007, and coinciding with the three-party meeting of the government with the donor community (IDB, World Bank, IMF)—and of particular interest in the negotiations for the new program with the IMF—the Government of Nicaragua, acting through the INE, expressed its commitment to support the transfer of energy costs to final rates[10] by instituting an automatic adjustment formula and to begin a gradual recovery of the transmission company's rates. Out of the final average price of electricity in 2005—which was 12.65 U.S. cents per kWh—65% is for energy costs, 32% is for distribution costs, and only 3% is for transmission costs.

1.18 The government's strategy incorporates a regional vision of the electricity sector (paragraph 1.16), using current interconnections while continuing with the regional integration effort. Nicaragua's transmission system is currently interconnected with the systems in Honduras and Costa Rica through two 230 kV transmission lines that enter the system at the León and Nicaragua substations, respectively. This interconnection has made it possible to import energy when needed to meet demand in the country, and has also been crucial in transporting energy that countries such as Costa Rica import from Guatemala. The current interconnection is limited by system conditions at a capacity of 30 MW. Investments in the electricity sector, including the transmission segment, should be made early enough to allow for the growth of both the national and regional systems. According to the CNE's latest indicative plans to expand generation between 2006 and 2014, mid-scale geothermal and hydroelectric projects ranging from 350 to 400 MW and distributed throughout the country need to be developed. The transmission plan associated with these long-term needs calls for more than US$103 million in works including transmission, transformation, and compensation. With the SIEPAC project going onstream, which will raise the current level of interconnection to 300 MW, 65% of the newly installed generation capacity is expected to come from hydroelectric and geothermal resources that will have to be transported through the regional interconnection and the national networks. As such, the government, in parallel with its strategy for the domestic sector, believes that the strategy should affirm its commitment to regional integration and make the necessary investments in ENATREL needed for the regional transmission project currently in progress.

[10] The average final sales prices for different groups of consumers in 2005-2006 were as follows (actual/transferred, in US¢/kWh): residential: 12.02/12.06; commercial: 14.45/14.79; industrial: 11.19/11.52; public lighting: 14.79/15.26; pumping: 9.8/9.9.

E. Bank strategy in the sector and lessons learned

1.19 The project is consistent with the Bank's strategies for the region, the sector, and the country. In this context, the project supports the focus on regional integration, particularly in the energy sector, described in the regional programming documents for Central America (GN-2126-2), by promoting the integration processes in the hydrocarbons and electricity sector to help develop regional infrastructure—and in particular, the SIEPAC project—more efficiently. Also, according to the latest update of the country strategy (GN-2251-8), a major focus of action is support for economic growth. The project will help achieve the objectives of sector-specific policies OP-708, OP-733, and OP-733-1, mainly because the project will: (i) contribute to the sector's financial sustainability; (ii) help the national electrical system to operate more efficiently; and (iii) promote competitiveness and efficiency in the national electricity market by increasing the possible avenues for supply. Nicaragua reformed the electricity sector by adopting a regulatory framework and structure in accordance with the basic conditions of the Bank's Public Utilities Policy (OP-708), including the separation of policymaking, regulatory, and operational roles; adoption of a market structure that fosters efficiency; and adoption of a legal framework and effective regulations. These reforms have not yet been fully successful, because the intended transition process was never completed, and because rising oil prices increasingly stressed institutions in the sector and compromised the ability of the distribution company to recover losses. As a direct result of these distribution losses, the sector's financial situation worsened considerably in 2006.

1.20 The Bank's sector strategy and the dialogue and programming of activities with the new government (see paragraph 1.2) reflected renewed interest in a broad program in support of the electricity sector stemming from the problems described in this document. In view of the above, the program in the last country strategy with Nicaragua (document GN-2251-8), which consisted of this operation, has been expanded with the new government to include two new operations for the electricity sector in the 2008-2009 operations program. These additional operations, for an amount of US$72.9 million, are consistent with the economic growth strategic pillar of the new country strategy, which will be placed before the Board of Executive Directors for consideration.

1.21 This operation for national investments in ENATREL's transmission network comes about to meet the needs of the process of regional integration with the SIEPAC project, with works that should be completed in the first half of 2009 to ensure that the integrated electricity sector is operating properly. In addition to this operation—and to support the government in its strategy to regularize the domestic electricity market and make it viable—the Bank is in the process of preparing the two energy sector operations agreed to with the government in the programming process for 2007-2008 to structure support for its strategy to regularize the sector (see paragraph 1.15), with a view to its financial recovery. This would include the following: (i) strengthening of the recently created ministry and of the regulatory

agency; (ii) a joint program to reduce losses for users in vulnerable urban settlements, and another program for large-scale users; and (iii) support for medium-term investment and modernization works in the generation and transmission sectors. This strategy is aimed at securing public resources in the sector specifically to help restore sound financial conditions and subsequently to help achieve growth in the sector.

F. The Bank's experience in the country

1.22 The most recent public operation for investment in Nicaragua's electricity sector is the US$46 million hybrid loan operation 1017/SF-NI, which was approved in 1998 before the Electricity Act was amended. The executing agency for this operation was ENEL, and it included financing for works related to transmission, transformation, distribution, and modernization of the control center and telecommunications issues. The loan was executed for the subsidiary transmission company that emerged from the reform process, which is now ENATREL. This loan has a balance of US$2.9 million, which will be fully disbursed in the second half of 2007. Program execution has been satisfactory, with some transmission projects experiencing delays in acquiring rights-of-way and because of the transition of the loans during the sector reform period.

1.23 Also, two loans for US$40 million were provided in 1997 to ENEL (ENATREL) for Nicaragua's contribution toward construction of the SIEPAC transmission line. These loans are currently being executed by Empresa Propietaria de la Red S.A. (EPR). Resources are now fully committed, the contracts for construction of the line have been signed, and the disbursement process is expected to wind down with completion of the transmission line in the first half of 2009. All countries in Central America had undertaken to have completed the transmission investments in their respective national networks by then.

1.24 In the private sector, the Bank granted US$10.75 million in financing in December 1999, along with B loans in the amount of US$14 million (for a total of US$24.75 million), to the Tipitapa electrical generation plant. The project includes construction, ownership, and operation of a 50.9 MW generation plant located 20 km east of Managua. The project began commercial operations in March 1999 and plays an important role in supplying power in the country through a purchase power agreement with distributors from Unión Fenosa. The sector's financial problems that spread to the generation segment temporarily set the project back. However, the project is currently on schedule with its payment obligations; the B loan was prepaid in full on 15 February 2007.

1.25 Meanwhile, the Bank has been supporting the Ministry of Energy and Mines through a number of technical-cooperation operations, including a US$300,000 project to develop wind-based generation in isolated systems and a US$700,000 operation to develop energy efficiency. As part of the Meso-American Energy Integration Program and the Matrix of Actions for Energy Development and Integration in Central America, a technical-cooperation project for more than

US$2 million is being carried out to support the Regional Biofuel Group, the Task Force for the Introduction of Natural Gas, and the Hydrocarbon Task Force.

1.26 **Lessons learned.** The Bank's interventions in the area of area of electricity transmission with the Republic of Nicaragua and the region have generated important lessons learned, including; (i) rights-of-way are increasingly difficult to acquire throughout the region, although Nicaragua has a better track record than other countries in the region; this operation will include a plan and mechanism for monitoring performance, with a well-defined strategy and intermediate and final goals; (ii) the transmission companies resulting from reform processes in several countries in the region focus on their specific functions, and the separation of roles has brought about improved performance; however, financial sustainability issues still require attention, especially in transmission companies in electricity sectors facing any type of broader structural financial problem; this operation has therefore developed targets and mechanisms for monitoring improvements in ENATREL's financial situation; and (iii) cooperation among national transmission companies in the region should be highlighted as a positive experience; there is a high degree of collaboration on everything from technical and operational issues to regional investments, such as with the regional transmission company EPR. The technical design of this project is the result of this regional cooperation, national companies having received an important transfer of knowledge that in turn enhanced their technical capacity.

G. Project strategy

1.27 This operation will finance investments in Nicaragua's national transmission network necessary to keep Nicaragua's electricity system operating in the face of common events, while at the same time adapting its network to the electrical interconnection with the countries of Central America through the SIEPAC project and thus allowing a secure and integrated operation consistent with regional standards. Specifically, these investments will make it possible, in the event of any contingencies in the national transmission network, to keep the Nicaraguan system running and prevent failures from spreading to the Central American system. This will maintain the regional system's capacity for energy imports and exports, even in the event of common contingencies in the system. These common contingencies include transmission shutdowns between the Planta Nicaragua and Los Brasiles substations and the transformer shutdown at the Masaya substation.

1.28 The project is being developed in the context of a regional electrical integration effort in which all six countries in Central America are involved. The works to be carried out in each country have been determined through an integrated analysis coordinated by the National Investments Task Force established for this purpose. The fundamental strategy in the studies is to determine the works that would allow for the import and export of up to 300 MW between pairs of neighboring countries in the event of the most foreseeable system contingencies, described in paragraph 1.27, thereby maintaining safety in the system. The studies concluded by determining the works needed in each country, and the task force established a

timetable for monitoring progress on the works in each country, which should be completed in the first half of 2009.

1.29 The project falls within the framework of the national and regional strategy for complying with the agreements described above and, specifically, of the works needed for Nicaragua's transmission network. These works, which are conventional within the electricity transmission industry, include a transmission line, the improvement of substations, increases in transformation capacity, and increases in the system's reactive reserve capacity. These works are needed to maintain the safety of the national and regional systems in the event of contingencies in the transmission network.

II. THE PROGRAM

A. Objectives

2.1 The objective of the project is to ensure that Nicaragua's transmission system is adapted to accommodate the electrical interconnection with the SIEPAC line, and in particular that energy may be sold in compliance with the reliability and safety standards established for the regional electrical system. Specifically, the project will support the investments needed to ensure the transfer of up to 300 MW of energy, both for export and import, through the national electrical system. This will ensure, from an operational perspective, that the regional electricity trade may be conducted safely and reliably, even in the event of contingencies in the electrical networks, and will thereby prevent partial or total service interruptions, both in the national network and in the regional interconnected system.

B. Description

2.2 The project has three components: (i) works for transmission at 230 kV; (ii) works for transformation at 230/138 kV and compensation equipment; and (iii) institutional strengthening in operational safety and regulation of transmission. The table of electronic links and references in this document includes a schematic diagram of the transmission line route and the transformation investment sites. The investments to be financed by the project are relatively small in proportion to the ENATREL system (less than 2% of the current transmission network and less than 1% of transformation capacity), but they are of strategic importance to the regional integration effort. The objectives and specific description of each component are as follows:

2.3 **Works for transmission at 230 kV (US$8,584,000).** These works are important for ensuring the operational safety of the regional electrical system in the event that the transmission line between the Planta Nicaragua and Los Brasiles substations shuts down. This is the most common contingency in the Nicaraguan electrical system; it has direct effects on the national electrical system and will have future impacts on the regional electrical system after the SIEPAC line is up and running. This contingency has effects ranging from load losses to total system collapse, and

thus far has been addressed through emergency actions such as automatic load disconnection. This transmission investment consists of the following segments: (i) construction of a new line, approximately 35.7 km long, within the corridor in which the SIEPAC line will be built between Planta Nicaragua and the Montefresco split point; (ii) a new section, approximately 10.8 km long between Montefresco and Tower 33, of the line between Los Brasiles and the Masaya substation; and (iii) the laying of 34.5 km of a second circuit between Tower 33 and up to the Masaya substation on the existing transmission line; this component includes the construction of access bays with a one and a half breaker arrangement at the Planta Nicaragua substation, and the access bay at the Masaya substation. This component will provide financing—as part of the local counterpart (US$1,281,000) from ENATREL—for topographic studies, basic engineering design, acquisition of the right-of-way extension in the first section and purchase in the second section, and works supervision.

2.4 **Works for transformation at 230/138 kV and compensation equipment at lesser voltages** (**US$1,924,000).** These works are needed to prevent transfers in the future regional electricity market, and in the event of contingencies in Nicaragua, from having an operational impact on the systems in Costa Rica and Panama. The contingency of a transformer at the Masaya substation destabilizes these systems, and this is solved by installing this new 75 MVA, 230/138 kV transformer at the Masaya substation. These works also contain the corresponding adaptations at the Masaya substation to incorporate the bay for the new transformer (US$1,291,000). Also, 49 MVAR of reactive compensation, distributed in 10 different substations in the system, will be installed (US$633,000): (i) at 13.8 kV at the Altamira, Batahola, Los Brasiles, Managua, and El Periodista substations; and (ii) at 24.9 kV at Acoyapa, San Rafael del Sur, Amerrisque, Bluefields, and Corocito. This equipment must be supplied to maintain reactive reserve levels in the event of contingencies in the national and regional electrical systems. The main objective is to prevent voltage collapses that could cause a suspension of service. As part of the environmental strategy, the project will be financing construction of oil sumps at the substations where reactive compensation will be installed. Cofinancing will also be provided for the permanent confinement of Polychlorinated Biphenyls (PCBs) (US$300,000) as described in the project's environmental strategy (see paragraph 4.15). As the local counterpart for this component (US$396,000), financing will be provided for supervising supply and startup of the transformer, as well as arrangements at the substation. The compensators will be installed at ENATREL's expense.

2.5 **Institutional strengthening (US$350,000).** This component will support the strengthening of the Planning Department of ENATREL through tools and training in the expansion of transmission capacity and operational safety (US$250,000). At the same time, support will be provided to the Standards and Rates Unit with specific studies for setting prices and rates (US$100,000). This support will help develop the company's technical capacities in order to collaborate in planning for

future expansion. It will also contribute to discussions with the sector's regulatory body in the process of setting rates for transmission activity.

C. Cost and financing

2.6 Table II-1 shows the total estimated cost of the project and the proposed financing. The total cost of the project is US$14,687,000. The Bank will provide financing through an investment loan in the amount of US$12.5 million, which represents 85% of the total. The Bank's financing will be provided in accordance with the new concessional financing framework, using a blend of resources from the Single Currency Facility of the Ordinary Capital and from the Fund for Special Operations (FSO), in the proportion established in that framework (US$6.25 million from the Ordinary Capital and US$6.25 million from the FSO). The local contribution for the remaining US$2,187,000 will be divided among engineering costs incurred by the company, acquisition of rights-of-way, and local labor.

Table II-1
Cost and financing
(in thousands of U.S. dollars)

Category	IDB	Local	Total
1. Engineering and administration	**710**	**480**	**1,190**
1.1 Engineering and works supervision		480	
1.2 Auditing and evaluation	60		
1.3 Support for environmental unit	300		
1.4 Strengthening of ENATREL	350		
2. Direct costs	**10,508**	**1,677**	**12,185**
2.1 Transmission works	8,584	1,281	9,865
2.2 Transformation works and compensation equipment	1,924	396	2,320
3. Contingencies	**1,082**	**0**	**1,082**
4 Financing costs	**200**	**30**	**30**
4.1 Commitment fee		30	
4.2 Inspection and supervision fee	0		
4.3 Interest	200		
Project total	**12,500**	**2,187**	**14,687**
	85%	15%	100%

III. PROGRAM EXECUTION

A. Borrower and executing agency

3.1 The borrower will be the Republic of Nicaragua, and the executing agency will be ENATREL. As a condition precedent to the first disbursement, an agreement must be signed between the borrower, acting through the Ministry of Finance, and ENATREL, and this agreement must set forth, *inter alia*, the following: (i) the manner in which loan proceeds will be transferred and repaid; (ii) ENATREL's commitment to execute project activities in accordance with the terms and

conditions of the loan contract; and (iii) ENATREL's commitment to use the loan proceeds and local counterpart resources for project purposes only.

B. Project execution and administration

3.2 In executing the program, the company's existing structures for planning, engineering, administration, procurement, and legal affairs will be used. For purposes of communication with the Bank, a project coordinator will be designated within the Engineering and Projects Department. Ultimate responsibility for fulfilling project objectives and targets falls to the Office of the Executive President. The main duty of the project coordinator will be to work internally and with the Bank to see that the project's execution timetable is met. The project coordinator will oversee and push forward the project by using the structures in ENATREL. Technical specifications will be provided by the Engineering Department, the Planning Department, and the Environmental Unit at the request of the project coordinator. The Procurement Unit of the Office of Administrative and Financial Management will be responsible for conducting procurement processes in accordance with the Bank's policies and the technical inputs and specifications provided by the technical units through the project coordinator. The Procurement Unit will be supported by the Office of Legal Counsel and the project coordinator in monitoring the procurement plan for the operation. Each unit will designate a liaison to facilitate the project coordinator's work on this operation. ENATREL's designation of the support liaisons in the respective line units will be a condition precedent to the first disbursement.

3.3 The project coordinator will be responsible for submitting a semiannual report to the Bank, after approval by the Executive President, and this report must include at least the following information: (i) overall progress on the project and the procurement plan; (ii) progress on the action plan for acquiring right-of-way extensions; (iii) works supervision or asset installation reports duly approved by the Engineering Unit or Environmental Unit, depending on which unit has technical responsibility for the works in question; (iv) documentation and records of execution indicators and outcomes set forth in the logical framework, with the information sent by the CNDC and with the support of the Planning Unit; and (v) facilitation of the activities of works or service providers through the various units of ENATREL. Designation of the project coordinator in accordance with the terms of reference previously approved by the Bank will be a condition precedent to the first disbursement. Once the works are completed, they will be operated and maintained under the mechanisms the company applies to its entire transmission network through the Office of Line and Substation Maintenance.

C. Disbursement timetable

3.4 The disbursement period for the program will be four years, starting from the moment when the conditions precedent to the first disbursement are fulfilled. See Table III-1.

Table III-1
Tentative disbursement schedule
(in millions of U.S. dollars)

	2008	2009	2010	2011	Total	%
Bank	2,224	3,011	4,401	2,864	12,500	85%
Local	1,000	0,780	0,207	0,200	2,187	15%
Total	3,224	3,791	4,608	3,064	14,687	100%
% year	21,95%	25,81%	31,38%	20,86%	100%	100%

3.5 As a condition precedent to the disbursement of resources for the transmission component, a plan for monitoring and acquisition of right-of-way extensions must be submitted to the Bank. Also, before beginning construction of the transmission works under this component, evidence that all rights-of-way have been acquired must be submitted. Prior to the installation of reactive compensation works (49 MVAR at 13.8 kV and 249.4 kV) under the transformation and compensation component, the firm that will condition the oil sumps and build the PCB confinement tanks described in the environmental and social strategy (see paragraph 4.15) will have been hired.

D. Procurement

3.6 The procurement of works and goods and the selection of consultants for the program will be governed by the Bank's policies as set forth in documents GN-2349-7 and GN-2350-7, respectively, and by the provisions of the loan contract. An evaluation of the Procurement Unit and the track record of recent years determined that ENATREL has the capacity to manage the procurement processes for this operation. Prior reviews will be conducted for all procurement processes—for both international competitive bidding and national competitive bidding. The procurement plan has been prepared for all procurement activity on the project, which basically covers five bidding processes for turnkey contracts for the provision of goods in the main components of investment, and three contracts for international consulting services related to institutional strengthening. The procurement plan will be available on the Bank's website, www.iadb.org, and on the website of the executing agency.

E. Project monitoring

3.7 **Bank supervision.** The program will be supervised by the Bank's Country Office in Nicaragua. Semiannual reports will be prepared as requested in the General Conditions and in semiannual joint meetings between the Bank and the executing agency to review progress on the project.

3.8 **Evaluation meetings.** After the conditions precedent to the first disbursement are fulfilled, an annual evaluation meeting will be held, with the participation of: (i) the project coordinator; (ii) the director of the Planning Unit; and (iii) the designated representative for the project from the Procurement Unit, the Finance Unit, the Legal Department, and the Environmental Unit of ENATREL. These meetings will

review: (i) progress on the project in accordance with the timetable; (ii) progress on procurement for the project; (iii) indicators for monitoring progress on the plan for acquiring and monitoring the right-of-way extensions; (iv) a report on issues related to social and environmental management on the project; (v) the status of indicators of project execution and expected outcomes as set forth in the logical framework; and (vi) ENATREL's financial projections and targets set during project execution. All of these elements must be included in a project progress report to be prepared by the project coordinator, and the report must be submitted to the Bank at least 15 working days prior to the aforementioned annual evaluation meeting.

3.9 **External auditing**. Financial and operational audits will be carried out by a firm of independent auditors acceptable to the Bank, in accordance with the terms of reference previously approved by the Bank (AF-400, AF-500) and with the Bank's procurement policies and procedures. Pursuant to Article 7.03 of the General Conditions of loan contracts, the borrower will submit the financial statements for the program and the executing agency every year during the execution period, after these statements have been duly audited by a firm of independent experts that is acceptable to the Bank. The external financial and operational audit of the program will yield an annual report, which the borrower must submit to the Bank within 120 days following the end of the calendar year. Auditing costs will be financed from program resources.

3.10 **Collection of information for the project completion report.** The project coordinator will collect, store, and maintain all information, indicators, and parameters that the Bank needs to prepare the project completion report or any other program evaluation that may be necessary.

IV. VIABILITY AND RISKS

4.1 The Bank has accumulated considerable knowledge on electrical infrastructure programs in Nicaragua and the Central American region, especially on transmission and transformation works. This enables the Bank to identify the operation's main strengths and risks, which are summarized below.

A. Institutional viability

4.2 ENATREL is currently doing a satisfactory job of operating and maintaining a transmission network that includes 334 km of lines at 230KV, 922 km of lines at 138 KV, and 662 km of lines at 69 KV. The transmission network has a transformation capacity of 1,779 MVA. The company has invested approximately US$14.2 million a year on average in similar works since 2000, despite the investment limitations (described in paragraph 1.10) when it began to operate as a company independent from the rest of the sector. Based on the effective capacity it has shown for expansion of its network and a review of recent works carried out with bilateral cooperation, ENATREL has the institutional capacity it needs to develop a small-scale project like this one.

4.3 ENATREL has experience in executing Bank projects and projects of other international organizations. ENATREL is executing a project with Germany's Kreditanstalt für Wiederaufbau to build a 14-km transmission line from Masaya to Granada at 138 kV and a 40 MVA substation, for a total cost of 3.2 million euros. These works were commissioned as turnkey operations. Also, funds from Spain's Instituto del Crédito Oficial are being used to execute a project in the amount of 3.6 million euros to build the Ticuantepe-Anillo transmission line in Managua. Between 2000 and 2006, ENATREL executed supply and assembly projects on various transmission projects for more than US$90 million.

4.4 ENATREL is also a shareholder of Empresa Propietaria de la Red S. A., which owns the SIEPAC transmission line that will interconnect the six Central American countries. As a result, it has participated in efforts to monitor the design of the transmission line, regulatory issues related to setting rates for transmission, and operational issues in construction of the transmission line, particularly in maintaining the rights-of-way and in operating and maintaining the interconnection line in the future. Participating in this regional project has indirectly given ENATREL significant technical capacities, including for the design of this project, which will increase its capacities for participation in a highly active regional market.

4.5 In view of the above and considering the small size of the recent operation, using the company's formal structure to implement the project is considered the best solution (see paragraph 3.2). The main expansion projects come out of the Planning Department, which has the tools to expand and support regional transmission expansion groups. It also has a well-structured tradition of performing economic and financial analysis for all its transmission projects. The unit has seven highly skilled professionals, though training in operational security, covered by this operation, is needed. The engineering and design unit has 11 professionals and is in charge of basic designs and detailed specification of materials and equipment for the various projects. The procurement unit was recently expanded and now has five full-time employees in the areas of administration and legal aspects. It has a good record in tendering processes and, although it has not used the Bank's new procurement procedures, training courses were provided at the Bank's Country Office on the subject during the preparation period, which were essential for preparing the operation's procurement plan. Once the works have been executed, their maintenance will be the responsibility of the Lines and Substations Maintenance Office, which has over 100 technical and professional staff in charge of routine operation and maintenance work on the ENATREL networks.

B. Economic and financial viability

4.6 The supply of electricity is vitally important to the Nicaraguan economy, and maintaining a constant flow requires investments explicitly aimed at ensuring system reliability and safety. Projects aimed at meeting these needs invariably have sizable economic returns, due mainly to the benefits of preventing unsupplied energy as a result of complete service interruptions (blackouts), which cause a

significant disruption to economic activity in any country. For the national investment project, the corresponding economic analyses were based on consideration of the investment and operating costs and the benefits related to: (i) the cost of unsupplied energy due to service interruptions; and (ii) the cost of penalties avoided due to noncompliance with reliability standards in transmission service. Assuming a discount rate of 12%, a useful life of 20 years for the project, and a cost of US$420 per MWh for unsupplied energy,[11] economic formulas yield an internal rate of return of over 40%, a net present value of US$67.2 million, and a cost-benefit ratio of 2.3. The following adjustments were made: (i) investment costs, +30%; (ii) costs of unsupplied energy at levels in accordance with other international practices, US$800 and 1,100 MWh; and (iii) fewer hours of unsupplied energy, –30%. In the worst-case scenario, the internal rate of return falls to 17.21% and net present value falls to US$4 million. An executive summary[12] containing the document that provides the technical rationale and economic evaluation prepared by ENATREL is one of the annexes to this document. It should be noted that ENATREL conducts economic and financial evaluations of all its projects to be submitted to the External Financing Commission of the Ministry of Finance, and for this purpose it uses analytical tools and software that were provided as part of the institutional strengthening effort under loan 1017/SF-N1 mentioned in paragraph 1.22.

4.7 Transmission activity is regulated, and as such its financial viability is determined by the framework for ENATREL's transmission activity as described in paragraph 1.11. Due to delays in adjusting transmission rates, the company has only been able to invest an average of US$14.2 million a year, although the expansion plans call for about US$25 million in annual investment needs. Financial projections indicate that in a baseline scenario (Scenario 2)[13] the company could meet the financial obligations associated with the proposed loan operation as well as the counterpart resources and a comprehensive plan for expanding transmission capacity. However, in an extreme scenario (Scenario 1[14]) where rates remain at their current level, the company would only be able to cover all its operating costs, service its debt, and make minor investments. In the best-case scenario (Scenario 3), which assumes that the full transmission rate is approved, cash surplus is generated that would allow the company to cover the entire investment plan and service its debt. Table V-1 summarizes the main financial indicators in the three scenarios.

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[11] All of these figures are set by the Norma de Operación Comercial [Commercial Operation Standard] Chapter 8.4.

[12] Executive summary, "Justificación técnica, evaluación financiera y económica: Refuerzos Nacionales de Nicaragua para el Proyecto SIEPAC", ENTREL, March 2007.

[13] The document titled "Proyecciones Financieras 2006-2013" for the company—projections carried out by an independent consultant—is one of the annexes.

[14] This scenario assumes that, except for small-scale investments, investments are shouldered by the government when there is no rate increase, as the coverage of ENATREL's debt would be high.

Table IV-1
Financial indicators

	2004-06			2007-2011				
	2004	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
BASELINE (Scen. 2)								
Rate (US¢/kWh)	0.43	0.43	0.43	0.54	0.65	0.65	0.65	0.65
Revenue (US$ million)	12.3	13.6	14.6	19.2	24.5	25.5	26.4	27.4
NICG* / Investments	28.3%	65.2%	41.9%	54.2%	36.9%	47.1%	80.0%	109.5 %
Operating margin	48.5%	59.6%	39.5%	48.5%	55.8%	57.5%	58.1%	58.7%
Debt service coverage				3.4	3.7	2.7	2.6	2.6
EXTREME (Scen. 1)								
Rate (US¢/kWh)	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43
Revenue (US$ million)	12.3	13.6	14.6	15.8	17.5	18.2	18.8	19.5
NICG* / Investments	28.3%	65.2%	41.9%	26.7%	11.1%	10.0%	15.3%	20.9%
Operating margin	48.5%	59.6%	39.5%	37.6%	38.1%	40.5%	41.2%	41.8%
Debt service coverage				2.2	1.8	1.4	1.3	1.3
BEST-CASE (Scen. 3)								
Rate (US¢/kWh)	0.43	0.43	0.43	0.92	1.42	1.42	1.42	1.42
Revenue (US$ million)	12.3	13.6	14.6	30.8	49.0	51.1	53.1	55.1
NICG* / Investments	28.3%	65.2%	41.9%	150.7 %	127.3 %	176.8 %	306.7 %	419.9 %
Operating margin	48.5%	59.6%	39.5%	68.0%	77.9%	78.8%	79.1%	79.5%
Debt service coverage				7.8	10.4	7.4	7.0	7.0

* NICG: Net internal cash generation

4.8 In order to ensure the sustainability of the company in the current environment in the sector and in light of the government's strategy, targets indicating a positive trend toward financial recovery will have to be met during the execution period, so that it may gradually reach optimal levels of investment. It will be agreed with ENATREL and the Government of Nicaragua that: (i) appropriate measures will be taken to ensure that revenues from ENATREL's rates are sufficient to cover normal operation and maintenance costs, service the debt, and substantially contribute to the investment plan (internally generated funds should contribute at least 25% in 2008, 30% in 2009, and 35% in subsequent years); (ii) a cash operating margin calculated as the amount remaining after covering operation and maintenance costs, equal to 35% in 2008, 38% in 2009, and 40% in subsequent years; and (iii) a debt service coverage ratio of at least 1.5 throughout the execution period. Attainment of these targets will be a special condition for project execution and will be verified annually; these conditions are determined under the comprehensive financial analysis stemming from scenario 2, which will allow ENATREL to repay the MHCP for debt service on this operation and to generate the necessary counterpart resources and the company's entire operation and maintenance resources as well as to cover a significant plan for additional transmission investments. In the event of any deviation from the indicators that signifies a decline in the company's financial

situation, the borrower and the executing agency will submit to the Bank an action plan that clearly identifies the reasons for the deviation, the management-related or financial measures to be adopted, the responsibilities of the executing agency and the borrower, and the execution timetable, in order that financial sustainability may be recovered.

C. Technical viability

4.9 The general nature of the works involved in this national investment project for integration with the SIEPAC project was determined through the collective technical work of the CEAC National Investment Task Force, which was supported by specialized consulting services in carrying out the technical studies, including: (i) an analysis of contingencies under stable conditions; (ii) transient and dynamic stability studies; and (iii) reactive compensation studies. The methodologies and tools used are all appropriate and widely used in the industry, thereby ensuring that the project's main components have been properly framed.

4.10 As for specific components, the transmission line, and the transformation and compensation equipment, are all at voltage levels that are already present in the network. Therefore, the company and contractors face no new specific technical challenges in installation or construction. ENATREL has sufficient capacity to supervise the works that will be carried out as turnkey operations, and the basic design-related technical specifications will be developed by its Engineering Department, which has relevant experience. The compensation equipment will be installed by ENATREL.

D. Social and environmental viability

4.11 With regard to the component for transmission at 230 kV, the project involves a line 81 km long, of which 34.5 km will be installed in an available circuit on an existing line and 35.7 km will be built within the right-of-way of the SIEPAC line (see table of electronic links and references). These two segments are joined by a 10.8 km section that will be newly constructed in livestock-raising areas outside sensitive or populated ecosystems. Thus, this component is not expected to generate environmental impacts that could not be controlled with the environmental measures already included in the SIEPAC project, for which the environmental impact studies and associated Bank-financed consultations were approved by all Central American environmental authorities, including the Ministry of the Environment and Natural Resources (MARENA) in Nicaragua.

4.12 An additional field inspection was also conducted during the identification mission to see whether the conditions described in the environmental impact study had since changed. It was confirmed that the reinforcement line runs entirely through agricultural areas, and there was no evidence of sensitive or fragile ecosystems such as forests, protected areas, or heritage sites. Similarly, based on evidence of limited human settlement, no conflicts are expected with towns or expanding urban areas. Should four small housing units in a tower site have to be moved, this will be done in accordance with policy OP-710. Thus, it is safe to say that no environmental or

social impacts are expected in construction and operation to warrant additional measures above and beyond those that already apply to the SIEPAC project, which are specified in the Environmental Management Plan.

4.13 In letter DGCA-HEU-C519-08-06, MARENA ruled that the new 10.8 km section of the line was environmentally viable, and requested that the complementary measures of the Environmental Management Plan for the SIEPAC line be included in the Social and Environmental Plan for the project. These measures basically consist in resettling the aforementioned four households in better than current conditions, but otherwise the route does not vary from that of the SIEPAC project, and the measures are therefore similar.

4.14 Transformation works refer to the installation of new compensation and transformation equipment within existing substations—specifically, a new 75 MVA transformer at 230/138 kV at the Masaya substation, including related access bays, and 49 MVAR of reactive compensation distributed among 10 different substations. The bid documents will stipulate that transformation and compensation equipment may not contain PCBs, and bidders will be asked to provide the corresponding certification. Space and facilities are available for installing the transformer at the Masaya substation, as are the access bays. In fact, the facilities are equipped to guard against any potential PCB spill.

4.15 As part of the institutional strengthening component, and in conjunction with ENATREL's Environmental Unit, areas with room for improvement in operational safety were identified in six of the substations that will receive reactive compensation and which, unlike ENATREL's new substations, do not have oil collection systems. The project will include financing for sump equipment to prevent oil spills in these substations, as well as conditioning of a site for permanent confinement of PCBs from any of ENATREL's old transformers that may be retired and may contain PCBs. The cost table already reflects this component, which has been designed in detail by the Environmental Unit through technical assistance provided to ENATREL under the United Nations Environment Programme to enable the Environmental Unit to comply with the Stockholm Convention on Persistent Organic Pollutants.

E. Benefits and beneficiaries

4.16 The benefits of the Central American electrical integration project for economic development in the region will stem from an increase in electricity transactions, which will create the scale needed to develop more efficient generation projects and save operating costs by displacing less efficient energy. The technical and economic feasibility study for the integration project identified an average of US$513 million in benefits for consumers in the region.

4.17 The national investment project to reinforce Nicaragua's transmission network provides complementary direct benefits in the reliability and safety of the national and regional systems. Nicaragua's electrical system is highly vulnerable to common contingencies, such as shutdown of the Planta Nicaragua–Los Brasiles transmission

line, which have caused total system collapse (blackouts) on at least two ocassions, on average, in each of the last three years, with the concomitant negative impact on the country's economy and its competitiveness. At the regional level, the project will enhance the reliability and safety of the regional system and will prevent operational events in neighboring systems from spreading to the entire regional system, which in extreme cases could cause the collapse of the regional system after they begin working in coordination with the infrastructure of the new SIEPAC line.

4.18 The project is expected to yield a system that operates reliably, in accordance with the standards established for the entire electrical system in Central America, thereby reducing the number of system shutdowns and the amount of unsupplied energy due to collapses in the national and regional systems, as well as unsupplied energy from regional transactions.

F. Risks

4.19 The following table summarizes the critical risks in the program and the corresponding mitigation measures.

Table IV-2
Critical program risks

Risk	Mitigation measures
Delays in legislative approval. The legislative approval process might delay the start of the program, thereby delaying its benefits as well.	While this risk is outside the control of the program, it is thought to be mitigated by the support shown by the current administration through the Ministry of Energy and Mines and the Ministry of Finance, as well as by the current favorable composition of Congress.
Delays in complementary works. Works associated with this project being built by the SIEPAC project through the EPR may be delayed.	The EPR has begun construction on the SIEPAC project and is in the process of awarding contracts for work on substations and reactive compensation.
Financial sustainability. ENATREL's financial situation may decline due to a failure to recover rate levels.	The government, acting through the recently created Ministry of Energy and Mines, and in coordination with entities in the sector, especially the INE, are in the early stages of implementing a plan to normalize the sector's financial situation. Financial targets have been set for project execution to ensure that steps are taken in the right direction.
Delays in execution due to rights-of-way. Procurement of works and assembly may be delayed due to the bidding processes.	ENATREL will rely on the successful experience of the EPR in Nicaragua for the acquisition of an additional 10 meters for the first section on the SIEPAC corridor and the 10 km of new rights-of-way. Submittal of the plan for monitoring and acquiring right-of-way extensions will be a condition precedent to the first disbursement. Since this project involves extending existing rights-of-way and only a small new section, this risk is low.

NATIONAL TRANSMISSION INVESTMENTS FOR INTEGRATION WITH THE SIEPAC PROJECT (NI-L1015)
LOGICAL FRAMEWORK

Descriptive summary	Performance indicators	Means of verification	Assumptions
Goal (impact)			
To help the national electrical system become more competitive, safer and to help integrate it with the regional electrical system	*After the start of the national investment project and the SIEPAC project* • Energy transactions increase by 929 GWh by 2010; 1,196 GWh by 2011; 1,727 GWh by 2012; and 1,747 GWh by 2013. • The national transmission network complies with the minimum performance standards of the national electrical system and the safety and quality standards of the regional electrical system.	• Statistics from the regional operator and the Regional Electric Interconnection Commission (CRIE) • Operations reports from the regional operator and the National Load Dispatch Center (CNDC)	• Political and institutional support for integration is maintained. • Conditions in the region remain appropriate for generation projects. • The process of converging national and regional regulations continues. • Regional macroeconomic stability is maintained.
Purpose (outcome)			
To ensure the reliability of both the national electrical system and the regional electrical system for levels of transportation up to 300 MW.	*When the entire project is placed in service:* • The amount of undelivered domestic power due to total collapses is kept below 0.29% in 2010; 0.25% in 2011; 0.22% in 2012, and 0.20% in 2013. *When the SIEPAC project goes on stream:* • Undelivered regional power (transactions) due to total collapses is kept below 0.27% in 2010; 0.21% in 2011; 0.14% in 2012, and 0.14% in 2013. *For the execution period and based on ENATREL's financial statements, the following will be verified:* • The net contribution of internally generated funds is at least 30% in 2008, 30% in 2009, and 35% in subsequent years.	• Annual statistical report from the CNDC • Maintenance report from ENATREL • Operations reports from the regional operator and the CNDC • Financial statements and projections from ENATREL	• The works on the Ticuantepe-Managua line are carried out. • The SIEPAC line is placed in service.

Descriptive summary	Performance indicators	Means of verification	Assumptions
	• The cash flow margin, based on the amount remaining after operation and maintenance expenses, is 25% in 2008, 27% in 2009, 30% in 2010, and 30% in 2011. • The debt service coverage factor is at least 1.5 throughout the execution period.		
Components (outputs)			
1.1 Works for transmission at 230 kV: Planta Nicaragua–Masaya line. To enhance the reliability of the national transmission system and ensure the reliable transportation of 300 MW from the regional electrical system.	*Eight months after fulfillment of conditions precedent:* • The works for the improvement of the Masaya and Planta Nicaragua substations and the Masaya–Planta Nicaragua line have been commissioned. *When the works are placed in service:* • As a result of the improvement of the Masaya and Planta Nicaragua substations and the Masaya–Planta Nicaragua transmission line, the collapse of the national electrical system is prevented for shutdowns of the following lines: Planta Nicaragua–Los Brasiles, Los Brasiles–Ticuantepe, and Planta Nicaragua–Ticuantepe. Also, the collapse of the regional system due to breaker failures at Planta Nicaragua is prevented. • As a result of the 49 MVAR of compensation at substations,[1] levels of reactive reserve are ensured in the system to prevent voltage collapses in the event of simple contingencies.[2] *Ten months after fulfillment of conditions precedent:* • The works for improvement of the Masaya substation and the transmission line have been commissioned.	• Project progress report • Annual statistical report from the CNDC • Maintenance report from ENATREL	• The works on the Ticuantepe-Managua line are carried out. • The additional compensation works are carried out by SIEPAC. • The capacity of the measurement transformers of the Managua ring circuit is increased.

[1] The following substations: Altamira, Batahola, Los Brasiles, Managua, El Periodista, Acoyapa, San Rafael Sur, Amerrisque, Bluefields, and Corocito.

[2] Refers to the CEAC-GTPIR study on national transmission investments.

Descriptive summary	Performance indicators	Means of verification	Assumptions
	Eight months after fulfillment of conditions precedent: • 80% of the right-of-way extensions in the segment parallel to SIEPAC and all of the 10 km for linking to the existing line have been acquired.		
1.2 Transformation works: Masaya transformer and reactive compensation To prevent overloads at the Masaya substation and maintain voltage levels that allow for reliable system operation for levels of regional transportation above 150 MW	*Eight months after fulfillment of conditions precedent:* • The supply and installation of the 75 MVA transformer and the compensation equipment have been commissioned. *When the works enter into service:* • From the 75 MVA transformer at the Masaya substation, system collapse is prevented for south-north regional transportation levels above 150 MW. • As a result of the 49 MVAR of compensation at substations,[3] levels of reactive reserve are ensured in the system to prevent voltage collapses in the event of simple contingencies.[4]	• Project progress report • Annual statistical report from the CNDC • Maintenance report from ENATREL	• The works on the Ticuantepe-Managua line are carried out. • The additional compensation works are carried out by SIEPAC. • The capacity of the measurement transformers of the Managua ring circuit is increased.
1.3 Institutional strengthening: Planning and regulatory issues To enhance the technical capacities of ENATREL in planning, operational safety, and issues related to transmission regulation	*At the end of the process of training and supplying models:* • The capacities of trained personnel are enhanced. • Long-term expansion plans are generated.[5]	• Project report and evaluation of training events	• The bidding processes attract companies that are interested in providing services.

[3] The following substations: Altamira, Batahola, Los Brasiles, Managua, El Periodista, Acoyapa, San Rafael Sur, Amerrisque, Bluefields, and Corocito.

[4] Refers to the CEAC-GTPIR study on national transmission investments.

[5] Refers to the CEAC-GTPIR study on national transmission investments (see executive summary in the online annexes to this document).

DOCUMENT OF THE INTER-AMERICAN DEVELOPMENT BANK

PROPOSED RESOLUTION DE-__/07

Nicaragua. Loan ____/Bl-NI to the Republic of Nicaragua.
National Transmission Investments for Integration
with the SIEPAC Project

The Board of Executive Directors

RESOLVES:

1. That the President of the Bank, or such representative as he shall designate, is authorized, in the name and on behalf of the Bank, to enter into such contract or contracts as may be necessary with the Republic of Nicaragua, as Borrower, for the purpose of granting it a financing to cooperate in the execution of a project for national transmission investments for integration with the SIEPAC project.

2. Such financing will be for the amount of up to US$12,500,000, as follows:

(i) up to the amount of US$6,250,000 from the resources of the Single Currency Facility of the Bank's Ordinary Capital, and

(i) up to the amount of US$6,250,000 from the resources of the Bank's Fund for Special Operations.

3. Such financing will be subject to the Financial Terms and Conditions and the Special Contractual Conditions of the Executive Summary of the Loan Proposal.

(Approved on _____ 2007)

LEG/OPR/RGII/IDBDOCS#981073
NI-L1015