DOCUMENT OF THE INTER-AMERICAN DEVELOPMENT BANK

HONDURAS

PUEBLA-PANAMA PLAN – SUPPORT FOR RURAL ELECTRIFICATION AND THE ENERGY SECTOR

(HO-0224)

LOAN PROPOSAL

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Abbreviations	http://opsws3.reg.iadb.org/idbdocswebservices/getDocument.aspx?DOCNUM=387442
Basic Socioeconomic Data	http://www/exr/country/eng/honduras/
Status of Loans in Execution and Loans Approved	http://opsws3.reg.iadb.org/idbdocswebservices/getDocument.aspx?DOCNUM=387448
Tentative Lending Program	http://opsws3.reg.iadb.org/idbdocswebservices/getDocument.aspx?DOCNUM=387447
Information Available in the RE2/FI2 Technical Files	http://opsws3.reg.iadb.org/idbdocswebservices/getDocument.aspx?DOCNUM=387445
Logical Framework	http://opsws3.reg.iadb.org/idbdocswebservices/getDocument.aspx?DOCNUM=387443
Procurement Plan	http://opsws3.reg.iadb.org/idbdocswebservices/getDocument.aspx?DOCNUM=387444
Other	http://opsws3.reg.iadb.org/idbdocswebservices/getDocument.aspx?DOCNUM=382678 //opsws3.reg.iadb.org/idbdocswebservices/getDocument.aspx?DOCNUM=382663

PROJECT SUMMARY

HONDURAS
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Financial Terms and Conditions					
Borrower: Republic of Honduras Executing agency: Empresa Nacional de Energía Eléctrica [National Electric Company] (ENEE)			Amortization period:	40 years	
			Grace period:	10 years	
			Disbursement period:	Minimum 3 years Maximum 5 years	
Source	**Amount (US$ millions)**	**%**	Interest rate:	1% per annum during the grace period and 2% thereafter	
IDB (FSO)	35.00	76	Inspection and supervision:	1%	
Local	4.55	10	Credit fee:	0.5%	
Cofinancing (See paragraph 2.10)	6.40[1]	14	Currency:	US dollars from the Single Currency Facility	
Total	45.95	100			

Project at a Glance

Project objective:
Make the electricity sector more efficient and improve the living conditions of the poorest segments of the population through rural electrification. The specific goals are to expand coverage of rural electrification, lower the costs of operating the interconnected electricity system, and upgrade it to meet the requirements of the regional electricity market being developed as part of the Puebla-Panama Plan (PPP).

Special contractual conditions:

First disbursement:
(i) Agreement signed between the ENEE and the Republic of Honduras (see paragraph 3.1); and (ii) appointment of project coordinator and liaisons at each office or unit involved (see paragraph 3.9).

Disbursement of the rural electrification support component:
Delivery of the detailed environmental and social action plan (see paragraph 4.36).

Disbursement of the rural electrification support component and other investments:
Availability of resources from the Nordic Development Fund (see paragraph 2.10).

For disbursement of the subcomponent to modernize the National Dispatch Center (CND):
Creation of consultation group (see paragraph 3.9).

Special conditions for project execution:
(i) Exchange of information with other institutions (see paragraph 3.11); (ii) delivery of a list of communities to be electrified (see paragraph 3.15); (iii) financial rehabilitation activities (see paragraph 4.24); (iv) allocation of resources for loss control and the Environmental Unit (see paragraph 3.9); and (v) impact mitigation plan recommendations (see paragraph 3.15).

Exceptions to Bank policies: None.

Project consistent with country strategy: Yes [X] No [ ]
Project qualifies as: SEQ [X] PTI [X] Sector [ ] Geographic [X] % Beneficiaries [ ]
Verified by CESI on: 23 July and 17 September 2004.
Environmental and social review: See paragraphs 4.29 to 4.36.
Procurement: See paragraph 3.14.

[1] Equivalent to €5 million as of 26 October 2004.

I. FRAME OF REFERENCE

A. Puebla-Panama Plan

1.1 The goal of the regional electrical interconnection initiative of the Puebla-Panama Plan[2] (PPP) is to spur the socioeconomic development of Mesoamerican communities by improving and extending coverage of electricity services and creating electricity markets that will attract private investment, particularly in the new power generation projects required for the region's economic development, in order to lower the cost of electricity for end users and make the companies more competitive. The initiative also promotes the efficient use of the region's natural resources to generate power, particularly for rural communities currently without electricity.

1.2 As part of the PPP electricity initiative, two projects are being executed with Bank support, namely the Central American Electric Interconnection System (SIEPAC) and the Guatemala-Mexico interconnection. The goal of the SIEPAC is to establish a regional electricity market for the six countries of Central America. The Guatemala-Mexico interconnection will link this market to Mexico´s, increasing the region's supply options.

1.3 The PPP Executive Committee, made up of presidential commissioners from the eight PPP countries, decided to promote rural electrification programs within the PPP framework, because although rural electrification projects are intrinsically local or national in scope, there is significant added value associated with linking the individual countries' rural electrification programs within the PPP framework. The availability of systematic, standardized information, greater political support, and a common set of criteria for measuring development impact will facilitate the countries' efforts to obtain financing for their individual programs. The proposed project is consistent with this approach, inasmuch as it will spur the production of regional public goods within the PPP framework through not only the rural electrification component, but also the modernization of the dispatch center that will help Honduras's National Electric Company (ENEE) or future private operators to coordinate effectively with the market and actively participate in the intraregional trade in electricity.

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[2] The PPP strategy consists of eight initiatives and the corresponding projects: (1) sustainable development; (2) human development; (3) natural disaster prevention and mitigation; (4) tourism promotion; (5) trade facilitation; (6) transportation; (7) electrical interconnection; and (8) interconnection of telecommunications services.

B. Honduras' electricity sector

1. Supply and consumption

1.4 The Honduran electricity sector recorded a peak demand of 860 megawatts (MW) in 2003 and had installed capacity of 1,040 MW, 45% of which was generated by hydroelectric plants. Due to the elevated percentage of capacity from hydroelectric sources, real or available capacity is considerably lower. For example, El Cajón has an installed capacity of 300 MW, but can only supply up to 175 MW, depending on the level of the reservoir. The net energy available, including the 331 imported gigawatt-hours (GWh), was 4,845 GWh, while total sales were 3,817 GWh.[3] The 1,028-GWh discrepancy represents technical losses in transmission and distribution plus nontechnical or commercial losses. Since technical losses were likely on the order of 680 GWh (14-15% of net energy), nontechnical losses represent extremely high financial losses for the ENEE of between US$3.5 million and US$4 million per year.

1.5 Honduras's power grid developed around two centers of intense economic activity: the Tegucigalpa and San Pedro Sula metropolitan areas. Since neither area provides easy access for combustible fuels, they depend on remote power generation in the north or south of the country. This creates technical problems with regard to voltage support. The ENEE serves 788,000 customers in three subregions: the south-central region, which includes the metropolitan area and 46% of total customers; the northwest region with 42% ; and the Atlantic coast region with the remaining 12% . Due to Honduras's low rate of coverage (63% in 2003), the 69-kV and 34.5-kV subtransmission lines that are used to supply remote, generally rural distribution networks are very long, which causes problems associated with poor voltage quality in these communities. The situation in rural areas is even more dire, with a coverage rate of 31% in 2002 and marked regional disparities. While coverage approaches 90% in the departments of Cortés and Francisco Morazán, the rate is barely 24% and 15% in Intibucá and Lempira, respectively.

1.6 The proposed project includes activities to help solve these problems. Specifically, it will enhance efficiency by reducing losses and improving the transmission and dispatch system. It will also support investments that expand and facilitate expansion of rural electrification.

2. Progress under the reform begun in the 1990s

1.7 After El Cajón came online in 1985, a year in which peak demand reached 220 MW and installed capacity was 560 MW, efforts to add capacity were halted and the thermal power plants were neglected. In 1993-1994, energy rations were imposed due to failure to add new capacity and low rainfall (the El Niño phenomenon). With a view to reform that would spur private-sector participation in

[3] MW and GWh are units of capacity and energy, respectively. The figures come from sector reports.

electricity generation and distribution, in 1994 Honduras passed the Electricity Subsector Framework Law (LMSE). The law introduced changes in sector management, creating an energy cabinet, consisting of four ministers and led by the president of Honduras, to shape and set policy in the electricity sector. It also created the National Energy Commission (CNE) as the regulatory agency for the subsector, set the general operating rules for the national interconnected system, and established the schedule of rates. A more detailed description of the 1994 reform is available in the technical annexes to this document.

1.8 The LMSE reform measures were partially implemented, changing the Honduran model into a sole buyer model (the ENEE) with a regulatory agency that enjoys limited autonomy and is legally authorized to issue mild regulations. Since the reform, the ENEE has made all capacity additions through contracts with private generators, known as power purchase agreements (PPA), such that 59% of Honduras's installed capacity is now privately generated. However, the PPAs were expensive and contained terms that made them very inflexible.

1.9 The LMSE stipulates that end-user rates must reflect the marginal cost of generation plus the total cost of transmission, plus the added value of distribution. Sales to distributors are based on the bus-bar rate, which is the average marginal cost over a period of five years. Rates remain in effect for five years, but can be automatically adjusted every year when changes in fuel prices or the official exchange rate cause end-user rates to change by 5% or more. Rates in effect are distinguished only by the type of consumer (residential, industrial, other users), the voltage level (high or low), and monthly consumption in the case of residential consumers. Users pay a flat rate, except in the case of industrial service, where separate charges for voltage and the amount of energy consumed are assessed. The current schedule of rates is applied uniformly throughout the country and rural users are charged the respective rate in the schedule.

3. Sector institutions

1.10 Since the 1994 reform, the ENEE, originally established under Decree Law 48 of 1957, has continued to play an instrumental role in the sector. As a State-owned, vertically integrated company, it is responsible for providing service and developing, operating, and maintaining the generation, transmission, and distribution infrastructure it controls. To do this, it has three regional distribution offices and a technical office that manages power generation and transmission, engineers the company's capital projects, and runs the system, including the National Dispatch Center (CND).

1.11 The LMSE created the Social Fund for Electricity Development (FOSODE), which is funded by the national budget and sector companies and managed by the ENEE. The Social Electrification Office (OES) has been in operation since 2001 and currently reports to the ENEE Technical Office, which is responsible for activities related to social electrification, including rural areas. The OES is in charge of

planning, managing, and executing rural and urban social electrification works financed by the FOSODE and other sources. Although it has been playing an important role in rural electrification, its staff has extensive duties, which include interacting with local committees, receiving and processing requests, and reviewing and occasionally even redesigning service extensions. In light of these responsibilities and the increase in capital investments, the OES must be strengthened and restructured to reduce turnover among technical staff.

1.12 The ENEE is overseen by the CNE, the regulatory duties of which overlap to a certain degree with those of the Ministry of Natural Resources and the Environment (SERNA). As the highest authority within the government's energy cabinet, the SERNA is also partly responsible for shaping and setting sector policy. However, because the energy cabinet exists at the highest levels of government, meets sporadically, and does not have the ability to follow up on its decisions, the SERNA does not have sufficient resources to conduct sector planning. Furthermore, the fact that it is in charge of the environmental portfolio creates a certain conflict of interest. In fact, the SERNA is strongly oriented towards promoting renewable resources. Consequently, the ENEE, in addition to pursuing activities related to power generation, transmission, and distribution within a vertically integrated structure, is responsible for sector planning and rural electrification.

C. The country's sector strategy

1.13 Honduras faces a formidable challenge as it attempts to bring its power grid in line with the development conditions the country requires. For the past two years, the ENEE and, by extension, the sector have been coping with financial difficulties arising from the expensive PPAs signed initially, energy losses, and weak revenue from user charges. In a broader context, the challenge is to adapt the sector model in such a way that accounts for the reality of a small electricity market, the limited capacity of the regulatory agency, and a weak institutional structure for shaping sector policy, which makes it difficult to attract private investment to the sector and guarantee supply. With these challenges in mind, the government has been developing a strategy to increase generation and transmission capacity, expand rural coverage, and improve sector finances, while revising sector reform measures to find a long-term solution to the problems described above.

1.14 In the area of generation, the ENEE has added enough capacity to alleviate the risk of rationing until at least 2008. It has done so by leasing 175 MW in motors for short periods of time (one or two years) and awarding, in 2003, 12-year PPAs for 210 MW and 200 MW in 2003. For its most urgent transmission needs, the ENEE included several transmission lines in the power generation projects.

1.15 The government is quite interested in developing new hydroelectric plants for both power generation and other uses (flood control and irrigation). One of the projects under consideration is the Piedras Amarillas project (Patuca 3). In fact, the government created an executive committee to ensure that this project materializes.

As part of this effort, the Bank supported, at the government's request and through the preinvestment fund administered by the Ministry of Finance (SEFIN), an advance prefeasibility study, the final version of which is currently being reviewed. If the conclusion is that the project should be contracted to the private sector, the Bank will provide technical cooperation to help design the concession.

1.16 The Honduran government has been pursuing rural electrification with special interest by identifying projects and financing them with FOSODE resources and soft loans. Between 1995 and 2003, US$93.3 million were invested in rural electrification through a combination of budgetary funds allocated by the government in accordance with Decree 158 of 1994 (LMSE) and loans and grants from international development agencies. The ENEE, through the OES, administers these resources according to a social electrification plan based on the requests of communities and their participation in the technical management of the corresponding project. Projects are selected on criteria that emphasize low financial cost.

1.17 The ENEE has made it a priority to reduce losses, adopting a strategy that attacks the problem on several fronts, namely through: (i) the creation of an information system on distribution networks and users that efficiently supports the task of detecting and tracking nontechnical losses by type and optimally designing network reinforcements and expansions, which includes gathering information on the networks, purchasing software and hardware, and setting up databases; (ii) a review of the processes and procedures for establishing new connections, taking readings, billing, cutting and reconnecting service, checking meters, designing distribution networks, and modifying them to make it easier to monitor and reduce energy losses; (iii) the normalization of service to subnormal communities illegally connected to the grid that have resolved land tenure problems; and (iv) the reestablishment of a temporary working group to detect and resolve cases of fraud, theft, and metering problems by conducting periodic field visits. This group will be given appropriate transportation, tools, and metering equipment.

1.18 With regard to the structure of the sector, since 1998 several changes to the current model have been discussed. The most recent proposal (2004) would reorganize the ENEE in the direction of a vertical separation, without actually creating new companies, in order to create conditions that would enable future administrations to involve the private sector in distribution, if such a decision were made. There is an additional proposal to strengthen the technical capacity of the regulatory agency and improve the pricing structure. The industry has been discussing these proposals, and the discussions are being monitored by both the IDB and the World Bank.

1.19 Although the proposed project is justified and sustainable regardless of any future sector reform, the project team, in coordination with the Honduran government, has studied the main points of the reform and the progress expected, especially with regard to the restructuring of the ENEE and possible legal changes. In accordance with the reform strategy, any change must be consistent with a number of factors

that extend beyond the electricity sector and take political and economic conditions into account. Furthermore, the government recognizes the importance of taking gradual steps and guaranteeing the financial stability of the ENEE and, thus, the sector, before pursuing deeper sector reform. The project team believes this is the right approach. Finally, the proposals the government is considering generally coincide with the conclusions of the study on the sustainability of electricity sector reforms, coordinated by the Bank's Sustainable Development Department (SDS) and done in consultation with the Honduran government. The results of the study are documented in the project technical files.

D. The Bank's sector and country strategy

1.20 The proposed project is consistent with the Bank's sector and country strategies. It will help achieve the goals of sector policies OP-708, OP-733, and OP-733-1, inasmuch as it will: (i) contribute to the sector's financial sustainability; (ii) improve the operating efficiency of the national electricity system; (iii) spur rural electrification; and (iv) help the Honduran electricity sector upgrade its operating systems to meet the requirements of the regional electricity market by backing the electrical integration initiatives of the Puebla-Panama Plan.

1.21 The proposed project is also in line with the Country Strategy with Honduras, approved by the Bank in February 2003 (document GN-2238). The country strategy is designed to support the government in its efforts to reduce poverty by promoting greater sustainable growth led by increases in competitiveness and in the productive capacity of the poor. By reducing energy losses and improving the efficiency of the interconnected system, the project will lower electricity costs, which will reduce the operating costs of industrial users. It should be noted that the problem of growth in Honduras has a geographical component and is most acute in rural areas.

E. The Bank's experience and coordination with other agencies

1.22 The Bank has long provided financing for the electricity sector. During the 1990s, it executed the energy sector hybrid program (644/OC-HO, 645/OC, and 868/SF-HO), designed to spur investment in the sector and promote sector reform. Subsequently, additional financing for sector adjustment was approved (937/SF-HO),[4] as were loans to invest in the El Cajón reservoir and establish an interconnection with El Salvador (936/SF-HO). In addition, the Bank financed private investments in power generation through its private-sector window. It has also extended US$240 million in loans to Honduras as part of the SIEPAC project. The Bank is also providing support through technical-cooperation projects to study the feasibility of a geothermal project (ATN/UE-8599-HO and ATN/SU-8600-HO) and to develop a loss-reduction plan (ATN/SF-8809-HO), which the proposed project will support. Furthermore, the Bank has experience

[4] In 1997, the Honduran government repaid this single-tranche loan and decided to postpone pending privatization activities in the sector.

with rural electrification projects in Chile (1475/OC-CH) and Nicaragua (1017/SF-NI), both of which are in the execution phase, and is preparing operations in Guatemala (GU-0126) and in Bolivia (BO-0224).

1.23 International institutions other than the IDB are also involved in different areas of Honduras's electricity sector. Both the IDB and the World Bank have supported the government on structural issues affecting the sector, coordinating efforts through periodic meetings and the ongoing exchange of information. With regard to the institutional strengthening of the ENEE, the proposed project benefits from and complements rural electrification planning activities by the Canadian International Development Agency and efforts by the European Union to diagnose losses and develop a loss-reduction strategy.

1.24 To invest in rural electrification, Honduras has been supplementing FOSODE financing with funds from the Central American Bank for Economic Integration (CABEI), Japan, Norway, Korea, and Finland. The World Bank has plans to finance a rural infrastructure project, which includes rural electrification projects in isolated areas, based on renewable energy sources, the rehabilitation of rural roads, and the development of local water and sanitation services. The project team has reviewed the scope of these agencies' interventions and shared information during project preparation. Furthermore, as part of the PPP energy initiative, coordination meetings have been held with these institutions and other multilateral and bilateral agencies. During the execution phase, the OES will implement a mechanism to enable financial and donor institutions involved in rural electrification in Honduras to share up-to-date information. (See paragraph 3.11).

F. Lessons learned

1.25 As part of project preparation, the project team is considering lessons learned from previous operations, which are summarized here. In capital investment projects, those responsible for project execution should have sufficient line staff, with at least the coordinators working full-time on the project, and sufficient technical capacity to make good decisions in a timely manner. Outcomes depend on having a team with the ability to make high-level decisions on matters related to the administration of contracts. Dividing the work by area and ensuring a sufficient degree of specialization has proven effective as a tool for finding solutions to the various challenges presented by projects.

1.26 One of the biggest problems has been obtaining rights-of-way, a process that ideally should begin prior to the Bank's approval of the loan. The procurement of goods, works, and services has typically taken longer than anticipated. To mitigate the risk of cost overruns and delays in execution, invitations to bid should be based on up-to-date, detailed engineering studies. For regional projects, steps should be taken to ensure proper coordination among the various countries. In the case of the proposed project, such coordination has occurred around the SIEPAC project.

G. Project strategy

1.27 The proposed project has been structured to address the reality of the Honduran electricity sector. First, it seeks to promote investments in rural electrification that improve existing services, expand coverage, and facilitate future expansions in coverage by reinforcing the subtransmission grid and strengthening the OES. It will also create conditions conducive to implementing, over the medium term, the changes to the sector model currently being studied. Improving dispatch operation and planning and equipping it to handle commercial transactions, as well as implementing the loss-reduction program, are steps that will improve the financial position of the ENEE, a prerequisite for making any changes to the sector model. In addition to the investment aspects of the proposed project dialogue will continue within the context of loan execution, to support the government as it builds consensus and makes the adjustments it proposes for the sector.

1.28 The works under the proposed project are urgent and address weaknesses in electricity supply services. First, investments in rural electrification will be made in primarily poor areas with low coverage and poor service. These investments, which will expand and strengthen existing transmission and distribution networks (on-grid), will be complemented by a rural infrastructure project (currently being prepared by the World Bank) designed to find solutions to the challenges associated with rural electrification in isolated areas (off-grid). Second, the ENEE's existing dispatch center is obsolete and incapable of ensuring the secure and financially sound operation of an interconnected electricity system that incorporates private operators and is integrated into a regional market. Last, the ENEE has conducted, with the assistance of external consultants, studies to identify energy losses in the transmission and distribution grid. These classify the losses by source and specify the most important steps to reduce technical and commercial losses.

II. THE PROJECT

A. Objectives and description

2.1 The general objective of the project is to make the electricity sector more efficient and improve the living conditions of the poorest segments of the population through rural electrification. The specific goals are to expand coverage of rural electrification, lower the costs of operating the interconnected electricity system, and upgrade it to meet the requirements of the regional electricity market being developed as part of the Puebla-Panama Plan (PPP).

2.2 Project investments will improve electricity service (better control of the interconnected system and reduction of undelivered power due to outages), lower costs, and enhance efficiency by reducing energy losses and improving the living conditions and increasing the productivity of the poorest segments of the population through expanded electricity coverage.

B. Project structure

2.3 The proposed project has two components: (i) support for Honduras's rural electrification plan; and (ii) support to enhance the efficiency of the Honduras's National Electric Company (ENEE).

2.4 **Support for the rural electrification plan.** Investments will be made to improve and expand service in the following zones: Zone 1 (La Puerta-Naco) in the departments of Santa Barbara and Cortés; Zone 2 (Danlí-Chichicaste-Trojes) in the department of El Paraíso; Zone 3 (Erandique-Flores) in the departments of Lempira and Intibucá; and Zone 4 in the department of Olancho. Investments consist of procuring and installing reactive compensation equipment for the 34.5-kV and 69-kV systems, which primarily serve the latter three zones. In addition, two new 69/34.5-kV substations will be built (Erandique and Chichicaste) and two 69-kV subtransmission lines will be installed: a 42-km line between Danlí and Chichicaste[5] and a 60-km line between Las Flores and Erandique. Rural electrification services will be extended to approximately 8,000 new users in Zones 1, 2, and 3, in support of the national social electrification plan currently being implemented by the Honduran government. Improvements to existing service are expected to benefit some 27,000 rural users. The ENEE will oversee the works. Consultants will be hired to oversee subtransmission works and perform an environmental audit.

[5] Using non project resources from the ENEE, a 34.5-kV distribution line will also be built from Chichicaste to Trojes to supply this border community, which is currently connected to the Nicaraguan grid, with electricity from the Honduran system.

2.5 **Support to enhance the efficiency of the ENEE.** This component calls for building a 19.5-km, 138-kV line between La Puerta and Naco and a 50 megavolt-ampere (MVA), 138/34.5-kV substation in Naco; modernizing the National Dispatch Center (CND); providing support for the loss-reduction plan; and strengthening the Social Electrification Office (OES).

2.6 Modernizing the CND calls for investments that improve and expand data acquisition mechanisms, control over the power grid and management of the electricity market (SCADA/EMS),[6] and investments in the telecommunications system, in order to improve the coordination of operations, the reliability and security (fewer blackouts) of the national interconnected system, and the administration of ENEE transactions with private generators, and to facilitate coordination with the regional operating entity and, by extension, the regional electricity market. SCADA/EMS will include interfaces for automatically controlling power generation and will have the capacity to handle commercial metering devices, which will be used when generation, transmission, distribution, and sale activities are separated as part of future changes to the sector model currently under review by the Honduran government. As part of this process, financing will be provided to train the ENEE employees who run the CND and to hire specialized consultants to support contracting and oversight during the modernization process.

2.7 As part of efforts to support the ENEE loss-reduction program, investments will be made to purchase vehicles, equipment, and tools for a temporary 40-team loss investigation unit; connect approximately 6,500 households in irregular communities that are currently connected to the grid illegally; and set up a geographic information system for the primary and secondary distribution networks in the country's major cities. The teams, which will cost an estimated US$2 million, will be composed of ENEE officials and employees.

2.8 Strengthening the OES will include: (i) formulating an OES strategy that updates the National Social Electrification Plan (PLANES) to include areas without electricity in communities with partial service, identifies a plan by which the OES can transition to community management of rural and urban social electrification projects, and fully develops the OES information system; (ii) training staff in aspects of economic and technical evaluation and monitoring social electrification projects; and (iii) procuring computer hardware and software to maintain and update the OES information system. In addition, investments will be made to strengthen the ENEE Environmental Studies Unit's information and monitoring systems.

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[6] SCADA/EMS is the acronym for Supervisory Control and Data Acquisition/Energy Management System.

C. Cost and financing

2.9 Table II-1 presents the total cost estimates for the project and the proposed financing. The Bank will finance 76% of the total cost of the project through an investment loan. The ENEE will provide counterpart resources with parallel financing expected from the Nordic Development Fund (NDF).

Table II-1
Cost and financing (in US$ millions)

Category	IDB	NDF	Local	Total
1. Engineering and management	0.49	-	0.80	1.29
1.1 Oversight	0.30	-	0.80	1.10
1.2 Monitoring logical framework indicators	0.03	-	-	0.03
1.3 Audits	0.10	-	-	0.10
1.4 Oversight and environmental audit	0.06	-	-	0.06
2. Direct costs	31.97	6.40	2.74	41.11
2.1 Support for the rural electrification plan	9.22	5.98	0.60	15.80
2.1.1 Subtransmission reinforcement and substation	2.22	5.98	0.60	8.80
2.1.2 Connections to end-users	7.00	-	-	7.00
2.2. Support to enhance the efficiency of the ENEE	22.54	0.42	2.14	25.10
2.2.1 La Puerta-Naco line and substation	2.60	0.42	-	3.02
2.2.2 Modernization of the CND	14.70	-	-	14.70
2.2.3 Loss-reduction program	5.00	-	2.00	7.00
2.2.4 Institutional strengthening of the OES	0.21	-	0.09	0.30
2.2.5 Strengthening of the environmental unit	0.03	-	0.05	0.08
2.3 Social and environmental mitigation measures	0.21	-	-	0.21
3. Contingencies	1.59	-	0.65	2.24
4. Financial expenses	0.95	-	0.36	1.31
4.1 Commitment fee	-	-	0.36	0.36
4.2 Interest	0.60	-	-	0.60
4.3 Inspection and supervision	0.35	-	-	0.35
Project total	35.00	6.40	4.55	45.95
	76%	14%	10%	100%

2.10 The project originally had a total cost of US$42.6 million. Adding to the budget approximately US$6.4 million (€5 million) to be provided by the NDF for subtransmission reinforcement and substations has freed up Bank resources, and the target for rural electrification connections has been raised from 3,270 to 8,000 new connections. On 19 October 2004 the NDF's Board added the funding to its programming, and final approval is expected in December 2004. The availability of the NDF resources will be a condition precedent to the first disbursement of the rural electrification component and construction of the La Puerta-Naco line and substation. If the NDF funding does not materialize, Bank resources will be used for these works and the project will still meet the proposed development objectives.

Talks have also been initiated with the CABEI for additional parallel financing under concessional terms, to increase rural electrification coverage.

III. PROJECT EXECUTION

A. Borrower and executing agency

3.1 The borrower will be the Republic of Honduras and Honduras's National Electric Company (ENEE) will act as executing agency. The investment loan proceeds will be transferred by the government to the ENEE for specific use for the project, and the ENEE will be responsible for repaying the government for the loan, with the exception of proceeds used for rural electrification, which the government will contribute. Considering the financing schedule for each investment category, the ENEE is expected to reimburse the government for 60% of the debt service for the project (financial expenses and amortization). Delivery of a subsidiary agreement, signed by the borrower and the ENEE, for transfer of the loan proceeds to the ENEE under the specified financial terms and conditions, as well as the obligations of the ENEE as the executing agency for the project, will be a condition precedent to the first disbursement.

B. Project execution and management

3.2 **Duties and responsibilities.** As the executing agency, the ENEE will be responsible for: (i) setting up and maintaining effective information systems for contract management and project financial management and accounting, as well as internal control systems for managing resources provided by the Bank, the local counterpart, and other lenders in accordance with Bank requirements; (ii) submitting timely disbursement requests and supporting documentation for eligible expenses; (iii) drafting and submitting timely quarterly progress reports that include revolving fund statements, as well as any other financial reports required by the Bank, such as annual financial statements for the project and the ENEE; (iv) maintaining separate and specific bank accounts that make it possible to identify the source and use of resources provided by the Bank, the local counterpart, and other lenders; (v) maintaining an effective filing system for documentation supporting eligible expenses, for verification by the Bank and external auditors; (vi) preparing bidding documents and purchase orders; (vii) hiring consultants for specialized project tasks; (viii) overseeing civil and electrical engineering works; (ix) overseeing and monitoring work execution timetables; (x) coordinating activities related to managing rights-of-way and the environment; (xi) preparing technical reports required by the Bank; (xii) reviewing and processing work estimates; (xiii) preparing and monitoring the project performance indicators in the logical framework; and (xiv) monitoring allocations made by the local counterpart for future periods, and reporting to the Bank in a timely manner as to whether there are sufficient resources to meet the annual disbursement schedule.

3.3 **Coordination.** A sole coordinator will be hired and given the necessary support for meeting the loan requirements. The coordinator will be responsible for: (i) liaising with the ENEE and the Bank; (ii) coordinating the technical and administrative

activities required for project execution within the ENEE; and (iii) advising ENEE management of any issues related to project execution that require its attention. The coordinator will work in the Engineering Division of the ENEE Technical Office and will have broad authority to perform his or her duties. To facilitate the coordinator's work, staff in the ENEE offices responsible for works, equipment, and processes related to the project will be placed in charge of technical issues.

3.4 The Engineering Division will be responsible for executing works in the rural electrification component, in coordination with the Social Electrification Office (OES). An employee will be appointed liaison for this component and will be in charge of coordinating the activities of the offices responsible for aspects of project execution (topography and rights-of-way; design, control, and monitoring; and oversight).

3.5 As part of efforts to modernize the National Dispatch Center (CND) and in order to ensure that the needs of users of the system, as well as those responsible for setting it up and running it, are met, a consultation group will be set up, consisting of the chief of the Department of Control and Communications and a delegate from each of the following units: Operational Planning, Electronic Control, Communications, and Programming and Dispatch. The technical recommendations of this group will be considered during implementation by the chief of the Department of Control and Communications and the chief of the Electronic Control Unit, who are ultimately responsible for the communications system and for technical aspects of SCADA/EMS, respectively. These officials will act in accordance with the administrative guidelines set by the project coordinator.

3.6 For the loss-reduction subcomponent, an official in the Loss Control Unit will be appointed liaison, with additional responsibility for coordinating the technical aspects of the loss-reduction plan and remaining in communication with the officials specifically appointed for the same purpose at the three regional offices.

3.7 Two accountants in the Accounting Unit of the Financial and Administrative Office will be placed in charge of project accounting. They will be responsible for processing information as required for the project, in accordance with Bank rules, and submitting timely reports, while ensuring that accounting practices for the project are consistent with those for the company as a whole.

3.8 To support the timely monitoring of midterm project impacts, the executing agency will hire a consultant or consultants, using loan proceeds, to provide technical assistance.

3.9 As a condition precedent to the first disbursement, a coordinator, the individuals who will be responsible for each subcomponent, and the liaisons at the OES, the Accounting Unit, and the three regional offices must be appointed. As special conditions for project execution, budgetary funds must be allocated and the members of the loss investigation teams and two officials in the Environmental

Unit must be appointed. As a condition precedent to disbursement of resources for the subcomponent to modernize the CND, a consultation group for the subcomponent must be assembled and corresponding operating procedures must be drafted.

3.10 **Sector reform.** The project team has studied the process the government is pursuing to alter the structure of the Honduran electricity sector (see paragraph 1.19), and its analysis is included in the project technical files. By promoting greater efficiency in the sector (see paragraph 4.27), the proposed project is helping make the required sector adjustment process feasible. This process is not expected to have a significant impact on project execution or the attainment of project objectives, considering the scope of the project, the planned execution structure, and the outlook and timelines for activities planned over the short and medium term. The General Conditions of the loan contract include provisions stipulating that any information related to a reorganization decision by the ENEE, the implementation schedule of any ENEE reorganization process, or the sale of company assets or equity is communicated to the Bank immediately. The General Conditions also include provisions for protecting and maintaining any assets and investments arising from the proposed project.

3.11 **Information-sharing with other agencies.** The borrower and the executing agency commit to implement a mechanism for sharing up-to-date information with financial and donor institutions involved in rural electrification in Honduras. To this end, the OES will draft an annual report on the execution of rural electrification works and connections and will distribute it to every participating institution. The report will indicate progress towards the physical and financial targets of each project being executed by the institutions and will summarize numbers of users, classified by geographical location, execution projections, and statistics on installation costs. The report will also provide contact information for the people responsible for the projects at each international institution and the OES.

C. Criteria for selecting communities for rural electrification

3.12 The OES has preselected an initial stage of 3,270 new connections in communities of Zones 1, 2, and 3, which encompass poor municipalities with human development indices among the lowest in the country (under 500). In addition, it has confirmed the socioeconomic feasibility of investments in these zones (see paragraphs 4.11 to 4.18). Resources have been distributed evenly in the three zones. The preselection was made in accordance with the eligibility and selection criteria described below. During project execution, there will be an opportunity to add or replace communities, provided they meet the following criteria and have the prior nonobjection of the Bank.

3.13 For a local project to be considered eligible, the following criteria must be met: (i) the project must be planned in communities located in Zones 1, 2, or 3, where subtransmission investments will be made, in an attempt to maximize their impact;

(ii) the community must submit a request for the project; and (iii) the community must be willing and have the means to provide the required connection designs at its cost and in a timely manner, the required connection designs. Projects with the lowest cost per housing unit will be chosen. Finally, it must be demonstrated that revenue from user charges, calculated for the three zones as an aggregate at the average rate, substantially covers the operating and maintenance costs and the cost of purchasing the power. Internal installation costs are the responsibility of each user.[7]

D. Procurement

3.14 The selection and/or procurement of works, consulting services, and goods financed with loan proceeds will be conducted in accordance with applicable Bank policies and procedures. In the case of works, international competitive bidding (ICB) will be required for contracts with an estimated value exceeding US$2 million. For consulting services, ICB will be required for contract amounts exceeding US$200,000. For goods, ICB will be required for amounts exceeding US$250,000. Annex II presents the bidding and procurement plan for the project and summarizes the thresholds mentioned above.

3.15 Prior to calling for bids for the works under the project, final designs for the works will be submitted to the Bank. These will include the recommendations contained in the impact mitigation plan (IMP) and must have the approval of the independent environmental supervisor for the project. The ENEE must deliver to the Bank a list of all communities to be electrified before initiating the first competitive bidding process for rural electrical connection works.

E. Execution period and disbursement schedule

3.16 The project disbursement period will be at least three years and no more than five years from the date on which the loan contract enters into force. The estimated disbursement schedule is presented in Table III-1.

Table III-1
Disbursement schedule
(in US$ million equivalent)

Source	Year 1	Year 2	Year 3	Year 4	Year 5	Total
IDB (FSO)	-	4.65	11.56	16.35	2.44	35.00
NDF	-	-	2.60	3.40	0.40	6.40
ENEE	0.07	0.55	1.50	2.12	0.31	4.55
Total	0.07	5.20	15.66	21.87	3.15	45.95

[7] In Honduras, experience has shown that users do not have any difficulty coming up with these resources, particularly when communities are selected based on demand.

F. Revolving fund

3.17 The project team recommends establishing a revolving fund equal to up to 5% of the Bank loan, in consideration of the works schedule and the simultaneous execution of several of the investments. The ENEE will be responsible for submitting semiannual reports on the revolving fund within 60 days after the end of each six-month period.

G. Monitoring and evaluation

1. Supervision by the Bank

3.18 The Bank's Country Office in Honduras will oversee the proposed project. Semiannually and within no more than 30 days after submitting to the Bank the semiannual report specified in the General Conditions of the loan contract, the Country Office will hold meetings between the executing agency and the Bank to discuss the status of project execution and the annual investment plan. The fulfillment of goals, objectives, and indicators will be reviewed, and an investment plan specifying the targets to be met and any necessary corrective measures will be approved for the subsequent year. In the event that the Bank identifies problems in the execution of the project, the executing agency will propose to the Bank corrective measures with an implementation timetable, the status of which will be reviewed during administrative and monitoring missions.

2. External audits

3.19 External audits of the proposed project will be performed in accordance with Bank policies and procedures (documents AF-100 and AF-300) by an independent auditing firm acceptable to the Bank. The firm will be hired according to the procedures described in the Bidding Documents for Procurement of Audit Services (AF-200) and the guidelines established in the Terms of Reference for External Audits of Bank-Financed Projects (AF-400), which must have the prior approval of the Bank. External audits will assess financial and operational aspects of the project and will require an "interim" semiannual report during project execution within 60 days after the end of the first calendar six-month period.

3.20 Annual reports on the project and executing agency financial statements will be submitted within 120 days after the end of each fiscal year. The final report on the project closing financial statements will be submitted within 120 days after the last disbursement. Auditing costs will be considered part of the total cost of the project and will be financed with the Bank loan proceeds. There are plans to hire an auditing firm for three years, with annual contract reviews. An independent environmental auditor will be hired in accordance with paragraph 4.36.

3. Final and ex post evaluations

3.21 A final project evaluation will be performed with the involvement of the executing agency and the Bank once the loan proceeds have been disbursed, in accordance with the rules for project completion reports. The purpose of the final evaluation will be to analyze the outcomes of each component and draw lessons that can be applied to future projects, with special attention to compliance with budgets and physical targets and the outcomes of the proposed mechanism for coordinating with financial and donor institutions.

3.22 During project execution, existing instruments, and the project performance monitoring report in particular, will support evaluation efforts. The Honduran government has stated its intention to conduct an ex post evaluation of the project two years after project completion, to be financed by the borrower. The executing agency will gather the information needed to verify the indicators presented in Table III-2 on an annual basis, to lay the groundwork for the ex post evaluation.

3.23 The gender-related development index (GDI)[8] can be used to measure changes in income and quality of life of the population. The indicator for total energy losses will measure the project's impact on the efficiency of the productive chain and management of the company. The indicators for satisfaction of subsistence energy consumption for lighting, for spending on energy for lighting, and for energy consumption in the area of influence will measure the direct effect that reinforcement of the subtransmission network has on coverage and electricity consumption in the area of influence. The voltage regulation indicator will measure the direct effect on the quality of service provided to rural users in the areas of influence. The equivalent outage time indicator will measure the direct effect that efforts to modernize the dispatch center and integrate with the regional market have on the quality of service within the interconnected system. Lastly, the regional distribution losses indicator will measure the direct effect of the loss-reduction plan on nontechnical losses in the distribution system. Included in the technical annexes for the project is a methodological guide for gathering data for these indicators.

3.24 The executing agency has agreed to gather the data needed to calculate the indicators on an annual basis. In particular, the executing agency has specifically committed to: (i) measure and isolate energy sales in the area of influence of the Chichicaste project, using billing information for the various electricity system codes or meter reading records for the area; (ii) install metering equipment to record voltage variations at the 10 control points on the circuits of the medium-tension lines in Catacamas, Erandique, and Chichicaste; (iii) conduct surveys, to be financed with loan proceeds, for the base year, project year two, and the last year in

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[8] The GDI figures in the table are taken from United Nations projections. At least the same trend is expected for departments within the project's area of infuence as for the UN-projected national trend, taking the following values for 2003 as a starting point: Olancho 0.628, Lempira 0.452, Intibucá 0.461, El Paraíso 0.589, and Santa Bárbara 0.563.

which loan proceeds are disbursed, which will be used to determine the impact of the Erandique and Chichicaste projects on lighting expenses, as well as gather relevant supplementary information to evaluate other indirect impacts; and (iv) systematically collect information on the other indicators in the logical framework.

Table III-2

Indicator	Unit	Baseline	2006	2008	2010
GOAL/Impact					
Gender-related development index (GDI)		0.628	0.654	0.680	0.706
Percentage of total energy losses	%	22.3%	22.4%	20.3%	19.3%
PURPOSE/Direct effect					
Satisfaction of subsistence energy consumption for lighting in the area of influence	%	45%	53%	81%	
Spending on energy for lighting in the area of influence	US$/year/ household	55.2	48.4	23.9	
Energy consumption in the area of influence	MWh/year	17,300	19,800	28,800	
Voltage regulation among users in Erandique and Catacamas	% nominal voltage	< 90%	< 90%	> 95%	
Equivalent outage time due to generation and transmission failures	Hours/year	12.45	12.45	10.39	
Distribution losses by region:					
Northwest	%	20.9%	21.0%	19.0%	
Central/South	%	16.7%	16.4%	14.4%	
Atlantic coast	%	18.5%	20.5%	18.5%	

IV. PROJECT FEASIBILITY AND RISKS

A. Institutional feasibility

4.1 The project team has analyzed whether Honduras's National Electric Company (ENEE) has sufficient institutional capacity to execute the components of the proposed project. As part of this analysis, the team held a workshop for ENEE personnel, which was widely attended by managers and line staff, where the participants reviewed the company's organizational requirements. As a result of this analysis, the scope of the institutional strengthening that the OES and the environmental unit will require has been defined, and the execution structure and oversight and training activities under the project components have been designed. The analysis, summarized below, confirms the institutional feasibility of the proposed operation and its contribution to efforts to strengthen the ENEE.

4.2 The Social Electrification Office (OES) has three working groups (customer service, technical design, and planning), which are supported by 11 engineers and economists. The office has installed basic geo referenced information systems, which its uses to identify and prioritize rural electrification projects. During execution of the electrification projects, it coordinates with the Engineering Division and the Environmental Studies Unit to ensure quality. As it is currently organized, the OES is capable of effectively meeting the specific requirements of this project's rural electrification component. However, the office's organizational structure is insufficient to meet the substantial demands projected for the future. Therefore, efforts must be made to strengthen its technical capacity and tailor its organizational strengths along the lines of the proposed sector reform. These needs will be addressed with project resources (see paragraph 2.8).

4.3 The project team analyzed the organizational structure and resources of the National Dispatch Center (CND), to determine whether it has sufficient capacity for project execution and operation. The team identified the need to strengthen coordination between the teams that act as providers and the users of CND tools and information. This strengthening was incorporated into the execution structure (see paragraph 3.5). In addition, the project calls for investments to improve the facilities to bridge physical gaps and enhance coordination and communication between the planning teams and the teams responsible for real-time dispatching. As part of the subcomponent to modernize the CND, there are plans to provide training for installing, running, and maintaining the new systems, and training providers will be required to guarantee in their bids the continuity of operations that the CND demands. Furthermore, the project budget provides the funds needed to assign specialized teams of professionals to support contracting and oversight during project execution.

4.4 The ENEE is experienced with loss-reduction processes and has a Loss Control Unit. The unit's support structure needs strengthening in the areas of coordination

at the management level and operating capacity. To improve coordination with other ENEE divisions and particularly the regional offices, the unit, with the support of the European Union, conducted a strategic assessment that identified, inter alia, the general organizational requirements for making the loss-control process sustainable over the medium term. Activities to meet these coordination requirements will be designed in detail with the support of technical-cooperation funds from the Bank (ATN/SF-8809-HO). In terms of operational capacity, the ENEE's ability to implement the loss-reduction plan in the short term will be strengthened by a strategy currently being pursued by the ENEE, which will be partly supported with project funds as explained in the subcomponent description (see paragraph 2.7).

4.5 The project team has determined that the Engineering Division has the capacity to execute and supervise the planned subtransmission works. The works are not complicated and the ENEE routinely executes works of a similar technical nature.

B. Technical feasibility

4.6 The project team has verified the technical feasibility of the project components. The proposed reinforcements for the subtransmission network (lines and substations) in the rural electrification subcomponent have been selected based on a study of the alternatives for supplying electricity, in terms of tension levels and line configurations, for supplying electricity that would meet projected demand while adhering to the reliability and service quality criteria adopted by the ENEE (mainly voltage regulation within ±5% of nominal under normal operating conditions and ±10% of nominal in emergencies and under maximum load in terms of line and transformer capacity). The basic features of the selected alternative (tension level, number of circuits, and caliber of conductors) have been defined with a view to minimizing investment costs and losses, while meeting the quality and reliability criteria mentioned above. Decisions about line routing and structure were made by the ENEE engineering group, which considered terrain and access routes in an effort to minimize construction and maintenance costs.

4.7 The configuration and basic features of the subtransmission substations were determined in accordance with ENEE standards on tension levels and substation types. For primary and secondary distribution networks in rural areas with low load capacities and density levels, the ENEE has adopted less stringent reliability and service quality criteria (monophase, medium-tension derivations of a single grounded conductor with a radial configuration of circuits), to keep investment and maintenance costs down.

4.8 The current CND came into service in 1986 with basic SCADA/AGC functions (Supervisory Control and Data Acquisition/Automated Generation Control). The center runs on computer technology developed in the 1970s that is characterized by a proprietary operating system, a semigraphic interface, and remote terminals that use proprietary protocols. In its present incarnation, the CND is an obsolete system

incapable of meeting the Honduran power system's monitoring and control requirements, due to its architecture of inflexible processors, the increase in the number of substations and power plants without remote terminal units, the difficulty of maintaining existing equipment, and the impossibility of loading modern software capable of analyzing and managing the national power system. The communications system currently in operation, which was installed between 1983 and 1985, consists of a carrier wave system, UHF and VHF networks, and a multipoint radio system. The UHF network is based on obsolete technology that is difficult to maintain; the repeater stations in the VHF network need to be replaced; the multipoint radio network operates on a bandwidth that cannot be expanded; and, in general, the communications system does not cover all of the areas that the national interconnected system has been expanded to include. The ENEE decided there was justification for modernizing the CND and the communications system in 1994 and did studies to identify the functional and architectural requirements of a modern system of supervisory control, data acquisition, energy management, and communications, based on the supervisory and control requirements of the regionally interconnected electricity system and the latest information technology.

4.9 In 2001, the ENEE prepared bidding documents for the manufacture, delivery, and installation of equipment and systems and conducted separate bidding processes for the dispatch center and the telecommunications system, which were invalidated. The CND consists of a SCADA/EMS system that is capable of controlling, supervising, and coordinating the operation of the interconnected system and managing a competitive energy market integrated with the regional energy market. The project team verified that the studies and the available information were adequate and agreed that the ENEE would engage the services of two individual consultants to review the functional requirements of the SCADA/EMS system and the telecommunications system and update the respective bidding documents. These consulting services will be financed through a technical-cooperation project already approved by the Bank and will be completed by the end of the year, in time to begin the bidding process.

4.10 Approximately 60% of the investment in the loss-reduction subcomponent will be used to purchase standard tools and equipment that have been clearly specified: single-cab pickup trucks, portable high- and low-tension metering equipment, tools for field personnel, and medium- and low-tension materials and equipment for connecting users in irregular communities, designed in accordance with the standards adopted by the ENEE for these types of works. The rest of the investment for this subcomponent will be used to install a geographic information system (GIS) and related software to manage losses and plan and design distribution networks. The functional requirements of the geographic information system will be determined with the support of technical-cooperation financing from the Bank (ATN/SF-8809-HO). The teams will consist of ENEE officials and employees.

C. Economic feasibility

4.11 The project team reviewed the economic evaluation of the two project components prepared by the ENEE, and the findings are summarized below. The evaluation of the rural electrification subcomponent (and evaluation of the Naco project) consisted of several phases. First, the ENEE verified that the planned networks presented the lowest cost alternative. Second, the company performed a cost/benefit analysis, and lastly, the social return of the local projects.

4.12 For the three subtransmission reinforcement projects, the ENEE evaluated several supply alternatives. In the case of Erandique and Chichicaste, service is poor and there are severe restrictions on expanding coverage, due to the use of very long 34.5-kV feeders. In the case of Naco, there are limitations on increasing load capacities because transmission is already maxed at 34.5 kV. In both cases, the ENEE evaluated 34.5-kV transmission reinforcement alternatives and determined that those selected, 69 kV and 138 kV, would be the least expensive. The Chichicaste project is unique in that it includes an expansion to supply the community of Trojes, which currently receives electricity from Nicaragua, but does not have sufficient capacity to meet any increases in demand in the area. In this case, the option of installing diesel motors in the area was studied, but determined to be uncompetitive.

4.13 The Erandique and Chichicaste rural electrification projects are part of a National Social Electrification Plan (PLANES), which exhaustively studied Honduras's rural electrification needs and identified 10-year investment programs to finance technically feasible projects, with priority given to projects that meet criteria related to financial sustainability,[9] impact on poverty reduction, and lower connection costs per user. The Erandique and Chichicaste projects have been given high priority because they will serve very poor departments with high connection costs (average of US$1,050/user).

4.14 According to the findings of the financial analysis of the projects, the price for residential consumption of 100 kWh (most users in these areas) covers 45% of costs (average current rate of US$52/MWh), under the provisions of the LMSE. This price covers 85% of the costs of power generation (estimated at US$61.40/MWh), and the costs associated with connections and subtransmission reinforcements should be subsidized in their entirety.

4.15 The PLANES team did an economic evaluation of the local projects, which were selected primarily by estimating the social benefit of electric lighting in rural areas using the lighting demand curve. A survey of rural households without electricity in Honduras shows that an average of US$89/household is spent every year on kerosene and other sources of lighting equivalent to annual consumption of 79

[9] For its sustainability criteria, PLANES determined revenue based on a rate that would cover supply costs (approximately US$110/MWh).

kilolumen-hours. In comparison, at the current ENEE price for electricity, it would cost US$8.20/year for a household to generate 1,777 kilolumen-hours with two light bulbs. As such, the estimated amount that people would be willing to pay for electricity is US$65/month. Taking into account these benefits, the social rate of return of the projects, including in the poorest areas, such as those covered by the Chichicaste and Erandique substations, was greater than 58%.

4.16 Although the estimates of electric lighting benefits calculated by the PLANES consultants are theoretically sound, they are considered optimistic given income levels in the country and the experiences other countries have had in assessing the benefits of lighting. Therefore, the social benefit from lighting that would have to be accepted in the two projects to achieve a social return of 12% was also determined, based on the assumption that additional benefits derived from electricity consumption for uses other than minimum lighting needs, for residential users and all incremental consumption of other users, are determined by the revenue at current rates applicable in each case.

4.17 In this analysis, consideration was given to the incremental demand made possible by reinforcements to the subtransmission network, its cost, and the cost of new connections made possible. The findings demonstrate that social benefits from lighting would have to be between US$15 and US$16/month/household in order to achieve a social return of 12%. This figure is high, but justified considering that the amount people are willing to pay was estimated using the lighting demand curve, that benefits from additional electricity consumption in the residential sector were underestimated because they were assessed using the current subsidized rate, and that the analysis did not calculate benefits associated with improved health and education or other qualitative benefits derived from having electricity.

Social return of projects

		Erandique	**Chichicaste**
Present benefits	US$000	13,469	7,773
Residential lighting	US$000	8,162	4,242
Other residential uses	US$000	2,266	1,149
Other sectors	US$000	1,736	1,077
Undelivered energy	US$000		
Reduction in losses	US$000	1,306	1,306
Present costs	US$000	13,395	7,774
Internal rate of return (%)		12.2%	12.0%
Lighting benefits needed to achieve internal rate of return of 12%	US$/month/ household	14.9	16.2

4.18 For the Naco and Catacamas projects, the lighting benefit would not have a significant impact of the project's social return, since, in the case of Naco, industrial

demand accounts for 60% of total demand and, in the case of Catacamas, benefits will derive from the reductions in losses and improvements in tension level that will result from the installation of reactive equalization. The social return for the Naco and Catacamas projects was calculated at 13.7% and 21.1%, respectively.

4.19 For the economic evaluation of the CND modernization subcomponent, quantifiable benefits were estimated for: (i) savings in variable generation costs from a new dispatch and redispatch system that uses software to optimize operations; (ii) the reduction in transmission losses resulting from the use of software for optimal load flow and control of reactive power; (iii) savings in costs that would otherwise accrue as a result of deterioration in the reliability of supply from the transmission system due to the absence of an effective supervisory and control system for the power grid; and (iv) savings in operating and maintenance costs associated with the continued operation of the current SCADA/AGC system. The results show a net present value of US$5.4 million (at a discount rate of 12%) and an internal rate of return of 17%.

4.20 For the loss-reduction subcomponent, a financial evaluation was only done for financed investments that have direct quantifiable benefits (the control and investigation unit and the connection of users in irregular communities), because the economic benefits associated with reducing nontechnical losses are small. This is due to the fact that additional revenue from user fees is not considered because it is a transfer between users and the company. The benefits were calculated as the additional revenue resulting from normalizing connections (discounting the effect of less consumption due to the price elasticity of demand), taking into consideration the outcomes of similar ENEE projects. The financial return from the control and investigation unit is very high, with a repayment period of less than a year, and the cost/benefit ratio of connecting illegal users is greater than 1.5.

D. Financial feasibility

4.21 With the Bank's support, a detailed financial analysis of the ENEE has been conducted. According to the results, the company's financial condition has worsened since 2002 due to a number of factors, including an increase in electricity purchases, low hydroelectric generation, higher fuel costs, an increase in energy losses, and inability to collect accounts receivable.

4.22 In response, the ENEE and the Honduran government initiated a financial rehabilitation process that included increasing rates at the end of 2003, signing new PPAs under more favorable terms, and deciding to implement a loss-reduction strategy. End-user rates rose from an average of US$0.087/KWh in 2002 to US$0.094/KWh in 2004 (an 8% increase). The average cost of purchasing energy dropped from US$0.098/KWh in 2003 to US$0.086/KWh in 2004.

4.23 To evaluate the financial prospects of the ENEE, the financial analysis considered several revenue, cost, and financing scenarios to determine the behavior needed for

critical sustainability variables and to identify a target scenario. This scenario is outlined in the flow-of-funds projections for the ENEE presented in Table IV-1. Based on this scenario, the company's finances are sufficient to guarantee the execution of the proposed project, service existing and projected debt, make the required local counterpart contributions, and make other investments as needed to meet energy demand. It should be noted that the sensitivity analyses indicate the importance of at least maintaining current rates in order to cover planned investments.[10]

Table IV-1
Source and use of funds
(in US$ millions)

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Total '04-'12
Source and use of funds												
SOURCE												
Internal generation of funds	27.70	2.13	18.05	50.14	55.67	65.60	83.99	78.08	84.92	105.57	138.13	680.15
Government contributions	9.92	16.11	8.89	19.99	18.22	5.58	14.00	10.00	10.00	10.00	10.00	107.68
Loans in disbursement	6.86	6.08	-	-	1.22	4.90	-	-	-	-	-	6.12
Loans in preparation (IDB)	-	-	-	-	4.65	11.56	16.35	2.45	-	-	-	35.00
Other loans in preparation						3.00	4.00	0.50				7.50
Short-term loans	8.75	9.03	5.52	-	-	-	-	-	-	-	-	5.52
Source total	53.23	33.35	32.47	70.13	79.76	91.63	118.34	91.2	94.92	115.57	148.13	841.97
USE												
Investments												-
- Proposed IDB project	-	-	-	0.07	5.20	16.06	22.47	3.26	-	-	-	47.05
-Transmission and generation	25.08	9.77	8.56	19.97	8.61	19	35.58	24.71	9.27	20.67	11.05	157.43
-Rural electrification	-	6.69	9.72	20.79	14.99	3.34	10.73	10.71	10.69	10.67	10.65	102.29
Debt service - interest	16.10	12.53	10.45	8.55	11.28	11.80	11.44	11.11	10.33	9.75	9.29	94.01
- amortization	16.74	21.64	17.12	19.63	30.85	27.73	22.89	22.40	20.84	18.74	19.50	199.71
Working capital variation	(4.68)	(17.29)	(13.69)	1.00	(0.99)	3.44	10.00	8.69	18.65	7.96	11.36	46.42
Use total	**53.23**	**33.35**	**32.17**	**70.02**	**69.942**	**81.36**	**113.12**	**80.88**	**69.78**	**67.79**	**61.85**	**646.91**
Spread	**0**	**(0)**	**0.30**	**0.11**	**9.82**	**10.27**	**5.23**	**10.14**	**25.14**	**47.78**	**86.28**	**195.06**
Cumulative spread	**0**	**(0)**	**0.29**	**0.41**	**9.93**	**20.09**	**15.50**	**15.36**	**35.28**	**72.92**	**134.06**	

4.24 The preceding scenario requires that certain assumptions be met as a result of actions by the ENEE and the Honduran government. These can be summarized as: (i) taking appropriate steps to ensure, to the Bank's satisfaction, that revenue from electricity rates covers the normal operating and maintenance costs of the ENEE,

[10] For example, lowering average rates by 1% would necessitate additional resources to cover 13% of the target investment plan, based on present values.

services its debt, and contributes substantially to the investment plan (the contribution of net internally generated funds should be at least 30% in 2005, 30% in 2006, and 35% in subsequent years), and that, during the same period, electricity rates adequately reflect fluctuations in fuel prices and the rate of exchange; (ii) reducing energy losses by an annual average of at least 0.5% for the 2004-2008 period; (iii) achieving a cash operating ratio, defined as the amount remaining after covering generation and other costs and operating expenses, of 12.6% in 2005, 13.2% in 2006, 14.8% in 2007, and 17.8% in 2008; (iv) reducing the collection period for accounts receivable from 98 days in 2004 to 75 days in 2005, 66 days in 2006, and 60 days in 2007 and thereafter; (v) achieving a minimum debt service ratio of 1.3 in 2005, 1.3 in 2006, and 1.5 in 2007 and subsequent years; (vi) attaining a current ratio of 0.6 in 2004, 0.7 in 2005, 0.8 in 2006, 0.9 in 2007, and 1.0 in 2008; and (vii) updating and documenting the overdue balance owed between the ENEE and the government each year and not generating any additional debt between them. These measures will be a special condition for project execution and will be verified on an annual basis. In the event of any deviations in these indicators that are determined to weaken the financial condition of the ENEE, the borrower and the executing agency will submit an action plan to the Bank clearly identifying the causes of the deviations and the managerial or financial measures that will be adopted, the responsibilities of the executing agency and the borrower, and a corresponding implementation schedule, so that the ENEE can regain financial sustainability.

E. Benefits and development impact

4.25 The proposed project will have a direct positive impact on the living conditions of the poorest people in Honduras, by providing them with greater electricity coverage and improving service. The project is expected to improve service for 27,000 rural users in the areas of influence of the subtransmission reinforcement activities. In addition, coverage will be expanded to include approximately 8,000 new users, who will be selected based on socioeconomic criteria. Benefits will result from freeing up household income currently spent on expensive sources of energy for lighting. Families will also benefit from potential increases in productivity and educational opportunities.

4.26 Additional benefits will accrue as a result of investments to reinforce the subtransmission grid and modernize the CND, because these efforts will improve the reliability and quality of service throughout the system and make the electricity sector more efficient.

4.27 The project as a whole will have a positive impact on the finances of the ENEE, which will increase the feasibility of successfully adjusting the model for Honduras's electricity sector. Financially rehabilitating the ENEE will contribute to macroeconomic stability, increase the probability of attracting fresh resources to the sector, and enable the company to focus its management efforts on strategic activities that are only possible on a financially sound footing. This will create the

right conditions for increasing investments in the sector chain, continuing to improve service quality over the medium and long term, and attracting greater resources from the private sector. The benefits and outcomes of the proposed project are summarized in the logical framework, which is attached as Annex I.[11]

F. Social equity and poverty reduction

4.28 The project qualifies as a social equity enhancing (SEQ) investment, as described in the indicative targets mandated by the Bank's Eighth Replenishment (document AB-1704). Although the project does not include performance indicators for measuring poverty reduction and social equity enhancement according to the May 2001 National Multiple Purpose Household Survey (conducted by Honduras's National Institute of Statistics, http://www.ine-hn.org), an estimated 73.8% of the Honduran people are poor, and of this percentage, 60.5% live in rural areas classified as very poor. The poverty-targeted investment classification (SEQ) is based on the fact that the project will invest in electricity distribution and transmission works in rural communities, spur local economic development in these communities, benefit human resources, and build capacity to create better health, education, and other opportunities by providing a stable electricity system. The project is expected to increase levels of social wellbeing across the board in rural communities.

G. Environmental and social management proposal

4.29 The project's environmental and social strategy (ESMR)[12] applies to all project activities that have the potential to adversely affect the environment (only subtransmission works), in accordance with Bank rules and procedures, Honduras's environmental laws, and the guidelines for PPP projects.

4.30 Based on the analysis and taking into consideration the qualitative environmental assessment[13] performed by the ENEE Environmental Studies Unit, the biophysical and socioeconomic conditions, laws and regulations in force, and field work, there are clearly no limitations that would make construction unfeasible, since the construction process is very simple and will mostly take place in areas that have already been altered.

4.31 However, the construction and operation phases of the project may have an impact on the environment. Most of the identified potential impacts will be minimized with proper design, the recommendations for which are set forth in the impact mitigation plan (IMP). Compensatory measures will be taken for permanent impacts, such as the felling of trees for several sections of the route, in order to maintain the

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[11] Baseline and projected indicators are described in detail in paragraphs 3.23 and 3.24.

[12] Contained in the Environmental and Social Management Report.

[13] The qualitative environmental assessment is used in Honduras for projects with potentially limited impacts. It is equivalent to an environmental analysis at the Bank.

project's environmental balance. The total estimated cost of the ESMR is US$280,000, of which US$210,000 will be used for mitigation measures and the remaining amount will cover costs associated with strengthening, oversight, and audits.

4.32 The recommendations contained in the IMP address design concerns, which are being addressed by the executing agency. The main recommendations are to: (i) avoid crossing through areas of urban expansion along the La Puerta-Naco route, to avoid resettlement;[14] (ii) minimize the felling of forest in certain sections of the La Puerta-Naco, Las Flores-Erandique, and Danlí-Chichicaste routes and, as required, obtain the corresponding permits from the Corporación Hondureña de Desarrollo Forestal [Honduran Forestry Development Corporation]; and (iii) arrange for the Instituto Hondureño de Antropología e Historia [Honduran Institute of Anthropology and History] to conduct an archaeological survey prior to construction in order to minimize passage through any area of interest. The final designs will be reviewed to ensure that these recommendations have been incorporated (see paragraph 3.15).

4.33 For the construction phase, the main recommendations are to: (i) prevent and compensate for losses to third parties as a result of construction, and halt construction and relocate when wildlife nests and/or dens are found; (ii) dispose properly of waste; (iii) comply with laws and regulations in force if cultural heritage sites are discovered; and (iv) set up a public service system for effective participation.

4.34 The recommendations for operation are aimed at monitoring factors that may have no impact, in order to have retrospect in the event that corrective action is required. Monitoring activities will focus on bird collisions with lines and electromagnetic fields. The ENEE Environmental Studies Unit is responsible for verifying compliance with the measures contained in the IMP by contractors and under the supervision of the specialized firm (see paragraph 4.36).

4.35 In accordance with the guidelines for PPP projects, the project team has confirmed the factors that determine community acceptance of a project. As part of the ESMR, the team analyzed two surveys conducted by the OES and found that 100% of survey participants want electricity and are willing to pay for it. The analyses of income spent on lighting and other sources of energy demonstrate that most potential users are prepared to spend more than, or the same amount, they currently spend on average.

4.36 Within the project, funds will be specifically allocated to hire independent consultants for environmental oversight and audits, as well as to cover costs

[14] The ENEE will ensure that the design recommendations are implemented and will verify that field conditions observed with the 1:50,000 plan are maintained in the fine topography, and if required, will reroute the line in the identified sectors.

associated with the mitigation measures. The ESMR contains the IMP and other environmental measures that will be observed during project execution. As a condition precedent to the first disbursement of the rural electrification component, a detailed environmental action plan must be submitted, along with a work execution timetable and the final terms of reference for environmental oversight.

H. Risks

4.37 Making progress on rate issues and implementing the loss-reduction plan will require the government to pursue measures that are not without problems, especially in the political arena. Failure to make progress in these areas could delay the financial sustainability targets set for the ENEE. Therefore, the government's commitment on rate issues is key. This commitment is embodied, along with other measures, in agreements with the International Monetary Fund to reverse fiscal deterioration and World Bank agreements approved in May as part of a loan to support poverty-reduction efforts in Honduras. The government is renewing its rate and loss-reduction commitments within the framework of this project, as indicated in the financial feasibility analysis (see paragraph 4.24).

4.38 Sector reform or an organizational restructuring process could adversely affect the execution of an investment project. For the proposed project, the project team has consulted with the authorities, reviewed the planned timetables, and evaluated the impacts of the potential reform under consideration by the government. In addition, the team has designed this operation with objectives that would retain their urgency and remain attainable under any foreseeable restructuring scenario. Furthermore, the loan contract contains provisions ensuring the timely flow of relevant information for project execution, as well as measures to protect the value of, and maintain, assets financed under the project.

4.39 Obtaining rights-of-way for the subtransmission lines and substations in a timely manner will be crucial for keeping these works on schedule and on budget. There are plans to purchase rights-of-way from approximately 450 landowners at an estimated cost of 23 million lempiras (US$1.3 million). The ENEE has reported that it included all of the resources needed to acquire these rights-of-way in its 2005 budget proposal. In addition, the project team has reviewed the action plan being pursued by the ENEE to manage rights-of-way, which clearly identifies planned activities and the scope, the timeline, and the ENEE office responsible for each one. There is a risk that difficulties in the availability of local funds will delay project execution. As part of its analysis of this project, the team reviewed financial projections and funds availability and determined that sufficient counterpart resources will be available. Budget allocations will be closely monitored during the project execution period, in order to anticipate any action that may be required to ensure the timely availability of the counterpart contribution.