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DEPARTMENT OF STATE  
AGENCY FOR INTERNATIONAL DEVELOPMENT  
Washington, D.C. 20523

PROJECT PAPER

Proposal and Recommendations  
For the Review of the  
Development Loan Committee

522-

HONDURAS - Aguán Valley Rural Electrification

AID-DLC/P-2223

UNCLASSIFIED

DEPARTMENT OF STATE  
AGENCY FOR INTERNATIONAL DEVELOPMENT  
WASHINGTON, D.C. 20523

UNCLASSIFIED  
AID-DLC/P-2223  
April 1, 1977

MEMORANDUM FOR THE DEVELOPMENT LOAN COMMITTEE

SUBJECT: HONDURAS - Aguán Valley Rural Electrification

Attached for your review is the recommendation for authorization of a loan to the Government of Honduras of not to exceed Ten Million United States Dollars (\$10,000,000) to help in establishing a rural electrification system in the Aguán Valley which will result in an improvement in the quality of life for those residents in the Aguán Valley.

The loan is scheduled for consideration by the Development Loan Staff Committee on Tuesday afternoon, April 12, 1977 at 2:30 p.m. in the PPC Conference Room, 3886 N.S. If you are a voting member, a poll sheet has been enclosed for your response.

Development Loan Committee  
Office of Development Program  
Review

Attachments:  
Summary and Recommendations  
Project Analyses  
Annexes A - H-19  
Glossary

PROJECT PAPER  
AGUAN VALLEY RURAL ELECTRIFICATION  
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## GLOSSARY

A.I.D.	-	Agency for International Development
BNF or BANAFOM	-	National Development Bank
COHBANA	-	Honduran National Banana Corporation
COHDEFOR	-	Honduran National Forestry Development Corporation
DAEC	-	Development Assistance Executive Committee of USAID/W
DAP	-	Development Assistance Program
EBASCO	-	A U.S. firm of consultants to utility companies
Empresa Asociativa	-	National Banana Growers Association
ENEE	-	National Electric Company Semi-autonomous agency of the GOH
FNCB	-	First National City Bank
GOH	-	Government of Honduras
IBRD	-	World Bank
IDB	-	Inter American Development Bank
INA	-	National Agrarian Institute
MOF	-	Ministry of Finance
NRECA	-	National Rural Electric Cooperative Association
Urbanismo	-	Honduran Urban Planning Center
ACSR	-	Aluminium conductor steel reinforced
AVR	-	Aguan Valley Region
GDP	-	Gross Domestic Product
IEE	-	Initial Environmental Examination
IRR	-	Internal Rate of Return
NRA	-	National Agrarian Reform

Aguán Cooperative Program	-	An Integrated Colonization program establishing agricultural cooperative villages in the Aguán Valley
Aguán Valley	-	Potentially the richest agricultural region in Honduras. Location of the proposed Rural Electrification Project
Campesino	-	Term applied to the rural poor
Cañaveral & Río Lindo	-	The two existing hydro-electric plants located in Honduras, operated by ENEE
El Cajón	-	A mammoth hydro-electric project, scheduled for construction in the early 1980's. Capacity 500 M.W.
Hectare	-	Measurement of land equal to 2.47 acres
Manzana	-	Measurement of land equal to 1.72 acres
Naranjito	-	An alternative hydro-electric project if El Cajón is deferred until 1986, generating capacity 90 M.W., scheduled completion date 1983
Nispero	-	A proposed hydro-electric project with a generating capacity of 15 M.W., scheduled completion date 1981
Piedras Amarillas	-	An alternative hydro-electric plant proposed if El Cajón is postponed indefinitely generating capacity 200 M.W., scheduled completion date 1985-1986
Puerto Castilla	-	One of the finest sites in Central America for a deep water port. Currently a 95 million development program is underway to develop its facilities
Sinaloa Service Center	-	The central offices for INA in the Aguan Valley
KV	-	1,000 Volts
WATT	-	1 Watt X 1 amp.
KW	-	1,000 Watts
MW	-	1,000 KW

- GW - Gigawatt = 1 billion Watts
- KWH - Equals 1 Kilowatt hour
- KVA - With 100% power factor is 1 KVA = 1 KW
- KVA - With 80% power factor is 1 KVA = .8 KW
- KM - Kilometer
- KMs - Kilometers

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**PROJECT PAPER FACESHEET**

1. TRANSACTION CODE: **A** (ADD), C (CHANGE), D (DELETE)

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5. PROJECT NUMBER (7 digits): **522-0138**

6. BUREAU OFFICE: A. SYMBOL **LA**, B. CODE **05**

7. PROJECT TITLE (Maximum 40 characters): **Aguán Valley Rural Electrification**

8. ESTIMATED FY OF PROJECT COMPLETION: **81**

9. ESTIMATED DATE OF OBLIGATION: A. INITIAL FY **77**, B. QUARTER **3**, C. FINAL FY **77** (Enter 1, 2, 3, or 4)

10. ESTIMATED COSTS (\$000 OR EQUIVALENT \$)

A. FUNDING SOURCE	FIRST FY		D. TOTAL	LIFE OF PROJECT		G. TOTAL
	B. FA	C. FC		E. FA	F. FC	
AID APPROPRIATED TOTAL	8,155	1,845	10,000	8,155	1,845	10,000
GRANT						
LOAN						
OTHER						
HOST COUNTRY	-	4,700	4,700	-	4,700	4,700
TOTALS	8,155	6,545	14,700	8,155	6,545	14,700

11. PROPOSED BUDGET APPROPRIATED FUNDS (\$000)

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	PRIMARY TECH. CODE		E. 1ST FY 77		H. 2ND FY 78		K. 3RD FY 79	
		C. GRANT	D. LOAN	F. GRANT	G. LOAN	I. GRANT	J. LOAN	L. GRANT	M. LOAN
(1) FN	200B	-	062	-	10,000				
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(3)									
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TOTALS									

12. IN-DEPTH EVALUATION SCHEDULED

A. APPROPRIATION	N. 4TH FY 80		O. 5TH FY 81		LIFE OF PROJECT		12. IN-DEPTH EVALUATION SCHEDULED
	C. GRANT	D. LOAN	H. GRANT	I. LOAN	J. GRANT	K. LOAN	
(1) FN	-	-	-	-	-	10,000	
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(3)							
(4)							
TOTALS							

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**1** 1. NO, 2. YES

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14. ORIGINATING OFFICE CLEARANCE

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TITLE: **Director, USAID/HONDURAS**

15. DATE DOCUMENT RECEIVED IN AID W. OR FOR AID W. DOCUMENTS, DATE OF DISTRIBUTION

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MM DD YY **03 20 77**

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4. DOCUMENT REVISION NUMBER  
 1

5. PROJECT NUMBER (7 DIGITS)  
 522-0138

6. BUREAU/OFFICE  
 A. SYMBOL LA B. CODE 05

7. PROJECT TITLE (MAXIMUM 40 CHARACTERS)  
 Aguán Valley Rural Electrification

8. PROPOSED NEXT DOCUMENT  
 A.  3 2 = PRP  
            3 3 = PP  
 B. DATE 03 77

10. ESTIMATED COSTS (\$000 OR EQUIVALENT, \$1 = )

FUNDING SOURCE		AMOUNT
A. AID APPROPRIATED		10,000
B. OTHER U.S.	1.	-
	2.	-
C. HOST COUNTRY		4,700
D. OTHER DONOR(S)		-
TOTAL		14,700

9. ESTIMATED FY OF AUTHORIZATION/OBLIGATION  
 a. INITIAL FY 77 b. FINAL FY 77

11. PROPOSED BUDGET AID APPROPRIATED FUNDS (\$000)

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	PRIMARY TECH. CODE		E. FIRST FY		LIFE OF PROJECT	
		C. GRANT	D. LOAN	F. GRANT	G. LOAN	H. GRANT	I. LOAN
(1) FN	200B	-	052	-	10,000	-	10,000
(2)							
(3)							
(4)							
TOTAL		-	-	-	10,000	-	10,000

12. SECONDARY TECHNICAL CODES (maximum six codes of three positions each)

13. SPECIAL CONCERNS CODES (MAXIMUM SIX CODES OF FOUR POSITIONS EACH)

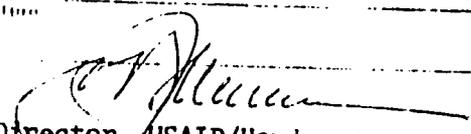
14. SECONDARY PURPOSE CODE

15. PROJECT GOAL (MAXIMUM 240 CHARACTERS)  
 To increase the real income and quality of life of the rural poor of Honduras.

16. PROJECT PURPOSE (MAXIMUM 400 CHARACTERS)  
 To establish a Rural Electrification system in the Aguán Valley.

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17. PLANNING RESOURCE REQUIREMENTS (staff/funds)  
 N/A

18. ORIGINATING OFFICE CLEARANCE  
 Signature:   
 Title: Director, USAID/Honduras  
 Date Signed: 03 18 77

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PART I. SUMMARY AND RECOMMENDATIONS

A. Recommendations

On the basis of the conclusions of the Mission that the project for Rural Electrification is technically, financially and economically justified and that it is socially sound and consistent with A.I.D. policies, it is recommended that a loan to the Empresa Nacional de Energia Eléctrica (Borrower), a semi-autonomous agency of the Government of Honduras (Guarantor), for an amount not to exceed ten million U.S. dollars (\$10,000,000) be authorized subject to the following conditions:

1. A Three-party Agreement among A.I.D., the Borrower and the Guarantor will provide for:
  - (a) Terms to the Borrower: Repayable within twenty five (25) years including a (10) year grace period, at an interest rate of three percent (3%) per annum during the grace period and four percent (4%) per annum thereafter. Borrower will make payments directly to the Guarantor in accordance with these terms.
  - (b) Guarantor will be responsible for making payment to A.I.D. in accordance with the following terms: Repayable in dollars within forty (40) years including a ten (10) year grace period, at an interest rate of two percent (2%) per annum during the grace period and three percent (3%) per annum thereafter.
  - (c) Proceeds in the amount of the differential between terms to the Borrower and terms under which payments are made to A.I.D. by the Guarantor will be earmarked for a Fund for rural electrification projects to be administered by the Borrower.
2. In addition to the initial conditions precedent to the issuance of any commitment document or disbursement, the following conditions will be met by the Borrower in form and substance satisfactory to A.I.D. prior to the issuance of any commitment document or disbursement for other than training and technical assistance:
  - (a) An agreement between Borrower and Guarantor concerning the criteria governing the use of resources of the Fund for rural electrification.

- (b) A staffing plan for Borrower's personnel assigned to this project and a time-phased plan for all project activities including construction, training and promotion.
  - (c) Evidence that Borrower has made firm arrangements for electric power generating capacity sufficient to provide for the needs of the project.
3. Borrower shall covenant:
- (a) That during the course of the project, at least once annually, Borrower shall conduct with A.I.D. an evaluation of project's progress and that in 1985, Borrower, pursuant to an evaluation framework satisfactory to A.I.D., will conduct an evaluation of the impact of the project and of the operations of the Internal Wiring Fund.
  - (b) That during the course of the project and thereafter until 1985, Borrower will maintain the level of project funds provided for the Internal Wiring Fund.
4. The loan shall be subject to such other terms and conditions as A.I.D. may deem advisable.

B. Description of the Project

The purpose of this Project is to establish a rural electrification system in the Aguán Valley, which for the residents of the Valley (together with other programmed investments in the area) will result in an improvement in the quality of life - increased employment opportunities, increased food consumption, increased income and improved nutritional status.

The Project will provide for the installation of 200 kilometers of transmission lines, approximately 500 kilometers of distribution lines and 550 kilometers of secondary lines to serve initially 25,000 consumers in 240 small villages and farm cooperative clusters in the Valley area. To facilitate acceptance of electricity and to assist those who are unable to finance initial installation costs, an Internal Wiring Fund will provide small loans which will be added to the monthly bill. Personnel for the Project, drawn principally from the Valley area, will be trained to administer the Project. Technical assistance will be provided for the design of the training program and of a billing and collection system appropriate to the region.

The project will directly affect the large majority of population living in the Valley by supplying inexpensive power to households and will benefit the region (and the country) by providing power for community services, agro-industry, and irrigated agriculture. The differential between Loan repayment terms to the Borrower, the power company, and A.I.D.'s most concessional terms to the Government of Honduras will flow to a special Fund for additional rural electrification projects.

## C. Summary Findings

### 1. Technical Analysis

In studies developed by U.S. consultants for this Project, five alternative electrification systems were analyzed including three alternatives for receiving power from the interconnected generation system and two from an isolated generation plant located in Sabá, a small town centrally located in the Valley. Each of the alternative systems was studied in view of load flow and voltage drop, transmission system losses, requirements in size and type of equipment, and costs associated with power generation and construction. The decision to adopt the 138 KV plan with 34.5/19.9 KV distribution is sound from an engineering operational and service standpoint, and is the most economical and practical of the five alternatives considered.

### 2. Social Analysis

The principal finding of the Social Analysis is that electrical energy introduced by this Project is critical to improvement in income, employment, and the quality of life for the rural poor majority in the Aguán Valley. The impact of electricity, particularly when combined with other innovations, is direct and quantifiable, and there is no doubt that it will benefit the intended beneficiaries - including the landless laborers, independent small farmers and agrarian reform farmers.

The Social Analysis describes the social categories in the target group, and analyses the input and spread of Project benefits. Prediction of the impact is a reasonable forecast based on knowledge of the target group, present policies of the GOH, and parallel cases. Changes in any of these will have consequences for the social impact. The analysis must be qualified to this extent, especially in relation to irrigation benefits for the independent small farmer, as these depend on continued and coordinated actions by public and private sector agencies.

### 3. Financial Analysis

A review of ENEE's financial statements reveals the Company to be operating on a firm financial basis with adequate operating revenues being generated and appropriately reinvested in combination with new long term debt for the expansion of plant and service. Moreover, an examination of the proforma source and application of funds statements shows ENEE with sufficient cash availability to finance both the Aguán Valley and necessary power generating projects if resources develop as planned. The most conservative rate of return analysis, taking into account the proposed project as well as complementary investments for expanding electric generating capacity, forecasts a 10% return on investment.

#### 4. Economic Analysis

The economic analysis which measures direct and surplus benefits establishes that the internal rate of return of the Project can reasonably be calculated at 12 per cent compared to the more conservative rate of return of 10 per cent derived from the financial analysis. This conclusion follows from a calculation of reasonable expectations of economic activity in the Valley region over the next several years. The Valley's GDP is projected for 1985 in order to derive additional industrial power demand not considered in the base case. Surplus benefits are estimated for households, producers, and consumers. Attendant benefits are discussed and related to increased employment opportunities and income increases that can be expected from the Project and other planned and related investment in the region.

D. Project Issues - Adequate Power Generation Capacity

During the course of intensive review, it became apparent that installed generating capacity for the country would be insufficient to meet power demand by 1981 even without considering the power requirements related to the project. This problem has resulted, in part, from protracted studies and negotiations attempting to identify feasible alternatives and to secure financing for the facilities which will provide for the country's long-term power needs. It has always been contemplated that these needs would be met by one or more large hydro-electric facilities. It can now be concluded that a large hydro-electric facility will not come on stream soon enough to provide for power demand which will exceed installed capacity in 1981 and that an interim power project will be necessary. 1/

The issue concerns whether the Rural Electrification project should proceed in the absence of firm arrangements for additional capacity and whether project-related incremental demand justifies the incremental costs of new capacity to be provided by the interim power project, which more than likely will take the form largely of thermal generators.

In the Mission's judgment the issue has been analyzed and resolved as follows. The financial analysis includes those costs of the interim power project attributable to demand stemming from the Rural Electrification project. The rate of return analysis demonstrates that the Rural Electrification project should go forward. This conclusion is substantiated by the Economic Analysis.

After discussion with the Borrower and personnel of the World Bank which has indicated preliminary interest in providing financing for the interim power project, the Mission is convinced that timely installation of the additional capacity will be assured. As an added precaution, a condition precedent to disbursement for construction activities will require firm arrangements for power generating capacity to meet the needs of the project.

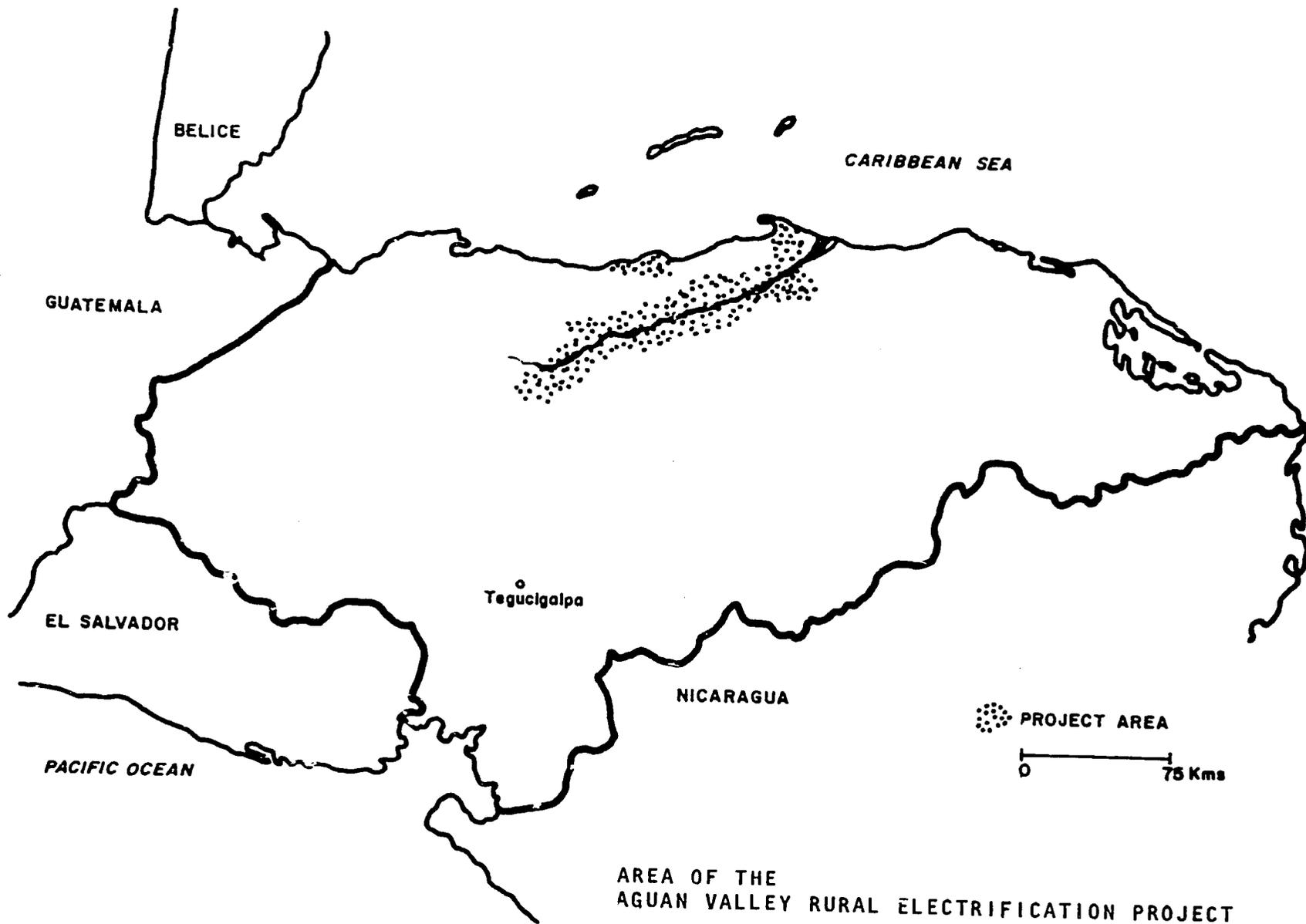
E. Negotiating Status

In addition to the terms and conditions set forth above under Part I, A, Recommendations, the Mission plans to negotiate with the Borrower and Guarantor that a source of funds (up to \$1 million) other than ENEE's resources be made available as necessary to assure the Borrower's timely contribution to the project. It is likely that the funding source will be a special fund for rural electric projects the resources for which are generated from two-step proceeds of a World Bank/IDA loan. In addition, the Guarantor will be asked to assume responsibility, in the final analysis, along with the Borrower in connection with the standard loan agreement covenant concerning "Funds and Other Resources to be Provided by Borrower."

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1/ See the Technical Analysis section of the Paper for a discussion of hydro-electric power and interim power project alternatives.

All terms and conditions have been discussed with the Borrower at the General Manager level. The essential aspects have been discussed with the Guarantor. The Mission believes that the negotiating status of the project warrants prompt authorization of the loan.



Capital Assistance Committee

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Peter Davis, Economist, USAID/Honduras  
John Kelly, Anthropologist, Personal Services Contractor  
J. Wright, Engineer, AID/Washington  
William Roach, Financial Analyst, Personal Services Contractor

## PART II. PROJECT BACKGROUND AND DETAILED DESCRIPTION

### A. Background

#### 1. A Brief National Perspective

The proposed loan for electrification of the Aguán Valley is designed to assist the Government of Honduras in addressing both the problems of the country's rural poor and opportunities for growth and development of the country through the development of its rural resources.

Honduras is typified by small rural villages and small farms where seventy percent of the population lives and works. Nearly seventy percent of the country's labor force works (typically as small farmers or farm laborers) in agriculture which presently yields only one-third of the Gross Domestic Product. The average, annual rural family income is \$300, or \$50 per capita. The problems of the small farmer in Honduras, among others, are limited productive land and uncertain tenure; a low level of technology applied to farm operations; and limited markets for his produce, which is exacerbated by a lack of marketing infrastructure including roads and storage facilities. The farm laborer is typically underemployed with negligible opportunity to improve his situation. The attendant problems of the rural poor are typically malnutrition, illiteracy, and inadequate provision of health, education and other public services.

Yet the country's development potential is represented by rural resources - agricultural land and forest reserves which can feasibly be exploited commercially. In the face of the problems and opportunities presented by rural Honduras, the Government has undertaken a serious rural development effort with the intention of exploiting natural resources for the benefit of the poor. Illustratively, increased productivity of land and more equitable income distribution are the objectives of an agrarian reform program with the objective of resettling over 100,000 families; the exploitation of natural resources through development of productive rural enterprise, particularly in the forestry area, is the subject of programmed, heavy public sector investment. Significant investment in basic infrastructure including power and roads is also underway or programmed. Expansion of rural education opportunities and of rural health and other social services is now underway.

#### 2. The Aguán Valley Region

Nowhere in Honduras is the juxtaposition of the problems of the poor and opportunities for development so dramatic as in the Aguán Valley. The Government is seizing the opportunity with an intensive effort to develop the resources of the valley region. And in the Aguán, it is clearly evident that the cui bono issue will be resolved in favor of the poor, by the nature of the Government's development program and based on an analysis of the population of the region.

The Aguán Valley region is the second largest and potentially most productive agricultural region in Honduras. The Valley has over 200,000 hectares of fertile bottom land, or 10 percent of all such cropland in the country. It runs 160 Kms. in a northeasterly direction, reaching the Caribbean on the north coast of Honduras. The Valley is separated from the Caribbean coast on the north by the Cordillera Nombre de Dios rising as high as 2,500 meters above sea level and to the south, is bordered by the Sierra de la Esperanza mountains. The total drainage basin of the Rio Aguán is approximately 10,500 square kilometers. Rising in the bordering mountains, one large river, the Mamé, and more than 45 year-round smaller rivers and streams flow into the Aguán River.

During the high water periods of June, October and November flooding is common, but the dry season of March through April sees the River depth decreasing as much as one meter. Water and constantly shifting sandbars permit navigation only by dugout canoes. With an 80" average annual rainfall, ground water supplies are abundant in the Aguán Valley and fairly constant throughout the year. Wells have been developed in moderate (100 gallons/minute) <sup>1/</sup> to very large quantities (1000 gallons/minute) at depths of five meters to more than 100 meters. The water table may fall as much as two meters during the dry season, but water yields are reduced only slightly.

The soils in the Valley are rich alluvial deposits with silty and clayey surface underlain by layers of unconsolidated clay, silt, sand and gravel. The agricultural potential of these soils is very high and naturally well suited to intensive, mechanized agriculture. Currently, the Valley supports such crops as bananas, corn, rice, beans, sugarcane, African palm, citrus fruits, and vegetable crops as well as supporting improved pasture. Though the Valley is subjected to recurring flooding and periodic drought, with reliable energy sources and the development of small drainage irrigation systems, together with related protective measures, the damaging consequences of these natural hazards can be reduced.

### 3. Aguán Development Programs

Into this geophysical setting the Government of Honduras, supported by international agency financing, has been investing heavily. With Interamerican Development Bank financing, an integrated colonization program began in 1971, at times moving entire villages from over-populated and/or non-productive lands to form new cooperative villages in the Aguán Valley. This settlement and resettlement of 3,200 families has been under the management of the National Agrarian Institute (INA). Under this same program, INA has established the Sinaloa Service Center in the Aguán Valley, with office buildings, a central warehouse, community center, employee housing, plant germination facilities, experimental farm plots, and extension services. From this central office technical assistance and credit is being provided to the entire area. As of June 1976, within the Cooperative program, 8,000 hectares were in production in basic grains; 1,200 hectares had been planted

1/ 100 gallons/minute will serve a village of 6,000 people.

in citrus fruits; and 3,000 hectares in African palm.

The GOH and IDB, in February 1977, signed a Loan Agreement in the amount of \$40 million for Phase II of the integrated colonization program for the Aguán Valley which will benefit an additional 3,000 families, 70% of whom are expected to migrate spontaneously to the Valley from other parts of Honduras. The services begun in the first stage will continue and additional technical assistance will be contracted for genetic control, plant health, marketing, storage, construction of five extraction plants for palm oil, small livestock breeding centers, and studies on industrial-scale production of pork products (sausage, hams, etc.). Phase II will also include the construction of a 170 meter bridge over the Aguán River near Tocoa, approximately 600 kilometers of internal roads in the permanent plantations, and 250 kilometers of internal roads on lands used for annual crops; the design and construction of drains, dikes, and irrigation systems; infrastructure (water wells, storage tanks, latrines) for cooperative villages; and a central mechanical workshop for maintenance and repair of the cooperatives' equipment and machinery. The program includes irrigation of 3,200 hectares of citrus planting by the year 1980 or 1981. Other irrigation schemes are entering the Planning stage.

The plantations of the Government's Honduran Banana Corporation (COHBANA) and Standard Fruit Company are located in the Aguán Valley. COHBANA manages 9 processing and packing plants in the area of Isletas, and Standard Fruit Company operates 18 additional plants in the Coyoles sector. These operations can be considered modern agribusinesses in most respects. Presently, produce from these plantations is moved by rail to the port at La Ceiba and on to markets abroad.

Puerto Castilla which is located near the mouth of the Aguán River is considered to be one of the finest sites in Central America for a deep water port. With financial assistance from international agencies, a \$95 million development program will be carried out to make it the largest port in Central America.

The forestry reserves to the east and south of the Aguan Valley are relatively untouched. The Government's National Forestry Corporation (COHDEFOR), with international financing, is in the first stage of developing a \$400 million program that includes the establishment of a \$182 million pulp and paper mill as well as three \$20 million sawmills. COHDEFOR is estimating that the paper mill alone will require no less than 1,500 semi-skilled laborers, 400 highly skilled or technical personnel and 600 common laborers. COHDEFOR is counting on the availability of local labor and is estimating that a large percentage of the unskilled employees will be drawn directly from the Aguán area.

#### 4. Brief Description of the Target Group

In 1977, there are an estimated 150,000 people in the Aguán Valley region. Per capita income in the Valley is estimated to be less than \$100. In contrast to the rural living patterns in the United States, Honduran small farmers live in villages and walk daily to their fields on the periphery of the villages. The familiar little farmhouse surrounded by cultivated fields rarely exists in Honduras. Obviously, such group living patterns facilitate a rural electrification program. A survey was conducted by ENEE and A.I.D. personnel during the intensive review stage of Project development to obtain a socioeconomic profile of the target beneficiary. A sample of approximately 700 families was interviewed in the Project area. Results of the survey follow:

- The typical rural electric consumers will be a farm family with an average of six persons per household, living in small nucleated settlements or government-sponsored cooperatives, and small household shops located in towns and villages. Some 25,000 of these families will be connected to the electrification facilities.
- The typical size of landholding for the independent small farmer in the area ranges from one to five manzanas.
- The average income level of Valley residents engaged in agricultural production is estimated at \$40.00 per month.
- The government-sponsored cooperatives presently range in size from 30 to 200 families per community. Within the next year INA is planning to combine several of the smaller isolated cooperatives into larger nucleated settlements with no less than 500 families each. These new communities will be established on high ground out of the flood area, and should simplify the provision of services and marketing for the community. Members of the government-sponsored cooperatives receive \$1.50 per day worked. Aside from this income, each family is assigned 2-3 manzanas for personal agricultural production until the cooperative reaches the capacity to produce cash crops of African palm, or citrus products.
- Rural day laborers make up about 14% of the target group. A large number have steady work with the fruit company, but many of them are employed on an occasional basis depending on seasonal demand for labor. The average income level for the rural day laborers varies from \$10 per month for temporary day labor to \$70 per month for a full-time fruit company laborer. Some day laborers work as semi-skilled or common laborers in INA's palm oil extraction plants or COHBANA and Standard Fruit Company packing plants. Improvement of the situation of the day laborers, who are dependent upon agro-processing activities, firmly depends on the production programs planned by INA, COHBANA, and Standard Fruit Company. The infrastructure programs planned over the next few years for the Aguán Valley will provide employment opportunities

for these target beneficiaries.

- Approximately 80% of the target group families have a home typically consisting of a kitchen and one large room which is sometimes divided into sleeping quarters with cardboard or bamboo partitions. About half the target group has water located within 50 meters of their house.
- The majority of families in the target group use kerosene to provide light for their homes. The average expenditure for kerosene by the families in the target group is between \$1.00 to \$1.75 per month.
- Over 75% of the families interviewed in the target area own battery-operated radios. While most spend over \$1.50 per month on batteries, the amount of income they have to purchase new electrical radios is limited.
- Over 90% of the families interviewed claimed to have sufficient financial capacity to pay a minimum of \$1.50 monthly for electricity. Given the rates ENEE will charge with a workable strategy for monthly payments, most rural poor families should be able to afford electrical service in their homes.

#### 5. Project Overview

The proposed project is intended: (a) to offer the possibilities for intensification of agricultural production with attendant increases in food production and income principally for the poor; (b) to provide a critical productive factor for agro-industrial development with economic benefits for the nation and attendant employment benefits for the poor; and (c) to offer distinct social and economic advantages for households and communities through provision of power for such benefits as more reliable community water supplies, increased educational opportunities, and freedom from time-consuming household tasks. There is no question that the project will dramatically contribute to the quality of life of the rural poor, including its nutritional status improvement.

The Government of Honduras is planning heavy investments in power, principally hydro-power generation capacity, over the next several years (some \$400 million). The intention of the Project is to direct some of the benefits of this huge investment by means of a relatively small investment to the rural areas of Honduras and particularly to the rural poor. The costs of electricity to the poor and ENEE's policies have been carefully analyzed, with the conclusion that the large majority of the poor will be connected and be able to afford the electricity provided. In this regard, a special fund will be established to enable consumers to finance a modest cost for internal wiring of their homes. This fund will be maintained after completion of the Aguán Project for application to other electrification projects, with a priority claim on resources of the Fund by Aguán Valley residents. ENEE, itself, will administer the program, and experience gained in this project will provide the basis for expansion of rural electric programs to other areas of the country.

To provide a further incentive in this direction, the two-step funds generated by the loan terms will be earmarked for additional rural electrification projects. Accordingly, the Project will have an impact transcending its own parameters.

## B. Project Description

### 1. Project Goal

The ultimate objective of the Project is to improve the quality of life of the rural poor of Honduras. This goal will be verified to the extent that: (1) the average family income of residents in the Aguán Valley increases 50 percent in real terms over the period 1979-1985; (2) a minimum of 5,750 additional rural poor will be employed in agro-industries in the Valley by 1981; (3) the prevalence of first, second, and third degree malnutrition for children ages 0-5 will diminish by 25 percent over the period 1975-1985. Goal achievement will be measured by: (1) obtaining income data from surveys conducted prior to the installation of the electrification system and again in 1985; (2) obtaining employment data in 1985 and comparing it with employment data for Aguán Valley residents secured in 1975; (3) conducting anthropometric studies of several Valley communities in 1985 and comparing the results with similar studies performed in 1975.

### 2. Project Purpose

The basic purpose of this Project is to establish a rural electrification system in the Aguán Valley. Attainment of the Project's purpose will be verified to the extent that by 1981: (1) 25,000 low income families have household electrical connections; (2) reliable service with less than 10% voltage drop is being maintained at acceptable rates to target beneficiaries; (3) approximately 1,250 kilometers of transmission, distribution, and secondary lines are effectively being operated and maintained by ENEE. A final evaluation of the Project will be conducted jointly by USAID and ENEE in late 1981, at which time all of these indicators will be measured.

The developmental hypothesis linking the Project's purpose and goal is that a reliable relatively inexpensive electrical system of the kind envisioned in this Project is a necessary condition for achieving the developmental objectives for the Aguán Valley area as currently envisioned by the Honduran Government and private enterprise over the next decade. A reliable energy source is essential for the timely, efficient development of irrigation systems required to ensure adequate levels of food production for both immediate consumption and processing. The various processing and other agro-industrial enterprises slated for the area are also dependent upon the electricity to be provided under the Project. The magnitude of the agricultural, industrial, and related service activities programmed for the Aguán Valley cannot be developed and sustained in an efficient manner, with the appropriate continuity of service, in the absence of a power program as contemplated in this Project. Therefore, the inclusion of this program is considered an imperative to achieving the area's growth potential which in turn will generate employment opportunities and resultant increased living standards for approximately 39,000 rural families residing in the Valley by 1985.

### 3. Project Outputs

The program will finance the following discrete but interrelated outputs:

#### a. Transmission, Distribution and Secondary Lines and Related Substations

By the end of 1979, 200 kilometers of 138 KV transmission lines will have been installed in the project area. By the end of 1981, 493 kilometers of 34.5/19.9 KV distribution lines and 551 kilometers of secondary lines will have been placed in operation. One switching station and two substations will also be constructed by the end of 1979, and two additional substations will be operating by the close of 1980.

Tied to the national network at La Ceiba, an 80 Km 138 KV transmission line will run to a switching station in the Aguán Valley, then divide into 120 Km of 138 KV lines terminating at four substations. From the substations, 493 Kms of distribution lines will carry power to the approximately 240 villages to be electrified. Within these villages 551 Kms of secondary lines will be required to furnish the 25,000 consumers with power for irrigation, agro-industry, household use, street lighting, and lights for schools and health centers. (See Annex H-4 for a list of the communities).

#### b. Storage, Maintenance, Office and Training Facilities

By the end of 1978, two centrally located facilities, each with about 12,500 square feet, will have been constructed in the Valley for storing equipment, tools and materials, and providing classroom and office space for the training program proposed under the Project.

#### c. Internal Wiring for Consumers

By 1981, about 20,000 consumers will have been provided with meters, internal wiring and fixtures to facilitate immediate usage of the electrical energy provided under the Project. An additional 5,000 consumers with existing connections to private or ENEE-owned thermal generators will also receive power from the new network after their internal systems have been inspected by ENEE electricians. To assist the rural poor who are unable to finance the initial installation costs for interior wiring and fixtures, a \$350,000 revolving Wiring Fund will provide 12 to 24 month loans at 7%

interest. <sup>1/</sup> Loan payment charges will be added to the monthly electric bills. No hook-up fee will be charged. The Wiring Fund and interest earnings will be maintained until 1985 for initial installation loans to future rural electricity consumers, with consumers in the Aguán Valley to have a priority claim on the resources of the Fund. In 1985, an evaluation of the Fund's operations will be undertaken by ENEE to determine whether, and with what modifications, it should be continued.

d. Trained Personnel

Trained personnel for the Project drawn principally from the Valley region will be adequate to administer the program, promote effective and efficient energy use, install end-user connections, repair and maintain the system, and repair and maintain consumers' equipment.

- Approximately 40 persons will be recruited as full-time ENEE employees and trained as administrators, electricians, line-men, and meter readers.
- An additional 50 persons will be trained as contract personnel for part-time work on specific installations, emergency repairs and maintenance, and will form a reserve labor pool to be drawn upon as the system expands. At the outset of the program these individuals will also be trained to provide each of the 240 communities participating in the Project with information concerning efficient usage of electricity, electrical appliance safety, and the benefits and costs associated with this power source.
- At least 60 additional persons will be enrolled in the training centers for instruction in repair and maintenance of electrical appliances and irrigation pumps, home wiring, installation of electrical fixtures, and small business management. Graduates of this program are expected to establish new businesses in the repair and/or sales of electrical appliances and/or to become small contractors servicing an expanding electrical network.

<sup>1/</sup> Specific criteria for obtaining a loan under the Wiring Fund have not been established since one of the Fund's purposes is to facilitate the use of electricity made available by the Project. However, the bulk of consumers assisted under the Fund will be from among the lowest income groups.

e. Billing and Collection System

ENEE personnel, with the assistance of consultants, will design and implement a billing and collection system tailored to the needs of consumers in the Aguán Valley area. Among the factors to be taken into account in developing such a system are simplicity of design and incentives and mechanisms for paying on a regular and timely basis.

f. Evaluation Framework

An evaluation framework will be developed to measure the effects of the Project at the goal-level. A more extensive baseline survey will be undertaken by 1979 as a point of reference for a follow-up survey of goal-level impact in 1985 to be effected by ENEE. Annual evaluations during the project construction period will focus on the specific output activities. (See Evaluation Plan page 89).

PART III PROJECT ANALYSES

A. Technical Analysis

1. Introduction

In 1955, the GOH established the Empresa Nacional de Energia Eléctrica and charged the new company with the responsibility of electrification of the country. The fledging organization began operations with control of the Power and Light Company in Tegucigalpa and with \$3.5 million provided by the GOH as investment capital. In 1963, ENEE purchased the San Pedro system from the Honduras Public Utilities Corporation; in 1965 it bought the Puerto Cortés system from the United Fruit Company; and in 1973 purchased the La Ceiba distribution system from the Standard Fruit Company. All these systems were isolated gas or diesel plants operating independently. In the 21 year history of the ENEE, these systems have been integrated into an interconnected network with transmission lines extending from the Atlantic to the Pacific. In September 1976, an international interconnection with Nicaragua was put into operation.

2. Generating Capacity

Since 1955, ENEE has developed two hydroelectric plants, Cañaveral and Rio Lindo, with Phase 4 of the Rio Lindo plant currently under construction and expected to be on stream in 1978.

With the installation of Rio Lindo Phase 4, the installed generation capacity will be as follows:

<u>Hydroelectric</u>	
Cañaveral	30 MW
Rio Lindo	92 MW
<u>Gas Turbine</u>	
San Pedro Sula	17 MW
Tegucigalpa	15 MW
<u>Diesel Engine</u>	
Santa Fé	10 MW
La Ceiba	26 MW
Total Installed Capacity	190 MW
Less the required reserve capacity of the largest installed unit (23 MW)	-23
Firm Capacity	167 MW

The agreement for the interconnection with Nicaragua was executed in 1972 and work on the construction began in 1974. During the months of the year when Honduras' largely hydroelectric power sources are building their water reserves, Nicaragua will sell power to Honduras from its petroleum-fired thermal generators, and Honduras in turn will sell hydro-generated power to Nicaragua during the months of maximum production. The interchange is expected to reduce the need for reserve capacity in both countries and conserve petroleum.

The Honduras-Nicaragua interconnection is the first of several contemplated regional interconnections. The feasibility study of the Nicaragua-Costa Rica interconnection has been completed, and an interconnection between Guatemala and El Salvador is currently under study. In addition to these bi-lateral programs, the Economic Commission for Latin America is preparing an overall study of Central American electrical interconnections. The technical analysis of this study is scheduled for completion in 1977.

An independent study conducted by EBASCO (a U.S. firm of consultants to utility companies) of ENEE's projected system energy sales and loads shows that firm capacity of 167 MW will be sufficient until sometime in 1981 when the proposed Aguán Valley Rural Electrification Project is expected to be completed. Even without considering additional demand from the Aguán Valley Project, installed capacity would be insufficient in 1982 absent additional investment for generating capacity.

Given the hydroelectric potential of Honduras, the logical solution to the country's long-range energy requirements is a hydroelectric project requiring a large capital investment and a long lead time for construction and installation. Based on pre-feasibility studies, ENEE considers the El Cajón hydroelectric project (\$325 million) with an installed capacity of 500 MW to be the most economic solution to the problem of securing additional generating capacity. Given the heavy financial costs of the El Cajón project, ENEE is considering alternatives, but any solution will require substantial lead time (3-5 years). To meet the interim requirements, ENEE has proposed the installation of a 30 MW thermal generating unit at Puerto Cortés and the upgrading of the transmission lines from Puerto Cortés to Bermejo in order to carry the additional load generated. Installation of the thermal unit by late 1979, at an estimated cost of \$11-12 million, will increase installed capacity to 220 MW. ENEE also plans to construct a small hydroelectric facility at Nispero in the Northwest to provide an additional 15 MW of power to the system. Upon completion of the Nispero project in 1981 at an estimated cost of \$15 million, installed capacity will be increased to 235 MW, which is considered adequate to meet the power demands of the country (including the proposed Aguán Valley electrification project) until 1983 when El Cajón is scheduled for completion. ENEE has requested financial assistance for these two generation projects from the World Bank.

### 3. Alternatives to El Cajón

The El Cajón project has not yet been approved for financing and in the event that it is deferred, ENEE has developed alternatives for meeting future power requirements. One alternative assumes that completion of El Cajón will be deferred until 1986. In that event, ENEE plans to construct the Naranjito hydroelectric project which is estimated to cost \$84 million and which will generate 90 MW of power. It would be programmed for completion in 1983 and financial assistance would be requested from the World Bank.

Another alternative based on the assumption that the El Cajón project will be postponed indefinitely is to go forward with the Naranjito project as described above and to follow on with a larger project, the Piedras Amarillas hydroelectric facility. While less ambitious than El Cajón, this Project is estimated to cost \$300 million (based on projected 1985-1986 prices) and it will generate 200 MW of power. It would be programmed for completion in 1985-1986 and the World Bank would be asked to provide financial assistance. (See Annex H-19 for a summary table of alternative generation possibilities.)

### 4. Rate Structure

The ENEE rate structure is divided into two categories: rates applicable to the interconnected system and rates applicable to various, small, isolated systems. The interconnected system in 1975 accounted for 91% of ENEE's sales revenues. ENEE tariffs for the interconnected system are uniform in all parts of the country serviced, while tariffs for isolated systems vary based on costs at each generating center. Tariffs are higher for isolated systems, but even with higher rates, the isolated systems as a group operate at a loss which was calculated to be approximately \$300,000 in 1975.

Interconnected system rates were revised upward in February 1975, representing the first general tariff increase in Honduras in eleven years. The February 1975 rates are still in effect and carry with them a fuel adjustment clause, which to date has not been applied. The present tariff structure and sales by tariff category are presented in Annex H-8. The 1975 rate increase affected all tariff categories. The large users category was hit with the highest percentage increase, moving revenues from 1.9 ¢/KWH in 1974 to 3.0 ¢/KWH in 1975. In 1975, the large users category accounted for 44% of KWH's sold and 30% of revenues. Residential usage accounted for 24% of KWH's sold and 36% of the revenues. The rate increase for residential customers moved revenues per KWH from 5.9¢ in 1974 to 6.9¢ in 1975. Commercial, industrial and government rates, accounting for 29% of KWH's sold and 34% of revenues in 1975, were also increased to yield 5.1¢ per KWH in 1975 as opposed to 4.2¢ per KWH in 1974.

Although all interconnected system tariff categories increased, the minimum monthly rate for residential usage of up to 20 KWH's was reduced in February 1975 from a total of \$2.00 to \$1.50, including meter rental. This new lower rate is of particular importance to a large percentage of proposed target beneficiaries in that electricity is now even more competitive with kerosene, the primary source of lighting in homes without electricity. The lower minimum rate is a reflection of ENEE's policy to extend electricity to approximately 30% of the total population by 1980.

With a minimum billing of \$1.50 for the first 20 KWH (including the 25¢ monthly meter rental), ENEE officials state that their minimum tariffs are the lowest in Central America. ENEE's policy has been, and will continue to be, to apply standard residential and industrial tariffs to all users, rural and urban, of interconnected system power. The result is that the relatively higher cost of rural electrical service is borne by urban consumers, both residential and industrial, as well as by the rural consumers.

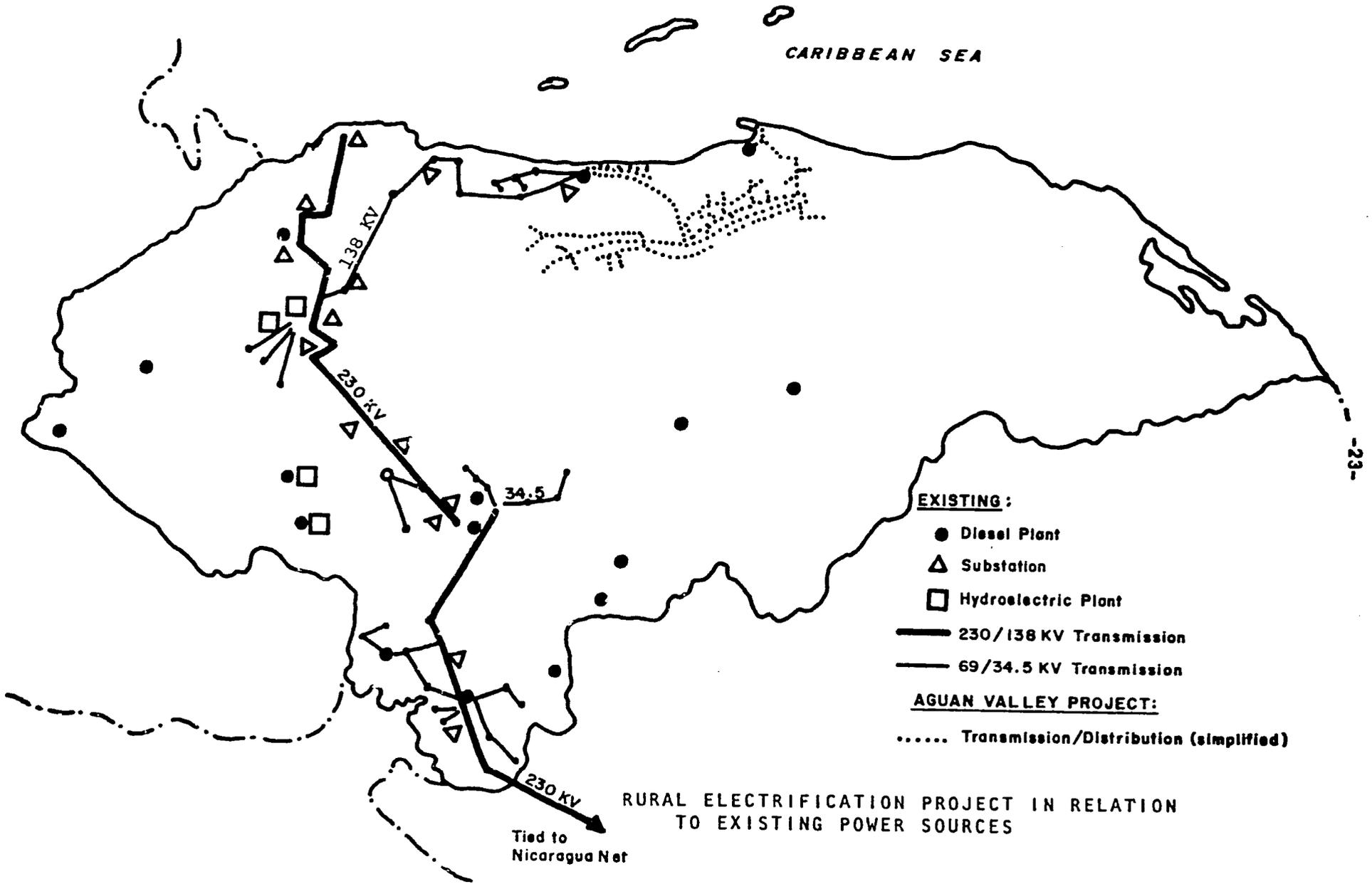
#### 5. Transmission and Distribution System

In studies developed by U.S. consultants for the Aguán Valley Rural Electrification Project, five alternative systems were analyzed including three alternatives for receiving power from the interconnected generation system and two from an isolated generation plant located in Sabá, a small town centrally located in the Valley (see maps on following pages). Each of the alternative systems was studied in view of load flow and voltage drop, transmission system losses, requirements in size and type of equipment, costs of power generation and construction costs.

The two isolated generation alternatives were analyzed by the consultant and ENEE with the conclusion that the generation costs so far exceeded the incremental generation costs of the interconnected system that neither of the isolated schemes would be practical.

One alternative using the interconnected grid called for stepping down from 138 KV to 69 k. at Reguleto with 69 KV transmission from Reguleto to Corocito and Coyoles, with 69 KV transformers stepping down to the 34.5/19.9 KV distribution at each substation. Construction costs were estimated to be 3% lower, but transmission losses would be 200% above the 138 KV scheme. The generating costs for these additional losses in a single year would equal the added investment required for the 138 KV transmission system.

Another alternative considered the possibility of using 34.5 KV as semi-transmission from Reguleto, thus eliminating the need for step-down substations at four sites, but the distance is too great for acceptable service. Voltage drop would be more than 15%, necessitating regulator and



**EXISTING :**

- Diesel Plant
- △ Substation

□ Hydroelectric Plant

— 230/138 KV Transmission

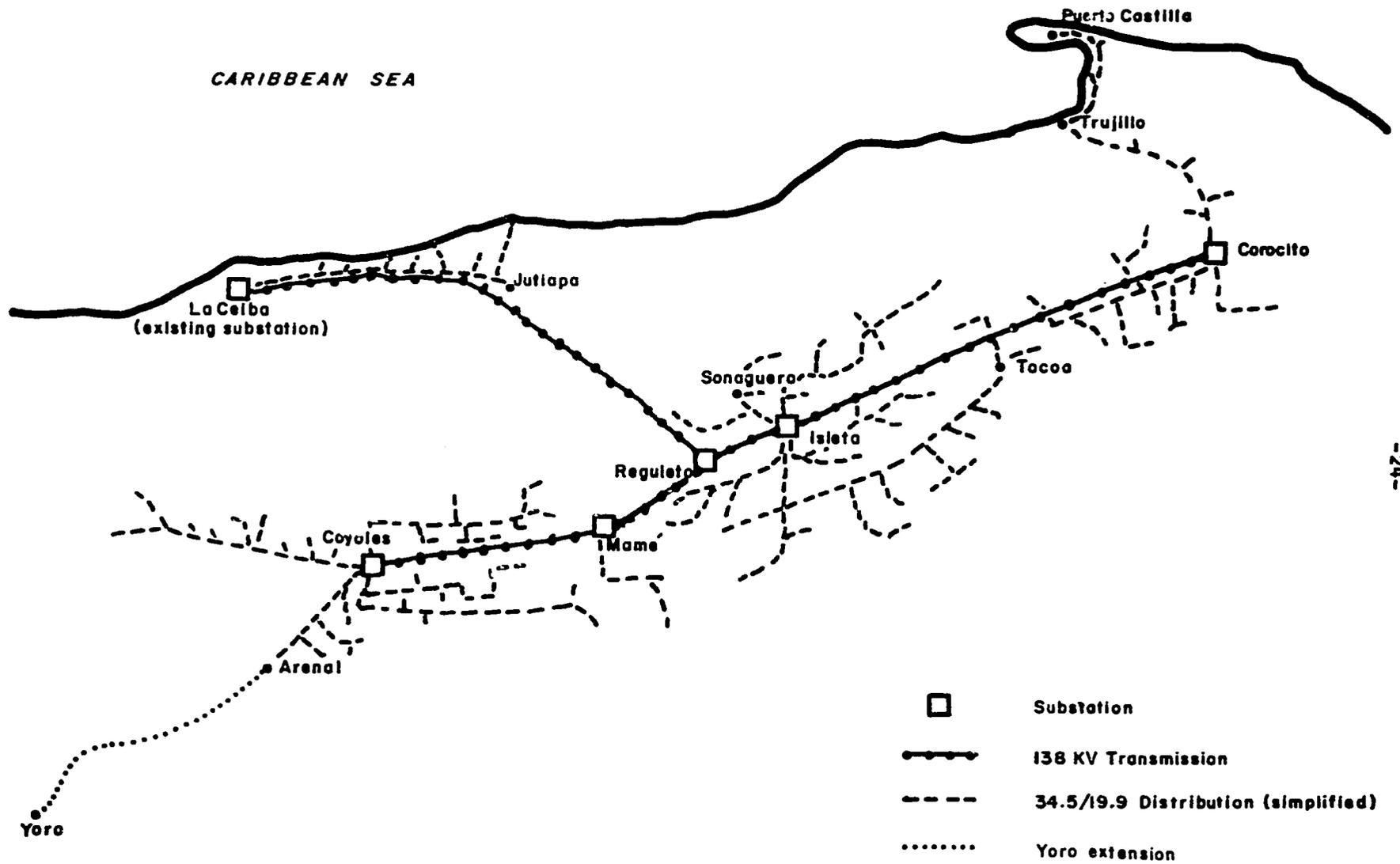
— 69/34.5 KV Transmission

**AGUAN VALLEY PROJECT:**

..... Transmission/Distribution (simplified)

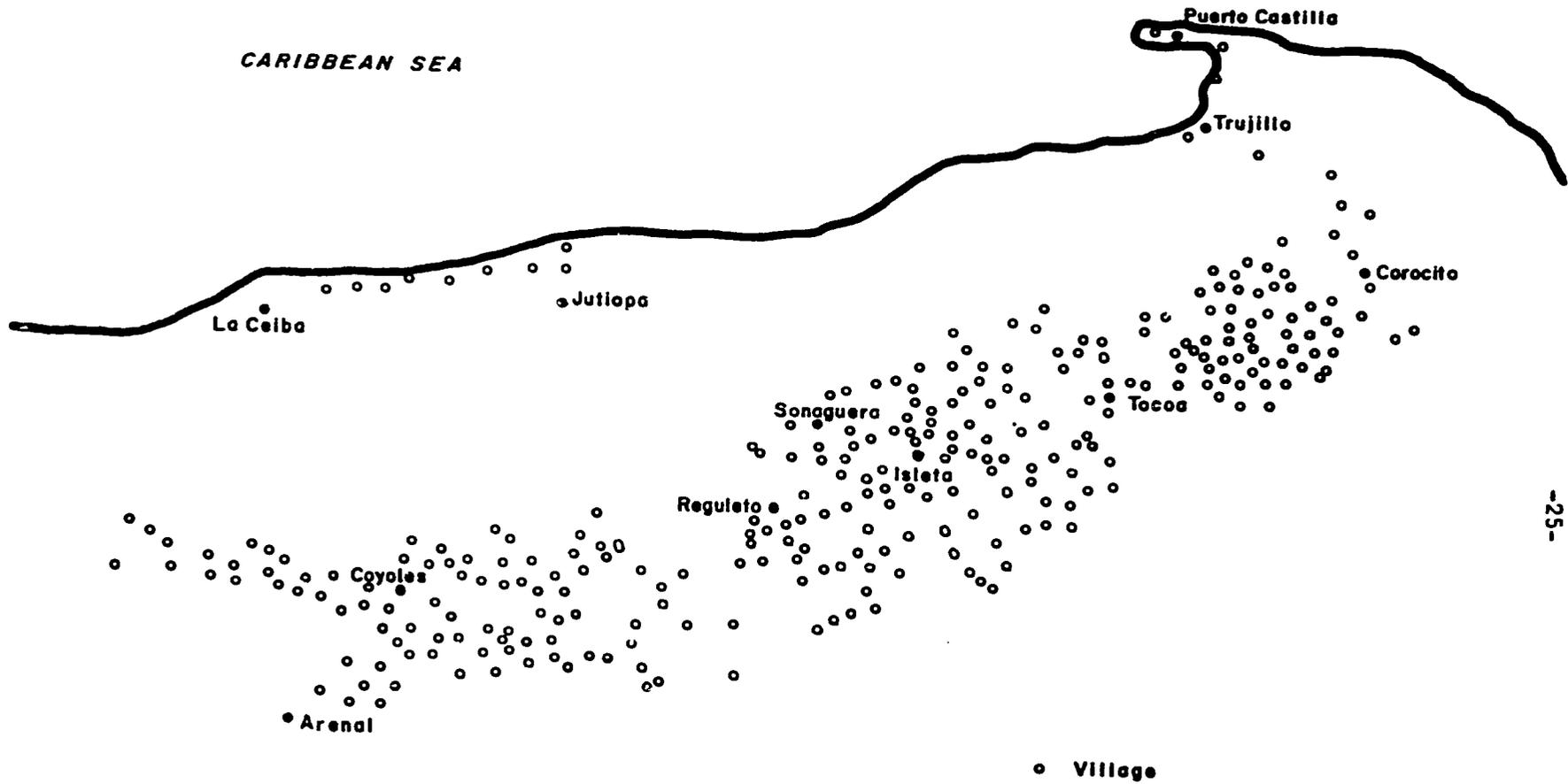
**RURAL ELECTRIFICATION PROJECT IN RELATION TO EXISTING POWER SOURCES**

Tied to Nicaragua Net



-24-

AGUAN VALLEY RURAL ELECTRIFICATION PROJECT



VILLAGES TO BE ELECTRIFIED UNDER THE  
 AGUAN VALLEY RURAL ELECTRIFICATION PROJECT

capacitor investment at the substations, and double-circuit 34.5 KV lines would be required from Reguleto in both directions.

The decision to adopt the 138 KV plan with 34.5/19.9 KV distribution is sound from an engineering, operational and service standpoint, and is the most economic and practical of the five alternatives considered. The alternative selected will bring an 80 Km., 138 KV transmission line from La Ceiba, tied to the national interconnected network, to a switching station at Reguleto in the Valley. From Reguleto the transmission line will extend 60 Kms. northeast first to the Isleta Substation and on to the Corocito Substation. Southwest from Reguleto, the line will run another 60 Kms. to the Mamé and Coyoles Substations. Three 7,500 KVA transformer capacity substations, each with four distribution circuits, will be located at Isleta, Coyoles and Corocito. The Mamé substation will have a 3,750 KVA transformer capacity with a single distribution circuit.

The distribution system will be 34.5/19.9 KV with some 326 Kms. of three-phase lines and 167 Kms. of single-phase lines. The 551 Kms. of secondary lines will be used primarily within the limits of the approximately 240 villages to be electrified. Street lighting for all villages has been included in the cost estimates for secondary lines. (See Annex H-6 for system diagram.)

Two service facilities, tentatively to be located in Tocoa and Olanchito, of approximately 12,500 square feet each will be constructed to incorporate warehousing and training centers. To house the training program, administrative offices, two classrooms, workshop and restrooms are planned. Roughly 9,000 of the 12,500 square feet will be devoted to warehousing of insulators, switches, capacitors, regulators, safety equipment, hardware and other maintenance supplies. A fenced storage area will be attached to these facilities for storage of poles, reels of conductors, transmission insulators, and maintenance vehicles. (See Annex H-7 for an architectural sketch of these facilities.)

All construction will be contracted. The transmission and distribution system will be offered for bidding as a package or may be bid separately with local sub-contracting permitted.

The contracting possibilities are as follows:

Unit	Contractor
1. Transmission and Distribution Systems	Foreign (non-Honduran)
2. Secondary Lines	Local or foreign contractor.
3. Substations	Local or foreign contract, with all equipment purchases to be made by ENEE.
4. Storage and Training Facilities	Local Contractor.
5. Service hook-ups	Local Contractor and/or ENEE personnel.
6. Interior house wiring	Small local contractors, most of whom are expected to be graduates of the Training Program under this Project.

6. Selection of Materials

The analyses of power demands through the year 1985\* for both residential and industrial consumers dictated the use of 138 KV transmission lines with #477 ACSR conductors. An additional factor in the choice of 138 KV lines as opposed to 69 KV was that new transmission lines can be connected in the future to any 138 KV bus at any of the Project sub-stations to further extend the interconnected network.

The use of 34.5/19.9 KV 1/0 ACSR distribution conductors also reflects the Project energy demands on the system, to be divided into 326 Kms. of three-phase and 167 Kms. of single-phase lines. The relatively high percentage of three-phase distribution conductors will supply the anticipated energy demands for irrigation pumps.

In some areas of the distribution system 1/0 ACSR conductors will be used rather than the standard 3/0 conductors despite the fact that 1/0 conductors show greater energy losses and voltage drops. The larger investment required for the purchase of 3/0 lines was greater than the generation costs of energy losses where 1/0 conductors are to be used. Excessive

\* Data compiled from 1976 reports made by the U.S. consulting firm, EBASCO, COHBANA, Standard Fruit Company, H.A. Simons, Ltda., the National Agrarian Institute, National Port Authority, and ENEE's records and forecast.

voltage drops will be compensated by shunt capacitors and voltage regulators. (See System Diagram, AnnexH-6).

Costs and types of power demands for the residential consumer were the factors under consideration in the decision to use three-phase lines for only 25% of the secondaries (in villages). The system will contain 134 Kms. of three-phase lines at \$5,000/Km and 417 Kms. of single-phase lines at \$3,500/Km. If future needs warrant, additional three-phase lines may be added.

Following new trends in the United States in the utilization of wood H-frame construction for transmission lines, a cost comparison was made between steel towers and wood structures. At 1976 steel prices a \$540,000 savings will be realized in the selection of treated pine wood poles for the Project, plus additional benefits in that Honduras produces wood poles for both domestic use and export. This additional benefit represents a spinoff of a \$1.3 million infusion into the local economy.

Wood structure requirements and costs are:

200 Kms. Transmission	-	1,000 structures at \$450	-	\$450,000
493 Kms. Distribution	-	4,000 poles at \$50	-	200,000
551 Kms. Secondaries	-	16,530 poles at \$40	-	<u>661,000</u>
TOTAL.....				<u>\$1,311,000</u>

The Project Chief for ENEE and his staff will be responsible for all design and construction supervision. ENEE engineering personnel have designed and supervised the construction of all the network 34.5 KV lines and a substantial portion of the 69 KV transmission system. The ENEE Project Chief studied in the United States in an advanced training program on design, construction and supervision of transmission lines with the consulting firm of Commonwealth and Associates. He has extensive experience with Commonwealth and ENEE in supervision and design. Currently in training in a similar course of study is a second ENEE engineer assigned to the U.S. Bureau of Reclamation. Another ENEE engineer is also studying substation design and construction at the present time with the Bureau of Reclamation. Both of the latter two are seasoned ENEE engineers with experience in supervision and design. These three engineers will head the supervisory team for the project construction. Additional details concerning the supervisory team are discussed in Part IV of this paper.

SUMMARY OF PROJECT CONSTRUCTION COSTS

(U.S. \$000)

USE	A.I.D.		GOH		Total
	FX	LC	FX	LC	
Transmission Lines - 200 Km	1,450	205		1,245	2,900
Substations (five)	1,600			600	2,200
Distribution System - 493 Km	1,190	705		1,000	2,895
Secondary Lines - 551 Km	1,250	300		955	2,505
Transformers - 20,000 KVA	800				800
Services - 20,000 KVA	100	200			300
Meters - 20,000	400				400
Service, Storage & Training Facilities				300	300
Engineering & Administration				600	600
Contingencies *	940	260			1,200
TOTALS	7,730	1,670		4,700	14,100

\* NOTE: An 8% inflation factor is included in all cost estimates.  
(For detailed cost estimates see Annex H-3).

## 7. Wiring Fund

A special, revolving Wiring Fund in the amount of \$350,000 will be established to provide loans for interior house wiring to promote system acceptance and to enable those who are unable to afford the initial costs to obtain electricity. (Costs will range from \$15 to \$50 including labor and materials, the cost being dependent upon the type and number of fixtures requested by the homeowner). ENEE will lend the money to the residents for 12 to 24 months at 7% interest and loan payments will be added to the monthly electric bill. The average cost for interior wiring is estimated at \$20. The Capital Fund will provide initially 20,000 families with electric services. Since it is planned that approximately one-third of the consumers will be connected one year before the remaining two-thirds, \$350,000 should provide adequate funding assuming a flow of repayments into the Fund and the likelihood that not all consumers will require financing. No connection fee will be charged; however, ENEE will require each new consumer to pay an advance fee equivalent to the estimated first month's billing. (See Annex H-5 for a proforma copy of the contract between ENEE and the new consumer for interior wiring loans.)

The Wiring Fund and accrued interest will be maintained until 1985 for additional rural electric interior wiring. The Aguán Valley Project area will claim first priority in the use of Fund resources.

Approximately 5,000 homes in the Project area have some interior wiring for electricity currently being supplied by privately owned or ENEE-operated small diesel systems. As a safety measure, those homes with existing wiring will be inspected and approved before they are connected to the new Rural Electrification System.

## 8. Technical Assistance and Training Activities.

ENEE has experience in training activities since the majority of its 2,000 employees have been trained by the Company. ENEE operates a training program which includes scholarships for overseas education and in-country and on-the-job training. Because of the existence of such training programs, higher-than-average wage scales, sound personnel policies, and a relatively strong Electrical Workers Union, the Company has experienced less than a 2% annual turnover in employees.

The Aguán Valley Rural Electrification Project includes a \$200,000 component to insure that personnel for operation and maintenance of the Project will be provided with adequate training. To house the program, training facilities will be constructed in conjunction with storage facilities in two centrally located areas of the Valley, tentatively Tocoa and Olanchito. In addition to administrative offices, each facility will have two classrooms furnished with blackboards, demonstration and visual aids, and a laboratory/workshop with the necessary equipment for teaching classes in welding,

soldering, metalworking, wood preservation, use of hand tools, etc. Up to \$50,000 of Loan funds will be used for the purchase of training aids and workshop equipment. (See Annex H-7 for an architectural sketch of these facilities.) Since the training courses will begin in 1979, before electric energy reaches the Valley, the use of visual aids and workshop implements will have to rely on small diesel generators for power to operate the teaching tools.

ENEE anticipates an immediate requirement of some 40 new staff members who will be recruited from the Aguán Valley area and trained to become permanent full-time personnel. These new employees will include six new administrators for the five zones of La Ceiba, Trujillo, Corocito, Isleta and Coyoles, plus meter readers, linesmen, electricians and five secretaries. An additional 50 persons will be recruited for training as contract employees for part-time, seasonal work such as for specific installations, emergency repairs and maintenance, and to form a reserve labor pool to be drawn upon as the system grows. Also to be included in contract employee training will be courses in promotion work. Trained individuals will be sent to each of the 240 communities to be electrified to offer short seminars on efficient usage of electricity, practical discussions on its benefits, electric appliance safety, and presentations on costs of operation of appliances.

At least 60 additional persons will be enrolled in the training centers to receive instruction in electric machinery and appliance repair, irrigation pump repair, interior wiring of homes, installation of electrical fixtures, and small business management. Successful graduates of this program will receive diplomas certifying their training and capabilities. These persons are expected to establish new small businesses in the repair and maintenance of electrical equipment or become small contractors for the continuing development of electrical energy usage. A small tuition fee and a pre-entrance examination for this type of training is planned to assure continuing interest of qualified students. The absence of electrical technicians in the Aguán Valley makes such a program an important and necessary public service effort.

Technical assistance will be provided for the design and execution of the training program and for the design of a billing and collection system for rural areas. Experience has demonstrated that collection problems are inevitable with newly connected rural users. ENEE personnel with the help of consultants will be responsible for designing and implementing a workable system by which the average rural family will be able to meet its financial obligations as an electric consumer.

TRAINING AND TECHNICAL ASSISTANCE COST SUMMARY

Technical Assistance

Training Program Design, 2 MM at \$5,000/M	\$10,000
Training Program Instruction, 12 MM at \$5,000/M	60,000
Billing and Collection System Design, 6 MM at \$5,000/M	<u>30,000</u>
Sub-total, Technical Assistance	\$100,000

Operation Expenses

Travel and per diem for promoters; printed promotional aids and tariff brochures; expendable workshop supplies; training program administrative and operational costs	50,000
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Equipment

Workshop machines and equipment, classroom equipment, visual aids, two generators	<u>50,000</u>
Total, Training and Technical Assistance	\$200,000

9. Evaluation

An important assumption of this project from the point of view of the borrower and A.I.D. is that availability of electric power at relatively cheap rates will result (with other technological innovations) in an improved quality of life for the rural poor. The nature of this generalized benefit is postulated more precisely in terms of employment generation, income increases, and in the improvement of nutritional status. The project will set aside \$50,000 in loan funds to contract a firm to develop a framework for measuring the effects of the electrification innovation on improvements in the quality of life of the population in the Valley region. The contractor, in addition, will undertake in 1979 (prior to the first connections) an extensive baseline survey in the region to collect data pertinent to the framework established. The borrower will agree to undertake a follow-up survey in 1985 and to conduct an evaluation based on the evaluation framework.

10. Effects on the Natural Environment

An Initial Environmental Examination was prepared for the Aguán Valley Electrification Project for the Project Review Paper proposing a Negative

Determination. Based on a review of the Mission's IEE, the Assistant Administrator for Latin America concurred in the proposed Negative Determination. (See Annex A for a copy of the Negative Determination.)

SUMMARY COST ESTIMATE AND FINANCIAL PLAN  
(US. \$000)

USE	A.I.D.		GOH		TOTAL
	FX	LC	FX	LC	
Transmission Lines-200 Km.	1,450	205		1,245	2,900
Substations (Five)	1,600			600	2,200
Distribution System-493 Km.	1,190	705		1,000	2,895
Secondary Lines-551 Km.	1,250	300		955	2,505
Transformers - 20,000 KVA.	800				800
Services - 20,000	100	200			300
Meters - 20,000	400				400
Service, Storage & Training Facilities				300	300
Engineering & Administration				600	600
Sub-Total	6,790	1,410		4,700	12,900
WIRING FUND					
Internal Wiring of 20,000 Consumers	175	175			350
TRAINING PROGRAM					
Consultants, Training Equip.	200				200
EVALUATION	50				50
Contingencies*	940	260			1,200
PROJECT TOTALS	8,155	1,845		4,700	14,700

\* NOTE: An 8% inflation factor is included in all cost estimates.

## B. Social Analysis

### 1. Introduction and Summary Conclusions

Analysis of the social impact and potential diffusion of Project benefits needs to be based on an understanding of the sociocultural environment of the Aguán River Valley and of the prospects for development in the Valley. The introduction of electricity is a significant factor in development plans for the region, but is particularly important in the human terms of employment creation, income redistribution and provision of options to persons and families whose income heretofore provided few options beyond survival at the subsistence level.

#### a. Theoretical Basis

The nature of the relationship between the introduction of electricity as a source of energy and other development interventions can also be illustrated in terms of White's "Basic Law of Cultural Evolution": "Other factors remaining constant, culture evolves as the amount of energy harnessed per capita per year is increased, or as the efficiency of the means of putting the energy to work is increased." <sup>1/</sup> Cultural evolution is synonymous with economic and social development and improvements in the quality of life. <sup>2/</sup>

The Aguán Valley is a focus of major development efforts of the GOH. Numerous technological inputs are being provided by national efforts supplemented by multilateral resources. This Rural Electrification Project will introduce a reasonably priced, dependable, and flexible source of energy to the Valley. The energy benefits of this Project will be linked to the technological benefits derived from other projects to produce socioeconomic development. It would be difficult and not wholly satisfactory to disaggregate the effects of this Project from the effects of other development activities. Electrical energy is one of several essential inputs in the GOH's coordinated effort to develop the region and to bring a critical mass of resources to bear so as to achieve a significant and measurable development impact.

An important caveat to bear in mind is that development per se is not the goal in the Aguán Valley. Rather, it is the means to an end, namely to increase income and improve the quality of life for the rural poor majority who live in the Valley now and for the additional rural poor families whose principal wage earners will seek employment in the agricultural cooperatives and agro-industries in the Valley by 1981.

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<sup>1/</sup> H. White, Leslie. 1959. The Evolution of Culture.

<sup>2/</sup> Culture is used in its scientific sense here-embracing economic, political, and social aspects of human existence.

b. Summary

The line of reasoning in this analysis is as follows: the quality of life, income, and employment opportunities for the rural poor majority can be expected to improve as a result of development in the Valley. Electrical energy introduced by this Project is critical in this respect, as it will be linked with technological innovations to produce the benefits described herein.

Perhaps the most satisfactory measure of the quality of life relates to nutritional status.

The nutrition assessment reasonably concludes that an inadequate distribution of income is the principal causal factor of nutrition problems in Honduras. The rural poor have the most severe and prevalent nutritional problems. The principal objective of the GOH nutrition strategy is to address severe and moderate malnutrition by improving the distribution of income to the campesino majority through agrarian reform, including the provision of increased governmental services 1/. Other GOH initiatives addressing the nutrition problem are being supported by an A.I.D. grant and loan.

The impact of this Project and related interventions on income, employment, and the quality of life is direct and quantifiable. Agro-industry currently planned for the Valley will employ 5,725 additional people. It will create a substantial demand for food for the additional workers and their families. Agro-industry will provide the mechanism for export of processed and fresh vegetables, using by conservative estimate some 2,500 hectares of irrigated truck farming land, and 3,200 hectares of irrigated citrus land. The income derived from these agro-industrial activities is expected to quadruple the present income of agrarian reform farmers. The increased employment represents 22,500 man/months per year in agricultural production.

Apart from plans for irrigation of export crops discussed above, agro-business generated by local demand for food will affect independent small farmers. A conservative estimate of increase in income for them is \$200 per hectare per crop planted 2/. The increased discretionary income will help to meet basic needs and also provide options for improving the quality of life.

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1/ GOH, October 1976. Assessment of the Priority of Nutrition Problems and their Possible Solutions, p. 267.

2/ Based on figures in the USAID Agro-Industrial Development Project Paper

Principal beneficiaries are landless laborers (agro-industry), independent small farmers (local food production), and agrarian reform farmers (food for consumption and export). The contribution that electrical energy will make varies. For irrigation of export crops, it represents about 10% of the production costs and generates more than 40% of value. For truck farming of crops for local consumption, irrigation represents 40% of costs but produces 100-200% increases in benefits. For farming to meet increased local demands for food, irrigation with electrical pumps provides the most viable single innovation.

Similarly, electrical energy contributes to the agro-industrial projects that will raise income and employment. The largest single project, a pulp-and-paper mill, will not be feasible without electricity. Steady and reliable service is also required for canneries, palm oil extraction plants, and the port through which the products of the region will flow to foreign markets.

Finally, increased community services will be provided by electricity. For example, corn mills will reduce time in household drudgery by 2-4 hours daily for women. This will make it possible for women to invest that time in alternate activities including those which are income-generating. Thus electricity will contribute measurably to improving the quality of life.

The outputs of this Project are linked to other development efforts to improve the distribution of income in the Aguán Valley, which is intended to be the principal means for eliminating the nutritional and other quality-of-life constraints on the rural poor in the Valley.

## 2. Beneficiaries

The target beneficiaries of this Project are rural families living in the small towns served by the distribution lines and those farm families living in villages in the vicinity of secondary lines. On the basis of 1974 census figures, current population growth rates and projected immigration, an estimated 35,000 families, the majority of which earn \$300-\$400 annually, will be in the target area by 1981. It is further estimated, based on experience in Honduras, that 25,000 of these families will utilize the proposed electrification facilities. Thus, 6% of the population of the country will be directly beneficially affected, i.e. 8% of Honduran population which can be characterized as the poor majority.

### a. Settlement Patterns

This rural population lives in nucleated settlements, in contrast to the dispersed peasantry in many of the more mountainous areas of rural Honduras. This settlement pattern is a result of the history of migration to the area. The first big wave of population movement to the lower Aguán Valley in the early 20th Century consisted of banana company workers who were settled

into planned towns. Within the last ten years, a considerable number of immigrants have settled into agricultural cooperatives. These cooperatives also have settled in nuclear fashion. This aspect of the beneficiaries sociocultural organization will facilitate the installation of household electricity throughout the area.

b. Socioeconomic Groups and Their Characteristics

There are four principal categories of rural families in the area: entrepreneurs, agrarian reform farmers, independent small farmers and laborers. Survey data indicate that 21% of the population are entrepreneurs, 44% are engaged in agricultural production, 14% are agricultural laborers, and 21% work in a variety of occasional service jobs.

(1) Entrepreneurs

The entrepreneurs engage in a number of small business enterprises, usually organized around a combined household-shop. Their income is higher than the average for this Valley. Of those families whose principal source of income is commerce, 33% own general stores, 5% have small pensiones, 9% have restaurants, 2% have repair shops, and the rest are involved in a variety of commercial activities. Most of the general stores are equipped with refrigerators, some electrical and some gas-operated. The larger stores have fans, coffee mills, and other appliances. A great majority of these are also involved in small-scale agriculture.

(2) Agrarian Reform Families

Farm families, representing 44% of the target population are divided into two categories: agrarian reform families and independent small farmers. The agrarian reform families represent 70% of all farm families and 40% of the total Project target beneficiaries. At present, 53 cooperatives and one "empresa asociativa" are in the target area. The cooperatives range in size from 30 to 200 families, and have been established under the aegis of the National Agrarian Institute's Aguán Project. Their principal functions are to organize agricultural production, credit and marketing. As groups they organize community education, sanitation, water, and housing projects. Eventually, 83 cooperatives will have 7,000 member families and the empresa asociativa will have 3,500. This Project is the biggest single effort in agrarian reform in Honduras. Major investment is financed by loans from the IDB. Current plans are for 35 of the cooperatives to produce African palm as the principal cash crop. The other cooperatives will grow citrus products and basic grains; they should eventually diversify into vegetables and other crops.

There is a large empresa asociativa on the left bank of the Aguán River, which will eventually have some 3,500 member families. It has been established to operate the banana plantations in the Valley, and is managed

jointly by the National Agrarian Institute and COHBANA.

The cooperatives and empresa together will have 10,500 member families by 1981. They immigrate into the Valley as beneficiaries of the GOH's largest and most concentrated single development effort. Their places of origin, up to now, are the densely-populated subsistence farming areas of the western highlands and the southern coast.

(3) Independent Small Farmers

The independent small farmers in the area live in towns and villages throughout the Valley, cultivating land on the fringes of agricultural cooperatives and in the low foothills. They represent 12% of the total target group, numbering an estimated 4,400 families by 1981. The typical size of their landholdings is from 1-5 manzanas, 1/ which is not large enough to justify investment in large technological inputs. At present, there are no organizations to which these members of the target group belong, although it is expected that eventually some types of producer's cooperatives will be organized.

(4) Wage Laborers

The major subdivisions of the wage labor category are agricultural day laborers and service industry workers. The former constitute 14% and the latter 21% of the target group total. A sizeable proportion of them have steady labor with the banana company, but many are seasonally employed. Most of the non-agricultural workers are sawyers, domestic workers, or employees of commercial enterprises.

c. Quality of Life

(1) Nutrition and Related Health Factors

The quality of life of the intended beneficiaries will be analyzed here principally by reference to nutritional status. The assessment of nutrition problems in Honduras defines priority areas for nutrition interventions.

Analysis of the nutrition problem was based on direct indicators (caloric intake, height/weight and age/weight ratios) and on indirect indicators (infant and child mortality). The 260 municipalities in the country were categorized in three levels: those with very severe malnutrition problems (30), those with serious malnutrition problems (75), and those with moderate malnutrition or normal nutrition (155). Of the 7 municipalities in the Project region, one has severe, three have serious, and three have moderate problems.

The overall nutrition situation is summarized in the assessment as follows:

"The low productivity of the population that depends on subsistence agriculture.... prevents that population from producing or acquiring sufficient foodstuffs to satisfy its needs. More than 80% of the population earns less than one-third of the national income and the major part of this low income population is in the rural area. To the low intake of foods is added precarious health status ... which contributes to diminishing the biological utilization of ingested foods." (GOH, 1976, Nutrition Assessment.)

The country-wide nutrition problem is characteristic of the Aguán Valley region. The principal direct indicator of malnutrition used in the study is the F. Gómez classification of malnutrition in first, second, and third degrees based on weight/age ratios. The third degree malnutrition problem is the most severe. Data are available from an INCAP study in 1966 and the Ministry of Health in 1975. In 1966, the total percentage of cases of malnutrition in children ages 0-5 was the same for Tocoa in the Aguán Valley as the rest of Honduras. However, there was a significantly higher number of cases of third degree malnutrition in the Valley (see Table D-1).

More extensive data are available for 1975, when one town, four villages, and five agricultural cooperatives were surveyed (see Table D-2). A comparison of these data and the 1966 survey shows that there had been no improvement in the situation in the Valley and a significant worsening of the incidence of malnutrition in the country as a whole.

TABLE D-1 Degrees of Malnutrition in Children Age 0-5 1/  
As Expressed by Weight/Age Relation 2/

Locale	Number of Children	91%-100% Normal Cases		76%-90% First Degree Cases		61%-75% Second Degree Cases		60% & Less Third Degree Cases		Total With Weight/Age Deficiency Cases	
		No.	%	No.	%	No.	%	No.	%	No.	%
Tocoa, Colón	21	5	23	8	38	6	29	2	10	16	77
Total for Honduras of Those Studied	657	159	24	296	45	191	29	11	2	448	76

1/ SOURCE: GOH-INCAP Study, 1966

2/ F. Gómez Classification of Malnutrition in I, II, and II degrees

TABLE D-2 Prevalence of Protein-Calorie Malnutrition in Children Ages 0-5, 1/ as Expressed by Weight/Age Relation 2/

Aguán Valley Locale	Number of Children	Adequacy of Weight/Age, Percentage									
		91-100% Normal Cases		76-90% First Degree Cases		61-75% Second Degree Cases		60% & Less Third Degree Cases		Total With Weight/Age Deficiency Cases	
		No.	%	No.	%	No.	%	No.	%	No.	%
<u>Colón</u> Tocoa (One village)	242	60	25	105	43	71	29	6	2	182	75
Tocoa (2 villages)	73	8	11	35	48	25	34	5	7	65	89
Bonita Oriental (One village)	152	36	24	58	38	50	33	8	5	116	76
Sabá (One town)	161	41	25	70	43	44	27	6	4	120	74
5 Coops.	145	22	15	71	49	47	32	5	3	123	85
TOTAL for HONDURAS of Those Studied	2,628	511	19	1,140	43	860	32	171	6	2,171	81

1/ SOURCE: GOH Ministry of Health Data, 1975

2/ F. Gómez Classification of Malnutrition in I, II and III Degrees

Malnutrition is the principal or contributing factor to 60% of deaths in the 1-5 age group in the Valley. The most common associated factor is the diarrhoeic syndrome, which accounts for 73.5% of all recorded illnesses in the Valley. The illnesses in this syndrome can be: typhoid fever, paratyphoid fever, bacterial dysentery, amoebiasis, diarrhea, and other protozoic intestinal diseases. This syndrome, in turn, is related to deficiencies in the water supply and environmental sanitation practices of the region.

The principal policy conclusion of the assessment is that improvement in nutritional status requires coordinated action by all the institutions directly or indirectly related to the production, marketing, and consumption of food; and to public health, education, and socioeconomic development interventions. The Aguán Valley development effort provides such coordinated action. The principal constraints to production of food are addressed. The goal of improving income, when achieved, will remove the principal cause of malnutrition.

## (2) Education

According to the 1974 Census, 53% of the Valley inhabitants are illiterate. INA survey data indicate that the cooperatives have an 80% illiteracy rate, as most of their members are recruited from the poorest elements of the population in other areas of the country.

The educational level of the population contributed to problems in other sectors. The Rural Education Sub-sector Assessment points out the problems experienced by programs that attempt to introduce agricultural innovations to large numbers of illiterate cooperative members, chief among which is the constraint on diffusion of accurate information by written media.

A major effort to eliminate the educational problem is underway on the North Coast of Honduras. The GOH is expanding its central/satellite school program, with support from an AID loan. The objectives of the program are to retain a greater number of school children and to link classroom education to development activities.

## 3. Spread of Project Benefits

The basic question is cui bono - who will benefit from this Project. The target beneficiaries have been categorized and described to facilitate this analysis. The types and levels of benefit must also be understood; while these are more fully analyzed in the following section, they are briefly considered here.

Strictly speaking there are no direct benefits from the principal innovation to be introduced by this Project - which is electrical energy. Rather, this benefit must be linked to technological inputs in order to produce benefits. These benefits, more precisely categorized are those introduced

by this Project alone, those introduced by this Project and other projects, and those to which this Project will make a qualitative contribution.

The level of benefits is determined by the socioeconomic conditions of the target group and the availability of inputs from other sources.

The last section of this analysis addresses more particularly the levels of benefits: household, community service, small agro-business, and large agro-industry.

The electricity to be introduced is not unfamiliar to the target group, and should not be viewed as an innovation which will encounter obstacles in terms of the values or beliefs of the target population. Privately-generated electricity is available in some towns of the Aguán Valley. Its distribution is limited by availability, cost, and location factors. The decisions to be made by target beneficiaries are whether to substitute electricity for available energy sources for household and small agro-business use, and whether to introduce electrical energy and accompanying technology for productive activities which presently make no use of electricity. The benefit/cost for this decision is described in the economic analysis. Other factors considered here are the values and social organization of the beneficiaries.

a. Diffusion to Entrepreneurial and Agrarian Reform Families

Entrepreneurial (21%) and agrarian reform families (40%) are prime potential beneficiaries. Furthermore, they have a sufficient economic base, as demonstrated in the economic analysis to permit purchase of electricity for household and industrial consumption. There are no changes in values or social organization necessary for them to utilize the benefits to be introduced by this Project. The spread of Project benefits among them will encounter no sociocultural obstacles.

Entrepreneurs are presently the principal consumers of private electricity. Present users will transfer to ENEE-generated electricity because of lower costs, greater dependability, and better quality of the services. The quality is better both in kind (24-hour service versus 6-hour service) and degree (steady 115v output versus 60-80v output). Others will add electrical services to enhance their businesses.

The relatively low cost and ready availability of Project electricity will contribute to the distribution of income to small entrepreneurs. For example, the survey indicates that the operators of small family stores will buy refrigerators when electricity is introduced. Some target families will be able to enter this expanded arena of economic activity and consequently increase their income. The small trucha (household store) that sells a few dry goods will be able to become a pulperia (neighborhood grocery store) with a greater volume of perishables. Thus, electrically-operated refrigerators will enhance the income of some small family enterprises as well as

add a convenience.

For agrarian reform farmers the spread of Project benefits will be conditioned by the motivation to use electricity since there is no economic obstacle. INA technicians have received numerous requests for electrification from members of cooperatives and the empresa. Both economic and social factors operate in this desire for electricity. In economic terms, the cooperatives are agro-businesses that can introduce pumps and mills to increase production. In fact, gasoline-powered pumps for irrigation have been obtained by some cooperatives. They are not in use now because of the high cost of gasoline. Plants for the extraction of palm oil are to be installed in the INA project. The utility and impact of these productive activities is described in the Economic Analysis and in the impact section of this Analysis.

The social uses of electricity for members of the cooperatives and the empresa are best seen by analogy to cooperatives in the Guanchías region of the Sula Valley. These are seven banana-producing cooperatives that have been established for a decade, and which provide a conscious model for other participants in Agrarian Reform. All members of the Guanchías cooperatives have electrical household lighting. Most have radios and some have refrigerators for household food consumption.

Both the cooperatives and the empresa will act as units to purchase services (school, clinic, public lighting), and for productive uses. They have a secure year-round financial base for the regular purchase of electricity. Members of these enterprises receive regular disbursements of credit on the basis of \$1.50 per day worked. For household use, the monthly cost of electricity is equivalent to one day's earnings and to the current level of expenditures for lighting. Thus, as indicated in the Economic Analysis, the cost of electricity for this level of usage is comparable to current expenditures; but the additional household benefits are considerable.

b. Diffusion to Independent Small Farmers and Wage Laborers

The spread of benefits to these categories of the target population will not be as widespread as among the entrepreneurs and Agrarian Reform farmers. To reach the predicted level of household usage, only 40% of independent small farmers and wage laborers need to install household connections.

The workers for the fruit company and those with regular employment in service industries will be the most steady users of household lighting and radios. Given their socioeconomic conditions, they might be able to enhance their incomes by purchase of refrigerators for entrepreneurial use. They will also perceive surplus benefits of household appliances. However, they are not likely to benefit directly from the small agro-business level of usage.

Independent small farmers (12% of total target group) living in towns and villages throughout the Valley are primarily household users. The typical size of their landholdings (1-5 manzanas) is not at present enough to justify investment in the items of technology which the cooperatives can purchase. However, electrical pumps for irrigation of vegetable gardens are within their means and can be expected to greatly improve income assuming present plans for organizing production cooperatives materialize. There is a dynamic factor to be considered. The regional market for food will increase with the employment generated by agro-industrial development. These small farmers will be able to go into this market as vegetables and basic grains producers; the benefits of irrigation with electrical pumps, will be available to them. However, it must be noted that while current GOH policy for these farmers is to organize credit cooperatives, such policy has not yet been put in practice in the Valley.

Many of the wage laborers are seasonally unemployed. The diffusion of household electricity among them is constrained by the level and dependability of their income. Yet they are the principal potential beneficiaries of the large agro-industrial development in the Valley, especially the pulp-and-paper mill. The steady income they will derive from this employment will provide the financial base for household consumption of electricity.

For these members of the target group, there will be a change in sociocultural practices. With small amounts of money, the patterns of monthly payments for a service will be an innovation. There are ways to facilitate this change. For example, in similar situations in rural Mexico, the electrical company provides small savings boxes which rural families use to deposit the daily small amounts they would have used for kerosene. Those boxes are opened once a month when the electric bill is due.

#### 4. Social Impact of Project Benefits

##### a. A General Overview of the Project Social Impact

This discussion analyzes some of the linkages between parts of the Aguán Valley development. The industrial and agro-industrial expansion will require 5,725 additional laborers and will provide them with increased incomes. The direct impact of this expansion will be to increase income and employment of the most disadvantaged category of the target beneficiaries. Electricity is a critical element in all facets of this aspect of Aguán Valley development, i.e. the pulp and paper mill, the port, the packing plants, etc.

Infrastructure in the Valley area is now in place and will be further developed to permit export of fresh fruits and vegetables to markets abroad. In addition, the increased population of the Valley, especially of the wage laborers, will produce a very significant demand for agricultural products. Staple dietary requirements for this population must be met. One viable

option is intensification of agricultural production by irrigation which will be supplied by electrical pumps. Increased agricultural production will provide direct income benefits for the Agrarian Reform and small farmers, and direct nutritional benefits for the wage laborers.

The storage of foodstuffs, will be a direct benefit of this Project. Its impact will be felt by the very poor who will no longer have to reduce food consumption; and by producers, whose income will increase.

The rise in discretionary income will have a major social impact on family expenditures and household services. The quality of life, above all, will be improved by these benefits. The drudgery and time of women's work, especially, will be significantly reduced. The increase in available women's time can be invested in the activities, e.g. income productive activities such as agricultural production, small crafts, and marketing.

The relation between Project inputs and the rise in income is direct and quantifiable. The bulk of increased industrial employment will be provided by the pulp and paper mill complex of activities. Electricity is a vital direct input to the mill. Thus, electricity is directly linked to an average income of \$844 for 4,500 employees - that is, a total of \$3,798,000 per year by 1985. A similar case is made in the Economic Analysis for the other agro-industrial projects.

A rise in agricultural income is directly linked to irrigation powered by electrical pumps. Citrus production with irrigation will be the primary cash source for some 800 Agrarian Reform farmers. According to INA income projections, this citrus production will provide an average of \$600 per family, or a total of \$480,000 in increased yearly income. In the case of truck farming, electrical irrigation will allow a quantum increase in productivity per hectare anywhere from 100-400% depending on the cash crop. The income from one hectare of vegetable land with irrigation will earn 200 per cent to 500 per cent more than a hectare in basic grains.

The social impact of Project benefits is conditioned by three factors: the nature of those benefits, the mechanism for their distribution, and the uses to which they are put. The principal benefits of this Project are economic - increased income and employment. There are some benefits that are social - e.g. improved community services, improved household lighting, greater opportunities for adult education, increased status of the target villages and towns, etc. Most of the Project benefits will be distributed through public sector activities and are therefore subject to public policy-making. The uses of these benefits are analyzed in detail in the following pages.

Economic benefits of the Project will be translated into social activity, though any predictions are probabilistic, and subject to the vagaries of human will. Increased income makes it possible to remove the principal cause of malnutrition. However, it will not do so unaided unless there are

other interventions which are indeed anticipated. Experience shows that there is often a lag between improvements in income and resulting improvement in the quality of life, as in the processes of cultural changes. A poor man may be hungry, but he may spend increased income on items other than food. Other interventions, most notably those in the AID-funded nutrition project and the education projects, will be necessary to translate income benefits into nutrition benefits. Nevertheless, current income/expenditure ratios suggest that persons with higher income in the Aguán Valley do enjoy better nutrition.

The principal benefit of improved income and increased employment is to provide options to members of the rural poor majority, especially to the landless and the small farmers. These options include improvement of the existing quality of life, investment in income-generating activities, or investment in social mobility through education. The dimensions and probable recipients of Project related benefits are analyzed in the following pages.

b. Industry and Agro-Industry

An estimated 5,725 people will be directly employed by 1985 on industrial and agro-industrial projects planned for the region. Firm estimates of income exist for 5,300 of these, as follows: the 4,500 COHDEFOR workers will average \$844 in annual income and the 800 port workers will average \$3,000 per year.

This substantial increase in employment and income will produce a considerable social impact. The sector of the target population that will be benefited will be wage laborers. They are presently the most disadvantaged of the target group. Since they have neither land nor capital, they are now the most affected by unemployment and seasonal underemployment. Their average real income is the lowest in the target group. The demand for wage labor will exceed supply in the Valley, so considerable numbers of landless families will immigrate in search of these jobs.

The quantum increase in income and employment will provide options for the poorest of the rural poor majority. Projected income will be sufficient to supply basic needs, to allow for investment in such areas as education for their children, and to provide discretionary income for improvements in the quality of life.

c. Agricultural Production and Small Agro-Business

Electricity will have a major impact on irrigation of 3,200 hectares of citrus on the INA cooperatives, and irrigation of truck farming plots on cooperatives and independent small farms. To assess the extent of this impact, it is necessary to analyze the advantages of irrigation with electrical pumps, the demand for citrus products and truck farming products, and the employment/income benefits of irrigated farming.

(1) Irrigation Benefits

Electrical pumps are superior to gasoline powered pumps for a variety of reasons. Initial investment is 10-20% lower than that for gasoline pumps. Recurrent costs are significantly lower. Electrical pumps are virtually maintenance free and electrical energy is much less expensive. These benefits have been quantified in a 12-year study of irrigation in the Oaxaca Valley, Mexico 1/. The cost of electrical power to irrigate one hectare of truck farming land is 10% of the cost of gasoline required for the same area. 2/ Gasoline pumps require regular maintenance and overhauls at six-month intervals. This involves labor and materials costs to the typical small farmer who lacks the know-how to repair complicated gasoline pumps. The same study shows that electrical pumps are easier to operate, more efficient, and more portable. Four men are required to move a gasoline pump from one field to another; electrical pumps can be carried by one person.

Electrically-powered irrigation will be used by INA cooperatives for citrus production for export. Irrigation will not significantly affect the amount of labor that cooperative members will invest on citrus production. It will significantly increase their cash income. Employment and income effects of irrigation provided for other crops can be considerably more dramatic.

Demand for irrigated truck farming will stem from two sources: increased population in the Aguán Valley and the export market. The Valley region is at present a net importer of foodstuffs. Production of basic grains is increasing and there is significant production of basic vegetables (onions, lettuce, etc.) and legumes. The labor force employed in industry and agro-industry will create a large demand for local production of these crops. The Agro-Industrial Project is developing a GOH processing and marketing structure for fresh vegetables (tomatoes, okra, cucumbers, asparagus, etc.). The Aguán Valley will have the port and roads necessary for marketing by 1985, and there are 25,000 hectares of land potentially available for irrigation. In fact the existing railroad and Standard Fruit packing plant in Coyoles and port facilities in La Ceiba provide a current basis for export of these products, accessible to several areas of the Valley region.

INA officials estimate that 10% of available cooperative land (2,500 hectares) will be under intensive irrigated farming by 1985 (in addition to banana and citrus land). Additional land owned by independent small farmers will also be irrigated; however, there is no basis for prediction of the extent of irrigation coverage.

The microeconomic study of Oaxaca truck farmers and the economic analysis of the Agro-Industrial Development Project Paper provide an analytical basis for predicting employment and income effects of truck farming. An average

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1/ SOURCE: Ron Waterbury and Carole Turkenik. Personal Communication.

2/ The ratio of gasoline to electricity costs is similar in Honduras.

of 3 persons per hectare for approximately three months per year is required, though this varies from crop to crop. Onions and garlic, for example, are labor intensive; radishes and lettuce require less labor. Therefore, 22,500 man/months of employment will be generated by irrigation of the 2,500 hectares. It should be emphasized that truck farming experiences seasonal peaks that require additional occasional labor.

The gross product generated by truck farming for export cannot be predicted for 1985. However, 1976 figures are illustrative of the rise in total product and net profits for the producer. The total income from one hectare of vegetables is 7 to 14 times greater than from one hectare of corn. Net profit is 13 to 26 times greater, because of the higher rate of return for truck farms.

### (2) The Demand for Increased Food Production

The demand for food created by the 84,000 additional people in the Valley by 1985 can be calculated on the basis of current average consumption rates. Increased demand for staple crops will require annual yearly production of: 2,309,355 kgms. of beans, 7,205,188 kgms of corn, 2,986,765 kgms. of rice, and 3,079,140 kgms. of vegetables. Given average yield figures per hectare, there must be an additional planting of 2,919 hectares in beans, 4,965 hectares in corn, and 2,172 in rice. With the high yields of irrigated vegetable farming, the increase to satisfy additional local demand represents 610 hectares of land.

The conservative estimate for increase in amount of unirrigated land required for local demand of basic grains is 10,056 hectares. However, average consumption should increase by 40-60% with the projected rise in income, if one extrapolates from current income/consumption ratios. Thus, 15,084 hectares of unirrigated land would be required based on current national average yields of grains and 910 of irrigated truck garden land. This translates into a total of 7,556 hectares of irrigated land. 1/

The electrical pumps for irrigation made possible by this Project will be a critical factor in producing foods to meet the minimal nutritional requirements. They provide the most viable alternative to increase productivity. INA has estimated that it is not feasible to install irrigation of basic grains with current irrigation costs. The dramatic reduction in costs of electrically-powered irrigation coupled with the demand increase will make it more feasible for small producers to introduce irrigation.

### (3) Social Impact of Increased Market Demands

The demand for small agro-business development has been established. The

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1/ Based on Planning Council estimates of rise in productivity with irrigation.

social impact of this demand can be predicted from present production patterns. Cooperatives will be able to go into irrigation agriculture because they have available capital. However, they are the likely organizations to go into agro-industrial vegetable production, given the experience in the Comayagua Valley of Honduras.

Independent small farmers are also likely candidates for this intensification of agriculture for a variety of reasons, both economic and sociological. They are not oriented to export crop production, as cooperative members are, but conditions exist which can change this orientation. They currently experience heavy underemployment and are likely to be able to absorb labor requirements. They are currently oriented to small-scale production for subsistence and sale on the local market but could become engaged in contract farming for export of their produce. The demand for locally-purchased foodstuffs will most likely be felt through the local market mechanism. Women in these families are also logical candidates for the small scale higgling in the market towns which will be the distribution channels.

In order for this benefit to be felt by independent small farmers, coordinated planning must take place including their organization into cooperatives as planned. Credit will be needed for the initial investment in pumps, etc. The Banco Nacional de Fomento will have investment credit available for these small farmers. A planned series of efforts to motivate their involvement in intensified agriculture is also necessary and feasible.

The social effects of this increased income for independent small farmers will be considerable. Their transition from the very poor category to the lower middle class will involve, if it parallels the present behavior patterns of the lower middle class a decrease in malnutrition, an increase in consumption of consumer goods, and increased access to services (health, education, etc.). The increased income will provide options that are at present not available to them.

#### (4) Food Storage Benefits

A Project-related benefit that is critical to the success of Aguán Valley development is silo building. At present, the major constraint to installation of a systematic grain storage program is the lack of electricity for the required drying operations. Storage of grain will have an important socioeconomic effect on independent small farmers and agrarian reform farms, and help to stabilize price variations over a year to the benefit of producers. For example, during the last two seasons, surpluses from bumper winter crops have been lost because of the lack of storage facilities. Price fluctuations at harvest time lead to a loss of income for the small producer who is forced to sell. A GOH silo program will increase the income of these two categories by reducing these losses.

Furthermore, the amount of income spent on basic grains by wage laborers

will be reduced with stabilization of prices. At present, prices rise up to 200-300% between harvests. The effect of GOH storage program will be to reduce the price rise significantly. Obviously, grain middlemen will be adversely affected by a storage program. However, most of these do not live in the Valley; they truck goods between the Valley and other areas of Honduras.

The social effects of this Project-related benefit are, again, linked to the rise in incomes. The positive effects will be especially felt by the very poor, who must reduce food consumption drastically when grain prices rise. Their purchasing power would be increased. For them, there is a clear nutritional benefit.

The storage of meat products, as well as grain products will be improved by this Project. Meat is now sold in open air stands, with high spoilage rates and sanitation problems. Refrigeration will be available to butchers; it is not clear to what extent gains from reducing spoilage loss will be offset by refrigeration costs. Income benefits to these entrepreneurs is not quantifiable. However, the reduction of diseases related to the improved hygiene will have a direct impact on the quality of life of the Valley's inhabitants.

d. Community Services Impact

Some electrical services will affect rural communities, e.g. public lighting, milling of corn, provision of potable water. Of these services, the technology for public lighting of streets will be introduced by the Project and can be afforded by market towns and cooperatives. The lighting of public buildings, mainly schools, will be similarly introduced, is within the means of most villages and cooperatives, and is desired by survey respondents. The impact on education of adults will be considerable - night classes will not interfere with the daily work schedule.

A number of public and private agencies are drilling wells for potable water in the Aguán Valley. A.I.D. will finance some wells through a loan-funded nutrition project. These wells have a demonstrated impact on the nutritional and health status of the rural poor majority - potable water contributes to the reduction of gastrointestinal diseases, especially in infants. This in turn, has a direct impact on the nutritional status of the population. One finding of the Nutrition Sector Assessment was that many nutrients that are taken by the rural poor are lost because of the prevalence of gastrointestinal disease.

This Project will make it possible to install electric pumps on these community wells, thereby greatly increasing the supply of water and the number of beneficiaries. The superiority of electrical water pumping over hand-operated pumps is due inter alia to the difference in maintenance requirements. Electrical pumps are virtually maintenance-free: One constraint in wells with hand pumps that have already been installed in Honduras is that they soon are damaged or become inoperative and rural villagers do not have the know-how to repair them.

Corn mills, which will be made possible by this Project, will produce direct and sizeable benefits for the target group, especially women. Females in the typical rural household spend 2-4 hours each day grinding corn for tortillas by hand. This usually involves arising at 1 or 2 a.m. in order to have tortillas ready for men to eat at 5 o'clock and to take to the fields with them. Experience in rural electrification projects in Mexico shows that this time is reduced to 15 minutes, including waiting time, when electric corn mills are installed in a village. These experiences also show that the cost of the mills is usually beyond the means of one peasant household, and public mills in the ratio of 1 to 30 families should be planned for. In the Aguán agrarian reform area, these mills can be operated by the cooperatives. In other parts of the Valley, they would probably be operated as small businesses.

The social impact of corn mills is considerable. It will free a large number of women from drudgery in a time and energy consuming endeavor. This energy is freed to be invested in other income and energy producing labor. In general, corn mills, irons, and other household labor savings devices will contribute to increasing the status of women. This process is familiar and has been documented for most industrialized countries.

#### e. Household Impact

The most widely diffused of Project benefits will be household service items, e.g. household lighting, ironing, and radio listening. This is supported by the survey data and experience in other rural electrification projects. They will have the least impact on economic development but the greatest impact on quality of life improvements.

Household lighting technology will be introduced by the Project. Our analysis indicates that it is feasible at current income levels for about 70% of the target group to install this basic electrical service. The Economic Analysis shows that in the absence of a clear cost superiority of electrical light over traditional light sources, there is a clear advantage in terms of quality, dependability, versatility and prestige of electric light. One indication of this is the overwhelming desire manifested by respondents in the survey, 90% of whom indicated a desire for electrical light in their homes.

Other household benefits will depend on the possibility of investment in irons, radios, and other appliances. The impact of the electrical iron alone on household labor investment will be considerable. Ironing time can be reduced by 40-60% with electrical irons; because the loss of time caused by placing flat irons on the heat source is eliminated. The cost of these items is not beyond the means of many members of the target group.

#### 5. A Concluding Postscript

Prediction in the social sciences is fraught with difficulties. For this

Project, for example, assumptions about human will must be maintained. While it is possible to build a reasonable and demonstrable scientific case for the impact of electricity and technology on the quality of life in the Aguán Valley, one must assume a continuation of current GOH policy on agrarian reform and agro-industrial development to posit the level of benefits analyzed here. There is little likelihood that human decisions will change the present course of development - there is too much at stake for the GOH in the Valley. A major development pole of the country is located here, and the major policy assumptions about agrarian reform and productivity are being tested.

The cui bono issue is addressed in the form and function of Aguán Valley development in which public capital and planning are developing the infrastructure and structure of capital development. An increase in income, and consequent enhancement of the quality of life for the rural poor is a central objective and function of GOH efforts. The Aguán Valley is being developed when fossil fuel energy costs are altering the entire cost/benefit pattern. The infrastructure and production structure (agricultural and industrial) requires over the intermediate and longer term inexpensive and dependable sources of energy. This Project, with hydro-generated electrical power, will supply the energy ingredient that meets the requirements of Aguán development plans.

Causal linkages have been established here between technology and electrical energy, the development of agriculture, and increases in income. These causal relations are scientifically predictable. The unscientific post-script is the policy issue of determining the beneficiaries of Aguán development. Ethical considerations and issues of social justice are a paramount consideration for an analysis of this project, and they have been built into the form and function of GOH policy for the development of the region.

It will be particularly important, and it is so planned, to establish baseline information on such items as employment, income, nutritional status, etc. so as to calculate over time the value of this project in specific economic and financial terms. This is indeed contemplated. Hopefully it may be possible to develop certain correlations between these factors and the increased supply of energy.

### C. Financial Analysis

#### 1. Historical

The financial statements of ENEE for the years 1972 through 1975, together with 1976 results through 11-30-76, are presented in Annex H-12. A brief summary is shown below:

#### BALANCE SHEETS AS OF (\$000's)

	<u>12-31-72</u>	<u>12-31-75</u>	INCREASE	
			<u>\$</u>	<u>%</u>
Net Fixed Assets	50,905	97,270	46,365	91
Current Assets	8,806	13,511	4,705	53
Other Assets	3,438	4,959	1,521	44
Total	<u>63,149</u>	<u>115,740</u>	<u>52,591</u>	83
Net Worth	24,253	53,533	29,280	121
Long Term Debt	33,808	53,194	19,386	57
Current Liabilities	5,088	9,013	3,925	77
Total	<u>63,149</u>	<u>115,740</u>	<u>52,591</u>	83

#### INCOME STATEMENTS FOR YEARS ENDED (\$000's)

	<u>12-31-72</u>	<u>12-31-75</u>	INCREASE	
			<u>\$</u>	<u>%</u>
Operating Revenues	10,598	19,592	8,994	85
Operating Expenses	5,885	11,665	5,780	98
Net Operating Income	4,713	7,927	3,214	68
Other Income (Expense)	(65)	275	340	-
Net Income Before Interest	4,648	8,202	3,554	76
Interest	1,862	3,274	1,412	76
Net Income	<u>2,786</u>	<u>4,928</u>	<u>2,142</u>	76
Cash Flow from Operations	<u>4,615</u>	<u>8,571</u>	<u>3,956</u>	85

Note: 1976 financial statements had not been finalized at the time of this analysis. 1972-1975 comparisons were made to demonstrate growth over that three-year period.

2. Financial Condition

Total assets of ENEE over the three-year period, 1972 through 1975, increased by \$52.6 million, or 83%, from \$63.1 million to \$115.7 million. The primary increase (\$46.4 million) was in net fixed assets, going from \$50.9 million to \$97.3 million. A bookkeeping transaction in 1975, recording a write-up of net fixed assets from historical cost to replacement value, established by independent appraisers, accounted for \$18.9 million of the increase. Principal increments to plant over the three years were in network connections, purchase and renovation of the La Ceiba system and expansion of the Rio Lindo hydroelectric facilities. Additions to fixed assets during the period were financed almost exclusively from long-term borrowings and operations.

New long-term debt contracted over the three-year period amounted to approximately \$31.6 million with the principal lenders being the World Bank (17.0 million), the Central Bank of Honduras (\$5.3 million), and the Central American Bank (CABEI) and First National City Bank each totalling some \$3.5 million. The net increase in long-term liabilities, after debt servicing, amounted to \$19.4 million, or an increase of 57% during the period. A schedule of ENEE's projected long-term debt is shown in Annex H-13 together with interest rates, amortization periods and borrowing arrangements/guarantees. World Bank and A.I.D. loans are guaranteed by the GOH. Loans of the Central Bank of Honduras are guaranteed by profits and assets of ENEE, while collateral for CABEI loans are the assets purchased with its loan funds. Other loans are not guaranteed.

The three-year increase in net worth of \$29.3 million resulted from the following:

	(\$000's)
Revaluation of assets and other	17,700
Contributions	900
Net Income	10,800
Increase in Net Worth	<u>29,300</u> <sup>1/</sup>

The revaluation of assets of \$18.0 million discussed above, is offset against a \$1.2 million loss from exchange rate fluctuations. Capital contributions over the period 1972-1975 were minor at \$0.9 million and came from three sources: consumers (\$600,000); GOH (\$200,000); and municipalities (\$100,000). Net income generated over the period boosted the ENEE capital accounts by \$10.8 million. Income and operations are discussed below in greater detail.

1/ Net Worth Rounded

The blend of net, new long term debt and equity, primarily from operations and asset revaluation reserve resulted in a debt-equity ratio on additional capitalization over the three years of 40/60; moving the debt equity ratio from 58/42 at the end of 1972 to 50/50 at the end of 1975.

Net working capital increased by \$780,000 over the three years to \$4.5 million at the end of 1975 and showed an adequate current ratio of 1.5:1 at that time. Accounts receivable, a significant part of working capital, was the subject of a qualification of the auditor's opinion in 1972, due to probable uncollectibility of certain government and water system accounts in an estimated amount of \$900,000. However, since that time, adequate allowance for doubtful accounts and rescheduling have been provided. The days sales in accounts receivable, a measure of collectibility, dropped immediately from 102 days at the end of 1972 to 81 days a year later. Days sales moved up gradually to 89 days at the end of 1975, but at the end of November 1976, had dropped back to 84 days. Inventories accounted for a substantial part of the build-up in working capital, representing a \$7.5 million investment at the end of 1975, its highest level in three years. During 1976 inventories were worked off by some \$1.9 million, bringing inventories more in line with historical amounts.

### 3. Operations

The comparative income statements for the years 1972 and 1975 show an increase in operating revenues of \$9.0 million, or 85%. This increase is attributable to both volume and price. During the period, GWH sales jumped 56% from 279.0 GWH's to 436.3 GWH's, while rate increases effective February 1975 moved revenue/KWH from 3.8 US¢ to 4.5 US¢, for an increase of 18%.

Residential use in 1975 accounted for 36% of revenues while consuming 24% of KWH's, and the large users category generated 30% of revenues but consumed 44% of KWH's.

Offsetting the gain in operating revenues were substantial increases in operating costs and interest expense. Operating costs in total increased \$5.8 million, or 98% during the period. Principal areas of increase are shown in the following table.

OPERATING COSTS

	(\$000's)			
	<u>1972</u>	<u>1975</u>	<u>Δ</u>	<u>%</u>
Depreciation	1,726	3,557	1,831	106
Generation	1,637	4,161	2,524	154
Transmission & Distribution	842	1,451	609	72
Customer Accounting & Collection	472	675	203	43
Sales Promotion	63	77	14	22
General & Administrative	1,145	1,744	599	52
Total Operating Expenses	<u>5,885</u>	<u>11,665</u>	<u>5,780</u>	<u>98</u>

Depreciation charge increases of \$1.8 million over the four years closely parallel the percentage growth in net fixed assets. Generation cost increases of \$2.5 million were principally due to general inflation, growth in volume and trebling of petroleum prices in late 1973. ENEE was not affected as adversely as electric utility companies in many parts of the world, since approximately 82% of the energy it provides is hydro-generated.

Transmission and distribution costs increased 72%, or \$609,000 during the period. Again, a portion of the increase is attributable to large volume increases in KWHs delivered, with the other major factor being mainly inflationary pressures. The costs/KWH for transmission and distribution were 3.0¢ in 1972 and 3.3¢ in 1975. Network-system line losses as a percentage of total energy generated improved slightly moving from 15.5% in 1972 to 14.3% in 1975 for the overall system. General and administrative costs reflect increases in staff with the number of permanent administrative employees increasing to 568 in 1975. Salary increases accounted for the other part of the increase. Interest costs increased by \$1.4 million, or 75%, going from \$1.9 million in 1972 to \$3.3 million in 1975, moving upward in close relationship with long-term debt.

Annual net income increased from \$2.8 million in 1972 to \$4.9 million in 1975 with only 1974 reversing the upward trend. The drop in net income in 1974 to \$2.4 million, as explained above, was due principally to the rate structure lagging behind rising petroleum costs and general inflation. This situation was rectified in February 1975 with an effective 18% increase in rates. Net income as a percentage of sales changed slightly between 1972 (26%) and 1975 (25%), as did return on total assets; 1972 (4.6%); 1975 (4.8%). Results for 1976 based on internal financial statements through November 1976 and then annualized, show net income approximately at the same level as 1975. Internal cash generations, a critical source of funds for expansion, increased from \$6.4 million in 1972 to \$11.8

million in 1975.

Two covenants in World Bank - ENEE loan agreements relate operating performance with asset base and debt-servicing. The first covenant requires ENEE to earn annually at least 10% on income before interest over average net fixed assets used in operations. This covenant was used as the vehicle to raise rates in February 1975, as the 1974 return amounted to 8.3%. As a result of the rate increase, return in 1975 was 10.8%, over the World Bank's minimum. The 1976 return based on annualized income, is estimated at 10.2%.

The second covenant requires that internal cash generation be at least 1.4 times debt service or ENEE may not incur additional long-term obligations without World Bank approval. This requirement was met in 1975 with a ratio of 1.4:1. Using annualized results for 1976, the ratio fluctuated between 1.2:1 and 1.6 depending on the manner used to calculate the ratio (See Annex H-14 for discussion of alternatives). Regardless of interpretation, the World Bank, in response to the inquiry of the General Manager of ENEE, has indicated that it has no objection to the proposed loan (see Annex H-18 ).

In conclusion, the review of the historical financial statements of ENEE shows the company to be on a firm financial footing with adequate operating revenues being generated and reinvested in combination with new long-term debt, in the expansion of plant and service.

#### 4. Financial Prospects

Projected financial statements for the years 1977 through 1984 are presented in Annex H-15 . These financial statements include the effect of the proposed Aguán Valley Project, the capital investment to meet short-term energy requirements, and the El Cajón hydroelectric project on ENEE operations.

The proposed El Cajón hydroelectric project will have a dramatic influence on the financial picture of ENEE. Although a final decision has not been made to proceed with the project, its financial effects have been included in the proforma financial statements for a number of reasons: (1) pre-feasibility studies indicate the project is the least-cost solution at opportunity costs up to 15%; (2) if El Cajón is not selected, another less ambitious but nevertheless major hydroelectric project will in all probability be selected; (3) sales forecasts indicate that, even with the additional capacity of Rio Lindo expected on line in 1978, energy requirements in 1981 will exceed firm capacity of 167 MW; and (4) El Cajón or a substitute hydroelectric project would be a competitor with the proposed Aguán Valley Project for ENEE funds over the next four years.

The El Cajón project is a \$325 million hydroelectric generation program designed to meet Honduras' needs until the early 1990's, with some excess capacity during the interim to be sold to Nicaragua. The current, proposed financing plan includes a \$50 million contribution by the GOH to ENEE as permanent capital, and it includes long term credits as follows:

Central American Bank for Economic Integration -  
Pre-Investment loan \$4.0 million, 6%, 15 years,  
2 year grace period.

Central American Bank for Economic Integration -  
\$25.0 million, 8%, 15 years, 5 year grace period.

Inter American Development Bank -  
\$95.0 million, 5%, 30 years, 6 years grace period.

World Bank -  
\$108.0 million, 8.5%, 25 years, 6 years grace period.

The balance of project funding of \$43 million is expected to come from suppliers credits which are assumed to carry interest at 8% with a 3 year grace period.

Effects of the El Cajón Project on debt servicing and on counterpart requirements during the Aguán Valley Project implementation period (1977 through 1980) are examined below.

ENEE's projected operating levels (number of KWH's generated and sold) are based on forecasts made by the utility consulting firm, EBASCO of New York, in addition to estimated sales to Nicaragua once the proposed El Cajón project comes on stream in 1982. KWH's sold are expected to increase from 555 in 1977 to 1,243 in 1984 within Honduras, in addition to sales to Nicaragua. Income from operations is expected to increase in each successive year from 1977 (\$11.8 million) through 1984 (\$34.2 million) due to increasing volumes and decreasing fuel costs as the Rio Lindo Hydroelectric Project comes on the line in 1978 and El Cajón starts up at the end of 1983. The ratio of fuel costs to KWH's sold drops from \$5.83 in 1978 and \$4.1 in 1982, to \$1.03 in 1983. Sales to Nicaragua in 1983 are estimated at \$13.8 million and in 1984 at \$12.1 million. Net income is expected to move upward from \$7.4 million in 1977 to \$9.5 million in 1981 and then to decrease in 1982 as interest on El Cajón borrowings begins to be charged to operating results instead of being capitalized as will be done during the construction period. Net income moves back up in 1984 to \$9.4 million with the higher revenue base to offset higher interest burden. Interest payments are estimated at \$25.2 million in 1983 and \$25.1 million in 1984.

ENEE's projected financial condition at three key dates is discussed below. At the end of 1981, the approximate termination date of the Aguán Valley Project, net fixed assets in operation are projected to be \$157.1 million reflecting an increase of 23% over the 1976 ending balance. The bulk of assets are tied up in El Cajón construction in progress (\$239.2). Projected net, new long term debt of \$287.4 million reflects an increase of several times the 1976 ending balance of \$59.0 million. Equity increases over the same period are projected at \$67.0 million including GOH contributions of \$33.5 million and \$33.5 million in additional earnings.

The proposed El Cajón Project is scheduled for completion by the end of 1982 and at that time net fixed assets are projected to approximate \$505 million. Long-term debt and equity components will have increased to \$364 million and \$155.1 million, respectively. At the end of 1984, after two years of operation of the El Cajón Project and three years after the Aguán Valley Electrification Project, net fixed assets are projected at \$489.9 million, the small decrease from the 1982 projection representing loan repayments; and equity increases by \$20.5 million to \$175.6 representing growth in retained earnings.

A review of the proforma source and application of funds statements shows ENEE with sufficient cash availability to finance both the Aguán Valley and El Cajón if resources develop as planned. Internally generated cash (income from operations plus depreciation) is estimated at \$15.5 million in 1977 and projected to move upward each year to \$21.5 million in 1980 and is more than adequate to meet debt servicing and expansion requirements. Loan drawdowns of \$24.7 million over the four-year Aguán implementation period, principally from the World Bank for an interim power project, will also be available.

Proposed loans of approximately \$205.9 million and GOH contributions of \$33.5 million are planned to be available to meet total construction needs from 1977 through 1980. Working capital is expected to increase by \$7.1 million over the four years with a portion of increased working capital due to higher receivable balances reflecting increased operating levels. Additional cash margins through 1980, after allowing for all financing of ENEE's planned expansion program and debt servicing including Aguán Valley and El Cajón, amount to \$2.2 million. Substantial cash usage in 1981 and 1982 is expected to result in a negative working capital of \$2.9 million in 1982 indicating a contraction of ENEE's normal expansion program, a concentrated effort to reduce accounts receivable or modest additional short-term borrowing to remedy what would essentially be a short-term financial situation. Net cash flow increases by 1984 resulting in a 1984 negative working capital of \$1.4 million.

The return on operating income over net fixed assets in operation is calculated at 7.4% in 1984, again below the current World Bank requirements of 10%, indicating the possibility of rate hikes tied to the 10% requirement. To bring returns up to a 10% level would require a rate hike of approximately \$11.7 million, and in the context of this project, would result in an additional monthly charge for average residential consumption in the Aguán Valley of 60¢.

### 5. Project Financial Analysis

Estimated yearly disbursements by project cost components and sources are detailed in Annex H-1 and summarized below.

(\$000's)

	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>Total</u>
A.I.D.	210	1,502	3,681	2,550	2,057	10,000
ENEE	85	<u>1,750</u>	<u>1,330</u>	<u>1,035</u>	500	<u>4,700</u>
TOTAL	<u>295</u>	<u>3,252</u>	<u>5,011</u>	<u>3,585</u>	<u>2,557</u>	<u>14,700</u>

A four-year disbursement period will be necessary to implement the project, particularly in the completion of 34.5 KV distribution and secondary lines and the installation of service lines to consumers. Financial projections showing estimated KWH demand and sales, income statement, cash flow, rate of return calculations and assumptions are presented in Annex H-17 .

### 6. Base Case Demand and Sales Projection

Projected energy demand and sales were prepared by ENEE on a very conservative basis using data from a survey of prospective residential and commercial use carried out in the Aguán Valley and tempered by the Nacaome experience, as well as requirements projected for INA agricultural and industrial use, COHDEFOR forest-related investments, development of Puerto Castilla, and COHBANA and Standard Fruit Company requirements. The demand projections set forth in this analysis have been termed "base case" data because the economic analysis section of the Project Paper uses the demand projections as a base which is adjusted to arrive at a more realistic demand forecast for the Project area. Base case demand and sales forecasts, limited to the new consumers, are listed on the following page for the first full operating year of the project and ten years later.

Rate Category	1981			1991		
	<u>1/No. of New Consumers</u>	<u>MWH's</u>	<u>\$000's</u>	<u>No. of New Consumers</u>	<u>MWH's</u>	<u>\$000's</u>
Residential	16,850	8,425	632	25,380	25,693	1,927
Commercial	2,970	1,931	141	4,480	4,514	316
Public						
Lighting		1,800	45		2,640	66
Government		8	4		12	6
COHDEFOR		13,600	354		44,600	1,160
COHBANA		11,000	352		13,200	422
Standard						
Fruit		8,800	282		22,800	732
INA						
Agriculture & Industry		1,800	58		2,800	90
Puerto Castilla		1,748	87		2,848	142
	<u>21,080</u>	<u>49,112</u>	<u>1,955</u>	<u>29,860</u>	<u>119,187</u>	<u>4,861</u>

1/ The 5,000 consumers with existing private or municipal generators were not included in the base case under the assumption that these 5,000 will be benefited to a lesser degree than the target group. Also base case population projections are very conservative.

Aguán Valley survey data adjusted by a projected population growth rate of 3.9 per cent show an estimated 35,000 households (residential and commercial) in the project area by 1981. Initially, it is assumed that 39%, or 13,520 of the former households will be connected while the estimated 7,000 INA households will be connected through an ENEE arrangement with the cooperatives. It is assumed that the proportion of households connected will increase to 60% of total households over a five year period and remain at that coverage rate through 1991.

Income levels reflected in the Aguán Valley survey for the intensive review support the demand projections as follows: household acceptance rates of 50 per cent are assumed for families with monthly incomes in the lowest of the \$51 - \$75 range and it is assumed that households with higher incomes above this range accept at 100%. Based on usage patterns in Nacaome, households in the \$51 - \$75 monthly family income range are considered to be financially capable of handling at least the minimum monthly electricity payment of \$1.50 plus a \$.92 installment (principal + interest) on the loan for internal wiring. The upper end of the \$38 - \$50 monthly family income range would also accept at 50% with the monthly payment still within the affordable category. Again in Nacaome, in those areas of town with electricity, 60% of the households are connect-

ed to the grid. Acceptance of INA cooperatives is based on special implementation procedures to be worked out by ENEE and the Cooperatives. At full development, yearly family income is estimated at \$1,250, of which 60% is in the form of cash income. Thus, electricity is easily afforded by INA cooperative households.

Average annual consumption amounts for residential users are estimated at 500 KWH's in 1981 increasing to 800 KWH's in 1985, using the Nacaome experience as a guide. Revenues were derived from tariff schedules based on average consumption amounts. The average rate used was \$.075/KWH.

Commercial connections are based on the ratio of commercial units to residential units as determined by the Aguán Valley survey, i.e. 15% commercial and 85% residential, again approximating the Nacaome relationship of 20% commercial and 80% residential. Average annual commercial consumption is projected at 650 KWH's in 1981 increasing to 1,000 KWH's in 1985, reflecting a more gradual growth than that in Nacaome. Revenues were derived from tariff schedules based on average consumption amounts. Average rates used fluctuated between \$.073 and \$.070/KWH.

The projected public lighting and government consumption requirements and the KWH selling price are based on ENEE standards applied in similar areas of Honduras. COHDEFOR demand is based on private investment in a large pulp and paper facility and sawmills planned for the Aguán region. ENEE and COHDEFOR estimates of consumption are based on energy needs during the construction and start-up period and carried through 1985. Energy requirements after 1985 remain static for purposes of the analysis. ENEE forecasts rates for the COHDEFOR project at \$.026/KWH. Projections for COHBANA and Standard Fruit consumption are based on the EBASCO study of energy requirements completed in August 1976. As the bulk of energy needs for COHBANA and Standard Fruit will be for irrigation, ENEE has used an average price of \$.032/KWH to calculate revenues. ENEE assumes that the average irrigation rate of \$.032/KWH will also apply to INA. Puerto Castilla demand includes port operations only and is based on the EBASCO energy requirements study. ENEE has projected a rate of \$.05/KWH for the port.

#### 7. Rate of Return Analysis and Operating Results

A rate of return analysis has been prepared using the following assumptions:

- A. El Cajón will be brought on line at the end of 1982.
- B. The thermal unit and small hydroelectric project will be constructed as planned.

C. The incremental capital costs of the investment for the thermal and small hydroelectric plants related to the Proposed Aguán Valley Project have been included in the analysis.

D. Generating costs are estimated at the following rates:

<u>YEAR</u>	<u>TYPE OF GENERATION</u>	<u>COST/KWH</u>
1980	Excess system capacity	\$ .0175
1981-82	Thermal/hydro addition	.0192
1983-91	El Cajón hydro power	.0125
1992-2007	Other hydro power	.0150

E. Other assumptions relating to operating costs are detailed in Annex H-16

An internal rate of return was calculated using the base case projection of power demand as described earlier in this section of the Project Paper. A rate of return of 10% is forecast on the base case; however the analysis has been adjusted to reflect additional power demands which have not yet been quantified. The Economic Analysis of the Project Paper supports 20% higher consumption than that projected in the base case in 1985 and an increase thereafter at a rate of 7% per year. Based on these revisions the internal rate of return is estimated at 12%. Furthermore, upon consideration of the productive users and consumers surplus benefits as set forth in the Economic Analysis, the rate of return advances to an estimated 16%.

8. Concessional Financing

The GOH considers the development of the Aguán Valley to be of the highest priority in its overall development plan. Electrification of the Aguán is critical to this effort. ENEE is acting as the agent for the GOH in carrying out the electrification element of Aguán Valley development. The design of the Project will permit the majority of people of the area to benefit directly and tangibly from its outputs. This implies costs, for example those costs of administration attendant on the provision of power to thousands of small, nearly negligible power users; and these are social costs which a power company would not ordinarily bear alone.

Apart from ENEE resources required for the development of the Aguán Project, there will be significant financial burdens on ENEE stemming from the interim power project and the El Cajón or substitute hydro-power project. They will be of two kinds - ENEE's contribution to the projects during their

construction period and the related debt-servicing. These considerations and the cash flow projections lead to two conclusions. First, a funding source, other than ENEE's resources, should be made available as a cushion to assure the Borrower's timely contributions. The Government and ENEE will agree to make available up to \$1 million from a special two-step fund for rural electrification established under a prior IBRD/IDA loan; and the Government (the Guarantor) will be asked to assume responsibility with the Borrower as concerns the general covenant on "Funds and Other Resources to be Provided by the Borrower."

Secondly, ENEE should be given relief during and subsequent to the period of construction of this Project and those projects involving hydro-power generating capacity. The projections show a negative cash flow beginning in 1982 and diminishing in 1984. Although rate hikes are likely during this period, a negative cash flow situation could present itself into the late 1980's depending on when the El Cajón or substitute hydro facility would come on stream. Thus, it is proposed that ENEE be given maximum relief in terms of the grace period, i.e., ten years. After that period, ENEE should be in a position to repay loan principal within fifteen years so that the repayment term to ENEE would comprise a total of twenty-five years (including the ten-year grace period).

Consistent with the above discussion, the interest rate during the grace period should take into account ENEE's financial position during the 1980's. An interest rate of three percent during the grace period is proposed, one percent higher than the most concessional rate, to permit cash to be generated for the Rural Electrification Fund. After the grace period, the interest rate will increase to four percent. A.I.D.'s most concessional terms will be applied to the Government's repayment of the loan.

D. Economic Analysis

1. Introduction

Until recently, the economic base of the Aguán Valley consisted primarily of the activities of the Standard Fruit Company, some extensive cattle enterprises, and small independent farmers. There had been no industrial development in the area except for some banana processing and packing plants, employing about 1,400 people, and one meatpacking plant with 65 employees. The living conditions of the Valley's population, typified by poor housing and a lack of all basic services, were similar to those in other rural areas except that the people tended to be more clustered. The 200,000 hectares of rich agricultural lands of the entire Aguán Valley were largely unexploited, with the Standard Fruit Company cultivating only about 12,000 hectares.

Significant changes are taking place and more are programmed for the Valley, to the extent that economically it should become the fastest growing region in the country. The GOH has given high priority to the settlement program in the Valley, and to the exploitation of the forests in the adjacent Olancho region. The second phase of the INA-Interamerican Development Bank program anticipates extending cooperative plantings over about 34,000 hectares (including 3,200 hectares in irrigated citrus), in addition to the 13,000 hectares from the first phase. The second phase includes financial inputs of some \$51.5 million scheduled over a four-year period beginning in 1977. Although firm plans have not yet been developed, it is expected that subsequent expansion phases will bring a total of 120,000 hectares into the INA cooperative settlement program, including up to 25,000 hectares to be brought under irrigation systems. The development of planned irrigation systems will be greatly facilitated by the availability of reliable, relatively cheap electricity.

A number of agricultural and forest industries are being planned to increase the value-added of the production of the primary products. In addition to existing operations of COHBANA and Standard Fruit, a number of agro-processing activities are anticipated in the Valley region including packing of bananas, citrus and other fruits; extraction, refining and processing of African Palm Oil; and processing of other fruits and vegetables. The forest reserves to the east and south of the region will be developed in a \$400 million program that includes the establishment of a \$182 million pulp and paper plant and three \$20 million sawmills. Other timber product industries can be expected to develop as well. All of the industries planned depend on the presence of a dependable, efficient source of electricity.

The protected harbor of Puerto Castilla is one of the finest sites in the Caribbean for a deep water port. It was used by the U.S. Navy during World War II, and then abandoned. Its use is currently limited almost exclusively to the export of meat and fish. A \$95 million program is being developed to make it the largest port in Central America. Through

it fresh and processed agricultural and forestry products will be exported from the region to world markets.

2. Power Demand: The Base Case Projection <sup>1/</sup>

The base case projection of power demand in the region foresees an increase in sales from \$1.96 million in the first full year of the system's operation in 1981 to about \$4.1 million in 1985. It then grows by about 3% annually to 1992, and is almost flat thereafter. The assumptions underlying this projection are a 7% annual growth in power demand by households and a 3% annual growth in commercial demand after 1985. Agricultural and industrial demand begins to flatten out after 1985 and remains unchanged after 1987.

These are extremely conservative assumptions in that they: (a) limit the agricultural and industrial demand to those activities specifically identified in the currently formulated investment programs, and in fact, do not include all projects that now can be identified and (b) assume that agricultural and industrial development will reach a limit in about 1987, with essentially no further expansion of irrigation, or additions to plant or to capacity utilization. It is more reasonable to anticipate a further expansion of intensive farming on the 25,000 hectares in annual crops through irrigation (as discussed in the social analysis), an increase in the number of processing plants, and continued plant expansion in the 22 years following 1985.

Table 1 sets forth all of the investments for the region which are included in the base case. The base case does not include a major expansion of irrigation systems being considered for the INA cooperatives following implementation of Phase II of the development program, although these plans are still in the formative stage. Table 2 lists a number of agro and forestry related industries being considered, all of which are at least at the prefeasibility level and additional to the investment shown in Table 1.

During the period of execution of the projects now planned for the 1977-85 period, it can reasonably be expected that plans and financial arrangements will be made for still more projects to be executed during that period and the years that follow. Logically, they will include agro-industries such as the processing of citrus fruits and other fruits and vegetables; other wood products industries such as window and door frames, furniture manufacturing, chip board plywood, etc.; tourism development; port-related activities; and other industrial and commercial activities.

<sup>1/</sup> Refer to the Financial Analysis

TABLE 1: Major Development Projects in the Lower Aguán Valley and Environs

<u>Project</u>	<u>Cost Applicable To Aguán Region (\$ millions)</u>	<u>Source of Financing (\$ millions)</u>
Lower Aguán Agricultural Development, Phase II	51.5	IDB 40
Jutiapa - Escombros Road	12.0	CABEI 6
El Porvenir - Sulaco - Yoro - Olanchito Road	60.0	IBRD 49.6
Jutiapa - Planes - Sabá Road	15.0	AID/IDB/CABEI 10
La Ceiba - Jutiapa Road	10.0	CABEI 10
Penetration Roads	6.0	AID 3.4
Agricultural Credit	20.0	AID 7.0
Agrarian Reform	20.0	IBRD/IDB 62.8
Castilla Port	95.0	IBRD/85
Hurricane Reconstruction	6.0	AID 9.5
Water Systems	12.0	IDB 12
Palm Oil Plant & Agro-Industries	10.0	
Castilla Bay Tourism	30.0	
Sub-Total	<u>\$347.5</u>	
Olancho Forestry Project*	<u>400.0</u>	IDB 76.4, VIF 27
GRAND TOTAL	<u>\$747.5</u>	

(\* Including a \$182 million paper & pulp plant and two \$20 million sawmills to be constructed in the valley.

TABLE 2: Additional Projects Being Planned For The Aguán

<u>Project</u>	<u>Stage</u>	<u>Cost in \$U.S 000</u>
Manufacture of SORBITAL to make ascorbic acid	P.F.	700
Process fish, shell fish and products	D	3,000
Manufacture wood parquet tiles for flooring	P.F.	500
Manufacture tropical wood veneers	P.F.	2,000
Manufacture wood doors	P.F.	1,000
Extraction of coconut pulp	P.F.	300
Manufacture wood mouldings	P.F.	400
Extraction, cutting and polishing marble	P.F.	400
Cutting and processing hard woods	F.	2,000
	<b>Total</b>	<b><u>10,300</u></b>

Planned but not yet studied: Processing of citrus fruits, other fruits and vegetables; palm oil refining; palm oil products.

Key: P.F. - Pre-feasibility  
 F. - Feasibility  
 D. - Design

SOURCE: D.G. de Urbanismo

### 3. Adjustments of the Base Case Projection

From the above analysis, there is ample justification for relaxing the constraint on the growth of power demand imposed by consideration only of development projects actually in the works. A more sanguine view of the probable course of development in the Valley leads to an expectation of higher levels of economic activity and growth continuing through the economic life of the Project. This, in turn, justifies increasing both the level and the rate of growth of the deliberately conservative projections of power consumption shown in the base case. The magnitude of this adjustment depends largely on the difference between the pace of development implicit in the base case assumptions and that which appears to be more probable. The Project economic benefits consist of two types - the direct benefits as measured by the net revenues received by ENEE, and benefits external to the Project, also referred to as "surplus" benefits. Estimates of these two factors are needed to adjust the base case to arrive at a more accurate picture of economic benefits.

#### a. Methodological Note

In computing the financial rate of return from the point of view of the investor, market prices are appropriate for estimating the values of inputs (costs) and outputs (benefits). However, to determine the rate of return to the economy as a whole, inputs and outputs must be measured in terms of "real" costs and benefits. The real economic cost of a factor of production is its marginal opportunity cost - the loss in output, in the present marginal use of the input, that would result if the marginal unit of the factor of production were transferred to the Project. If market prices are not considered to be an accurate measure of real costs, "accounting" or "shadow" prices must be used. For the purposes of this analysis, shadow-pricing is considered unnecessary since (1) the foreign exchange rate of the country essentially reflects the market supply and demand situation in Honduras, (2) unskilled labor costs will amount to only 3-5 percent of capital costs, (3) interest rates are not a cost in the Internal Rate of Return Analysis and taxes and subsidies will be too marginal to justify an evaluation.

The surplus benefits considered here are those received by residential and productive users when they convert to electric power. They are a measure of the net advantage of the use of electricity over alternative sources of energy. In addition to a probable decreased cost, they include a valuation of increased convenience, availability, quality and dependability associated with the power to be made available.

The power that will be provided by the Project will also result in increased commercial activity relating to the sale and servicing of electrical appliances and machinery and other commercial and industrial activities that would not have taken place in the absence of the Project. There

will be attendant employment and income benefits. These additional benefits are treated subsequently in the discussion of Attendant Benefits, at the end of this analysis. For purposes of adjusting the base case rate of return, they are not included.

4. Adjustment to the Base Case for Direct Benefits

To provide a partial basis for adjusting the direct benefits of the project, the Valley's Gross Domestic Product (GDP) in 1985 is projected and related to power needs considered in the base case, to arrive at a factor for adjusting power demand.

a. Growth of Economic Activity in the Valley Region

The level and growth of productive energy demand in the region will, of course, be directly related to its level and growth of economic activity. To illustrate the dramatic change that is programmed for this area, a comparison is made between the region's GDP in 1972 and its projected GDP in 1985. The 1972 GDP estimate for the Department of Colón <sup>1/</sup> includes essentially the economic activities in the Aguán Valley region. The GDP for the area (Department of Colón plus Coyoles) was Lps. 72.4 million in 1972 (see Table 3). The relative sector shares were 84% to agriculture, 1.5% to industry and 14.5% to commerce and services.

The 1985 GDP projection for the region depends primarily on the production programs firmly planned. Provisions were made for the agro-industrial and forestry-related industries currently being considered for study and implementation in the years 1980-82 and beyond, and for commercial and service activities.

The 1985 economic profile of the region demonstrates a sharp relative decrease in the dependence on agriculture, at the same time that agricultural production rises sharply (see Table 4). The region will have risen from an insignificant contributor to industrial GDP in 1972 to the nation's second largest contributor in 1985. The integrated paper and pulp mill/sawmills operation will account for most of this. However, meatpacking and fish processing plants currently in operation, the palm oil extraction

1/ SOURCE: Depto. de Estudios Económicos, Banco Central de Honduras.  
This document did not include Coyoles which we have included.

TABLE 3

GROSS DOMESTIC PRODUCT FOR THE YEAR 1972: Department of Colón Plus Coyoles, Department of Cortés  
(Lps. 000 - Current Prices)

	Dept. of Colón Plus Coyoles 1972		Dept. of Cortés 1972	
	Value	% Total	Value	Total
Agriculture, total	60,713	84	89,628	23
Traditional	10,887		52,810	
Bananas	48,504 <sup>1/</sup>		33,471	
Forestry	1,110		2,626	
Fisheries	212		690	
Industry, total	1,084	1.5	87,867	22
Factory	994		80,497	
Artisan	90		7,370	
Other	10,593	14.5	213,185	55
Mining	25	-	3,090	-
Construction	1,787		20,792	
Electric Energy & Water	76		9,200	
Trans., Communication & Warehousing, total	1,381		35,398	
Transportation	(1,375)		(34,688)	
Warehousing	(6)		(710)	
Commerce	1,136		84,276	
Banking, Insurance, Real Estate	164		15,656	
Income from Property	2,563		15,705	
Services	2,220		21,411	
Public Administration & Defense	1,241		7,657	
Gross Domestic Product	<u>72,390</u>		<u>390,682</u>	

1/ 12,104 For the Dept. of Colón plus an estimated 36,400 for Coyoles.

SOURCE: Producto Interno Bruto por Actividad y Departamentos. Preliminary Estimate. Banco Central de Honduras.- Estudios Económicos.

TABLE 4  
ESTIMATED VALUE OF PRODUCTION AND GROSS DOMESTIC PRODUCT  
AGUAN VALLEY, 1985 (1977 Prices)<sup>1/</sup>  
(Lps. 000)

	<u>Value of Production</u> 1985		<u>Gross Domestic Product</u>		<u>% Total</u>
	<u>Value</u>	<u>% Total</u>	<u>Factor</u>	<u>GDP</u>	
<u>Agriculture Total</u>	<u>145,500</u>	27%	.65 <sup>2/</sup>	94,575	43%
Traditional	20,000				
Organized (High Technology)	<u>122,000</u>				
INA	38,000				
COHBANA	28,000				
COYOLES	56,000				
Fisheries	3,500				
<u>Industry Total</u>	<u>259,000</u>	48%	.30 <sup>2/</sup>	77,700	36%
Large Factory	<u>229,000</u>				
Paper Mill	140,000				
Saw Mill	62,000				
Palm Oil Extraction Plant	8,000				
Meat Packing and Products	19,000				
Small Factory & Artesan	<u>30,000</u>				
Small Factory	4,000				
Agro-Industry	25,000				
Artisan	1,000				
<u>Other Total</u>	<u>132,000</u>	25%	.35 <sup>2/</sup>	46,000	21%
Construction	14,000				

TABLE 4 Cont'd.

	<u>Value of Production</u>		<u>Gross Domestic Product</u>		<u>% Total</u>
	1985		<u>Factor</u>	<u>GDP</u>	
	<u>Value</u>	<u>% Total</u>			
Electric Energy & Water	10,000				
Transport, Communication	35,000				
Commerce	35,000				
Tourism <sup>3/</sup>	18,000				
Other	20,000				
<b>TOTAL</b>	<u>536,500</u>		41 <sup>4/</sup> %	218,475	

1/ The value of production and GDP projection are conservative estimates. Agriculture and Industry estimates were taken mostly from feasibility studies of the various projects. The projection for INA does not include irrigation for citrus products (3,200 hectares planned), basic crops (6,646 hectares possible) or truck farming (at least 3,410 hectares possible).

2/ Factor applied to value of production to estimate value added based on information from Banco Central, Ministry of Natural Resources, Dirección General de Estadísticas.

3/ Tourism: Assumed 500 rooms, 37,000 visitors, \$9 million expenditures (500 rooms X 1.7 per room X 365 ÷ 5 days average stay X .6 occupancy rate X \$250 average expenditures per visitor).

4/ Implicit.

plant planned for 1980 and other agro-industrial and forestry-related industries will account for over 20% of the industrial GDP of the valley. The substantial increase in agricultural, and especially in industrial activities, will generate greatly increased commercial activities and services; and, the large infrastructure programs planned over the next 4-8 years will not simply cease in 1985. A high level of construction will continue well beyond 1985 2/.

As a check on the reasonableness of the projection, a comparison is made with the Department most similar to what the valley will be like in 1985. The Department of Cortés has a major port, a fertile valley similar to the Aguán, accounts for over two-fifths of the nation's industrial GDP, and has experienced rapid growth in population, employment and income.

The relative share of the agricultural and industrial sectors are higher in the Aguán Valley region than in Cortés (see Table 3), and the relative share of the other sectors is less. This is to be expected. The very large increase in agricultural and industrial activity is expected over a relatively short time. The commercial and service activities will take longer to develop. San Pedro Sula, in the Department of Cortés, will supply many of these services, as well as La Ceiba. It is probable that the proportion of GDP generated by these other services (25%) will not approach that of Cortés (55%) for many years.

The construction of Table 4, projecting the valley region's GDP for 1985, provides a basis for adjusting the base power consumption projections.

b. Adjustments to the Base Case Projection for Direct Benefits

The base case projections of energy demand take into consideration the industrial demand of the paper and pulp mill/integrated sawmill, and palm oil extraction plants; and the irrigation demand of the Isletas and Coyoles plantations. These are the firm demands for which ENEE can plan. However, the projection of economic activity in the region indicates a substantially larger prospective demand. Current plans do not include the provision of electricity for some 19.3% (Lps. 50,000,000) of the projected industrial output of Lps. 259,000,000 in 1985 (see Table 4). This output would require about 13 million KWH (some 12% of base case projected demand in 1985) using the national average of .26 KWH consumption for each Lempira of industrial output.

2/ The 1985 projection is in 1977 prices.

The base projection does not plan for irrigation systems for the INA sponsored cooperatives other than for research and demonstration farms. The INA program includes irrigating 3,200 hectares of citrus planting, with the prospect of irrigating most of the 25,000 hectares to be planted to annual crops. At an average of 1,600 KWH per year per hectare, this would add an additional demand for 40 million KWH, about 40% of the 1985 base projection. There is a high probability of a major extension of irrigation systems being implemented in the period following 1980 as the Phase II investment program is completed.

The prospective fourfold increase in the GDP of "Other" sectors is not fully taken into account in the relatively modest projection of "commercial" power demand in the base case projection. In the base case, the number of commercial establishments is projected at 15% of the number of households, a common relationship in rural areas. Average electricity consumption is also consistent with other rural areas. In the valley region, however, it must be anticipated that a wider range of commercial and service activities will be located than in "typical" rural areas, and the average use of electricity will be higher.

It is not possible to quantify with precision the addition to the base case projections that would be justified by the above considerations. However, a conservative estimate would be that by 1985 total projected consumption would be about 20% higher than shown in the base case. To reach this figure, 5% is added to the 1982 projection, 10% in 1983, 15% in 1984, and 20% in 1985.

The growth rate of total demand in the base case projection falls to 1.5 percent to 2 percent annually as a result of limiting industrial demand to the specific users identified at the present time, and leveling off that demand relatively soon. In a region that will evidence such economic vitality, it would not be unreasonable to anticipate the continued growth of total demand at an annual rate of 10%. However, a more moderate adjustment is made to the base case projections. Projections of total demand (gross income) are increased by an annual rate of 7% from 1986 on. At most, increased operating costs offset about 25% of the incremental increases in income. This factor is derived directly from a comparison between base case production increases and the related increase in operating costs. The net amount, added to the base projection net flow, increases the internal rate of return to 12%.

5. Adjustment to the Base Case for Surplus Benefits

a. Household Consumer Surplus Benefits

In the first instance, the valuation of the electricity used by residential

consumers is measured by what they pay for the electricity - ENEE's receipts from residential sales. However, the consumer can also perceive gains from the availability and use of electricity over and above what he pays for it. These are "surplus" benefits. They include monetary savings resulting from the reduced cost over the alternative power sources previously used (e.g Kerosene lamps or battery-powered radios). They may also include the consumer's qualitative appreciation of electricity as compared, for example, with an autogenerating system that functions only 3 hours a night, the better quality light of an electric bulb as compared with a kerosene lamp, or the convenience of an electric iron as compared with a charcoal iron.

The cost of using an electrical appliance includes the cost of the appliance itself as well as the electricity consumed. Consumers may not be sophisticated enough to think in terms of annualized costs of appliances but they surely take the appliance costs into consideration. The decision to convert to electricity may be partly influenced by an expected reduction in the cost of using some appliances, but it is largely based on the qualitative benefits. Adding the annualized costs of the appliances (including household wiring and connection costs) to the energy costs of operating them, it is not clear that electric lights or irons are less expensive than substitutes. However, in rural areas all electrified houses use electric lights and some four-fifths use electric irons.

Electric refrigerators clearly have a cost advantage, total annual costs being about one-half those of a kerosene refrigerator. About one-third of electrified houses have them, whereas in non-electric houses an insignificant number use kerosene refrigerators. The annual cost of a wood stove is perhaps two-thirds the cost of an electric stove, most of the annual cost being in the wood consumed. Most electrical rural households continue to use wood, gas or kerosene stoves.

The evidence seems to demonstrate that households connect to electricity primarily for the non-monetary benefit they perceive in its use and availability 24 hours a day, for its greater dependability in service, and particularly for its better quality of electric light as well as its convenience and better results from electric irons.

The presumption that household demand for electricity is based primarily on considerations of quality and convenience, was confirmed in the survey conducted for Nacaome, in which respondents who said they wanted electricity were asked why. In no case was lower cost given as the reason. Rather the respondents stated they were looking forward to the convenience, reliability and continual availability of electric power. 1/

The quantification of these surplus benefits involves placing a value on these qualitative improvements. A measure of this benefit is what the consumer would be willing to pay, over and above what ENEE will charge for its service when the interconnected system goes into operation. An indication

1/ The information in this section is substantiated by an unpublished study of rural electrification in El Salvador.

is what the consumer is actually paying with the present tariffs charged by ENEE's isolated systems and by private systems. ENEE plans to lower its rates by about half with the interconnected system - from Lps. 0.15 to Lps. .07 in Isletas, and from Lps. 0.2033 to Lps. .105 in Trujillo. The direct cost of electricity is a fraction of the total costs of operating electrical appliances (30-50% for lights, irons and refrigerators). This may contribute to a relatively inelastic demand for electricity with respect to its price, within a spread of Lps. 0.07 to Lps. 0.20 per KWH. All things considered, it does not seem implausible to suggest that consumers might be willing to pay 25-50% more than the rates ENEE will charge without affecting the demand projections. The lower value of 25% is selected to represent residential user's consumers surplus.

b. Productive Uses and Consumers Surplus

The productive users of electricity will cover a wide range of activities, including such home industries as corn grinding and work shops; a diversity of small businesses, processors and manufacturers; the larger industries; private and public water pumps for potable and sanitary systems; and pumps for irrigation and farm activities. Consumers surplus in productive uses of electricity is measured by the net additions to profit resulting from the use of electricity - the difference between profits using electricity, and profits using an alternative source of power.

To arrive at a calculation of this consumers surplus, it would be necessary to conduct a detailed survey of a representative range of productive users to collect the cost information. This information was not available for this study. However, this type of survey was conducted in El Salvador by a major international financial institution <sup>1/</sup>. It was estimated that these savings expressed as a percentage of the electricity bill, were about 90% for small consumers and 30% for large consumers, after adjustment for taxes.

In addition to these monetary benefits, a value should be placed on the reliability and convenience of electricity as compared with alternative power sources. For example, the integrated paper and pulp/sawmill operation will receive about one-third of its energy needs from the interconnected system. It will generate about two-thirds from boilers powered by waste materials. Officials of COHDEFOR state that without the reliability of ENEE electricity, this operation would not be feasible. Periodic shut-down of the plant because of power failure would increase costs to unacceptable levels. In

1/ This is an internal document and its contents are not for attribution.

consideration of the above, an estimate of surplus benefits of 50% would not seem too high. However, as in the case of household systems, a lower value of 25% is selected to represent consumer surplus in productive uses. When the "net cash flow" stream (after adjustment I) is increased to take into account surplus benefits to residential and productive users, the IRR increases to about 16%.

6. Attendant Benefits:

a. Employment

The population in the region is expected to grow from 150,000 (25,000 families) in 1977 to 210,000 (35,000 families) by 1981 and then to 234,000 (39,000 families) by 1985. This represents a 56% increase over an eight year period, about half of which is directly related to the planned migration of families to work as cooperative members and in the banana enterprises. The remaining increase is related to the new employment opportunities that will open up as a result of the planned investments in agro and forest product industries and in the port, as well as the related new employment that will be generated by requirements for services for a rapidly increasing population.

An estimate of the total real increase in employment by 1985 in the Valley region has not been attempted. However, the increase in employment by 1985 directly associated with the currently planned investment in the region is, itself, substantial. The pulp and paper mill with its related activities will bring 4,500 new jobs to the area. The development of Puerto Castilla will lead to the employment of approximately 500 people. Banana, meat and fish, and citrus packing plants will require at least 300 new employees. Palm oil plants and a new refinery will hire about 175 additional people. The electrification project itself will require ENEC to employ about 100 people and another 50 people will be trained as local appliance repairmen. An increase in tourism should provide at least 100 new jobs. In total, over 5,725 jobs will be created by 1985 in the region directly related to the planned investment. As already discussed the large portion of this employment would not materialize in the absence of reliable power.

It does not seem unreasonable to assume that for every 4 or 5 new jobs directly associated with the planned investment in the region, at least one new employment opportunity would be created to provide services to the others. For example there will be an increase in housing needs, and additional teachers will be needed in the schools for the children of the families migrating to the region. Banking, marketing, transportation and various other facilities will be expanded to meet the needs of the workers and their families.

Historically, over the last 15 years, some 26 percent of the labor force has been engaged in the Construction, Utility, Transport and Service Sectors, or one person for every three person employed in the principal sectors of Agriculture and Industry. Even though it has been assumed that the ratio of employment in the Service Sector to employment in other sectors in the Aguán Valley region will not approach ratios of more developed regions such as the Sula area for some time to come, it can be assumed that a ratio of around one to five or one to four will be representative for the region.

Thus it can be assumed that the 5,725 new jobs resulting from the planned investment in the region will produce attendant employment benefits of between 1,145 and 1,430 new jobs in the related sectors.

No calculation of the employment benefits from irrigation has been attempted. Firm plans exist for irrigating 3,200 hectares in citrus. Preliminary planning indicates that 2,500 hectares would be irrigated for export truck farming. On the basis of domestic demand generated in the region, itself, 6,600 hectares might be irrigated for basic grains and a 1,000 hectares in truck farming. Given the ecology of the region, the nature of agro-industrial investment in place and programmed and the potential income benefits it is quite possible that another roughly 12,000 hectares would be irrigated and devoted to export truck farming and basic grains. The annual labor requirement per hectare for truck farming is about 9 man months. Thus, one can see the significant employment potential of irrigation in the region.

a. Income

There will be a significant increase in income levels in the Valley as a result of the Project and other planned and related investment. A conservative measure of what will occur to incomes in the region can be derived from a comparison of the Valley's current GDP and the GDP in 1977 prices projected for 1985. GDP in 1977 is estimated on the basis of 1972 GDP for the region increasing through 1976 at national GDP rates. The projected GDP for the region for 1985 in constant 1977 prices is L 218.5 million, representing a real increase of about 124%. This increase is understated to the extent that irrigation will be used by the associated cooperatives. Furthermore, the GDP projection for "Other" activities (excluding Agriculture and Industry), while reasonable, is also probably understated.

The population in the Aguán is expected to grow by 84,000 people or 56 percent between 1977 and 1985. If it is assumed that personal income maintains a constant proportion of GDP throughout the period, then conservatively real per capita income will show a 44% increase between 1977 and 1985. This quantified (and qualified) real increase in income demonstrates the reasonableness of the goal statement which postulates a 50% real increase in per capita income over the period 1977-1985. An increase on this order of magnitude will have significant effects on personal consumption patterns and the overall standard of living of the people in the Valley.

#### PART IV. ADMINISTRATIVE ARRANGEMENTS

##### A. Implementing Agent - ENEE

ENEE is a semi-autonomous agency of the Honduran Government with complete administrative freedom; that is, the company approves its own budget, has its own purchasing office, and conducts its business in a manner consistent with its By-Laws. Traditionally the company has generated the funds necessary for its operations and has assumed long term debt for expansion programs. GOH contributions to the Company have been minimal as illustrated by the fact that during its 20 year history, the Company has received only \$3.4 million in capital from the Government.

ENEE's policies are established by a Board of Directors with the day-to-day operations under the responsibility of a general manager. In accordance with the By-Laws, the members of the Board of Directors consist of the following:

- The Minister of Communications, Transportation and Public Works, who acts as Chairman of the Board.
- The Minister of Natural Resources.
- The Executive Secretary of the National Economic Planning Council.
- A representative of the National Development Bank.
- A representative of the Chamber of Commerce and Industry.
- The General Manager of ENEE, who is the Secretary of the Board, participating in discussions, but who is a non-voting member.

In addition to establishing broad policies for the Company, the Board of Directors acts as liason between the ENEE and the Government of Honduras.

##### Technical Capacity

Although ENEE has experienced a rapid growth in sales over the past ten years, it has demonstrated the ability to keep pace in terms of providing services and meeting the demands of its expansion programs.

The ENEE organization chart is attached as Annex H-9. Three large units, composed of the Central Division, Northern Division and the Interconnected Generating System Division, are the principal operating entities of the Company. These units are backed up by an Engineering and Planning Division and the Administrative Services Division. ENEE offices are located in 28 towns including Tegucigalpa and San Pedro Sula. The number of employees working for the Company totals approximately 2,000, including temporary and

part-time help. The ratio of employees to customers in 1975 was 45:1. Management has adopted a policy of limiting hiring to maintain a proper balance between services rendered and personnel strength. For example, three persons work in Nacaome; an administrator-linesman, helper and secretary. They are responsible for all installations, meter reading, service cut-offs, and complaints.

The consulting firm of R. W. Beck has been retained by ENEE to develop management information and computer-based systems in the areas of inventory control, payroll, billing, accounting and budget control. New inventory, payroll and billing systems have recently been installed and new accounting and budget control systems are due to be operational by mid-year 1977.

For the proposed project, ENEE will set up a special implementation unit within the Department of Engineering and Planning. The Chief of this project group has already been selected. The proposed staff to be assigned exclusively to the Project include the following: chief project engineer, chief transmission line engineer, two assistant transmission line engineers, chief substation engineer, one assistant substation engineer, an accountant, two draftsmen, secretary, and chauffers as required (See Engineering and Administration Costs following Part B of this section).

ENEE is aware that project requirements for staff will affect other requirements and plans to augment its technical and administrative staff accordingly. To augment its capability in the planning and design of systems, private engineering consulting firms will be contracted as necessary, which has been the Company's practice. ENEE will contract out the construction of the 138 KW transmission lines, the 34.5 KV Distribution lines, the secondary distribution lines and the five substations, with the interior wiring of homes to be contracted to trained and prequalified local electricians. Once the construction phase of the project is finished, operations and servicing will be turned over to the Northern Division headquartered in San Pedro Sula. The collection of accounts is now handled through arrangement with local banks.

Technical assistance and training will be made available to mid-management operating and administrative staff, with particular focus on sales promotion and the related use of the Internal Wiring Fund and on billing and collection.

B. A.I.D.

1. USAID Monitoring

The USAID Office of Engineering will have primary responsibility for monitoring Project implementation, assisted by the Office of the Controller and the Capital Resources Development Office. The Mission will request SER/TMG TDY assistance periodically to review project progress. Officials from Mission divisions will review procurement proposals, plans and specifications

for commodity procurement, training and technical assistance. Monthly project status meetings will be held to discuss progress, ensure that Project activities conform to A.I.D. regulations, that sound financial control is being exercised, and that the terms and conditions of the Project Agreement are being met.

2. Disbursement Procedures

A four-year disbursement period is planned. The selection of contractors, procurement of commodities and shipping and insurance will be performed in accordance with A.I.D. regulations to be set forth in the Loan Project Agreement and appropriate methods of disbursement will be developed to ensure prompt reimbursement of Project costs and to ensure compliance with A.I.D. procurement regulations. Reporting requirements will be established, and these reports will be monitored by the Engineering Division, the Office of Capital Resources Development, and the Office of the Controller.

ENGINEERING AND ADMINISTRATION PROJECT COSTS

Administration and Supervision

1 project engineer, 54 MM at \$1,200/M	\$ 64,800
1 chief transmission line engineer 54 MM at \$1,000/M	54,000
2 assistant transmission engineers 108 MM at \$800/M	86,400
1 substation engineer, 48 MM at \$1,000/M	48,000
1 assistant substation engineer, 48 MM at \$800/M	38,400
1 accountant, 54 MM at \$550/M	29,700
2-4 draftsmen, 72 MM at \$350/M	25,200
1 secretary, 54 MM at \$240/M	13,500
Chauffers, 100 MM at \$75/M	<u>7,500</u>
Sub-total .....	\$367,500

Engineering Costs

Consultants, 23 MM at \$5,000/M	115,000
Surveys, 1,244 Kms. at average of \$50/Km.	<u>62,200</u>
Sub-total .....	\$177,200

Storage and Training Center Design & Supervision

9% of total cost of \$300,000 (2 sites)	27,000
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Training Program Administration

2 administrators, 48 MM at \$400/M	19,200
2 secretaries, 48 MM at \$200/M	<u>9,600</u>
Sub-total .....	\$ 28,800

TOTAL, Engineering and Administration ..... \$600,500

To establish a rural Electrification System in the Aguán Valley.

CPI DESCRIPTION

A. Pre-Implementation Arrangements

- A-1) 4/77 - Loan Authorization (AID/W)
- A-2) 6/77 - Sign Loan Agreement (USAID, GOH, ENEE)
- A-3) 3/77 - Meet initial C.P.'s (ENEE, GOH)

B. Transmission, Distribution and Secondary Lines, and Substations

- B-1) 7/77 - Approval of designs for transmission lines, distribution system and substations (ENEE, USAID).
- B-2) 8/77 - Approval of bidding documents for construction and procurement for substations (ENEE, USAID).
- B-3) 8/77 - Advertise for construction bids on transmission lines, distribution system, and substation equipment (ENEE).
- B-4) 8/77 - Advertise for procurement of substation equipment (ENEE).
- B-5) 8/77 - Complete survey for transmission lines (ENEE)
- B-6) 1/78 - Award substation construction contracts (ENEE)
- B-7) 1/78 - Award Distribution System construction contract (ENEE)
- B-8) 5/78 - Award transmission line construction contract (ENEE)
- B-9) 6/78 - Complete surveys for distribution, and secondary lines (ENEE)

- B-10) 8/78 - Approval of designs for secondary lines (ENEE, USAID)
- B-11) 8/78 - Advertise for construction bids of secondary lines (ENEE)
- B-12) 11/78 - Award contracts for secondary lines (ENEE)
- B-13) 6/79 - Reguleto, Isleta and Corocito substations in place (ENEE, Contractors).
- B-14) 11/79 - Transmission lines in place (ENEE, Contractor)
- B-15) 9/80 - Mamé and Coyoles substations in place (ENEE, Contractor)
- B-16) 4/81 - Distribution system in place (ENEE, Contractor)
- B-17) 6/81 - Secondary lines in place (ENEE, Contractor)

C. Storage, Maintenance, Office and Training Facilities

- C-1) 12/77 - Approval of design and contracting for storage and training facilities (ENEE, USAID).
- C-2) 9/78 - Storage and training facilities in place. (ENEE, Contractor).

D. Internal Wiring for Consumers

- D-1) 9/79 - Award contracts for internal house wiring (ENEE)
- D-2) 5/81 - Complete internal house wiring (ENEE)

E. Training Program

- E-1) 8/77 - Complete Training Program Design (ENEE, Consultants)
- E-2) 4/81 - Complete Training Program (ENEE, Consultants)
- E-3) 4/81 - Complete promotion program (ENEE)

CRITICAL PERFORMANCE INDICATOR (CPI) DESCRIPTION

PROJECT PURPOSE (FROM FACTOR SHEET)

CPI DESCRIPTION

F. Billing and Collection System

- F-1) 7/79 - Contract consultants for billing and collection system design (ENEE)
- F-2) 7/80 - Complete billing and collection system design (ENE, Consultants)

G. Evaluation Framework

- G-1) 7/79 - Baseline survey for goal-related indicators completed (ENEE, USAID, Consultants)
- G-2) 7/85 - Follow-on survey completed. (ENEE, USAID, Consultants)

H. Project Completion

- H-1) 6/81 - Project Assistance Completion Date (ENEE, USAID).
- H-2) 9/81 - End of Project Status Report (ENEE, USAID).
- H-3) 3/82 - Final Disbursement Date, (ENEE, USAID, GOH).

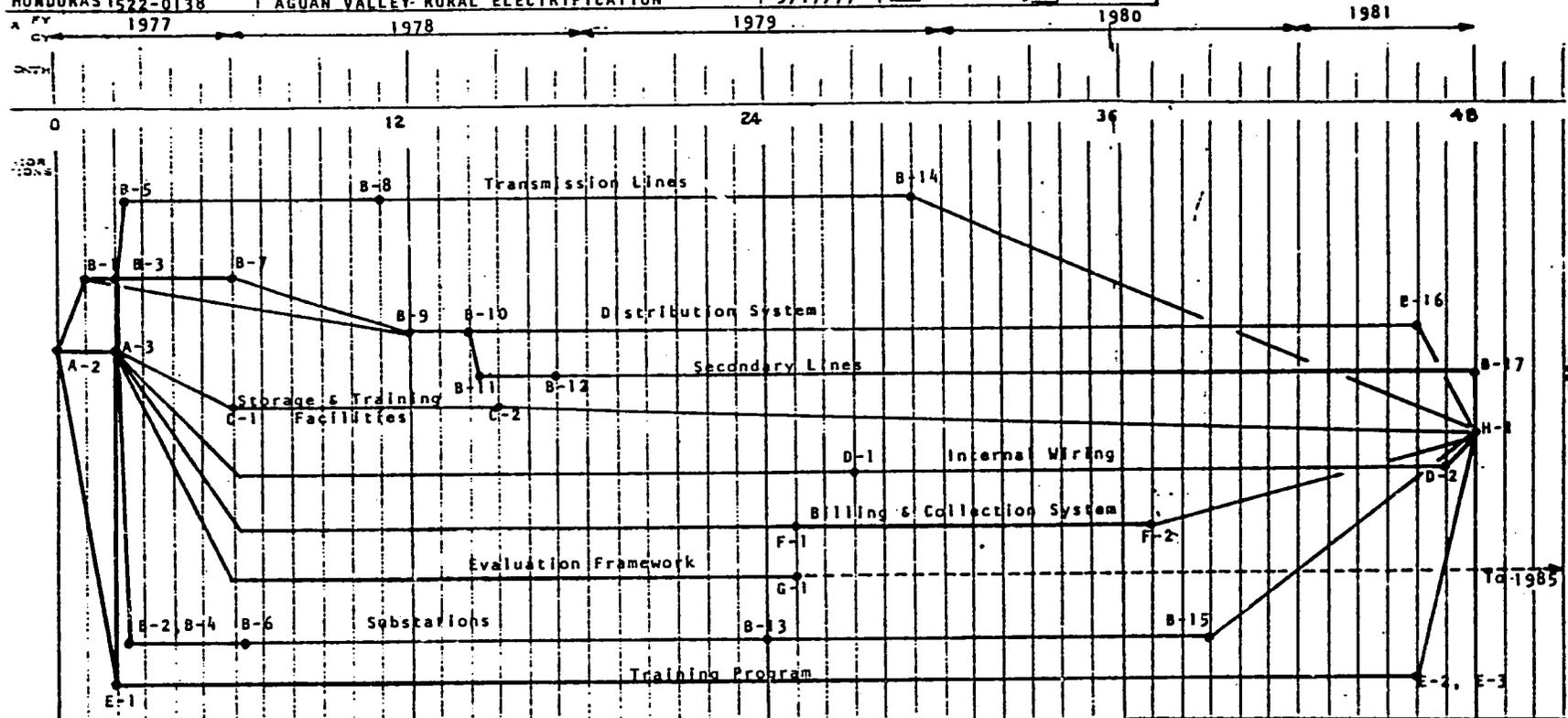
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CRITICAL PERFORMANCE INDICATOR (CPI) DESCRIPTION

INDUSTRY	PROJECT NO.	PROJECT TITLE	DATE	<input checked="" type="checkbox"/> ORIGINAL	APPROVED
HONDURAS	522-0138	AGUAN VALLEY-RURAL ELECTRIFICATION	3/17/77	<input type="checkbox"/> REVISION #	



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CRITICAL PERFORMANCE INDICATOR (CPI) NETWORK	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
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C. Evaluation Plan

1. Evaluation of the Project will be undertaken at two levels-goal and purpose. At the goal level, the evaluation will attempt to determine Project impact on the quality of life of the target group (employment, agricultural production, income, and nutritional status). At the purpose level, during the course of the project, annual evaluations will assist in monitoring implementation and determining whether adjustments are necessary and, at the completion of the project, will determine whether project purposes have been met.

In the Mission's judgment, the earliest date by which the goal level impact of the project can be determined would be 1985. Accordingly, ENEE will covenant to undertake such an evaluation at that time. Consultants will be contracted to develop a framework for this evaluation. During the course of intensive review of the project, ENEE and Mission personnel collected and compiled data through a survey undertaken in the Aguán. These data will be useful to the consultants, but a more extensive baseline survey will also be undertaken to provide a pre-project point of reference within the evaluation framework. Loan funds in the amount of \$50,000 have been set aside for this purpose. In 1985, ENEE will also evaluate the operations of the Internal Wiring Fund to determine whether, and with what modifications if any, the Fund should be continued.

2. The first purpose level evaluation will be scheduled for July 1978 and will focus on construction progress. It will be carried out by ENEE and will be reviewed by the USAID/Honduras engineering staff, with a written report to be issued covering progress, problems and recommendations. The evaluation in July 1979 will focus on construction progress and the training program. By July 1980, a portion of the target group will have been connected. It will then be appropriate to evaluate all aspects of the program at the purpose level, including the operations of the Internal Wiring Fund. In September 1981, after completion of the project, a report will be issued on all aspects of the project at the purpose level.

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ACTION AID

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INFO AMB&DCM

TAGS:

CHRON

INFO: D/AD

PROG

RD

CHRON

READER

SUBJECT: DAEC REVIEW - AGUAN VALLEY RURAL ELECTRIFICATION  
LOAN PRP

SUBJECT PRP WAS REVIEWED BY DAEC ON NOVEMBER 5, 1976 AND  
INTENSIVE REVIEW WAS APPROVED. THE FOLLOWING GUIDANCE IS  
PROVIDED TO ASSIST MISSION IN THE PREPARATION OF THE PP.

1. TARGET BENEFICIARIES. THE DAEC WAS CONCERNED THAT  
A SIGNIFICANT PROPORTION OF THE TARGET GROUP MAY LACK A  
SUFFICIENT SOCIO-ECONOMIC BASE, WHICH COULD EFFECTIVELY  
RESTRICT THEIR ACCESS TO RURAL ELECTRIC SERVICES. DURING  
THE INTENSIVE REVIEW, THE MISSION SHOULD UNDERTAKE A SUR-  
VEY OF THE AGUAN VALLEY TO INCLUDE A REVIEW OF CRITICAL  
FACTORS, SUCH AS INCOME AND EDUCATIONAL LEVELS, GEO-  
PHYSICAL CHARACTERISTICS OF THE REGION, NATURE OF THE  
REGION'S ECONOMIC ACTIVITY, AND PROJECTED COSTS OF ELECTRIC  
SERVICES, WHICH MIGHT LIMIT THE BENEFIT INCIDENCE OF THIS  
PROJECT ON THE RURAL POOR. WITHIN THIS FRAMEWORK THE PP  
SHOULD RE-EXAMINE THE PROJECT'S PROPOSED INCENTIVES, TO  
DETERMINE IF THEY WILL BE SUFFICIENT TO MOTIVATE THE  
RURAL POOR TO UTILIZE AVAILABLE ELECTRIC SERVICES.

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2. ECONOMIC FEASIBILITY. THE PRP SEEKS TO JUSTIFY  
THE PROJECT ON ECONOMIC GROUNDS, STATING THAT THE  
"DIRECT" AND "SURPLUS" BENEFITS, IF VALUED PROPERLY,  
WILL YIELD A SATISFACTORY ECONOMIC COST/BENEFIT RATIO.  
THE PP SHOULD FOCUS MORE NARROWLY ON THE ECONOMIC  
BENEFITS TO THE AGUAN REGION THAT CAN BE READILY  
IDENTIFIED AND MEASURED. THESE BENEFITS MIGHT INCLUDE  
HIGHER AGRICULTURAL PRODUCTION STIMULATED BY INCREASED  
ELECTRIC POWER FOR IRRIGATION, AND INCREASED INVESTMENT  
IN AGRICULTURAL PROCESSING INDUSTRIES, RURAL ENTER-  
PRISES AND ARTISAN ACTIVITIES, WHICH IN TURN CAN LEAD

TO INCREASE RURAL EMPLOYMENT OPPORTUNITIES, GREATER ACCESS TO AGRICULTURAL INPUTS, AND STRENGTHENED RURAL LINKAGES WITH THE NATIONAL ECONOMY. HOWEVER, ANY ASSUMPTIONS UNDERLYING THE INCIDENCE OF THESE BENEFITS ON THE RURAL POOR SHOULD BE JUSTIFIED.

THE DAEC RECOGNIZES THAT AN ECONOMIC ANALYSIS BASED ON PROJECTED INPUT SUBSTITUTIONS AND ECONOMIC VALUE ADDED TO THE AGUAN VALLEY AS A RESULT OF INCREASED ACCESS TO LOW COST ELECTRIC POWER, WILL BE IMPRECISE, GIVEN THE SCARCITY OF RELIABLE DATA. THE MISSION SHOULD, THEREFORE, AS A COMPLEMENTARY EFFORT, EXAMINE THE ECONOMIC BENEFIT/COST OF RURAL ELECTRIFICATION ON THE TOWN OF NACAHOE, AND COMPARE THE IMPACT OF ELECTRIFICATION ON THE POOR MAJORITY IN THAT TOWN WITH WHAT IS PROJECTED FOR THIS PROJECT.

3. FINANCIAL VIABILITY. BECAUSE ENEE DERIVES ITS OPERATING AND INVESTMENT CAPITAL FROM CURRENT REVENUES AND EXTERNAL FINANCING, FUTURE EXPANSION OF ELECTRIC SERVICES DEPENDS ON ITS ABILITY TO EARN A NET PROFIT. THE FINANCIAL ANALYSIS OF THE PROJECT SHOULD THEREFORE CONTAIN, AT A MINIMUM, A 10 YEAR PROJECTION OF SALES AND CASH FLOW FOR THE OPERATION OF THE AGUAN VALLEY ELECTRIFICATION SYSTEM, WITH SUPPORTING PROFIT AND LOSS ESTIMATES. IN COMPUTING THE INTERNAL RATE OF RETURN FOR THIS PROJECT, THE COST OF INVESTMENT CAPITAL, PROJECTED CONSUMER DEMAND AND EXPECTED TARIFF RATES SHOULD BE INCLUDED. THE 10 YEAR FINANCIAL FORECAST SHOULD INITIALLY BE COMPUTED WITHOUT SUBSIDY CONSIDERATIONS, TO ASCERTAIN IF THE PROJECT CAN REALIZE CASH MARGINS ON AN ANNUAL BASIS. IF A CONTINUING RATE SUBSIDY WILL BE REQUIRED, OR CONSIDERED APPROPRIATE, THE PP SHOULD ALSO EXAMINE ITS IMPLICATIONS FOR CONTINUING AND EXPANDING OTHER RURAL ELECTRIFICATION PROGRAMS IN HONDURAS.

4. ENVIRONMENTAL IMPACT. BASED ON A REVIEW OF THE MISSION'S INITIAL ENVIRONMENTAL EXAMINATION, THE ASSISTANT ADMINISTRATOR (LAD) HAS REACHED A THRESHOLD DECISION INDICATING A NEGATIVE DETERMINATION. ROBINSON  
BT

#3084

AGUAN VALLEY RURAL ELECTRIFICATION SUPPLEMENT

PROJECT DESIGN SUMMARY  
LOGICAL FRAMEWORK

UNCLASSIFIED  
ANNEX B  
Page 1 of 4

INSTRUCTION: THE SAN OFICIAL FORM WHICH CAN BE USED AS AN AID TO ORGANIZING DATA FOR THE PAR REPORT. IT NEED NOT BE RETURNED OR SUBMITTED.

Life of Project: From FY 77 to FY 81  
Total U. S. Funding \$10,000,000  
Date Prepared: March, 1977

Project Title & Number: **AGUAN VALLEY RURAL ELECTRIFICATION**

NARRATIVE SUMMARY	OBJECTIVE, VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>A. Program or Sector Goal: The broader objective to which this project contributes:</p> <p><b>Improve the quality of life of the rural poor of Honduras.</b></p>	<p>Measures of Goal Achievement</p> <ol style="list-style-type: none"> <li>1. The average family income of residents in the Aguan Valley will increase 50% in real terms over the period 1979-1985.</li> <li>2. A minimum of 5,750 additional rural poor will be employed in the agro-industries in the Aguan Valley by 1981.</li> <li>3. The prevalence of first, second and third degree malnutrition will diminish by 25% over the period 1975-1985.</li> <li>4. Additional improvements in the quality of life for the rural poor which are not readily quantifiable include: increasing land productivity through utilization of electric irrigation pumps; attracting teachers, doctors, nurses and other professionals to rural "electrified" areas; providing an alternative to urban migration; reducing the work burden for women by making it possible to utilize household appliances; permitting rural schools to conduct night classes for local residents unable to attend school during the day; upgrading public health facilities and environmental health conditions; and improving communication systems.</li> </ol>	<ol style="list-style-type: none"> <li>1. Income data obtained from surveys conducted prior to the installation of the electrification system and again in 1985.</li> <li>2. Conduct employment survey in 1985 and compare data with employment data for Aguan Valley residents obtained in 1975 survey.</li> <li>3. Conduct anthropometric studies of several Aguan Valley communities in 1985 and compare results with similar studies performed in 1975.</li> <li>4. The evaluation framework to be developed under the Project (see outputs) will establish base-line data for measuring several of these quality-of-life indicators.</li> </ol>	<p>Assumptions for achieving goal targets:</p> <ol style="list-style-type: none"> <li>1. Majority of development projects contemplated for the Aguan Valley materialize.</li> <li>2. Same as 1 above.</li> <li>3. Health education programs and environmental health conditions improve significantly for majority of Aguan residents.</li> </ol>

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PROJECT DESIGN SUMMARY  
LOGICAL FRAMEWORK

Life of Project: \_\_\_\_\_  
From FY 77 to FY 81 Page 2 of 4  
Total U.S. Funding \$10,000,000  
Date Prepared: March, 1977

AID 1020-13 (7-71)  
SUPPLEMENT 1

Project Title & Number AGUAN VALLEY RURAL ELECTRIFICATION

PAGE 2

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>B. <u>Project Purpose:</u></p> <p>To establish a rural electrification system in the Aguan Valley of Honduras.</p>	<p>Conditions that will indicate purpose has been achieved: End of project status.</p> <p>By end of 1981:</p> <ol style="list-style-type: none"> <li>1. 25,000 low income families have household electrical connections;</li> <li>2. reliable service with less than 10% voltage drop is being maintained at acceptable rates to target beneficiaries;</li> <li>3. approximately 1,250 Kilometers of transmission, distribution, and secondary lines are effectively being operated and maintained by ENEE.</li> </ol>	<p>A final evaluation of the Project will be conducted jointly by USAID and ENEE in 1981. All of these indicators will be measured during this evaluation.</p>	<p>Assumptions for achieving purpose:</p> <p>30 MW thermal plant (or equivalent power source) installed by 1979 to insure adequate electricity generation capacity to meet ENEE's demand requirements.</p>

PROJECT DESIGN SUMMARY  
LOGICAL FRAMEWORK

Life of Project: \_\_\_\_\_  
From FY 77 to FY 81  
Total U.S. Funding \$10,000,000  
Date Prepared MARCH, 1977

Project Title & Number: AGUAN VALLEY RURAL ELECTRIFICATION

PAGE 3

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p><b>C. Outputs:</b></p> <p>1. Transmission, distribution, and secondary lines and related substations installed and operating.</p> <p>2. Storage, maintenance, office and training facilities established.</p> <p>3. Internal wiring for consumers.</p> <p>4. Trained personnel for promoting, administering and maintaining the system.</p>	<p>Magnitude of Outputs:</p> <p>1. (a) By end of 1979, 200 Kms. of 138 KV transmission lines will be installed in the Project area.</p> <p>(b) By end of 1981, 493 Kms. of 34.5/19.9 KV distribution lines and 551 kilometers of secondary lines will be installed.</p> <p>(c) One switching station and two substations will be constructed by 1979 and two additional substations will be operating by close of 1980.</p> <p>2. By the end of 1978, two centrally located facilities, each with about 12,500 square feet, will be constructed in the Aguan Valley for storing equipment, tools and materials, and providing classroom and office space for the training program proposed under the Project.</p> <p>3. By 1981, about 20,000 consumers in the Project area will have been provided with meters, internal wiring and fixtures. An additional 5,000 consumers will have had their existing wiring systems inspected prior to hook-up</p> <p>4. (a) By end of 1979, 40 persons recruited by ENEE and trained as local administrators, electricians, linesmen, and meter readers.</p>	<p>1. ENEE's progress reports; observation.</p> <p>2. Progress reports; observation.</p> <p>3. ENEE progress reports.</p> <p>4. ENEE progress reports.</p>	<p>Assumptions for achieving outputs:</p> <p>4. Qualified individuals, interested in these types of work, can be found from among the Valley residents.</p>

PROJECT DESIGN SUMMARY  
LOGICAL FRAMEWORK

Project Title & Number AGUAN VALLEY RURAL ELECTRIFICATION

DESCRIPTIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>C. <u>Outputs:</u> (Cont'd)</p> <p>5. Billing and collection system developed and established.</p> <p>6. Evaluation framework developed.</p> <p>D. <u>INPUTS:</u> See Summary Cost Estimate and Financial Plan at end of Technical Analysis section of the paper.</p>	<p>Magnitude of Outputs:</p> <p>(b) By end of 1979, 50 persons trained by ENEE as contract personnel for part-time work on specific installations, emergency repairs and maintenance, and promoters of the system.</p> <p>(c) By end of 1980, a minimum of 60 persons will have received intensive training in the repair and maintenance of electrical appliances and irrigation pumps, home wiring, installation of electrical fixtures, and small business management.</p> <p>5. By 1979, a billing and collection system will be established for ENEE's consumers in the Aguán Valley.</p> <p>6. By 1979, a baseline survey will be conducted in the Aguán Valley to provide a point of reference for a follow-up survey of goal level indicators to be effected by ENEE in 1985</p>	<p>5. ENEE progress reports; observation</p> <p>6. ENEE progress reports; USAID monitoring.</p>	<p>Assumptions for achieving outputs:</p>

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6C(1) - COUNTRY CHECKLIST

Listed below are, first, statutory criteria applicable generally to FAA funds, and then criteria applicable to individual fund sources: Development Assistance and Security Supporting Assistance funds.

A. GENERAL CRITERIA FOR COUNTRY

1. FAA Sec. 116. Can it be demonstrated that contemplated assistance will directly benefit the needy? If not, has the Department of State determined that this government has engaged in consistent pattern of gross violations of internationally recognized human rights?  
The Project Paper demonstrates that the assistance will benefit the needy.
2. FAA Sec. 481. Has it been determined that the government of recipient country has failed to take adequate steps to prevent narcotics drugs and other controlled substances (as defined by the Comprehensive Drug Abuse Prevention and Control Act of 1970) produced or processed, in whole or in part, in such country, or transported through such country, from being sold illegally within the jurisdiction of such country to U.S. Government personnel or their dependents, or from entering the U.S. unlawfully?  
The GOH has taken adequate steps to control illegal narcotics traffic. A special Narcotics Investigation Branch was established within the Police Bureau (CES) in 1970. Honduras is not at this time a channel for international traffic in heroin or cocaine and most cases have been in the area of internal use, sale or growing of marijuana, or sale of amphetamines or barbiturates. The Honduras Police have previously cooperated with BNDD. Legislation has been passed which updates a previous law by providing criminal penalties for newer forms of drug abuse.
3. FAA Sec. 620(a). Does recipient country furnish assistance to Cuba or fail to take appropriate steps to prevent ships or aircraft under its flag from carrying cargoes to or from Cuba?  
Honduras neither furnishes assistance to Cuba nor permits ships or aircraft under its to carry cargo to or from Cuba.
4. FAA Sec. 620(b). If assistance is to a government, has the Secretary of State determined that it is not controlled by the international Communist movement?  
The Secretary of State has determined that Honduras is not controlled by the international communist movement.
5. FAA Sec. 620(c). If assistance is to government, is the government liable as debtor or unconditional guarantor on any debt to a U.S. citizen for goods or services furnished or ordered where (a) such citizen has exhausted available legal remedies and (b) debt is not denied or contested by such government?  
A.I.D. knows of no such indebtedness of any U.S. citizen.
6. FAA Sec. 620(e) (1). If assistance is to a government, has it (including government agencies or subdivisions) taken any action which has the effect of nationalizing, expropriating, or otherwise seizing ownership or control of property of U.S. citizens or entities beneficially owned by them without taking steps to discharge its obligations toward such citizens or entities?  
There is no evidence of any such action.

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7. FAA Sec. 620(f); App. Sec. 108. Is recipient country a Communist country? Will assistance be provided to the Democratic Republic of Vietnam (North Vietnam), South Vietnam, Cambodia or Laos?

Honduras is not a communist country. Assistance will not be provided to North or South Vietnam, Cambodia or Laos.

8. FAA Sec. 620(i). Is recipient country in any way involved in (a) subversion of, or military aggression against, the United States or any country receiving U.S. assistance, or (b) the planning of such subversion or aggression?

A.I.D. has no evidence of any subversion or aggression or of plans for any such action against any country.

9. FAA Sec. 620(j). Has the country permitted, or failed to take adequate measures to prevent, the damage or destruction, by mob action, of U.S. property?

During period of unrest caused by factors such as a recent change of government in Chile where public attention is focussed on the U.S., the GOH has at times been unsuccessful in containing demonstration which resulted in damage to USG property. The GOH now provides guards for the Chancery during periods of unrest.

10. FAA Sec. 620(l). If the country has failed to institute the investment guaranty program for the specific risks of expropriation, inconvertibility or confiscation, has the AID Administrator within the past year considered denying assistance to such government for this reason?

The OPIC Investment Guaranty Program is in operation in the country.

11. FAA Sec. 620(o); Fishermen's Protective Act, Sec. 5. If country has seized, or imposed any penalty or sanction against, any U.S. fishing activities in international waters,

Honduras has not seized or imposed any penalties or sanctions against U.S. fishing vessels because of their activities in international waters during recent years.

a. has any deduction required by Fishermen's Protective Act been made?

b. has complete denial of assistance been considered by AID Administrator?

12. FAA Sec. 620(q); App. Sec. 504. (a) Is the government of the recipient country in default on interest or principal of any AID loan to the country? (b) Is country in default exceeding one year on interest or principal on U.S. loan under program for which App. Act appropriates funds, unless debt was earlier disputed, or appropriate steps taken to cure default?

Honduras is not in default on any such loans.

13. FAA Sec. 620(s). What percentage of country budget is for military expenditures? How much of foreign exchange resources spent on military equipment? How much spent for the purchase of sophisticated weapons systems? (Consideration of these points is to be coordinated with the Bureau for Program and Policy Coordination, Regional Coordinators and Military Assistance Staff (PPC/RC).)

According to officially released figures 8.7% of the GOH budget was allocated to military spending during 1975. It is estimated that a very small percentage of foreign exchange resources are spent on military equipment. The Mission does not consider the equipment purchased could be classified as "sophisticated weapons systems".

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- 14. FAA Sec. 620(t). Has the country severed diplomatic relations with the United States? If so, have they been resumed and have new bilateral assistance agreements been negotiated and entered into since such resumption?  
Honduras has maintained diplomatic relations with the U.S.
  - 15. FAA Sec. 620(u). What is the payment status of the country's U.N. obligations? If the country is in arrears, were such arrearages taken into account by the AID Administrator in determining the current AID Operational Year Budget?  
Honduras is not in arrears to the extent described in Article 19 of the U.N. Charter.
  - 16. FAA Sec. 620A. Has the country granted sanctuary from prosecution to any individual or group which has committed an act of international terrorism?  
NO.
  - 17. FAA Sec. 666. Does the country object, on basis of race, religion, national origin or sex, to the presence of any officer or employee of the U.S. there to carry out economic development program under FAA?  
NO.
  - 18. FAA Sec. 669. Has the country delivered or received nuclear reprocessing or enrichment equipment, materials or technology, without specified arrangements on safeguards, etc.?  
NO.
  - 19. FAA Sec. 901. Has the country denied its citizens the right or opportunity to emigrate?  
NO.

B. FUNDING CRITERIA FOR COUNTRY

1. Development Assistance Country Criteria

a. FAA Sec. 102(c), (d). Have criteria been established, and taken into account, to assess commitment and progress of country in effectively involving the poor in development, on such indexes as: (1) small-farm labor intensive agriculture, (2) reduced infant mortality, (3) population growth, (4) equality of income distribution, and (5) unemployment.

b. FAA Sec. 201(b)(5), (7) & (8); Sec. 208; 211(a)(4), (7). Describe extent to which country is:

- (1) Making appropriate efforts to increase food production and improve means for food storage and distribution.
- (2) Creating a favorable climate for foreign and domestic private enterprise and investment.

Criteria for assessing progress in involving the poor in development have been set through Sector and sub sector assessments in Agriculture, Education and Nutrition.

Major investment is being made in agricultural credit, technical assistance and other services for farmers aimed at increasing food production. Major storage facilities and rural buying stations are being upgraded and enlarged.

A favorable climate for investment exists and specialized GOH agencies such as the National Development Company and the Ministry of Economy are being effective in attracting internal and external resources for private investment.

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- (3) Increasing the public's role in the developmental process.
- (4) (a) Allocating available budgetary resources to development.
- (b) Diverting such resources for unnecessary military expenditure and intervention in affairs of other free and independent nations.
- (5) Making economic, social, and political reforms such as tax collection improvements and changes in land tenure arrangements, and making progress toward respect for the rule of law, freedom of expression and of the press, and recognizing the importance of individual freedom, initiative, and private enterprise.
- (6) Otherwise responding to the vital economic, political, and social concerns of its people, and demonstrating a clear determination to take effective self-help measures.
- c. FAA Sec. 201(b), 211(a). Is the country among the 20 countries in which development assistance loans may be made in this fiscal year, or among the 40 in which development assistance grants (other than for self-help projects) may be made?
- d. FAA Sec. 115. Will country be furnished, in same fiscal year, either security supporting assistance, or Middle East peace funds? If so, is assistance for population programs, humanitarian aid through international organizations, or regional programs?
2. Security Supporting Assistance Country Criteria
- a. FAA Sec. 502B. Has the country engaged in a consistent pattern of gross violations of internationally recognized human rights? Is program in accordance with policy of this Section?
- b. FAA Sec. 531. Is the Assistance to be furnished to a friendly country, organization, or body eligible to receive assistance?
- c. FAA Sec. 609. If commodities are to be granted so that sale proceeds will accrue to the recipient country, have Special Account (counterpart) arrangements been made?
- (3) The Government is pursuing a clear policy aimed at increasing the participation of all sectors in the development of Honduras. In the past few years the number and size of programs that benefit the poor has been greatly expanded.
- (4) Honduras has been allocating approximately 25% of the budget in the recent past to investment programs.
- (b) While military expenditures have increased they seem to be reasonable in comparison with total government expenditures. Honduras has not interfered in the affairs of other free and independent nations.
- (5) Major reforms initiated during the last few years include a strong agrarian reform investment (under which tens of thousands hectares have been distributed to poor farmers) and a land taxation program (which is being assisted through an A.I.D. Loan).
- (6) The National Development Plan and the Government's action programs clearly define its commitment to help raise the incomes of the poor majority, and to shift development efforts more towards rural areas where the majority of the poor are found.
- (c) Congress has been informed that A.I.D. intends to confirm development assistance loan and grant activities in Honduras.
- (d) Honduras is not a recipient of security supporting assistance or middle East peace funds.
- Not applicable.
- Not applicable.
- Not applicable

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6C(2) - PROJECT CHECKLIST

Listed below are, first, statutory criteria applicable generally to projects with FAA funds, and then project criteria applicable to individual fund sources: Development Assistance (with a sub-category for criteria applicable only to loans); and Security Supporting Assistance funds.

CROSS REFERENCES: IS COUNTRY CHECKLIST UP TO DATE? IDENTIFY. HAS STANDARD ITEM CHECKLIST BEEN REVIEWED FOR THIS PROJECT?

GENERAL CRITERIA FOR PROJECT.

1. App. Unnumbered; FAA Sec. 653(b)

(a) Describe how Committees on Appropriations of Senate and House have been or will be notified concerning the project;  
(b) is assistance within (Operational Year Budget) country or international organization allocation reported to Congress (or not more than \$1 million over that figure plus 10%)?

The project will be included in the FY78 Congressional Presentation, A Congressional notice will be sent in FY77 informing Congress of A.I.D.'s intention to authorize the project in FY77.

2. FAA Sec. 611(a)(1). Prior to obligation in excess of \$100,000, will there be (a) engineering, financial, and other plans necessary to carry out the assistance and (b) a reasonably firm estimate of the cost to the U.S. of the assistance?

The required plans have been completed and a reasonably firm estimate of the cost to the U.S. of the Activity to be financed has been obtained.

3. FAA Sec. 611(a)(2). If further legislative action is required within recipient country, what is basis for reasonable expectation that such action will be completed in time to permit orderly accomplishment of purpose of the assistance?

Since the GOH will repay the loan, ratification by the Chief of State and the Council of Ministers will be necessary prior to initiation of disbursements. A.I.D. loans made to the Government and US agencies in the past have been ratified on a timely basis.

4. FAA Sec. 611(b); App. Sec. 101. If for water or water-related land resource construction, has project met the standards and criteria as per Memorandum of the President dated Sept. 5, 1973 (replaces Memorandum of May 15, 1962; see Fed. Register, Vol 38, No. 174, Part III, Sept. 10, 1973)?

Not applicable.

5. FAA Sec. 611(e). If project is capital assistance (e.g., construction), and all U.S. assistance for it will exceed \$1 million, has Mission Director certified the country's capability effectively to maintain and utilize the project?

The Mission Director has signed the certification which is included in the PP Annexes.

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6. FAA Sec. 209, 619. Is project susceptible of execution as part of regional or multi-lateral project? If so why is project not so executed? Information and conclusion whether assistance will encourage regional development programs. If assistance is for newly independent country, is it furnished through multi-lateral organizations or plans to the maximum extent appropriate?

The Project is not suitable for execution as part of a regional project.

7. FAA Sec. 601(a); (and Sec. 201(f) for development loans). Information and conclusions whether project will encourage efforts of the country to: (a) increase the flow of international trade; (b) foster private initiative and competition; (c) encourage development and use of cooperatives, credit unions, and savings and loan associations; (d) discourage monopolistic practices; (e) improve technical efficiency of industry, agriculture and commerce; and (f) strengthen free labor unions.

The project will facilitate increased production largely in agro industries for internal consumption and foreign trade; will foster private initiative and competition; will facilitate the development of agrarian cooperatives and will improve the technical efficiency of industry, agriculture and commerce. It will have no apparent effect on discouraging monopolistic practices or strengthening free labor unions.

8. FAA Sec. 601(b). Information and conclusion on how project will encourage U.S. private trade and investment abroad and encourage private U.S. participation in foreign assistance programs (including use of private trade channels and the services of U.S. private enterprise).

It is anticipated that a significant portion of the materials and equipment to be procured under the loan will be of U.S. origin.

9. FAA Sec. 612(b); Sec. 636(h). Describe steps taken to assure that, to the maximum extent possible, the country is contributing local currencies to meet the cost of contractual and other services, and foreign currencies owned by the U.S. are utilized to meet the cost of contractual and other services.

Honduras is contributing local currency to the project. See the financial analysis section of the PP for details. No U.S. owned foreign currencies are available for utilization in the project.

10. FAA Sec. 612(d). Does the U.S. own excess foreign currency and, if so, what arrangements have been made for its release?

The U.S. does not own such excess foreign currency.

B. FUNDING CRITERIA FOR PROJECT

1. Development Assistance Project Criteria

- a. FAA Sec. 102(c); Sec. 111; Sec. 281a. Extent to which activity will (a) effectively involve the poor in development, by extending access to economy at local level, increasing labor-intensive production, spreading investment out from cities to small towns and rural areas; and (b) help develop cooperatives, especially by technical assistance, to assist rural and urban poor to help themselves toward better life, and otherwise encourage democratic private and local governmental institutions?

The project, represents a large investment in a poor but potentially high productivity agricultural area containing over 100,000 target group members. This project will permit the establishment of labor intensive industries as well as the adoption of more labor intensive agricultural production techniques. As there are over 80 small farmer groups in the area, most of them cooperatives, the project will assist in the development of the cooperatives.

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b. FAA Sec. 103, 103A, 104, 105, 106, 107. Is assistance being made available: [include only applicable paragraph -- e.g., a, b, etc. -- which corresponds to source of funds used. If more than one fund source is used for project, include relevant paragraph for each fund source.]

- (1) [103] for agriculture, rural development or nutrition; if so, extent to which activity is specifically designed to increase productivity and income of rural poor; [103A] if for agricultural research, is full account taken of needs of small farmers;
- (2) [104] for population planning or health; if so, extent to which activity extends low-cost, integrated delivery systems to provide health and family planning services, especially to rural areas and poor;
- (3) [105] for education, public administration, or human resources development; if so, extent to which activity strengthens nonformal education, makes formal education more relevant, especially for rural families and urban poor, or strengthens management capability of institutions enabling the poor to participate in development;
- (4) [106] for technical assistance, energy, research, reconstruction, and selected development problems; if so, extent activity is:
  - (a) technical cooperation and development, especially with U.S. private and voluntary, or regional and international development, organizations;
  - (b) to help alleviate energy problem;
  - (c) research into, and evaluation of, economic development processes and techniques;
  - (d) reconstruction after natural or manmade disaster;
  - (e) for special development problem, and to enable proper utilization of earlier U.S. infrastructure, etc., assistance;
  - (f) for programs of urban development, especially small labor-intensive enterprises, marketing systems, and financial or other institutions to help urban poor participate in economic and social development.

The project is designed to alleviate the high cost of energy in an area receiving a relatively high level of investment due to its high potential for agricultural development. The PP demonstrates the extent to which the substitution of electrical energy for higher cost fuels (specifically petroleum based fuels) will result in savings to businesses and small farmers.

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(5) [107] by grants for coordinated private effort to develop and disseminate intermediate technologies appropriate for developing countries.

c. FAA Sec. 110(a); Sec. 208(e). Is the recipient country willing to contribute funds to the project, and in what manner has or will it provide assurances that it will provide at least 25% of the costs of the program, project, or activity with respect to which the assistance is to be furnished (or has the latter cost-sharing requirement been waived for a "relatively least-developed" country)?

d. FAA Sec. 110(b). Will grant capital assistance be disbursed for project over more than 3 years? If so, has justification satisfactory to Congress been made, and efforts for other financing?

e. FAA Sec. 207; Sec. 113. Extent to which assistance reflects appropriate emphasis on; (1) encouraging development of democratic, economic, political, and social institutions; (2) self-help in meeting the country's food needs; (3) improving availability of trained worker-power in the country; (4) programs designed to meet the country's health needs; (5) other important areas of economic, political, and social development, including industry; free labor unions, cooperatives, and Voluntary Agencies; transportation and communication; planning and public administration; urban development, and modernization of existing laws; or (6) integrating women into the recipient country's national economy.

f. FAA Sec. 281(b). Describe extent to which program recognizes the particular needs, desires, and capacities of the people of the country; utilizes the country's intellectual resources to encourage institutional development; and supports civic education and training in skills required for effective participation in governmental and political processes essential to self-government.

The Loan Agreement will commit the GOH to provide more than 25% of the total project costs. Past experience indicates that this commitment will be honored without further assurances.

No grant capital assistance will be provided under the project.

The project is designed to increase efficiency in the production and processing of food stuffs, thereby helping to meet the country's food needs. In addition, it will allow for the introduction of labor saving devices into rural homes thus easing some the drudgery for which women are normally burdened.

Previous experience has shown that a high percentage of rural residents desire electricity and are willing to pay for it. This project responds directly to the need and desire for electricity by target group members. It will facilitate organized night time activities such as schools and community meetings and thus contribute to increasing participation of the poor in improving themselves and participating in civic affairs.

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g. FAA Sec. 201(b)(2)-(4) and -(8); Sec. 201(e); Sec. 211(a)(1)-(3) and -(8): Does the activity give reasonable promise of contributing to the development: of economic resources, or to the increase of productive capacities and self-sustaining economic growth; or of educational or other institutions directed toward social progress? Is it related to and consistent with other development activities, and will it contribute to realizable long-range objectives? And does project paper provide information and conclusion on an activity's economic and technical soundness?

h. FAA Sec. 201(b)(6); Sec. 211(a)(5), (6). Information and conclusion on possible effects of the assistance on U.S. economy, with special reference to areas of substantial labor surplus, and extent to which U.S. commodities and assistance are furnished in a manner consistent with improving or safeguarding the U.S. balance-of-payments position.

2. Development Assistance Project Criteria (Loans only)

a. FAA Sec. 201(b)(1). Information and conclusion on availability of financing from other free-world sources, including private sources within U.S.

b. FAA Sec. 201(b)(2); 201(d). Information and conclusion on (1) Capacity of the country to repay the loan, including reasonableness of repayment prospects, and (2) reasonableness and legality (under laws of country and U.S.) of lending and relending terms of the loan.

c. FAA Sec. 201(e). If loan is not made pursuant to a multilateral plan, and the amount of the loan exceeds \$100,000, has country submitted to AID an application for such funds together with assurances to indicate that funds will be used in an economically and technically sound manner?

d. FAA Sec. 201(f). Does project paper describe how project will promote the country's economic development taking into account the country's human and material resources requirements and relationship between ultimate objectives of the project and overall economic development?

The project will contribute directly to improving Honduras' economic development. It is inconceivable to imagine any significant long range progress in the Aguan Valley without electrification of that area. The lack of electrification up till now has served to brake the area's development and limit the returns to other GOH and private investment.

It is expected that over \$4 million worth of loan financed equipment and machinery will be purchased from the U.S. No significant negative effects on the U.S. balance of payments are expected as a result of the project.

Financing for the project is apparently not available from other free-world sources, including private sources within the U.S.

It is reasonably certain that the GOH will be able to repay the loan. The proposed loan is legal under Honduran and U.S. law and the proposed terms are reasonable for Honduras.

The activity has been found economically and technically sound. The borrower has submitted a loan application to AID. The Loan Agreement will contain provision to assure that loan funds are used in a sound manner.

Yes.

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e. FAA Sec. 202(a). Total amount of money under loan which is going directly to private enterprise, is going to intermediate credit institutions or other borrowers for use by private enterprise, is being used to finance imports from private sources, or is otherwise being used to finance procurements from private sources?

The loan proceeds will go to a semi-autonomous government corporation. The procurement financed will be obtained from private sources.

f. FAA Sec. 620(d). If assistance is for any productive enterprise which will compete in the U.S. with U.S. enterprise, is there an agreement by the recipient country to prevent export to the U.S. of more than 20% of the enterprise's annual production during the life of the loan?

The assistance is not being provided to an enterprise which will compete in the U.S. with U.S. enterprise.

3. Project Criteria Solely for Security Supporting Assistance

FAA Sec. 531. How will this assistance support promote economic or political stability?

Not applicable.

4. Additional Criteria for Alliance for Progress

[Note: Alliance for Progress projects should add the following two items to a project checklist.]

a. FAA Sec. 251(b)(1), -(8). Does assistance take into account principles of the Act of Bogota and the Charter of Punta del Este; and to what extent will the activity contribute to the economic or political integration of Latin America?

The project takes into account the principles of the Act of Bogota and the Punta del Este Charter. It is not expected to contribute to any great extent in directly furthering economic or political integration of Latin America.

b. FAA Sec. 251(b)(8); 251(h). For loans, has there been taken into account the effort made by recipient nation to repatriate capital invested in other countries by their own citizens? Is loan consistent with the findings and recommendations of the Inter-American Committee for the Alliance for Progress (now "CEPCIES," the Permanent Executive Committee of the OAS) in its annual review of national development activities?

To our knowledge, capital invested in other countries by Hondurans does not constitute a serious problem. Consequently no actions have been taken, to our knowledge, to repatriate this capital. The loan is consistent with the recommendations of the most recent CEPCIES review.

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6C(3) - STANDARD ITEM CHECKLIST

Listed below are statutory items which normally will be covered routinely in those provisions of an Assistance agreement dealing with its implementation, or covered in the agreement by exclusion (as where certain uses of funds are permitted, but other uses not).

These items are arranged under the general headings of (A) Procurement, (B) Construction, and (C) Other Restrictions.

A. Procurement

- |   |  |
|---|--|
| <p>1. <u>FAA Sec. 602</u>. Are there arrangements to permit U.S. small business to participate equitably in the furnishing of goods and services financed?</p>  | <p>US Small businesses will be permitted to participate in furnishing loan financed goods and services.</p>  |
| <p>2. <u>FAA Sec. 604(a)</u>. Will all commodity procurement financed be from the U.S. except as otherwise determined by the President or under delegation from him?</p>  | <p>Yes.</p>  |
| <p>3. <u>FAA Sec. 604(d)</u>. If the cooperating country discriminates against U.S. marine insurance companies, will agreement require that marine insurance be placed in the U.S. on commodities financed?</p>   | <p>The loan agreement will so require.</p>   |
| <p>4. <u>FAA Sec. 604(e)</u>. If offshore procurement of agricultural commodity or product is to be financed, is there provision against such procurement when the domestic price of such commodity is less than parity?</p>  | <p>No such procurement is contemplated.</p>  |
| <p>5. <u>FAA Sec. 608(a)</u>. Will U.S. Government excess personal property be utilized wherever practicable in lieu of the procurement of new items?</p>   | <p>The loan agreement will so require.</p>   |
| <p>6. <u>MMA Sec. 901(b)</u> (a) Compliance with requirement that at least 60 per centum of the gross tonnage of commodities (computed separately for dry bulk carriers, dry cargo liners, and tankers) financed shall be transported on privately owned U.S.-flag commercial vessels to the extent that such vessels are available at fair and reasonable rates.</p> | <p>The loan agreement will provide for compliance with this provision.</p>   |
| <p>7. <u>FAA Sec. 621</u>. If technical assistance is financed, will such assistance be furnished to the fullest extent practicable as goods and professional and other services from private enterprise on a contract basis? If the facilities of other Federal agencies will be utilized,</p>   | <p>Technical assistance to be financed under the loan will be furnished to the fullest extent practicable by private organizations or individuals.</p> |

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are they particularly suitable, not competitive with private enterprise, and made available without undue interference with domestic programs?

8. International Air Transport. Fair Competitive Practices Act, 1974

If air transportation of persons or property is financed on grant basis, will provision be made that U.S.-flag carriers will be utilized to the extent such service is available?

No grant financing will be provided under the project.

No grant financing will be provided under the project.

B. Construction

1. FAA Sec. 601(d). If a capital (e.g., construction) project, are engineering and professional services of U.S. firms and their affiliates to be used to the maximum extent consistent with the national interest?

Services of U.S. Consultant will be used to the maximum extent.

2. FAA Sec. 611(c). If contracts for construction are to be financed, will they be let on a competitive basis to maximum extent practicable?

Construction contracts will be let on a competitive basis to the maximum extent practicable.

3. FAA Sec. 620(k). If for construction of productive enterprise, will aggregate value of assistance to be furnished by the U.S. not exceed \$100 million?

The U.S. assistance will not exceed \$100 million.

Other Restrictions

1. FAA Sec. 201(d). If development loan, is interest rate at least 2% per annum during grace period and at least 3% per annum thereafter?

The interest rate is 2% per annum during the grace period and 3% thereafter.

2. FAA Sec. 301(d). If fund is established solely by U.S. contributions and administered by an international organization, does Comptroller General have audit rights?

No international organization will have administering responsibilities under the project.

3. FAA Sec. 620(h). Do arrangements preclude promoting or assisting the foreign aid projects or activities of Communist-Bloc countries, contrary to the best interests of the U.S.?

This loan will not promote or assist foreign and projects of Communist block countries.

4. FAA Sec. 636(i). Is financing not permitted to be used, without waiver, for purchase, long-term lease, or exchange of motor vehicle manufactured outside the U.S. or guaranty of such transaction?

No loan funds will be used for this purpose.

AID HANDBOOK 3, App 6C	FRANK MEMO NO. 3:11	EFFECTIVE DATE November 10, 1976	PAGE NO. 6C(3)-3
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5. Will arrangements preclude use of financing:
- a. FAA Sec. 114. to pay for performance of abortions or to motivate or coerce persons to practice abortions?
  - b. FAA Sec. 620(g). to compensate owners for expropriated nationalized property?
  - c. FAA Sec. 660. to finance police training or other law enforcement assistance, except for narcotics programs?
  - d. FAA Sec. 662. for CIA activities?
  - e. App. Sec. 103. to pay pensions, etc., for military personnel?
  - f. App. Sec. 106. to pay U.N. assessments?
  - g. App. Sec. 107. to carry out provisions of FAA Sections 209(d) and 251(h)? (transfer to multilateral organization for lending).
  - h. App. Sec. 501. to be used for publicity or propaganda purposes within U.S. not authorized by Congress?

The loan agreement will provide for specific use of loan funds for agreed upon purposes and will thus preclude allocation of the funds for the items covered by the legislation cited in items 5a-5h.



DRAFT OF PROJECT DESCRIPTION FOR PROJECT LOAN AGREEMENT

The purpose of this Project is to establish a rural electrification system in the Aguán Valley as a major component in the broader effort of the Government of Honduras to establish a sound economic basis for the future growth and development of the region. The Parties to this Agreement believe that a reliable, relatively inexpensive electrical system of the kind envisioned in this Project is a necessary condition for achieving the development objectives for the Aguán Valley area. The ultimate objective of the Project, in concert with the other Aguán development programs, is to improve the quality of life for the rural poor residing in the Valley area.

Attainment of the Project's purpose will be verified to the extent that by 1981: (1) about 25,000 low income families residing in the Aguán have household electrical connections, (2) reliable service with less than 10% voltage drop is being maintained at acceptable rates to target beneficiaries, (3) approximately 1,250 kilometers of transmission, distribution, and secondary lines are effectively being operated and maintained by ENEE. An evaluation of the Project will be conducted jointly by USAID and ENEE in late 1981, at which time all of these indicators will be measured.

In achieving the Project's purpose, the following discrete but interrelated outputs will be accomplished:

A. Transmission, Distribution and Secondary Lines and Related Substations

By the end of 1979, about 200 kilometers of 138 KV transmission lines will have been installed in the Project area. By the end of 1981, approximately 500 kilometers of 34.5/19.9 KV distribution lines and 550 kilometers of secondary lines will have been placed in operation. One switching station and two substations will also be constructed by the end of 1979 and two additional substations will be operating by the close of 1980.

Tied to the national network at La Ceiba, an 80 Kms. 138 KV transmission line will run to a switching station in the Aguán Valley, then divide into 120 Kms. of 138 KV lines terminating at four substations. From the substations, around 500 kms. of distribution lines will carry power to the approximately 240 villages to be electrified. Within these villages about 550 kms. of secondary lines will be required to furnish approximately 25,000 consumers with power for irrigation, agro-industry, household use, street lighting, and lights for schools and health centers. In the event cost savings are realized during the installation of this network, a 48 kilometer distribution line will be installed from Arenal to Yoro further benefitting some 3,000 families.

B. Storage, Maintenance, Office and Training Facilities.

By the end of 1978, two centrally located facilities, each with about 12,500 square feet, will have been constructed in the Valley for storing equipment, tools and materials, and providing classroom and office space for the training program proposed under the Project.

C. Internal Wiring for Consumers

By 1981, about 20,000 consumers will have been provided with meters, internal wiring and fixtures to facilitate immediate usage of the electrical energy provided under the Project. An additional 5,000 consumers with existing connections to private or ENEE owned thermal generators will also receive power from the new network after their internal systems have been inspected by ENEE electricians. To promote acceptance and assist those who are unable to finance the initial installation costs for interior wiring and fixtures, a \$350,000 Internal Wiring Fund will provide 12 to 24 month loans at 7% interest. Loan payment charges will be added to the monthly electric bills. No hook-up fee will be charged. The Wiring Fund and interest earnings will be maintained until 1985 for initial installation loans to future rural electricity consumers, with consumers in the Aguán Valley to have a priority claim on the resources of the Fund. In 1985, an evaluation of the Fund's operations will be undertaken by ENEE to determine whether, and with what modifications, it should be continued.

D. Trained Personnel

Trained personnel for the Project drawn principally from the Valley region will be adequate to administer the program, promote effective and efficient energy use, install end-user connections, repair and maintain the system, and repair and maintain consumers' equipment.

- Approximately 40 persons will be recruited as full-time ENEE employees and trained as administrators, electricians, linesmen, and meter readers.

- An additional 50 persons will be trained as contract personnel for part-time work on specific installations, emergency repairs and maintenance, and will form a reserve labor pool to be drawn upon as the system expands. At the outset of the program these individuals will also be trained to provide each of the 240 communities participating in the Project with information concerning efficient usage of electricity, electrical appliance safety, and the benefits and costs associated with this power source.

- At least 60 additional persons will be enrolled in the training centers for instruction in the repair and maintenance of electrical appliances and irrigation pumps, home wiring, installation of electrical fixtures, and small business management. Graduates of this program are

expected to establish new businesses in the repair and/or sales of electrical appliances and/or to become small contractors servicing an expanding electrical network.

E. Billing and Collection System

ENEE personnel with the assistance of consultants will design and implement a billing and collection system tailored to the needs of consumers in the Aguán Valley area. Among the factors to be taken into account in developing such a system are simplicity of design and incentives and mechanisms for paying on a regular and timely basis.

F. Evaluation Framework

An evaluation framework will be developed to measure the effects of the Project on the quality of life of the residents of the area including, but not limited to, the creation of additional employment opportunities, increased food consumption, increased real income and improved nutritional status. A baseline survey will be undertaken by 1979 as a point of reference for a follow-up survey to be effected by ENEE in 1985 of the project's impact in these respects. At the termination of the project, i.e., 1981, and annually during the project construction period, evaluations will focus on specific output activities.

To help ensure the continuing development and expansion of rural electrification projects in Honduras, the proceeds derived from the differential between the terms to the Borrower (ENEE) and the terms under which payments are made to A.I.D. by the Guarantor (Government of Honduras) will be contributed to a Fund for rural electrification projects to be administered by ENEE. An agreement between the Borrower and Guarantor, acceptable to A.I.D., shall establish the policies and procedures governing the use of Fund resources.

A summary financial plan of Project activities is set forth below. This plan may be changed within the limits established under Section 2.1 (Definition of Project) of this Agreement.

SUMMARY FINANCIAL PLAN

(US \$000)

USE	A.I.D.		GOH		TOTAL
	FX	LC	FX	LC	
Transmission Lines-200 Kms.	1,450	205		1,245	2,900
Substations (Five)	1,600			600	2,200
Distribution System-493 Kms.	1,190	705		1,000	2,895
Secondary Lines-551 Kms.	1,250	300		955	2,505
Transformers - 20,000 KVA	800				800
Services-20,000 consumers	100	200			300
Meters-20,000 consumers	400				400
Service, Storage & Training Facilities				300	300
Engineering & Administration				600	600
Sub-total:	6,790	1,410		4,700	12,900
WIRING FUND					
Internal Wiring of 20,000 consumers	175	175			350
TRAINING PROGRAM					
Consultants, Training, Equip.	200				200
EVALUATION	50				50
CONTINGENCIES	940	260			1,200
PROJECT TOTALS	8,155	1,845		4,700	14,700

DRAFT PROJECT LOAN AUTHORIZATION

Name of Country : HONDURAS  
Name of Project : AGUAN VALLEY RURAL ELECTRIFICATION  
Project Number : 522-0138  
Loan Number : 522-T-033

Pursuant to the authority vested in the Administrator, Agency for International Development ("A.I.D."), by the Foreign Assistance Act of 1961, as amended, and the delegations of authority issued thereunder, I hereby authorize a Loan pursuant to Sections 103 of the Act, and in furtherance of the Alliance for Progress to the Empresa Nacional de Energia Eléctrica ("Borrower"), a semi-autonomous agency of the Government of Honduras ("Guarantor"), of not to exceed ten million United States Dollars (\$10,000,000) to assist in financing the United States Dollar and local currency costs of a program designed to assist in the development of the Aguán Valley in Honduras ("Project"). The Loan shall be subject to the following terms and conditions:

1. A three-party Agreement among A.I.D., the Borrower and the Guarantor will provide for:

a. Terms to the Borrower: Repayable within twenty five (25) years including a (10) year grace period, at an interest rate of three percent (3%) per annum during the grace period and four percent (4%) per annum thereafter. Borrower will make payments directly to the Guarantor in accordance with these terms.

b. Guarantor will be responsible for making payment to A.I.D. in Accordance with the following terms: Repayable in dollars within forty (40) years including a ten (10) year grace period, at an interest rate of two percent (2%) per annum during the grace period and three percent (3%) per annum thereafter.

c. Proceeds in the amount of the differential between terms to the Borrower and terms under which payments are made to A.I.D. by the Guarantor will be earmarked for a Fund for rural electrification projects to be administered by the Borrower.

2. Source and Origin

Except for ocean shipping, goods and services financed under the Loan shall have their source and origin in the Central American Common Market ("CACM")

member countries or in countries included in A.I.D. Geographic Code 941, except as A.I.D. may otherwise agree in writing, provided, however, marine insurance may be financed under the Loan only if it is obtained on a competitive basis, and any claims thereunder are payable in freely convertible currencies. Ocean shipping financed under the Loan shall be procured in any country included in A.I.D. Geographic Code 941, not including CACM member countries.

3. Local Currency Costs

United States Dollars utilized under the Loan to finance local currency costs shall be made available pursuant to procedures satisfactory to A.I.D.

4. Conditions Precedent to Disbursement for Other Than Training and Technical Assistance

The following conditions will be met by the Borrower in form and substance satisfactory to A.I.D. prior to the issuance of any commitment document or disbursement for other than training and technical assistance:

- a. An agreement between Borrower and Guarantor concerning the criteria governing the use of resources of the Fund for rural electrification.
- b. A staffing plan for Borrower's personnel assigned to the project and a time-phased plan for all project activities including construction, training and promotion.
- c. Evidence that Borrower has made firm arrangements for electrical power generating capacity sufficient to provide for the needs of the project.

5. Covenants

Borrower shall covenant and agree:

- a. That during the course of the project, at least once annually, Borrower shall conduct with A.I.D. an evaluation of project's progress and that in 1985, Borrower, pursuant to an evaluation framework satisfactory to A.I.D., will conduct an evaluation of the impact of the project and of the operations of the internal Wiring Fund.
- b. That during the course of the project and thereafter until 1985, Borrower will maintain the level of project funds provided for the internal Wiring Fund.

6. Other Terms and Conditions

The Loan shall be subject to such other terms and conditions as A.I.D. may deem advisable.

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Administrator

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Date

T E C H N I C A L

D A T A

DISBURSEMENT SCHEDULE

CALENDAR YEAR	1977		1978		1979		1980		1981		TOTAL
	AID	ENEE	AID	ENEE	AID	ENEE	AID	ENEE	AID	ENEE	
Engineering and Administration		85		170		170		100		75	600
138KV Transmission			607	770	903	330	145	145			2,900
34.5KV Distribution			200	100	1048	430	400	300	247	170	2,895
Substations	200		330	260	820	100	150	140	100	100	2,200
Secondaries			145	150	350	300	535	350	520	155	2,505
Transformers			100		200		300		200		800
Services							100		200		300
Meters			60		200		80		60		400
Internal Wiring Fund					60		190		100		350
Training and Promotions	10		60		50		50		30		200
Storage & Training Facilities				300							300
Evaluation					50						50
Contingencies							600		600		1,200
<b>TOTALS</b>	<b>210</b>	<b>85</b>	<b>1502</b>	<b>1750</b>	<b>3681</b>	<b>1330</b>	<b>2550</b>	<b>1035</b>	<b>2057</b>	<b>500</b>	<b>14,700</b>

COSTING OF PROJECT OUTPUTS/INPUTS  
(US \$000's)

Project No. 522-0138

Title: Aguán Valley Rural Electrification x New

PROJECT INPUTS	PROJECT OUTPUTS				TOTAL
	#1	#2	#3	#4	
<u>A.I.D.</u>					
Construction	8,200				8,200
Capital Fund		350			350
Training Program			200		200
Evaluation				50	50
*Contingency	1,200				1,200
<u>HOST COUNTRY</u>					
Construction	4,100				4,100
Engineering and Administration	600				600
TOTALS	14,100	350	200	50	14,700

#1 - Construction of Aguán Valley Rural Electrification System.

#2 - Capital Fund for internal wiring of homes of rural poor, to be established as special revolving fund.

#3 - Training and promotion program in Project area.

#4 - Establishment of evaluation framework for measuring Project Goals.

\* Note: An 8% inflation factor is included in all cost estimates.

SUMMARY OF PROJECT CONSTRUCTION COSTS

AGUAN VALLEY RURAL ELECTRIFICATION

1. Transmission Lines - 200 Kms.	\$2,900,000
2. Substations - 5 stations	2,200,000
3. Distribution	2,895,000
a) 326 Kms. Three Phase	
b) 167 Kms. Single Phase	
4. Secondaries	2,505,000
a) 134 Kms. Three Phase	
b) 417 Kms. Single Phase	
5. Transformers, 20,000 KVA capacity	800,000
6. Services - 20,000 new services	300,000
7. Meters - 20,000 meters	400,000
8. Service and Storage Facilities - 2	300,000
9. Engineering and Administration	600,000
10. Contingencies	1,200,000
	<hr/>
TOTAL.....	\$14,100,000

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NOTE: Cost estimates include 8% inflation factor.

DETAILED COSTS  
AGUAN VALLEY RURAL ELECTRIFICATION

1. Transmission Lines

138 KV Transmission - 477 ACSR, wood H-Frame Construction		
A - La Ceiba to Reguleto		
80 Kms at \$14,500/Km		\$ 1,160,000
B - Reguleto to Corocito		
60 Kms at \$14,500		870,000
C - Reguleto to Mamé to Coyoles		
60 Kms at \$14,500		870,000
	Sub-total .....	<u>\$ 2,900,000</u>

2. Substations

A - Reguleto		500,000
138 KV Switching Station		
(138 KV Step down to 34.5/19.9 KV)		
B - Isleta		550,000
7,500 KVA transformer capacity		
and 4 distribution circuits		
C - Coyoles		450,000
7,500 KVA transformer capacity		
and 4 Distribution Circuits		
D - Corocito		450,000
7,500 KVA Transformer Capacity		
and 4 Distribution Circuits		
E - Mamé		250,000
3,750 KVA Transformer Capacity		
and 1 Distribution Circuit		
	Sub-total .....	<u>\$2,200,000</u>

3.	<u>Distribution - 34.5/19.9KV</u>	
	A.- Three Phase, 3/0 and 1/0 ACSR, Wood Pole 326 Km. at \$6,700/Km.	\$ 2,185,000
	B - Single Phase, 1/0 ACSR, Wood Pole 167 Km. at \$4,250/Km	710,000
		<hr/>
	Sub-total .....	\$ 2,895,000
4.	<u>Secondaries</u>	
	A - Three Phase 134 Kms at \$5,000/Km	670,000
	B - Single Phase 417 Kms at \$3,500/Km	1,460,000
	C - Street lighting for 240 villages	375,000
		<hr/>
	Sub-total .....	\$ 2,505,000
5.	<u>Transformers</u>	
	20,000 KVA at \$40/KVA	800,000
6.	<u>Services</u>	
	20,000 at \$15/service	300,000
7.	<u>Meters</u>	
	20,000 at \$20/meter	400,000
8.	<u>Service and Storage Facilities</u>	
	2 at \$150,000	300,000
9.	<u>Engineering and Administration</u>	600,000
10.	<u>Contingencies</u>	1,200,000
		<hr/>
	TOTAL CONSTRUCTION.....	\$14,100,000

CANDIDATE PROJECT COMMUNITIES FOR RURAL ELECTRIFICATION

Bajo Aguán Cooperatives

Cooperativa Sabá	Cooperativa La Coloneña
Cooperativa Choloma	Cooperativa Camarones
Cooperativa No. 3	Cooperativa El Tranvío
Cooperativa Voluntades Unidas	Cooperativa El Chile
Cooperativa Luxón Palmeras	Cooperativa San Antonio de Bridge
Cooperativa Unión San Francisco	Cooperativa Luchadores del Palmichal
Cooperativa Nueva Jerusalem	Cooperativa Brisas del Aguán
Cooperativa Palos de Agua	Cooperativa Corocito
Cooperativa Orica	Cooperativa Tepí
Cooperativa A.C.A.P.	Cooperativa La Brea
Cooperativa Sagrado Corazón	Cooperativa Colón
Cooperativa Cuaca	Cooperativa Quebrada Honda
Cooperativa Chiripa	Cooperativa Guanchías
Cooperativa Brisas Cuaqueñas	Cooperativa Mochito
Cooperativa Central Zamora	Cooperativa Lourdes
Cooperativa Las Colinas	Cooperativa San Esteban
Cooperativa La Concepción	Cooperativa Los Buenos Amigos
Cooperativa Guapinol	Cooperativa Despertar
Cooperativa Lempira	Cooperativa La Bóveda
Cooperativa La Occidental	Cooperativa Los Leones
Cooperativa La Norteña	Cooperativa La Auxiliadora
Cooperativa San Isidro	Cooperativa Tarros
Cooperativa Central Bajo Aguan	Cooperativa Nueva Instancia
Cooperativa La Aurora	Cooperativa La Buena Fé
Cooperativa La Confianza	Cooperativa Honduras Aguán
Cooperativa Salamá	Cooperativa 13 de Junio
Cooperativa 15 de Mayo	

Arenal Area

Arenal	El Nance
Santa Cruz	San Jerónimo
La Esperanza	San Rimas
Teguajal	San Juan
Perritos	San Lorenzo Abajo
Las Delicias	San Patricio
San Marcos	San Lorenzo
Hacienda El Sauce	Las Minas
Santa Bárbara	Sabana Larga
Tejeras	
Tacualtuste	

Olanchito Area

El Cayo  
Campo Palo Verde  
Coyoles Central  
El Carril  
La Cabañita  
Agua Buena  
Campo El Hoyo  
Trojas Leaps  
Trojas G  
Trojas  
Limonas A  
Nombre De Jesus  
Trojas Tres  
Trojas Dos  
Campo Nerones  
Campo El Chorro  
Campo El Balsamo

Campo El Rosario  
Hacienda Las Almendras  
Campo El Ocote  
Tegujinal  
Medina  
Chorrera  
San José  
Olanchito  
Jaguas Arriba  
Hacienda Columbus  
Uchapa  
El Chaparral  
Potrerillos (Atlántida)  
Potrerillos (Yoro)  
Puerto Escondido  
Coyoles

Ilanga Area

Quebrada de Arena  
Sabana de Toribio  
La Curva de Isleta  
Los Carrioles  
Lorelay  
Churusquera  
El Guayabal  
Campo Nuevo  
Parma  
Agua Caliente  
Chacalapa Spar  
La Fuente  
Chacalapa Puente  
Monte Abajo  
La Atascosa  
Ilanga  
Rigones  
El Coco  
Cuaca Viejo  
Cuaca Nuevo  
El Cayo Sierra  
Zamora  
Lérida  
Guainol Abajo  
El Café

Ceibita (Sabá)  
Nerones  
Copete  
Sabá  
Tiburones  
El Achiote  
Palos de Agua Abajo  
Pasuales  
Orica  
Palos de Agua Arriba  
El Calmuyo  
El Jaguillo Muerto  
Campo Guanacaste  
El Chorro  
Campo La Paz  
Masicales  
Prieta  
Chiripa  
La Concepción  
Guapinol  
San Pedro  
Cayo Campo  
Ceibita (Tocoa)  
Tosca  
Caballería

Ilanga Area (cont.)

Vally	Bohemia
Tocoa	
Aguan Paso Tocoa	
San Isidro	

Puerto Castilla Area

Yucatán	Colonia del Aguan
Taujica	Tarros
Sinaloa	Chapagua
Salamá	El Palmetal
El Barro	Rriche
Juan Antonio	Sonora
Quebrada de Arena	Puerto Castilla
El Esprimento	Trujillo
Quebrada de Agua	Kilómetro Cinco
Palmichal	
Corocito	

Sonaguera Area

La Sabana	Trovador
San Carlos	Sonaguera
Boca de Mamé	Faos
Jalisco	Río de Piedra
El Juncal	La Monga
San Francisco	Quemado
Nalao	Elixir
Armenia	Lucía
Campo Nuevo	Sabana de Elixir
Balsamo Oriental	Lanza
Tepusteca	Los Planes
Carvajales	Barranco

La Ceiba Area

Corozal	El Cacao
Villa Nuria	Jutiapa
Sambo Creek	Nueva Armenia
Salitran	El Perú

In addition 30 INA cooperatives to be formed during the Project period will also be connected to the distribution system.

CONTRATO PRIVADO

Nosotros, \_\_\_\_\_, mayor de edad, casado, Ingeniero Civil y de este domicilio, actuando en su carácter de Gerente de la Empresa Nacional de Energía Eléctrica, que en adelante se denominará la ENEE y el señor \_\_\_\_\_, mayor de edad, Estado Civil, Profesión y vecino de \_\_\_\_\_, actuando en su propio nombre; hemos convenido en celebrar y al efecto celebramos el siguiente Contrato Privado de Compra-Venta a plazos de materiales, el cual se ajustará a los términos y condiciones siguientes: PRIMERA: El Ingeniero \_\_\_\_\_ en su condición supra-indicada manifiesta: Que dentro del Programa de Electrificación Rural la ENEE ha decid' do establecer facilidades para los usuarios del servicio eléctrico, permitiendo la realización de instalaciones domiciliarias, y para tal efecto la ENEE proporcionará a los interesados los materiales eléctricos necesarios. SEGUNDA: La ENEE en base a lo dispuesto en la cláusula anterior, proporcionará al señor \_\_\_\_\_, \_\_\_\_\_, los materiales señalados en el siguiente cuadro bajo las condiciones siguientes:

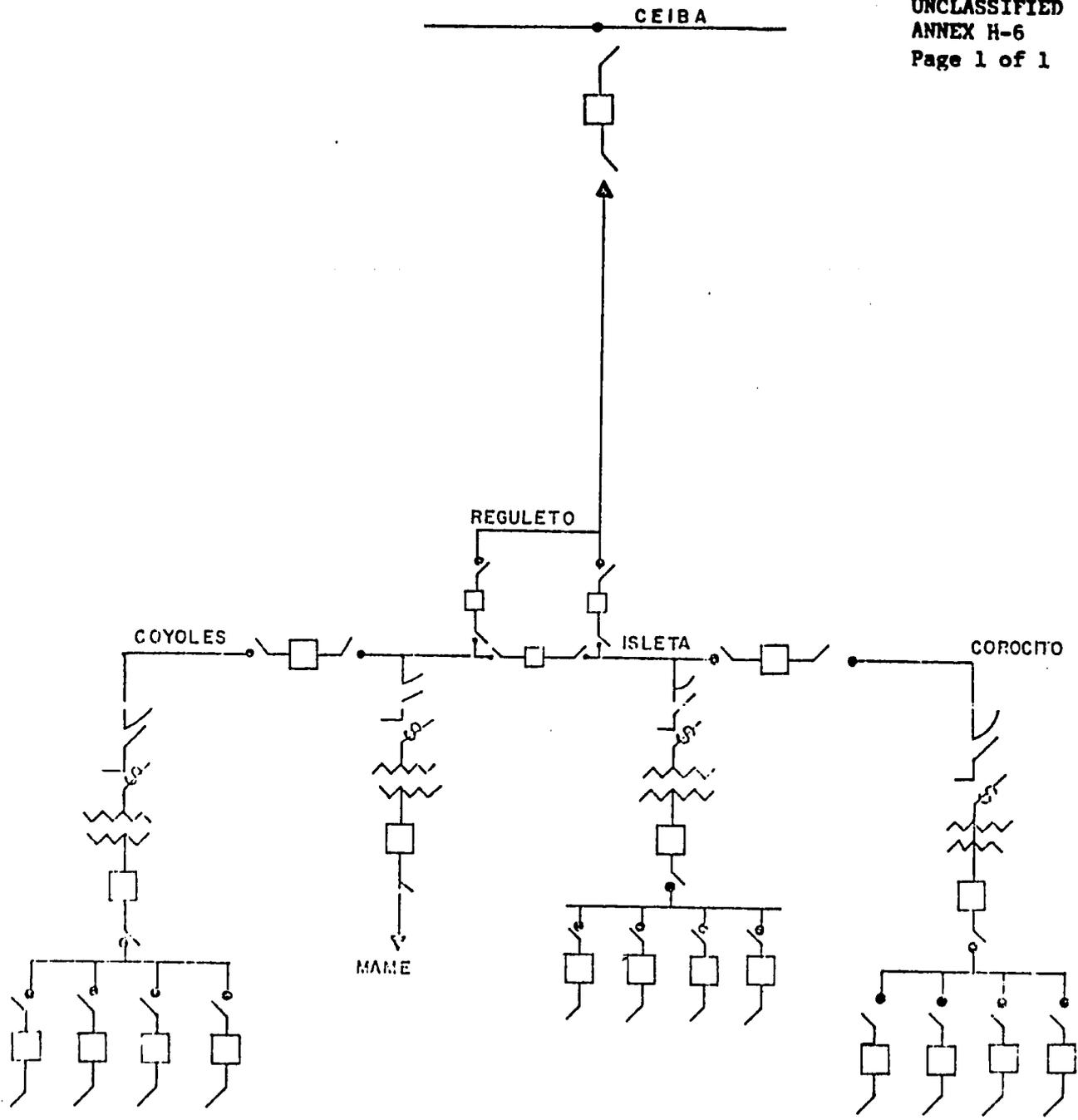
<u>Materiales</u>	<u>Bolsa Básica</u>	<u>Bolsa Adicional</u>
Ydas. alambre de cobre #10		
Aisladores de porcelana		
Switch de cuchilla		
Roseta de porcelana o baquelita de cadena		
Foco 60 watts		
Tablero 8 X 10 pulgadas		
Fusibles de 10 amperios		
TOTAL		

Es entendido que los materiales contenidos en la Bolsa Básica y Bolsa Adicional deberán ser conservados en buen estado y no podrán ser gravados o traspasados a otra persona, mientras no hayan sido cancelados a la ENEE. A tal efecto, mientras no se cancele la obligación el Contratista se considerará depositario de los aludidos materiales.

TERCERA: La ENEE se compromete a la instalación domiciliaria y al suministro del servicio de energía eléctrica en los términos que establece los reglamentos de energía eléctrica de la ENEE. CUARTA: El señor \_\_\_\_\_, se compromete a hacer efectiva en la Tesorería de la ENEE o en la Agencia Bancaria que se designe la cantidad de \_\_\_\_\_ Lempiras que serán cobrados en la factura mensual de consumo de energía, en cantidades mensuales de \_\_\_\_\_ a partir de la suscripción de este Contrato hasta la completa terminación de la deuda. QUINTA: El señor \_\_\_\_\_ dice que es cierto lo manifestado por el otro contratante que se da por recibido los materiales y acepta las limitaciones de uso y de dominio impuestas. SEXTA: Para todo lo no dispuesto en este Contrato las partes estarán a lo dispuesto en el Reglamento de Servicio Eléctrico de la ENEE y demás leyes vigentes en Honduras, sometiéndose expresamente a la jurisdicción de los tribunales de Francisco Morazán. SEPTIMA: Ambos contratantes manifiestan estar acordes con el contenido de todas y cada una de las cláusulas anteriores y de consumo, por duplicado y ante testigos firman el presente Contrato en la ciudad de Tegucigalpa, Distrito Central, a los \_\_\_\_\_ del mes de \_\_\_\_\_ de mil novecientos setenta y \_\_\_\_\_.

\_\_\_\_\_  
Representante de ENEE

\_\_\_\_\_  
Contratista



BEST AVAILABLE COPY

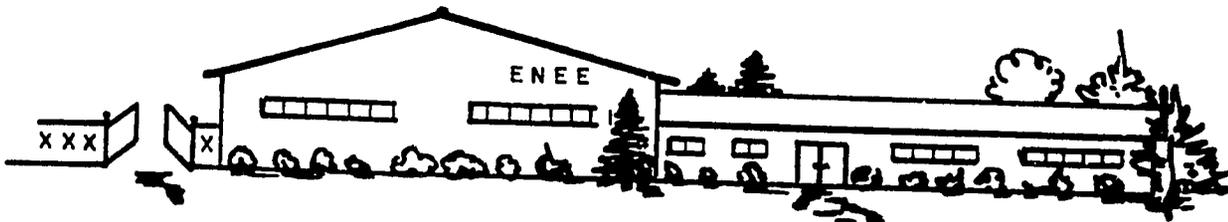
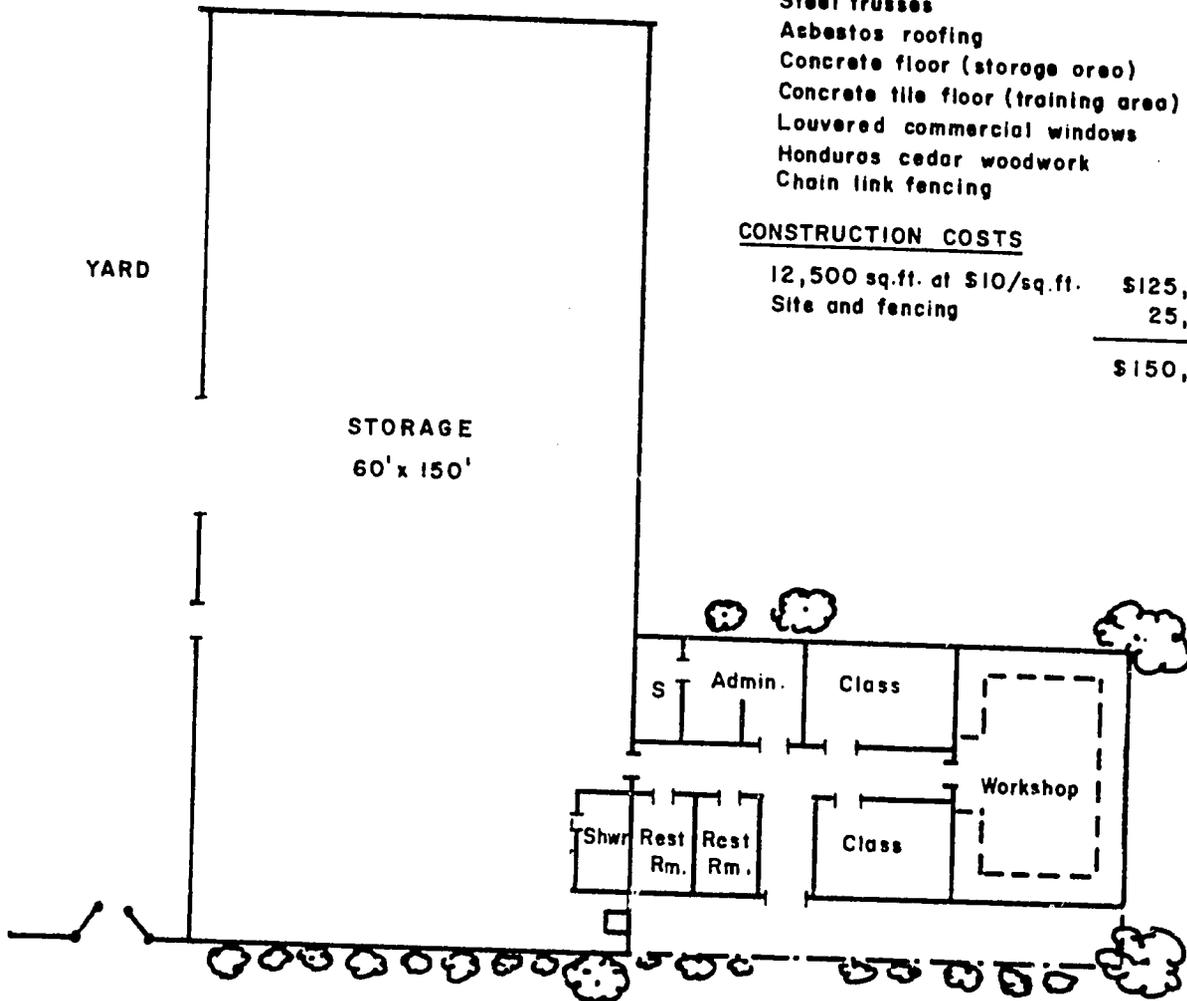
EMPRESA NACIONAL DE ENERGIA ELECTRICA INSTITUTO DE INVESTIGACIONES
ONE LINE DIAGRAM AGUAN VALLE Y SYSTEM
DEPARTAMENTO DE INGENIERIA ELECTRICA

MATERIALS

- Concrete block walls
- Steel trusses
- Asbestos roofing
- Concrete floor (storage area)
- Concrete tile floor (training area)
- Louvered commercial windows
- Honduras cedar woodwork
- Chain link fencing

CONSTRUCTION COSTS

12,500 sq.ft. at \$10/sq.ft.	\$125,000
Site and fencing	25,000
	<hr/>
	\$150,000



scale: 1" = 30'

SKETCH -  
TRAINING AND STORAGE CENTERS (2)

TARIFF STRUCTURE

TARIFF "A" - Residential

For domestic use only and where the residence is combined with a small business provided the commercial usage is less than the domestic.

Monthly Rates:

\$ 1.25 (minimum rate) for the first	20 KWH
0.075 per KWH for the following	80 KWH
0.055 per KWH for all in excess of	100 KWH

Meter Rental:

\$0.25 per month

TARIFF "B" - General Services

Monthly Rates - Single Phase

\$ 1.50 (minimum rate) for the first	20 KWH
0.065 per KWH for the following	80 KWH
0.055 per KWH for the following	4,900 KWH
0.0375 per KWH for the following	5,000 KWH

Meter Rental:

\$ 0.25 per month

Monthly Rates - Three-phase

Same as above except:

\$ 6.50 (minimum rate) for the first	100 KWH
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Following usage same as above

Meter Rental:

\$ 0.50 per month

TARIFF "C" - Optional General Service

Large users with signed contracts for minimum annual usage:

Minimum monthly rate - \$ 937.50



ENCUESTA DE FAMILIAS  
Electrificación Rural del Valle de Aguán

UNCLASSIFIED  
ANNEX H-10  
Page 1 of 3

Fecha: \_\_\_\_\_

Encuestador: \_\_\_\_\_

Pueblo o Aldea: \_\_\_\_\_

Número de habitantes: \_\_\_\_\_

Familias

1.- Nombre: \_\_\_\_\_, edad: \_\_\_\_\_

2.- Nivel de educación: Primaria ( )      Secundaria ( )      Superior ( )  
Grado: \_\_\_\_\_

3.- Ocupación: Hombre \_\_\_\_\_ Mujer \_\_\_\_\_

4.- Número de hijos: \_\_\_\_\_

5.- Número de personas por casa: \_\_\_\_\_

6.- Cuántos hijos están yendo a la escuela? \_\_\_\_\_

CASAS

7.- Tenencia de la vivienda: Propia ( )      Alquilada ( )      Compra ( )

8.- Si está alquilando o está siendo comprada, cuánto paga al mes? \_\_\_\_\_

9.- Número de cuartos: \_\_\_\_\_ Servicio de agua Si ( )      No ( )

10.- Baño interior ( )      exterior ( )

11.- Si no tiene servicio de agua, qué tan lejos está la fuente más cercana \_\_\_\_\_

12.- Material de las paredes: Ladrillo ( )      Madera ( )      Adobe ( )      Cemento ( )

13.- Piso de: Ladrillo ( )      Tierra ( )      Madera ( )      Cemento ( )

14.- Techo de: Teja ( )      Manaca ( )      Zinc ( )

Ingresos y Egresos

15.- Nivel de ingreso mensual

0 - 20 ( )	51 - 75 ( )	101 - 150 ( )
21 - 50 ( )	76 - 100 ( )	151 - 200 ( )
201 - 300 ( )	301 - 400 ( )	401 - 500 ( )
+ de 500 ( )		

16.- Tiene pagos regulares mensuales? Si ( ) No ( ) Cuánto \_\_\_\_\_

Energéticos

17.- Tiene generador eléctrico? Si ( ) No ( )

18.- Comparte este generador con otros? Si ( ) No ( )

19.- Gasto en combustible al mes: \_\_\_\_\_

20.- Aparatos eléctricos que tiene: Radio ( ) Tocadoisco ( ) Ventilador ( )  
Refrigeradora ( ) Focos ( ), cuántos: \_\_\_\_\_

21.- Qué usa para alumbrarse? Gasolina ( ) Kerosene ( ) Lefia ( ) Velas ( )

22.- Gasto mensual en alumbrado: \_\_\_\_\_

23.- Tiene radio: Si ( ) No ( ) Gasto mensual en baterías: \_\_\_\_\_

24.- Escucha programas de noticias? Si ( ) No ( ) Educativos: Si ( ) No ( )

Tierras y Cosechas

25.- Tiene tierra propia para el cultivo? Si ( ) No ( )

26.- Cuántas manzanas? \_\_\_\_\_

27.- Tiene cultivo? \_\_\_\_\_

28.- Cuántas cosechas por año: \_\_\_\_\_

29.- Tiene irrigación? \_\_\_\_\_ Tipo de combustible para bombeo: \_\_\_\_\_

30.- Gasto mensual de combustible para bombeo: \_\_\_\_\_

31.- Tipo de maquinaria agrícola que posee: \_\_\_\_\_

32.- Tipo de maquinaria agrícola que su Cooperativa posee: \_\_\_\_\_

Electricidad

33.- Podría usted pagar Lps.3.00 mensuales como mínimo para tener servicio de luz eléctrica en su casa? Si ( ) No ( )

Pág. 3

34.- Si tuviera electricidad las 24 horas en su casa, qué aparatos eléctricos instalaría?

Radio ( ) Rockola ( ) Plancha ( ) Ventilador ( ) Refrigeradora ( )

Licuada ( ) Tocado ( ) Televisor ( ) Torno ( ) Taladro ( )

Otros: \_\_\_\_\_

35.- Con electricidad que servicios le gustaría poner en su comunidad? \_\_\_\_\_

36.- Si en el pueblo hubiera alumbrado de calle estaría usted dispuesto a contribuir con el pago del alumbrado? Si ( ) No ( )

37.- Si la escuela tuviera alumbrado, iría usted a tomar clases de noche?

Si ( ) No ( )

38.- Estaría usted en disposición de contribuir con el pago del servicio eléctrico de la escuela? Si ( ) No ( )

### Negocios

39.- Tipo de negocio: \_\_\_\_\_

40.- Negocio fuera de la vivienda, Si ( ) No ( )

41.- Está abierto de noche? Si ( ) No ( )

42.- Qué usa para alumbrarlo? Velas ( ) Kerosene ( ) Gasolina ( )

43.- Abriría su negocio por la noche si hubiera electricidad? Si ( ) No ( )

44.- Si hubiera electricidad disponible qué artefactos eléctricos instalaría?

Refrigeradora ( ) Congelador ( ) Rockola ( ) Ventilador ( )

Otros: \_\_\_\_\_

ENCUESTA DE COMUNIDADES  
ELECTRIFICACION RURAL DEL VALLE DE AGUAN

Fecha \_\_\_\_\_

Encuestador \_\_\_\_\_

Nombre de la Comunidad \_\_\_\_\_

Departamento: Colón ( ) Yoro ( ) Municipio \_\_\_\_\_

No. Habitantes de la Comunidad \_\_\_\_\_

Ciudad importante más cercana \_\_\_\_\_

1. Qué vías de comunicación tiene el lugar? Avión ( ) Bus ( ) Correo ( )  
Teléfono ( ) Telégrafo ( ) Otros \_\_\_\_\_

2. Tiene pista para avioneta? Si ( ) No ( )

3. Frecuencia y tipo de transporte que se utiliza:

	Diario	Cada dos días	Semanal
Avión	( )	( )	( )
Bus	( )	( )	( )
Otro tipo de carro	( )	( )	( )
Ferrocarril	( )	( )	( )

4. Tiene luz eléctrica la comunidad? Si ( ) No ( )

5. Qué frecuencia tiene el servicio de luz eléctrica?

24 horas ( ) 12 horas ( ) 5 horas ( ) 3 horas ( )

6. Quién proporciona el servicio eléctrico?

ENEE ( ) Municipalidad ( ) Particular ( )

7. Cuáles son las tarifas que se pagan por electricidad?

Mensuales Lps. \_\_\_\_\_ Semanales Lps. \_\_\_\_\_ Por foco Lps. \_\_\_\_\_

8. Tiene servicio de agua potable la comunidad? Si ( ) No ( )

9. Frecuencia del servicio de agua potable:

Todo el día ( ) 1/2 día ( ) Menos ( )

10. Cuenta con servicios médicos la comunidad? Si ( ) No ( )
11. Existen en la comunidad: Clínica particular ( ) Centro de Salud ( ) Hospital ( )
12. Cuantas escuelas tiene: Jardín de niños \_\_\_\_ Primarias \_\_\_\_ Secundarias \_\_\_\_
13. Qué agencias organizadas existen en la comunidad? FUSEP ( ) DIN ( ) JNBS ( )  
COHDEFOR ( ) Seguro Social ( ) INA ( ) DESAGROH ( ) ANACH ( )  
UNC ( ) FECORAH ( ) CARITAS ( )
14. En el comercio cuantas tiendas hay en la comunidad? Tiendas \_\_\_\_ Pulperías \_\_\_\_
15. Qué tipo de negocios y número de: Bancos \_\_\_\_ Farmacias \_\_\_\_  
Talleres de Carpintería \_\_\_\_ Talleres Mecánicos \_\_\_\_ Reposterías \_\_\_\_  
Vendedores de Equipo Agrícola \_\_\_\_ Vendedores de Repuestos \_\_\_\_ Otros \_\_\_\_
- 
16. Hay fábricas en la comunidad? Qué tipo? \_\_\_\_\_
17. Hay procesadoras de alimentos? Qué Tipo? \_\_\_\_\_
18. Quien apoya económicamente la comunidad? Fruit Company ( ) COHBANA ( )  
INA Cooperativas ( ) Particulares ( ) Otros \_\_\_\_\_
19. Conoce nuevos negocios o fábricas contempladas a ser construidas cerca de la comunidad?  
Sí ( ) No ( ) Cuáles son? \_\_\_\_\_
- 
20. Qué tipo de servicio con electricidad le gustaría tener para su comunidad?  
\_\_\_\_\_  
\_\_\_\_\_
21. Nombre de la persona dando la información y su cargo dentro de la comunidad  
\_\_\_\_\_  
\_\_\_\_\_  
(Alcalde, Presidente del Patronato, Director de la Escuela)

ENEE Balance Sheets for Year Ended 12.31  
( \$000's )

	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>
<b>Fixed Assets</b>					
Plant & Equipment	62,157	76,481	86,907	120,858	133,607
Less: Accum. Depreciation	<u>(11,252)</u>	<u>(13,251)</u>	<u>(15,530)</u>	<u>(23,588)</u>	<u>(26,960)</u>
<b>Net Fixed Assets</b>	<u>50,905</u>	<u>63,230</u>	<u>71,377</u>	<u>97,270</u>	<u>106,647</u>
<b>Current Assets</b>					
Cash	260	248	307	982	995
Net Accounts Receivable	2,972	2,665	3,379	4,803	4,931
Inventories	4,048	3,453	4,782	7,453	5,594
Other	1,526	799	245	273	26
<b>Total Current Assets</b>	<u>8,806</u>	<u>7,165</u>	<u>8,713</u>	<u>13,511</u>	<u>11,546</u>
Other Assets	3,438	7,206	7,641	4,959	5,567
<b>Total Assets</b>	<u>63,149</u>	<u>77,601</u>	<u>87,731</u>	<u>115,740</u>	<u>123,760</u>
<b>Capital and Retained Earnings</b>	24,253	29,707	32,360	53,533	58,358
<b>L-T Debt</b>	<u>33,808</u>	<u>42,213</u>	<u>47,583</u>	<u>53,194</u>	<u>59,012</u>
<b>Current Liabilities</b>					
Current Portion of L-T Debt	3,006	3,511	5,096	5,303	2,317
Accounts Payable	590	535	1,892	2,794	1,030
Other	1,492	1,635	800	916	3,043
<b>Total Current Liabilities</b>	<u>5,088</u>	<u>5,681</u>	<u>7,788</u>	<u>9,013</u>	<u>6,390</u>
<b>Total Capital &amp; Liabilities</b>	<u>63,149</u>	<u>77,601</u>	<u>87,731</u>	<u>115,740</u>	<u>123,760</u>
<b>Current Ratio</b>	<u>1.7:1</u>	<u>1.3:1</u>	<u>1.1:1</u>	<u>1.5:1</u>	<u>2.1:1</u>
<b>Net Working Capital</b>	<u>3,718</u>	<u>1,484</u>	<u>925</u>	<u>4,498</u>	<u>5,156</u>
<b>Days Sales in A/C Rec.</b>	<u>102</u>	<u>81</u>	<u>87</u>	<u>89</u>	<u>84</u>
<b>Debt/Equity Ratio</b>	<u>58/42</u>	<u>59/41</u>	<u>60/40</u>	<u>50/50</u>	<u>50/50</u>

SOURCE: ENEE Audited Statements 1972-1975  
 ENEE Unaudited Statements 1976  
 \* As of 11.30.76

ENEE Source and Application of Funds for Years  
(S000's)

	1972	1973	1974	1975
<b>Sources</b>				
From Operations	4,615	5,781	5,039	8,571
New L-T Debt	11,635	10,148	9,687	11,845
Contributions	10 <sup>1</sup>	305	263	200
Other		1,604	127	12
<b>Total Sources</b>	<u>16,351</u>	<u>17,838</u>	<u>15,116</u>	<u>20,628</u>
<b>Applications</b>				
Debt: Repayment & Transfers to				
Current Portion of L-T Debt	7,343	3,348	4,542	5,516
Additions to Plant	5,258	13,627	9,143	10,594
Other	2,311	3,097	1,990	945
<b>Total Applications</b>	<u>14,912</u>	<u>20,072</u>	<u>15,675</u>	<u>17,055</u>
<b>Net Change in Working Capital</b>	1,439	(2,234)	(559)	3,573
<b>Beginning Working Capital</b>	<u>2,279</u>	<u>3,718</u>	<u>1,484</u>	<u>925</u>
<b>Ending Working Capital</b>	<u>3,718</u>	<u>1,484</u>	<u>925</u>	<u>4,498</u>
 <b>Debt Service (Amort. &amp; Int.)</b>	 1.5	 1.5	 1.2	 1.4
<b>Cash From Operations Before/NT.</b>				

SOURCE: ENEE Audited Statements 1972-1975  
ENEE Unaudited Statements 1976

ENEE INCOME STATEMENTS FOR YEARS

(\$000's)

	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>
Operating Revenues	<u>10,593</u>	<u>12,051</u>	<u>14,232</u>	<u>19,592</u>	<u>19,628</u>
Operating Expenses					
Depreciation	1,726	1,893	2,336	3,557	3,346
Generation	1,637	1,638	3,157	4,161	4,542
Transmission & Distribution	842	948	1,131	1,451	1,473
Customer Accounting & Collection	472	565	606	675	640
Sales Promotion	63	68	81	77	51
General & Administrative	1,145	1,444	1,447	1,744	1,523
Total	<u>5,885</u>	<u>6,556</u>	<u>8,758</u>	<u>11,665</u>	<u>11,575</u>
Net Operating Income	4,713	5,495	5,474	7,927	8,053
Other Income	(65)	116	114	275	(137)
Net Income Before Interest	<u>4,648</u>	<u>5,611</u>	<u>5,588</u>	<u>8,202</u>	<u>7,916</u>
Interest	<u>1,862</u>	<u>2,121</u>	<u>3,198</u>	<u>3,274</u>	<u>3,533</u>
Net Income	<u>2,786</u>	<u>3,490</u>	<u>2,390</u>	<u>4,928</u>	<u>4,383</u>
Beginning Capital & Surplus	22,163	24,253	29,707	32,360	53,533
Contributions	101	305	263	200	442
Adjustments	(797)	1,659		16,045	
Ending Capital & Surplus	<u>24,253</u>	<u>29,707</u>	<u>32,360</u>	<u>53,533</u>	<u>58,358</u>
Sales in GWH	<u>279.0</u>	<u>324.0</u>	<u>396.0</u>	<u>436.3</u>	<u>426.3</u>
Revenue/KWH	<u>3.8c</u>	<u>3.7c</u>	<u>3.6c</u>	<u>4.5c</u>	<u>4.6c</u>
Operating Costs/KWH	<u>2.1c</u>	<u>2.0c</u>	<u>2.2c</u>	<u>2.7c</u>	<u>2.7c</u>
Return on Total Assets	<u>4.6%</u>	<u>5.0%</u>	<u>2.9%</u>	<u>4.8%</u>	<u>4.0%</u> (annualized)
Income Before Interest as % of net fixed operating assets	* 9.9%	*10.3%	* 8.3%	10.8%	10.2%(annualized)
Net Income as % of Sales	<u>26%</u>	<u>29%</u>	<u>17%</u>	<u>25%</u>	<u>22%</u>
% Increase in sales	<u>12%</u>	<u>14%</u>	<u>18%</u>	<u>38%</u>	<u>9%</u>

SOURCE: ENEE AUDITED STATEMENTS 1972-1975  
 ENEE UNAUDITED STATEMENTS 1976

\* World Bank Calculation

ENEE  
SCHEDULE OF LONG TERM DEBT  
As of 12.31.75

<u>LENDER</u>	<u>INTEREST RATE</u>	<u>TERM</u>	<u>BORROWING ARRANGEMENT/ GUARANTEE</u>	<u>(\$000's) AMOUNT</u>
WORLD BANK:				
261-HO	6%	1977-85	GOH Guar.	4,853
541-HO	6 1/4%	1977-93	GOH Bor.	6,520
692-HO	7%	1977-90	GOH Bor.	4,985
841-HO	7 1/4%	1977-96	GOH Guar.	9,478
1081-HO	8%	1979-99	GOH Guar.	2,577
IDA:				<u>28,413</u>
116-HO	6 1/4%	1978-2018	GOH Bor.	3,480
201-HO	7%	1977-90	GOH Bor.	4,296
				<u>7,776</u>
AID: 137	3 1/2%	1977-87	GOH Bor.	<u>1,681</u>
CENTRAL BANK OF HONDURAS:				
2nd Stage-Rio				
Lindo	7 1/2%	1977-81	(Profits and	1,812
Other	7%	1977-85	Assets of	3,513
				<u>5,325</u>
CABEI	5 3/4%-8%	1977-89	(Assets Pur-	8,705
				<u>8,705</u>
OTHER	7%-12%	1977-81	None	6,294
TOTAL				<u>53,194</u> =====

ENEE  
SCHEDULE OF LONG TERM DEBT  
As of 12.31.75

<u>LENDER</u>	<u>INTEREST RATE</u>	<u>TERM</u>	<u>BORROWING ARRANGEMENT/ GUARANTEE</u>	<u>(\$000's) AMOUNT</u>
<b>WORLD BANK:</b>				
261-HO	6%	1977-85	GOH Guar.	4,853
541-HO	6 1/4%	1977-93	GOH Bor.	6,520
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1081-HO	8%	1979-99	GOH Guar.	2,577
<b>IDA:</b>				
116-HO	6 1/4%	1978-2018	GOH Bor.	3,480
201-HO	7%	1977-90	GOH Bor.	4,296
				<u>7,776</u>
<b>AID: 137</b>	3 1/2%	1977-87	GOH Bor.	<u>1,681</u>
<b>CENTRAL BANK OF HONDURAS:</b>				
2nd Stage-Rio				
Lindo	7 1/2%	1977-81	(Profits and Assets of ENEE)	1,812
Other	7%	1977-85		<u>3,513</u>
<b>CABEI</b>	5 3/4%-8%	1977-89	(Assets Pur- chased with Loan)	<u>8,705</u>
<b>OTHER</b>	7%-12%	1977-81	None	6,294
<b>TOTAL</b>				<u>53,194</u> =====

INTERPRETATION OF WORLD BANK DEBT SERVICING COVENANT

There are three different interpretations of the World Bank debt servicing covenant. These are based on a review of the loan agreement and the Bank's December, 1974 appraisal report of extension of the Rio Lindo hydro electric plant.

The most conservative method of calculation is based on the covenant in the World Bank loan agreement with ENEE for the Rio Lindo expansion. Using the covenant yields a ratio of 1.2:1. Other methods based on calculations in the World Bank appraisal report yield, on a more liberal basis, debt servicing ratios of 1.56:1 and 1.50:1.

As the most conservative approach gives a ratio of less than 1.4:1, the ENEE general manager has agreed to ask for World Bank approval of the proposed A.I.D. loan.

Calculations of the three ratios are the following:

CALCULATION OF DEBT SERVICING RATIO

A) World Bank Appraisal Report Method

1976 Net Income Before Interest	16,153	
Depreciation	7,298	
	<hr/>	
Total Internal Cash Generation	23,451	=====
1976 Interest Charged to Income	6,131	
1976 Amortization	8,882	
	<hr/>	
Total Debt Service	15,013	=====
Total Internal Cash Generation	<u>23,451</u>	= 1.56
	15,013	

B) World Bank Loan Covenant Method

1976 Net Income Before Interest Depreciation	16,153 7,298
Total Internal Cash Generation	<u>23,451</u> =====
1977 Interest Charged to Income	7,803
1977 Interest Charged to Construction	3,763
1977 Amortization on new L-T Debt	
1977 Payments on L-T Contracts	
1977 Amortization	7,786
Total Debt Service	<u>19,352</u> =====
<u>Internal Cash Generation</u>	<u>23,451</u>
Debt Service	19,352
= 1.21	

c) Believe World Bank meant following

1976 Net Income Before Interest Depreciation	16,153 7,298
Total Internal Cash Generation	<u>23,451</u> =====
1977 Interest Charged to Income	7,803
1977 Amortization	7,786
1977 Amortization on new L-T Debt	--
	<u>15,589</u> =====
<u>Internal Cash Generation</u>	<u>23,451</u>
Debt Service	15,589
= 1.50	

1976 net income has been annualized using 11 months ended 11-30-76 financial statements (unaudited). 77 amortization and interest charged to income are ENEE estimates.

		ENEE							
		<u>Pro Forma Source And Application of Funds</u>							
		000's							
		1977	1978	1979	1980	1981	1982	1983	1984
<b>Source -</b>									
Net Operations Before Depreciation		15,445	17,052	19,005	21,517	23,845	26,667	47,274	49,398
Existing Loans		11,028	6,800	3,200	3,700				
Proposed A.I.D. Loan		210	1,502	3,681	2,550	2,057			
Loan & GOH Contribution Package For El Cajon		5,016	31,144	41,094	71,357	93,851	69,712	10,697	
World Bank Loans For Thermal @ Nispero			5,200	12,000	6,750	1,550			
	<b>Total</b>	<b>31,699</b>	<b>61,698</b>	<b>78,980</b>	<b>105,874</b>	<b>121,303</b>	<b>96,379</b>	<b>57,971</b>	<b>49,398</b>
<b>Application -</b>									
Construction		20,945	48,097	62,387	86,507	102,964	74,972	17,317	7,140
Interest - to construction		1,867	3,892	5,324	5,578	6,927	1,091	849	
- to operations		4,388	4,379	5,229	6,867	7,743	19,866	26,281	25,095
Loan Amortizations		3,806	4,883	5,796	6,637	7,505	7,730	13,884	15,240
	<b>Total</b>	<b>31,006</b>	<b>61,251</b>	<b>78,736</b>	<b>105,589</b>	<b>125,139</b>	<b>103,659</b>	<b>58,331</b>	<b>47,475</b>
		693	447	244	285	(3,836)	(7,280)	(360)	1,923
Beginning Working Capital		5,156	5,849	6,376	7,025	7,690	4,309	(2,971)	(3,331)
Ending Working Capital		5,849	6,296	6,220	7,310	3,854	(2,971)	(3,301)	(1,408)

ENEE  
PRO FORMA INVESTMENT PLAN  
(\$000's)

	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>
Aguan Valley	295	3,042	5,136	3,670	2,557			
Normal Expansion	2,850	3,150	3,750	4,500	4,800	5,600	6,500	7,000
Puerto Cortes Thermal Unit		5,200	5,300					
San Pedro System Improvements	850							
Nispero Hydro-electric Plant			6,700	6,750	1,550			
Rural Electrification	462	434	407	230	206	181	120	140
Project V - Diesel Generation and Transmission	665							
Project VI - Rio Lindo Expansion	10,807	5,127						
El Cajón Project	5,016	31,144	41,094	71,357	93,851	69,191	10,697	
<b>TOTAL</b>	<b>20,945</b>	<b>48,097</b>	<b>62,387</b>	<b>86,507</b>	<b>102,964</b>	<b>74,972</b>	<b>17,317</b>	<b>7,140</b>

E  
N  
E  
E  
  
Pro Forma Income Statement  
 (000's)

	1977	1978	1979	1980	1981	1982	1983	1984
Revenues	24,515	27,430	30,577	34,101	37,687	41,915	60,304	63,896
Operating Expenses	5,867	6,612	7,732	8,591	9,564	10,648	11,866	13,659
Fuel	3,203	3,766	3,840	3,993	4,278	4,600	1,164	839
Depreciation	3,678	4,777	5,416	5,529	6,624	6,741	14,870	15,189
Total	12,748	15,155	16,988	18,113	20,466	21,898	27,900	29,687
Income from Operations	11,767	12,275	13,589	15,988	17,221	19,966	32,404	34,209
Interest	4,388	4,379	5,229	6,867	7,743	19,866	26,221	25,095
Net Income	7,379	7,896	8,360	9,121	9,478	100	6,183	9,114

ENEE PRO FORMA BALANCE SHEET

( \$000's )

	<u>12/31/80</u>	<u>12/31/82</u>	<u>12/31/84</u>
Net fixed assets	<u>157,022</u>	<u>505,022</u>	<u>489,883</u>
Construction in progress	<u>247,516</u>	<u>13,588</u>	<u>3,570</u>
Net working capital	<u>7,690</u>	<u>( 2,971 )</u>	<u>(1,408)</u>
Long term debt	<u>287,443</u>	<u>364,000</u>	<u>336,876</u>
Equity	<u>125,366</u>	<u>155,137</u>	<u>175,628</u>

AGUAN VALLEY PROJECT  
Financial Analysis Assumptions

Assumptions

1. Project Investment

Includes all investment during project implementation period except \$400,000 wiring fund assumed to earn 7% over its life. After 1981 a \$60 capital cost for each new household connected to the electrical system is calculated representing ENEE's average investment per hook-up.

2. Generation Investment

Represents investment in additional generating capacity required during interim period of 1981-82 until El Cajón hydro project comes on line. Investment is assumed to be the incremental cost applicable to the project area.

3. Income

See Annex H-17 for demand projections and Annex H-17 for price and sales projections.

4. Operating Costs

a. Transmission and distribution costs are calculated at 1% of investment in these facilities and based on ENEE historical data.

b. Generation Costs are based on ENEE's historical and forecasted data and calculated as follows:

<u>Year</u>	<u>Generating Source</u>	<u>Cost/KWH</u>
1980	Excess System Capacity	\$ .0175
1981-82	Thermal/Hydro Generation	.0192
1983-91	El Cajón Hydro Power	.0125
1992-2007	Other Hydro Power	.0150

Interconnected system energy losses are estimated at 10.4%, based on historical data.

c. Salaries are estimated using current average costs per employee. Initially 40 new employees are hired and with the addition of each 500 customers another new position is created.

d. Miscellaneous expenses are figured at a flat \$45,000 and assumed to increase at \$2,000-\$3,000 per year to reflect higher operating levels.

5. Depreciation is based on a useful life of 30 years for project investment. Depreciation on generation investment is calculated at 5% per year.
6. Debt servicing includes interest and amortization on A.I.D. loan in addition to interest and amortization on generation equipment loan.
7. Inflation in operating sales and figures is ignored as it is assumed that rate increases would offset operating cost inflation.

AGUAN VALLEY RURAL ELECTRIFICATION  
RATE OF RETURN ANALYSIS

Year	Generation Investment	Project Investment	Income	Cash Expenses				Total	Net Cash Income	Base Case Cash Flow	Revision to Base Case Cash Flow	Revised Cash Flow	Surplus Benefits	
				Generation	Salaries	General	Distribution Costs							
1977		295	-							(295)	-	(295)	-	(295)
1978	780	2882	-							(3662)	-	(3662)	-	(3,662)
1979	1800	5099	-							(6899)	-	(6899)	-	(6,899)
1980	1013	3698	671	349	92	45	132	616	53	(4658)	-	(4658)	-	(4,479)
1981	233	2326	1955	1084	92	47	132	1355	608	(1959)	-	(1959)	-	(1,437)
1982		65	2630	1557	92	49	132	1736	900	735	99	834	703	1537
1983		78	3054	1014	92	51	132	1269	1765	1687	229	1916	816	2732
1984		90	3623	1332	92	53	132	1602	2014	1924	408	2332	969	3301
1985		78	4092	1489	97	55	132	1775	2319	2241	514	2855	1094	3949
1986		43	4214	1516	97	57	132	1802	2412	2369	221	2590	1127	3717
1987		43	4335	1542	102	59	132	1835	2500	2457	227	2684	1159	3843
1988		47	4454	1565	102	62	132	1861	2593	2546	233	2779	1191	3960
1989		47	4581	1590	107	64	132	1893	2689	2641	240	2881	1255	4136
1990		50	4718	1617	107	67	132	1923	2795	2745	247	2992	1262	4254
1991		50	4861	1645	109	69	132	1955	2906	2856	255	3111	1300	4411
1992		53	5005	2005	109	72	132	2318	2687	2634	262	2896	1338	4234
1993		55	5015	2007	114	75	132	2328	2687	2632	263	2895	1341	4236
1994		57	5025	2009	114	81	132	2330	2689	2632	263	2895	1344	4239
1995		59	5036	2012	119	84	132	2347	2689	2630	264	2894	1347	4241
1996		60	5049	2017	119	88	132	2356	2693	2633	265	2898	1350	4248
1997		62	5061	2019	124	91	132	2366	2695	2633	265	2898	1353	4251
1998		64	5074	2022	124	95	132	2373	2701	2637	266	2903	1357	4260
1999		66	5090	2025	129	99	132	2385	2705	2639	267	2906	1361	4267
2000		68	5105	2029	129	103	132	2393	2712	2644	268	2912	1367	4277
2001		70	5121	2032	134	107	132	2405	2716	2646	268	2914	1369	4283
2002		72	5139	2035	134	111	132	2412	2727	2655	279	2924	1374	4298
2003		74	5158	2040	139	115	132	2426	2732	2658	270	2928	1379	4307
2004		76	5179	2043	139	120	132	2434	2745	2669	271	2940	1388	4325
2005		78	5200	2046	144	125	132	2449	2751	2673	273	2946	1391	4337
2006		80	5223	2053	144	130	132	2459	2764	2684	274	2958	1397	4355
2007		82	5248	2058	149	135	132	2474	2774	2692	276	2968	1403	4371

Internal Rate of Return

16%

12%

16% UNCLASSIFIED  
ANNEX H-17  
Page 1 of 5

AGUAN VALLEY PROJECT  
Sales by Customer Classification  
(\$,000's)

Rate	Customer Classification	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
\$													
.075	Residential	140	532	734	892	1066	1284	1374	1470	1573	1683	1801	1927
.073-.070	Commercial	31	141	160	146	222	265	273	281	289	298	307	316
.025	Public Lighting	23	48	47	43	51	52	55	57	59	61	64	66
.050	Govt. & Municipal	2	4	4	5	5	5	5	6	6	6	6	6
	Sub-Total	196	822	950	1132	1344	1606	1707	1814	1927	2048	2178	2315
.026	CORDEFOR	136	354	707	763	978	1160	1160	1160	1160	1160	1160	1160
.031	CONSAM	100	350	307	380	394	408	420	422	422	422	422	422
.031	Standard (Devices)	1	10	11	59	73	73	73	73	73	73	73	73
.032	INA Agriculture & INA	1	88	54	67	74	80	83	90	90	90	90	90
.050	Puerto Castilla	83	27	30	96	101	106	112	117	123	129	136	142
	Sub-Total	322	1123	1406	1623	2279	2486	2507	2521	2527	2533	2540	2546
	Total	671	1955	2636	3054	3623	4092	4214	4335	4454	4581	4718	4861

AGUA VALLEY PROJECT

Demand in KWH's

	1977	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Total Village Households <sup>1/</sup>	22500	25000	26000	27000	28000	29100	30300	31500	32700	34000	35300	36700	38100
Total Connected <sup>2/</sup>		4165	12520	14580	15680	16880	18160	18900	19620	20400	21180	22020	22860
INA Project Households <sup>3/</sup>	3200	6200	6300	6500	6700	7000	7000	7000	7000	7000	7000	7000	7000
Total Households Connected <sup>4/</sup>		8315	19820	21080	22380	23580	25180	25900	26620	27400	28180	29020	29860
Residential		7490	16850	17920	19025	20300	21400	22015	22630	23290	23955	24665	25380
Commercial		1325	2970	3160	3355	3580	3780	3885	3990	4110	4225	4355	4480
Residential Consumption (000 KWH annually) <sup>5/</sup>		1873	8425	9856	11891	14210	17120	18318	19601	20973	22441	24012	25693
Commercial Consumption (000 KWH annually) <sup>5/</sup>		423	1931	2212	2600	3133	3780	3693	4010	4131	4254	4382	4514
Public Lighting (000 KWH annually) <sup>6/</sup>		900	1500	1870	1945	2020	2095	2180	2265	2355	2445	2540	2640
Government and Municipal (000 KWH annually) <sup>6/</sup>		4	8	9	9	9	10	11	11	11	11	12	12
Sub-Total		3200	12164	13947	16445	19372	23005	24402	25887	27470	29151	30946	32859
COHDEFOR <sup>7/</sup> (000 KWH annually)		5000	13670	27200	30300	37600	44600	44600	44600	44600	44600	44600	44600
COHBANA <sup>8/</sup> (000 KWH annually)		5280	11000	11440	11880	12320	12760	13112	13200	13200	13200	13200	13200
Standard (Coyoles) <sup>9/</sup> (000 KWH annually)		1320	8800	14080	18480	22880	22880	22880	22880	22880	22880	22880	22880
INA Agriculture and Industrial Uses <sup>10/</sup> (000 KWH annually)		1600	1800	2600	2100	2300	2500	2600	2800	2800	2800	2800	2800
Puerto Castilla <sup>11/</sup>		1665	1748	1836	1927	2024	2125	2231	2343	2460	2583	2712	2848
Sub-Total		14865	26948	56556	64687	77124	84865	85423	85823	85940	86063	86192	86328
Grand Total		18065	49112	70503	81132	96496	107870	109825	111710	113410	115214	117138	119187

<sup>1/</sup> 1977 Estimate from survey. 1981 on increased at annual rate of 3.9%. Excluding the 5,000 families connected to private or municipal generators.

<sup>2/</sup> Connected households to increase from 50% of total households to 60% over 5 years and remain at 60% thereafter.

<sup>3/</sup> All INA project households are connected.

<sup>4/</sup> 1/3 of connected village households and 75% of INA households start receiving service mid-year 1980. <sup>5/</sup> All connected households receive service from 1981. Average annual residential consumption increases from 500 KWH in 1980 and 1981 to 550 KWH, 625 KWH, 700 KWH and 800 KWH in 1982, 1983, 1984, and 1985 respectively. For the same years commercial consumption increases from 650 KWH to 700 KWH, 775 KWH, 875 KWH and 1,000 KWH from 1986, residential consumption increases at a 7% rate and commercial consumption at a 3% rate.

<sup>6/</sup> Based on standards used in similar areas in Honduras.

<sup>7/</sup> Includes proposed paper mill/integrated saw mill.

<sup>8/</sup> Includes Isleta Central and 9 irrigated plantations.

<sup>9/</sup> Includes all Standard Fruit Company activities for Coyoles

<sup>10/</sup> Includes palm oil extraction plant, Sinaloa Service Center and Irrigated Pilot Project.

<sup>11/</sup> Includes only port operation.

ENEE  
SALES BY TARIFF CATEGORIES

Tariff Category	1975						1974					
	# of Customers	Sales in MKWH	%	(5000's) Revenues	%	US¢ Rev/KWH	# of Customers	Sales in MKWH	%	(5000's) Revenues	%	US¢ Rev/KWH
Residential	76,281	103,182	24	7,103	36	6.9	71,606	94,254	24	5,633	39	5.9
Commercial	9,215	64,366	15	3,490	18	5.4	8,912	58,174	15	2,774	19	4.7
Industrial	1,297	47,391	11	2,327	12	4.9	1,257	50,676	13	1,922	13	3.7
Large Users	51	193,492	44	5,786	30	3.0	48	165,533	42	3,161	22	1.9
Government	1,094	15,435	3	703	4	4.6	1,036	15,078	4	580	4	3.8
Street Lighting	41	11,483	3	139	-	1.2	41	11,029	2	134	1	1.2
Miscellaneous	1	953	-	183	-	-	-	914	-	145	2	-
<b>TOTAL</b>	<b>87,980</b>	<b>436,302</b>	<b>100</b>	<b>19,592</b>	<b>100</b>		<b>82,900</b>	<b>395,658</b>	<b>100</b>	<b>14,349</b>	<b>100</b>	

ENEE SALES AND COSTS BY LOAD CENTER  
1975

CENTER	SALES		EXPENSES							TOTAL
	MKWH	\$ 000	GENERAL	TRANSPOR- TATION	DIST.	CUST. ACCTG.	SALES PROM.	GEN'L	DEP'N	
Tegucigalpa	114,248	6,902			394	248		57	432	1,131
San Pedro Sula	141,138	6,781			350	240	13	297	261	1,161
Large Users	117,801	2,937								
Transmission				364					419	783
Generating Plants			2,331		10				1,264	3,605
Other Interconnected	41,074	2,189			200	106	1	115	186	608
Isolated	22,041	1,788	1,619	3	131	81		44	200	2,078
Unallocated							62	1,231	827	2,120
<b>TOTAL</b>	<b>436,302</b>	<b>20,597</b>	<b>3,950</b>	<b>367</b>	<b>1,085</b>	<b>675</b>	<b>76</b>	<b>1,744</b>	<b>3,589</b>	<b>11,486</b>

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22 de febrero de 1977

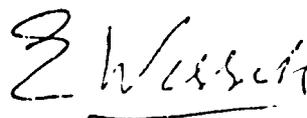
Dr. Luis Cosenza Jimenez  
Gerente General de ENEE  
Apartado 99  
Tegucigalpa, Honduras, C.A.

De mi consideración:

Tengo el agrado de acusar recibo de su carta del 2 de febrero de 1977, por la cual solicita la anuencia del Banco a un préstamo de A.I.D., que se canalizará a través del Gobierno de Honduras.

Al respecto, cumpla en informarle que no tenemos objeciones a la operación propuesta pero deseáramos recibir los estudios realizados y la evaluación económica y financiera del proyecto.

Atentamente,



Everardo Wessels  
Jefe

División de Energía  
Oficina Regional para Latinoamérica y el Caribe

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ENEE POWER GENERATION  
( \$000,000 )

YEAR	Demand in MW	1977 Firm Capacity in MW	ALTERNATIVE NO. 1		ALTERNATIVE NO. 2		ALTERNATIVE NO. 3	
			Generation	Cap. MW*	Generation	Cap. MW*	Generation	Cap. MW*
1979	145	167	30 MW Thermal Plant \$11	197	30 MW Thermal Plant \$11	197	30 MW Thermal Plant \$11	197
1980	167	167		197		197		197
1981	187	167	Nispero 15 MW hydroelectric \$15	212	Nispero 15 MW hydroelectric \$15	212	Nispero 15 MW hydroelectric \$15	212
1982	208	167		212		212		212
1983	232	167	El Cajón 500 MW hydroelectric \$325	712	Naranjito 90 MW hydroelectric \$84	302	Naranjito 90 MW hydroelectric \$84	302
1984	255	167		712		302		302
1985	279	167		712		302		302
1986	309	167		712	El Cajón 500 MW hydroelectric \$410	802	Piedras Amarillas 200 MW hydroelectric \$300	502
1987	339	167		712		802		502

(\* ) The sum of 1977 firm capacity plus new installed capacity.