

PD-AAL-345

517-0144/37

1982

A.I.D. Loan No. 517-T-037
517-W-038
Project Number 517-0144

LOAN AGREEMENT

Between

THE GOVERNMENT OF THE DOMINICAN REPUBLIC

and

THE UNITED STATES OF AMERICA

for

ENERGY CONSERVATION AND RESOURCE DEVELOPMENT

Dated: April 22, 1982

CONFORMED COPY

A.I.D. Loan No. 517-T-037
517-W-038
Project No. 517-0144

LOAN AGREEMENT dated April 22, 1982 between the GOVERNMENT OF THE DOMINICAN REPUBLIC ("Borrower") and the UNITED STATES OF AMERICA, acting through the Agency for International Development ("A.I.D.").

ARTICLE 1

The Agreement

The purpose of this Agreement is to set out the understanding of the Parties named above ("Parties") with respect to the undertaking by the Borrower of the Project described below, and with respect to the financing of the Project by the Parties.

ARTICLE 2

The Project

SECTION 2.1 Definition of the Project. The Project, which is further described in Annex 1, consists of assisting the Borrower to upgrade institutional capability in the energy area and to carry out programs in energy conservation and development of non-petroleum energy resources. Within the limits of the above definition of the Project, elements of the amplified description stated in Annex 1 may be changed by written agreement of the authorized representatives of the Parties named in Section 9.2, without formal amendment of this Agreement.

ARTICLE 3

Financing

SECTION 3.1 The Loan. To assist the Borrower to meet the costs of carrying out the Project, A.I.D., pursuant to the Foreign Assistance Act of 1961, as amended, agrees to lend the Borrower under the terms of this Agreement an amount not to exceed Eleven Million Eight Hundred Eighteen Thousand United States Dollars (US\$11,818,000) ("Loan"). The aggregate amount of disbursements under the Loan is referred to as "Principal."

The Loan may be used to finance foreign exchange costs, as defined in Section 7.1, and local currency costs, as defined in Section 7.2, of goods and services required for the Project.

SECTION 3.2 Borrower Resources for the Project.

(a) The Borrower agrees to provide or cause to be provided for the Project all funds, in addition to the Loan, and all other resources required to carry out the Project effectively and in a timely manner.

(b) The resources provided by the Borrower for the Project will be not less than the equivalent of Four Million Four Hundred Thousand United States Dollars (US\$4,400,000).

SECTION 3.3 Project Assistance Completion Date

(a) The "Project Assistance Completion Date" (PACD), which is April 22, 1987, or such other date as the parties may agree to in writing, is the date by which the Parties estimate that all services financed under the Loan will have been performed and all goods financed under the Loan will have been furnished for the Project as contemplated in this Agreement.

(b) Except as A.I.D. may otherwise agree in writing, A.I.D. will not issue or approve documentation which would authorize disbursement of the Loan for services performed subsequent to the PACD or for goods furnished for the Project, as contemplated in this Agreement, subsequent to the PACD.

(c) Requests for disbursement, accompanied by necessary supporting documentation described in Project Implementation letters, are to be received by A.I.D. or any bank described in Section 8.1 no later than nine (9) months following the PACD, or such other period as A.I.D. agrees to in writing. After such period, A.I.D., giving notice in writing to the Borrower, may at any time or times reduce the amount of the loan by all or any part thereof for which requests for disbursement, accompanied by necessary supporting documentation described in Project Implementation letters, were not received before the expiration of said period.

ARTICLE 4

Loan Terms

SECTION 4.1 Interest. The Borrower will pay to A.I.D. interest which will accrue at the rate of two percent (2%) per annum for ten (10) years following the date of the first disbursement hereunder and at the rate of three percent (3%) per annum thereafter on the outstanding balance of Principal and on any due and unpaid interest. Interest on the outstanding balance will accrue from the date (as defined in Section 8.5) of each respective disbursement, and will be payable semi-annually. The first payment of interest will be due and payable no later than six (6) months after the first disbursement hereunder, on a date to be specified by A.I.D.

SECTION 4.2 Repayment. The Borrower will repay to A.I.D. the Principal within twenty five (25) years from the date of the first disbursement of the Loan in thirty one (31) approximately equal semi-annual installments of Principal and interest. The first installment of Principal will be payable nine and one-half (9-1/2) years after the date on which the first interest payment is due in accordance with Section 4.1. A.I.D. will provide the Borrower with an amortization schedule in accordance with this Section after final disbursement under the Loan.

SECTION 4.3 Application, Currency, and Place of Payment. All payments of interest and Principal hereunder will be made in U.S. Dollars and will be applied first to the payment of interest due and then to the repayment of Principal. Except as A.I.D. may otherwise specify in writing, payments will be made to the Controller, Office of Financial Management, Agency for International Development, Washington, D.C. 20523, U.S.A., and will be deemed made when received by the Office of Financial Management.

SECTION 4.4 Prepayment. Upon payment of all interest and any refunds then due, the Borrower may prepay, without penalty, all or any part of the Principal. Unless A.I.D. otherwise agrees in writing, any such prepayment will be applied to the installments of Principal in the inverse order of their maturity.

SECTION 4.5 Renegotiation of Terms

(a) The Borrower and A.I.D. agree to negotiate, at such time or times as either may request, an acceleration of the repayment of the loan in the event that there is any significant and continuing improvement in the internal and external economic and financial position and prospects

of the Dominican Republic, which enable the Borrower to repay the Loan on a shorter schedule.

(b) Any request by either Party to the other to so negotiate will be made pursuant to Section 9.1, and will give the name and address of the person or persons who will represent the requesting Party in such negotiations.

(c) Within thirty (30) days after delivery of a request to negotiate, the requested Party will communicate to the other, pursuant to Section 9.1, the name and address of the person or persons who will represent the requested Party in such negotiations.

(d) The representative of the Parties will meet to carry on negotiations no later than thirty (30) days after delivery of the requested Party's communication under subsection (c). The negotiation will take place at a location mutually agreed upon by the representatives of the Parties, provided that, in the absence of mutual agreement, the negotiations will take place at the office of the Borrower in the Dominican Republic.

SECTION 4.6 Termination on Full Payment. Upon payment in full of the Principal and any accrued interest, this Agreement and all obligations of the Borrower and A.I.D. under it will cease.

ARTICLE 5

Conditions Precedent to Disbursement

SECTION 5.1 First Disbursement. Prior to the first disbursement under the Loan, or to the issuance by A.I.D. of documentation pursuant to which disbursement will be made, the Borrower, will, except as A.I.D.

may otherwise agree in writing, furnish to A.I.D. in form and substance satisfactory to A.I.D.:

(a) An opinion of the legal advisor to the Borrower that this Agreement has been duly authorized and/or ratified by, and executed on behalf of, the Borrower, and that it constitutes a valid and legally binding obligation of the Borrower in accordance with all of its terms;

(b) A statement of the name of the person holding, or acting in the office of the Borrower specified in Section 9.2, and of any additional representatives, together with a specimen signature of each person specified in such statement;

(c) Evidence that a full time coordinator has been appointed by the Borrower for the Project;

(d) Evidence that adequate administrative arrangements have been made within the National Energy Policy Commission to provide the necessary supporting staff, equipment and other resources to administer the Project;

SECTION 5.2 Additional Disbursements

(a) Condition Precedent to Disbursement for Industrial Conservation Audits, Commodities and Equipment - not including Vehicles

Prior to any disbursement, or the issuance of any commitment documents under the Project Agreement for industrial conservation audits, commodities and equipment, the Borrower shall, except as A.I.D. may otherwise agree in writing, furnish in form and substance satisfactory to A.I.D. a detailed implementation plan for the Industrial Conservation Program.

(b) Condition Precedent to Disbursement for Industrial Conservation Pilot Projects

Prior to any disbursement, or the issuance of any commitment documents under the Project Agreement for industrial conservation pilot projects, the Borrower shall, except as A.I.D. may otherwise agree in writing, furnish in form and substance satisfactory to A.I.D. evidence of the legal arrangements between the National Energy Policy Commission and individual industries where pilot projects are to be carried out, regarding ownership, liability, access to facilities and implementation responsibilities.

(c) Condition Precedent to Disbursement for the Industrial Conservation Credit Fund

Prior to any disbursement, or the issuance of any commitment documents under the Project Agreement for the industrial conservation credit fund, the Borrower shall, except as A.I.D. may otherwise agree in writing, furnish in form and substance satisfactory to A.I.D. evidence of the establishment of the Credit Fund and sub-loan procedures, terms and criteria to be used by FIDE.

(d) Conditions Precedent to Disbursement for Mini-Hydro Commodities and Equipment - not including Vehicles

Prior to any disbursement, or the issuance of any commitment documents under the Project Agreement for mini-hydro commodities and equipment, the Borrower shall, except as A.I.D. may otherwise agree in writing, furnish in form and substance satisfactory to A.I.D.:

- (1) A detailed implementation plan for the Mini-Hydro Development Program.

(2) Evidence of an interagency agreement among the National Energy Policy Commission, CDE and INDRHI regarding institutional responsibilities for implementation of the program.

(3) Evidence of the legal arrangements between CDE and individual communities where mini-hydro facilities are to be installed, regarding ownership of equipment, maintenance and procurement of spare parts, and entitlement to revenues generated.

(e) Conditions Precedent to Disbursement for Commodities and Equipment for the Wood Fuel Development Program - not including Vehicles

Prior to any disbursement, or the issuance of any commitment documents under the Project Agreement for commodities and equipment for the Wood Fuel Development Program, the Borrower shall, except as A.I.D. may otherwise agree in writing, furnish in form and substance satisfactory to A.I.D.:

- (1) A detailed implementation plan for the Wood Fuel Development Program.
- (2) Evidence of an interagency agreement among the National Energy Policy Commission, ISA, the Secretariat of Agriculture, FORESTA and INDOTEC regarding institutional responsibilities for implementation of the program.
- (3) Evidence of ISA's title or right to use the land at Mao and the GODR's title or right to use the land at Azua for the Wood Fuel Program.

- (4) Evidence of a legal dispensation issued by the GODR allowing trees grown under the program to be cut for research and experimental purposes.

SECTION 5.3 Notification. When A.I.D. has determined that the conditions precedent specified in Sections 5.1 and 5.2 have been met, it will promptly notify the Borrower.

SECTION 5.4 Terminal Dates for Conditions Precedent.

(a) If all of the conditions specified in Section 5.1 have not been met within 90 days from the date of this Agreement, or such later date as A.I.D. may agree to in writing, A.I.D., at its option, may terminate this Agreement by written notice to the Borrower.

(b) If the conditions specified in Section 5.2 are not met within the following dates:

- (1) 5.2 (a) within 12 months from the date of this Agreement;
- (2) 5.2 (b) within 24 months from the date of this Agreement;
- (3) 5.2 (c) within 12 months from the date of this Agreement;
- (4) 5.2 (d) within 12 months from the date of this Agreement;

and

(5) 5.2 (e) within 12 months from the date of this Agreement, or such later date (s) as A.I.D. may agree to in writing, A.I.D. at its option, may cancel the then undisbursed balance of the loan, to the extent not irrevocably committed to third parties, and may terminate this Agreement by written notice to the Borrower. In the event of such termination, the Borrower will repay immediately the Principal then outstanding and any accrued interest; on receipt of such payments in full, this Agreement and all obligations of the Parties hereunder will terminate.

ARTICLE 6

Special Covenants

SECTION 6.1 Project Evaluation. The Parties agree to establish an evaluation program as part of the Project. Except as the Parties may otherwise agree in writing, the program will include two evaluations during the implementation of the Project and at least one more at the Project conclusion. The evaluation will include, but not be limited to: (a) evaluation of progress toward attainment of the objectives of the Project; (b) identification and evaluation of problem areas or constraints which may inhibit such attainment; (c) assessment of how such information may be used to help overcome such problems; and (d) evaluation, to the degree feasible, of the overall development impact of the Project.

SECTION 6.2 Evaluation Plan. Except as A.I.D. may otherwise agree in writing, the Borrower will prepare and submit to A.I.D. within 12 months of the signing of this Agreement a time phased plan for evaluation described in Section 6.1.

ARTICLE 7

Procurement Source

SECTION 7.1 Foreign Exchange Costs. Except as A.I.D. may otherwise agree in writing, disbursements pursuant to Section 8.1 will be used exclusively to finance the costs of goods and services required for the Project having their source and origin in countries included in Code 941 of the A.I.D. Geographic Code Book as in effect at the time orders are placed or contracts entered into for such goods and services ("Foreign Exchange

Costs"), except as provided in the Project Loan Standard Provisions Annex, Section C.1 (2) with respect to marine insurance. In addition, transportation costs will be financed under the loan on carriers under flag registry of an AID Geographic Code 941 country or the Dominican Republic.

SECTION 7.2 Local Currency Costs. Disbursements pursuant to Section 8.2 will be used exclusively to finance the costs of goods and services required for the Project having their source and, except as A.I.D. may otherwise agree in writing, their origin in the Dominican Republic ("Local Currency Costs").

ARTICLE 8

Disbursements

SECTION 8.1 Disbursement for Foreign Exchange Costs

(a) After satisfaction of conditions precedent, the Borrower may obtain disbursements of funds under the Loan for the Foreign Exchange Costs of goods or services required for the Project in accordance with the Terms of this Agreement, by such of the following methods as may be mutually agreed upon:

(1) By submitting to A.I.D. with necessary supporting documentation as described in Project Implementation Letters, (i) requests for reimbursement for such goods or services, or (ii) requests for A.I.D. to procure commodities or services in Borrower's behalf for the Project; or,

(2) By requesting A.I.D. to issue Letters of Commitment for specified amounts (i) to one or more U.S. banks, satisfactory to A.I.D., committing A.I.D. to reimburse such bank or banks for payments made

by them to contractors or suppliers, under letter of Credit or otherwise, for such goods or services, or (ii) directly to one or more contractors or suppliers, committing A.I.D. to pay such contractors or suppliers for such goods or services.

b) Banking charges incurred by the Borrower in connection with Letter of Commitment and Letters of Credit will be financed under the Loan unless the Borrower instructs A.I.D. to the contrary. Such other charges as the Parties may agree to may also be financed under the Loan.

SECTION 8.2 Disbursement for Local Currency Costs

(a) After satisfaction of conditions precedent, the Borrower may obtain disbursements of funds under the Loan for Local Currency Costs required for the Project in accordance with the terms of this Agreement, by submitting to A.I.D., with necessary supporting documentation as described in Project Implementation Letters, requests to finance such costs. The Local Currency needed for such disbursement may be obtained through acquisition by A.I.D. with U.S. Dollars or from local currency already owned by the U.S. Government.

SECTION 8.3 Other Forms of Disbursement. Disbursements of the Loan may also be made through other means as the Parties may agree to in writing.

SECTION 8.4 Rate of Exchange. If funds provided under the Loan are introduced into the Dominican Republic by A.I.D. or any public or private agency for purposes of carrying out obligations of A.I.D. hereunder, the Borrower will make such arrangements as may be necessary so that such funds may be converted into currency of the Dominican Republic at the highest rate of exchange which, at the time the conversion is made, is not unlawful in the Dominican Republic.

SECTION 8.5 Date of Disbursement Disbursements by A.I.D. will be deemed to occur (a) on the date on which A.I.D. makes a disbursement to the Borrower or its designee, or to a bank, contractor or supplier pursuant to a Letter of Commitment, contract or purchase order; or (b) on the date on which A.I.D. disburses to the Borrower or its designee local currency acquired in accordance with Section 8.2.

ARTICLE 9

Miscellaneous

SECTION 9.1 Communications. Any notice, request, document or other communication submitted by either Party to the other under this Agreement will be in writing or by telegram or cable, and will be deemed duly given or sent when delivered to such party at the following address:

To the Borrower:

Mail Address: National Energy Policy Commission
Plaza Compostela, Ave. John F. Kennedy
Apartado 304-2
Santo Domingo, Dominican Republic

Cable Address: National Energy Policy Commission
Plaza Compostela, Ave. John F. Kennedy
Apartado 304-2
Santo Domingo, Dominican Republic

To A.I.D.:

Mail Address: USAID Mission to the Dominican Republic
Santo Domingo, Dominican Republic

Cable Address: USAID Santo Domingo

All such communications will be in English or Spanish, unless the Parties otherwise agree in writing. Other addresses may be substituted for the above upon the given of notice.

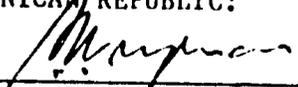
SECTION 9.2 Representatives. For all purposes relevant to this Agreement, the Borrower will be represented by the individual holding or acting in the office of President, National Energy Policy Commission, and A.I.D. will be represented by the individual holding or acting in the office of the Director, each of whom, by written notice, may designate additional representatives for all purposes other than exercising the power under Section 2.1 to revise elements of the amplified description in Annex 1. The names of the representatives of the Borrower, with specimen signatures, will be provided to A.I.D., which may accept as duly authorized any instruments signed by such representatives in implementation of this Agreement, until receipt of written notice of revocation of their authority.

SECTION 9.3 Standard Provision Annex. A "Project Loan Standard Provisions Annex" (Annex 2) is attached to and forms part of this Agreement.

SECTION 9.4 Language of Agreement. This Agreement is prepared in both English and Spanish. In the event of ambiguity or conflict between the two versions, the English language version will control.

IN WITNESS WHEREOF, the Borrower and the United States of America, each acting through its duly authorized representatives, have caused this Agreement to be signed in two originals in their names and delivered as of the day and year first above written.

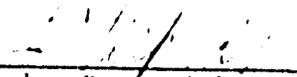
FOR THE GOVERNMENT OF
THE DOMINICAN REPUBLIC:

BY: 
Antonio Guzmán

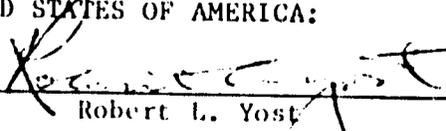
TITLE: President

BY: 
~~Dr. Dolfino Báez Ortín~~

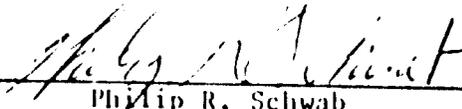
TITLE: Technical Secretary
of the Presidency
President, National Energy
Policy Commission

BY: 
Carlos Despradel
TITLE: Governor of the Central Bank

FOR THE GOVERNMENT OF THE
UNITED STATES OF AMERICA:

BY: 
Robert L. Yost

TITLE: Ambassador

BY: 
Philip R. Schwab

TITLE: Director, USAID Mission
to the Dominican Republic

ANNEX 1

PROJECT DESCRIPTION

The goal of this project is to help reduce the dependence of the Dominican Republic on imported petroleum and to increase the availability of affordable energy to all Dominicans. The purposes of the project are to (1) develop a national energy investment planning capability, (2) initiate a continuing program of industrial energy conservation, (3) develop small scale hydro and wood fuels as alternative sources of energy, and (4) upgrade the technical, financial and planning capabilities of CDE.

The following is a summary budget for the project:

<u>SUMMARY PROJECT BUDGET</u>				
(\$000)				
	<u>A.I.D.</u>		<u>GO DR</u>	<u>TOTAL</u>
	<u>L</u>	<u>G</u>		
1. <u>National Energy Planning</u>	-	250	50	300
2. <u>Industrial Conservation Program</u>	7,544	1,040	4,852	13,436
3. <u>Mini-Hydro Development Program</u>	3,260	540	868	4,668
4. <u>Wood Fuel Development Program</u>	924	674	470	2,068
5. <u>CDE Technical Assistance Program</u>	90	610	50	750
6. <u>Project Administration and Evaluation</u>	-	1,000	-	1,000
TOTALS	11,818	4,114	6,290	22,222

Funds will be reprogrammable among different project components up to 15 percent.

The project consists of six components which are described below.

1. National Energy Planning (\$300,000)

The project will finance technical assistance to the National Energy Commission for a period of up to 12 months for development of a national energy investment planning capability. Technical assistance to commence the energy planning effort was recently contracted by the Energy Commission with LAC Regional funds (\$72,560). This project will finance a continuation and conclusion of this effort.

Specifically, the Commission will be assisted in evaluating alternative investments in energy conservation, resource development, and centralized and decentralized electricity generation on the basis of economic, social and technical criteria. Priorities among all investments over a 10 year period will be established and for each recommended investment an annual schedule of foreign and domestic capital requirements will be developed. Preliminary financial analyses for recommended investments will also be included as a first step for facilitating discussions with potential private and public funding sources. Finally, recommendations will be made by the Commission regarding specific changes in CODR fuel-pricing and rate structure policies to ensure maximum efficiency of investments undertaken. By the end of the technical assistance effort it is expected that the Commission will have developed a proposed energy investment plan for consideration by the CODR as well as the capability to carry on investment planning efforts on a continuing basis.

The proposed investment plan for the period 1981-1990 will be presented in a comprehensive report prepared by the Energy Commission staff and followed up by a cabinet level workshop of the Energy Commission. The report will include:

- A comprehensive set of recommended time-phased energy investments and realistic sources of financing for such investments;
- A master schedule showing the time-phasing of project commitments, project startup and operations, and associated funds flows;
- Recommendations regarding government pricing and other policies necessary to support the national energy investment plan;
- Analysis of the likely effect, over time, of the national energy investment plan -- including both the investment projects themselves and the supporting capital financing program and energy pricing.

measures and other government policies -- on national energy balances, energy imports, and projected macroeconomic aggregates (balance of payments on current account, level of servicing costs of external debts, etc.).

The proposed plan will serve as the basis from which to proceed with development of multi-year donor assistance programs as well as with initiation of specific energy pricing policy and investment actions. It is expected that the plan will also help to achieve a consensus within the government on energy investment activity and serve as a guideline for budget allocations to different implementing institutions.

To assist the Commission in developing an energy investment planning capability and proposed national investment plan, approximately 25 person months of technical assistance in economics, financial analysis and technical areas will be required over a 9-12 month period, in addition to that already contracted with LAC Regional funds. The cost of additional technical assistance required is estimated at \$250,000.

2. Industrial Energy Conservation Program (\$13,436,000)

2.a. Introduction

In the area of energy conservation, this project will focus on the sector of the economy which consumes almost 40 percent of all energy in the country - industry. There is at present no systematic program of industrial conservation underway in the Dominican Republic. Of course, with the cost of fuels and electricity continuing to rise, the economic incentive for individual industries to save energy is increasing. The fact that very little has actually been done in the way of industrial conservation, however, can probably be attributed to the following principal constraints: lack of awareness in industries about appropriate energy conservation techniques and available technologies; reluctance to assume the cost and risk of introducing new technologies; and lack or inaccessibility of credit for financing conservation measures. In short, before industries can begin to conserve energy effectively, they will need assistance in identifying ways in which energy is currently used and wasted, in understanding how wastage can be reduced, and in implementing and financing specific conservation measures.

This project will initiate a continuing program in industrial conservation aimed at the above constraints. In general, the project will support government efforts, through the National Energy Commission, to conduct energy analyses of Dominican industries, to identify opportunities for increasing energy efficiency in the industrial sector, to provide direct assistance to industries for this purpose, and to encourage a broader based effort on the part of the private sector in industrial conservation.

It should be emphasized at the outset that the proposed program envisions an essential role for the private sector in achievement of large scale energy savings in industry. Government activities to be supported under this program are designed less to achieve conservation directly than to encourage and facilitate efforts on the part of individual industries and of private firms in assisting industries to carry out conservation measures. The Energy Commission is considered the most appropriate government institutions for taking the lead in this outreach effort to the private sector. It has an Industrial Conservation Department with a capable staff of six professionals (to be expanded under the program) and has recently completed a brief survey of energy consumption in 100 industries. While other institutions such as INDOTEC will provide support to the Commission in implementing the program, no other government agency appears to be as capable or willing to take the lead in promoting industrial conservation. Through detailed data gathering and analysis of individual industries, this program should also contribute to the overall capability of the Commission in national energy planning.

In an environment of limited human and financial resources, it is not practical to define a program which can cover all industries, at least at the outset. It has been decided, therefore, not to direct this program initially towards the sugar industry, mining, the oil refinery and CDE, which are clearly important energy consumers but are considered cases involving special circumstances not appropriate to this program.

2.b Program Activities

2.b.1. Energy Audits

Purpose and Scope of Energy Audits

At the individual industry level, an effective energy conservation program has to be related to a numerical target or objective. To define company and plant targets for the reduction of waste or the improvement of energy efficiency, each plant needs to know exactly what energy it uses and how. Such a procedure is provided by an energy audit, which includes:

- (1) monitoring the type and quantity of fuels and electricity consumed;
- (2) relating energy consumptions and costs to the output of the plant;
- (3) identifying the activities and major processing stages where energy is used;
- (4) identifying the activities where energy savings can be effected.

The purpose of the energy audits to be initiated by the industrial conservation program is thus to provide plants with accurate means of recording energy consumption and costs and identifying real opportunities for energy savings, and to provide the Energy Commission with comprehensive and accurate data appropriate for national energy planning activities.

An initial "short audit" for a plant will probably take about 2-3 days on average, depending on the complexity of the plant and the availability (and accuracy) of data on existing operations. This kind of brief audit cannot be very sophisticated, but is most useful in revealing inadequacies in metering and measurement. Obvious examples of waste, such as steam and fluid leaks, and a lack of insulation, will be found in the course of even the most elementary check of a plant. Such deficiencies should be attended to at once, as a few quick results serve as an encouragement to further action, and will demonstrate to even the most skeptical plant management the value of audit work. The aim of the brief initial audit is to obtain data and energy savings quickly. It must be accepted that data forms, and procedures, may have to be redesigned several times to best suit the needs of a specific plant.

A more comprehensive "extended audit" usually follows the first brief audit. Depending on the nature and complexity of the plant, an extended audit can take from several weeks to several months to complete. It will include a detailed examination of energy and material balances for specific plant activities and equipment. Whenever possible, checks of plant operations are carried out over extended periods of time, at night and at weekends, as well as during normal daytime working hours to ensure that nothing is overlooked. An audit report is prepared which includes a description of energy inputs and product outputs by major activity or processing function, and which evaluates the efficiency of each step of the manufacturing process. Means of improving these efficiencies will be listed, and at least a preliminary assessment of the cost of the improvements will be made to indicate the expected payback on any capital investment needed. The audit report should conclude with specific recommendations for detailed engineering studies and feasibility analyses, which must then be performed to justify the implementation of those conservation measures that require investments.

Selection of Plants for Audits

Much useful work on data collection has already been accomplished by the staff of the Energy Commission. Brief surveys of 100 plants were conducted at the end of 1980, and the analysis of results is already complete. The surveys concentrated on obtaining energy consumption and production data. The audit work to be conducted within this program will build upon the excellent start made by the Commission and will extend the data collection aspect to include review of plant operating practices and efficiency. Where necessary, portable instruments will be used to assess the operating performance.

Under the program, it is proposed that about 50 plants be studied, some for short audits only, some for extended audits of up to one or two months duration. The criteria for selecting plants to be audited are:

- (1) the plant is similar to many other plants in the industrial sector, and therefore its energy consumption pattern is likely to be representative of many others of its kind, and conservation measures/programs may be replicated widely (e.g. bakeries);
- (2) the plant itself consumes a significant amount of energy (especially oil-based fuels);
- (3) the plant includes one or more unit operations which occur widely in the industrial sector, offering the opportunity for replication, as well as for training engineers in widely applicable techniques.

The final selection of plants to be audited should be made of course by the Commission. Both state owned (CORDE) plants and private plants will be considered. While auditing of CORDE plants may present some political problems in some cases, and require that the Commission proceed with some caution, both the Mission and the Commission believe that as many state owned plants should be audited as possible. The government, after all, should be expected to demonstrate that it is indeed serious about industrial conservation.

Training in Audit Techniques

To be able to carry out energy audits effectively, Energy Commission staff will require a good deal of training. The Energy Commission is already committed to increasing the staff of its Industrial Conservation Department from 6 professionals to 15. By the end of the project it is expected that 10 commission engineers will be fully trained in audit techniques. Training will be provided through a combination of classroom lectures, practical on-the-job training in the performance of actual energy audits and special overseas training.

The topics for the classroom lectures will include:

- (1) Energy consumption patterns in the Dominican industrial sector;
- (2) Energy audits - what they are, data forms, conversion factors, etc.;

- (3) Basic unit operations - combustion principles, calculation of efficiencies, heat transfer, heat recovery, drying, evaporation, distillation, boiler operation, water treatment, steam systems, control of electrical demand, combined heat and power systems (cogeneration);
- (4) Industrial lighting;
- (5) Space conditioning of industrial buildings and offices;
- (6) Generally-applicable conservation measures;
- (7) Measures applicable to specific industries;
- (8) Company and plant conservation programs - how to set up, energy efficiency monitoring, development of targets for efficiency improvement;
- (9) Economics of energy conservation, oil prices, electricity tariffs; and
- (10) Practical aspects of plant audits, use of portable instruments.

Classroom lectures will continue for the first four years of the proposed program. It is anticipated that two "cycles" of lectures will be given each year, enabling a total of about 8 to 10 engineers to receive this training annually. Initially, it is recommended that participants be exclusively from the Commission, but that "outside" participants be accepted in subsequent years from such institutions as INDOTEC, CDE, CEA, and the private sector. In this way, priority will be given to building the resources of the Commission but due recognition will be given to the need to broaden the base of qualified audit engineers available to serve the entire Dominican industrial sector, both public and private.

Practical on-the-job training will be carried out under the short and extended audit programs described below.

It is also proposed that Commission engineers receive special training in audit work outside the Dominican Republic. Groups of 2-4 engineers at a time will be assigned to work within audit teams engaged in energy conservation work in the United States or elsewhere. In the course of a two months assignment, Commission engineers would be expected to participate fully, as working team members, in comprehensive audit projects for commercial clients including development of practical and economic recommendations for plant improvement. A maximum of ten Commission engineers would receive training abroad. This practical

experience in audit techniques, including cost-benefits analyses, and exposure to a variety of industrial plants in other countries, is recommended as an essential complement to their on-the-job training in the Dominican Republic itself.

To help upgrade the capability of local universities to train Dominicans in audit techniques in the future, up to 6 faculty members from the engineering departments of UCMM in Santiago and UNPHU in Santo Domingo will be included in both the in country training courses and the on-the-job training abroad.

Short Audit Program

In the first year of the program, it is proposed that up to 10 short audits be performed by Commission engineers in conjunction with foreign experts.

These short audits will serve several functions:

- (1) as training exercises for CNPE staff in audit techniques and the use of portable diagnostic instruments;
- (2) as a means of obtaining accurate energy-related data for the plants examined;
- (3) as a means of identifying appropriate plants for extended audits;
- (4) as a means of identifying opportunities for pilot projects to demonstrate conservation technologies.

In subsequent years of the program, it is anticipated that Commission staff will carry out up to 15 short audits each year, for a total of approximately 50 over 4 years, assisted to a lesser and lesser extent by foreign experts as their own expertise and confidence improves. It is important, however, to ensure that the quality of work at all times remains high, in order to foster the credibility of the program and of the Commission as a responsible organization in the field of audits.

The short audits will consist of visits by teams of engineers, approximately four from the Commission and two instructors (industry/audit specialists). Questionnaires and proposed work plans will be sent to selected plants in advance, and the teams will subsequently spend up to 3 days on site, collecting data and examining the manufacturing plant. A further 3 days will be required for data analysis and one or two days allowed for a return visit to the plant to discuss the audit findings with plant personnel.

The precise form of data collection will depend on the size of the plant, its functions and its complexity. Appropriate questionnaires will be developed as part of the program.

In order to transport the complete sets of portable instruments from plant to plant, it is proposed that each team of three or four engineers be provided with a small van or minibus, with special storage space for instruments and supplies. The audit team can then be a self-sufficient unit, capable of operating in plants whose own instrumentation may be deficient to the extent of being virtually non-existing, as is all too often the case.

Extended Audit Program

As a further stage in the training of Commission personnel, and in order to identify and evaluate real opportunities for energy savings in plants, it is proposed that two extended audits be performed in the first year of the program and a total of about 10-12 extended audits during the first four years of the program. It is recommended that one large plant and one small plant should be selected to serve as models for the extended audit procedures in the first year. The two plants to be covered by extended audits in the first year will be selected following the completion of the short audits mentioned above.

Large plants (e.g. a glass factory) are expected to require about 4-6 weeks on site by a team of up to four Commission engineers accompanied by three process/audit experts, followed by 4 weeks of data analysis and report writing, and up to one week for review with plant personnel.

Smaller plants (e.g. fruit and vegetable canning) are expected to require about 2 weeks on site, followed by 2 weeks for data analysis and report writing, and up to one week for review with plant personnel.

The participation of foreign experts in the extended audits is expected to remain necessary throughout the first four years of the program, but the level of their participation will be gradually reduced as Commission staff become better able to work independently.

Audit Reports

An important element of any industrial energy conservation program is the communication of techniques and achievements throughout the industrial sector. Preparation of comprehensive reports on the brief and extended audits is therefore included as a specific task in the program. Obviously, care will have to be taken to exclude sensitive confidential data from published reports. The Program Advisor (see Technical Assistance below) will help the Commission to establish guidelines on what information should be made public and what should remain confidential.

The plants themselves must, of course, receive full reports directly from the audit teams, and preparation of these reports is included within the tasks described above.

In addition, there are at least two "types" of report which can be produced for widespread distribution outside the plants actually subjected to audit:

(1) General reports of the short audits, which seek to present a picture of the aggregated energy consumption patterns in specified industries (cement, textiles, chemicals, etc.). These reports can also present the "energy efficiencies" of the plants audited, so that similar plants will be able to compare their own performance. A list of energy saving opportunities applicable to the plants can also be provided as a guide for other plants.

(2) Specific reports on the extended audits, which serve as models of audit procedures. These will include details of energy consumption, and should examine the manufacturing processes used in the particular plant. The potential for energy savings should be reviewed in detail, and needs for further research, development or demonstrations should be identified.

The general reports should be prepared at least annually, and can be up-dated regularly to provide industry-wide aggregated statistics. These reports should aim to act as a stimulus to the industrial sector to conserve energy. The specific reports will be prepared following the completion of each extended audit, and should aim to be as comprehensive technically as possible. They should be useful to other companies in the same industry that are prepared to undertake their own extended audits.

2.B.2 Assistance to Industries in the Development of Conservation Programs

As a result of audits, both short and extended, a variety of activities and conservation measures will be identified for individual plants. It is proposed that the staff of the Commission, with the help of conservation experts, provide informal assistance to industries which have completed audits in developing their own conservation housekeeping and investment programs. It is not recommended that the Commission provide engineering design services on a regular basis to industries, as this is viewed as an activity for the private sector in the Dominican Republic. The activities of the Commission should be limited to an advisory role, which would include assisting plant management in defining targets for energy efficiency improvement and developing, in general terms, a corresponding investment program. Engineers from the Commission should be available to review energy matters regularly at the request of the plant.

The Commission staff could also play a major role in helping plants to monitor their energy consumption following a first audit. Comprehensive data should be taken regularly to allow comparisons of performance against targets for improvement, reveal previously unidentified areas of waste, assist plants in budgeting for capital expenditures, identify areas of training need, and quantify peaks in energy consumption, as these are important for both individual and national planning purposes. The participation of Commission engineers in regular monitoring of plant energy demands will thus prove useful both to the plants and to the Commission itself in its responsibilities for developing national policies.

Under the program, Commission staff will provide the types of assistance outlined above primarily to the 50 plants for which short audits are performed, thereby developing a capability to provide such advisory services to industry on a wider scale following the formal end of this program.

2.b.3. Promotional and Training Activities

Private Sector Audits

In order for the maximum national benefit to be obtained from this conservation program, it is essential that industries themselves be encouraged to undertake audits and to implement their own conservation programs. The Commission will prepare and disseminate throughout the industrial sector manuals and reports on appropriate audit techniques, conservation measures and equipment, and results of conservation efforts in specific industries. The ready availability of information to all plants will undoubtedly help to encourage plants not able to benefit directly from the Commission audit work to undertake their own audit and conservation programs, and will stimulate the development of private sector engineering companies capable of conducting audits on a commercial basis.

After the first year of the program, during which priority will be given to developing the Commission's own audit work, it is proposed that the Commission actively promote the use of private sector audit services, as these must ultimately serve the needs of the industrial sector outside the limited scope of this program. Beginning in the second year, therefore, the Commission will begin to identify the private sector capability to undertake audit work, assist the development of that capability through promotional and training activities (see below), and develop a register of individuals and companies approved as being competent to perform plant audits.

Energy Coordinators

It is proposed that the Commission also actively promote the appointment of "Energy Coordinators" in all plants. The duties of an Energy Coordinator will be primarily:

- (1) To generate interest among plant management and personnel in energy conservation and sustain the interest with new ideas and activities;
- (2) To identify where major energy waste is occurring, to quantify the losses in physical and financial terms, and to develop practical targets for improvement;
- (3) To maintain accurate records of all energy purchases and consumptions;
- (4) To ensure that, in making improvements in energy efficiency, health and safety are not adversely affected;
- (5) To maintain contacts with other industries, research organizations, equipment manufacturers and professional bodies to ensure that he is up-to-date on significant developments in the field of energy conservation;
- (6) To remain up-to-date on national energy matters and to advise senior company management on such topics, as well as cooperating with government departments with responsibilities in energy-related matters.

The creation of an Energy Coordinators Association, which could meet every 3-4 months, would bring together plant Energy Coordinators for an exchange of views and information with each other and with the Commission. Presentations by Commission staff, and by Coordinators themselves, on practical aspects of their work on energy conservation and on national energy matters could be made regularly. Both the Energy Commission and private groups, such as the Consejo Nacional de Hombres de la Empresa, could provide support to a Coordinators Association. Through the dissemination of advice on conservation techniques, and the communication of successful results, it is anticipated that the benefits of the Commission audit and training programs could be extended to a much larger audience than could ever be reached directly at the plant level. In addition, valuable insights into the needs of the industrial sector, and how government might meet those needs, will undoubtedly be obtained through the informal interchange of ideas and experiences at the Energy Coordinators meetings.

Training

Beginning in the second year of the program, it is proposed that the Energy Commission, again with outside technical assistance, conduct a series of formal courses for private sector personnel in the following areas:

- (1) Energy Management in the Industrial Sector;
- (2) Plant Boiler and Furnace Operators Course;
- (3) Courses on Energy Conservation Investments.

Technical Information Center

The Energy Commission will also establish a Technical Information Center through which information can be made available readily to private inquirers on the latest techniques and equipment in the field of industrial energy conservation. The Center will include a library of recent reports on conservation topics and subscriptions to a number of technical journals in the field. The establishment of such a center will be facilitated by the Technical Information Transfer component of the Energy Policy Development Project.

2.b.4. Pilot Demonstration Projects

Purpose of Pilot Projects

The objective of this part of the program is to encourage the widespread adoption of energy conservation technologies by demonstrating their technical and economic effectiveness in working situations in Dominican industry through a selected number of pilot projects. By demonstrating the feasibility of conservation techniques, processes and equipment, it is intended to accelerate their adoption throughout Dominican industry. The pilot projects to be chosen for the program should therefore be capable of replication in a number of other industries, and the results of each pilot project will be monitored closely to establish a sound basis of technical and economic data which will contribute to this replication.

Approximately five pilot projects will be implemented under the program. The Energy Commission will be responsible for identifying and selecting the projects, monitoring project implementation, and evaluating subsequent energy and economic savings. Technical assistance will be provided to the Commission staff in carrying out these responsibilities. The role of plant owners and operators is also important in the pilot projects. The plant owner must make the decision to accept a pilot project in his plant, and must then be given ultimate authority in all aspects of plant operation, modification, etc. The projects will involve both costs and risks to plant owners, in the sense that production may have to be temporarily slowed or curtailed,

plant personnel may be diverted temporarily from normal functions, and new and unfamiliar equipment or processes may be involved requiring new maintenance procedures and training of personnel. Given these possibilities, as well as a general resistance on the part of private industries to outside, particularly government, interference, it is believed that an incentive will be required to encourage plants to participate in the pilot projects. The program therefore proposes to bear the costs of services and equipment provided to plants as part of the pilot projects. Plant owners, in effect, will be given the pilot project equipment in exchange for their cooperation in installing and operating demonstrations in their plants.

Selection of Pilot Projects

Based on the Short and Extended Audit Programs, candidate demonstration projects will be identified and subjected to a prefeasibility analysis. Final selection of plants for pilot projects will be made on the basis of the following selection criteria:

- (1) Potential for Replication on a National Scale;
- (2) National cost-effectiveness;
- (3) Economic Viability;
- (4) Degree of risk;
- (5) Effect on Dominican Suppliers; and
- (6) Experience value to industry as a whole;

It is expected that a majority of the pilot projects will be conducted at plants which have undergone short and extended audits, and for which comprehensive energy demand data are readily available. There may, however, be good reasons for taking an idea from one plant and applying it in another which was not audited. For example, the plant management in one location may be unable or unwilling to install the necessary equipment in their plant following their audit, or it may be excessively expensive to shut one particular plant down for the required time for equipment installation.

The first pilot project will be selected and initiated toward the end of the first year of the program. All pilot projects should be underway by the third year.

Pilot Project Implementation

Having selected a pilot project, it will be necessary to proceed promptly with implementation. Engineering design services, and procurement and installation of equipment in the plant will be carried out by contractors to be selected by the Energy Commission helped by the technical assistance personnel.

Monitoring of equipment installation, operating performance and project costs is essential to provide full information on the technology being demonstrated. In particular, a clear assessment of the energy saved as a result of the equipment or process being demonstrated is an integral part of the project. This monitoring and evaluation will be performed by Commission staff in conjunction with foreign audit specialists.

Another important component of the pilot project demonstration is the promotion and publication of the results. This is a necessary part of encouraging others to invest in the techniques, processes or equipment which have been demonstrated. Full reports on all pilot projects will therefore be prepared by the Energy Commission, assisted by foreign audit specialists, for widespread distribution throughout the Dominican industrial sector. It is also necessary that the factories in which pilot projects are implemented be prepared to allow visitors to inspect the equipment or process when operating. There may, of course, be some situations where the plant is employing processes or equipment unconnected with the demonstration, which the plant management would not wish to be disclosed. In such cases all reasonable measures will be taken to ensure that such disclosure does not occur, for example, during visits or by publication of results arising from the demonstration. Furthermore, all information on the plant and its business (other than that directly relating to energy saving) ascertained during the course of a pilot project will be treated as strictly confidential.

2.b.5. Financial Assistance Program

Financial assistance for industrial conservation will involve two separate programs, one for the grant financing of energy audits and the other for making available credit for industrial conservation investments.

Audit Assistance Program

The limited number of energy audits carried out by the Energy Commission directly will be provided to plants at no cost.

Beginning in the second year of the program, plants will be encouraged to use the private sector for carrying out audits on a commercial basis. A fund of \$1,000,000 will be established to help finance these. The fund will be administered by the Energy Commission and will involve the following main features:

- (1) Short and extended audits will be performed by individuals or companies on an approved register of energy consultants which will be maintained by the Commission.

- (2) The short or extended audit consultant will be engaged directly by an industry. The Commission or other government agency authorization will not be required.
- (3) On completion of the audit, the industry will apply to the Commission for reimbursement of its costs up to a limit of RD\$500 for short audits and \$2,500 for extended audits. The Commission will make reimbursement subject to receipt of proof of payment by the company and receipt of a copy of the approved consultant's audit report.
- (4) Extended audit assistance will be made only after the completion of a short audit.
- (5) The Fund should be sufficient to help finance about 1,000 short audits and about 200 extended audits during the 4 year life of the program.

The limits of \$500 for short audits and \$2,500 for extended audits are estimated to be the average cost of undertaking the audits. Depending on the nature and size of the plant, the cost of the audit will of course vary and in some cases the industry itself will have to contribute to financing the audit (more likely in extended than short audits).

Industrial Conservation Credit Fund

For the purpose of encouraging investment in energy conservation, the project will establish an \$8.0 million Industrial Conservation Credit Fund within FIDE. A.I.D. will provide \$4.0 million in loan funds for initial capitalization of the Fund and the Central Bank will provide the remaining \$4.0 million.

The \$8.0 million is considered sufficient to cover the growing demand for conservation credit during the five years of the program. The anticipated demand for credit is based upon the number of audits expected to be accomplished - approximately 1,000 short audits and 200 extended audits. An average of one loan application is expected to result from every fifth short audit and every other extended audit. At an average capital requirement of \$25,000 per loan (this will vary greatly from one loan to the next) approximately \$8 million will be required during the project. (Rate of disbursement of the Fund is explained in the Financial Analysis and Plan.)

The Fund would be revolving and would continue beyond the life of the project. As demand for credit continues to increase, FIDE would be in a position to seek resources from other institutions for expansion of the Fund.

A primary advantage of the Fund is that for promotional purposes, it would demonstrate to industries that credit specifically for the purpose of energy conservation is indeed available.

The main features of the proposed Energy Conservation Credit Fund are as follows:

- (1) Loan applications would be considered for companies wishing to invest in energy conservation projects and for the development of private sector energy conservation services.
- (2) Acceptable projects would be financed by FIDE loans up to a ceiling of 75% of the total project cost. The remainder of the finance required would be from the borrowers own resources or from intermediary bank sources. Interest rates from FIDE to intermediaries would be at FIDE's maximum of 10 percent. Rates from intermediary institutions to industries would be the maximum allowable by law, 12 percent, plus a 2 percent commission for an effective rate of 14 percent. The rates will remain at the maximum allowed by law and will increase if the legal limit on interest rates is raised.
- (3) Loans would be made according to normal commercial criteria. In other words, projects should be economically viable and the financial performance and outlook for the company should be sound.
- (4) All loan applications would have to be supported by a detailed feasibility study describing the technical and economic basis of the project and the returns on investment forecast. All feasibility studies would be reviewed by both the Energy Commission and FIDE before acceptance. A feasibility study relating to the installation of energy conservation equipment should also include at least a short energy audit. An extended audit could be requested by the Commission if considered necessary to a satisfactory definition of the project. The Commission could also request to observe the installation and initial operation of conservation equipment, subject to any confidentiality restrictions.

2.b.6. Technical Assistance

In order to train Energy Commission staff and assist in implementation of the different activities described above, a good deal of long and short term technical assistance will be required. The following summarizes the T.A. to be provided:

(1) Resident Program Advisor - \$400,000

Level of effort: 48 months, primarily resident in the Dominican Republic.

Activities: Overall management and coordination of the program in-country, working closely with Energy Commission staff. Active participation in all project tasks with particular emphasis on the following:

- execution of energy audits;
- practical training of local personnel in audit techniques;
- organization of formal training courses;
- identification and management of suitable pilot projects;
- initiation of promotional activities;
- coordination of financial assistance program with the Commission and FIDE.

(2) Short Term Technical Experts (in-country) - \$500,000

Level of effort: 15 person months in each of the 1st and 2nd years reducing to 10 person months in the 3rd and 4th years. Duration in country to be variable, ranging from two weeks to several months per visit, depending on the specific work to be performed. The effort is expected to involve a total of approximately 6-8 experts during the program duration. This participation by a relatively large number of personnel is considered necessary as the range of specialized expertise required is broad and unlikely to be available from one or two long term resident personnel.

Activities: Each expert will participate in specific program activities under the coordination of the Program Advisor. The main emphasis for short term experts' participation will be on the following activities:

- execution of the energy audits (particularly "extended" audits);
- delivery of specialist training courses (e.g. furnace/-boiler operations, energy conservation investment projects);

- specialized assistance in pilot demonstration projects;
 - analysis of major loan applications to FIDE.
- (3) Overseas Training Consultant - \$88,000 (included in budget under overseas training costs)

Level of effort: 10 person months in consultant's home office and overseas industrial facilities.

Activities: Coordination of the out of country training of Dominican personnel in practical audit techniques.

Summary Budget - Industrial Conservation Program
(\$000)

	<u>A. I. D.</u>	<u>GODR</u>	<u>TOTAL</u>
Long Term T.A.	400		400
Short Term T.A.	500		500
Portable Instruments (including calibration and maintenance)	124		124
Vehicles (including operation & maintenance)	75		75
Publications and Materials	225		225
Overseas Training	140		140
Pilot Projects	1,000		1,000
Audit Finance Program	1,000		1,000
Credit Fund	4,000	4,000	8,000
Local Personnel		852	852
Inflation & Contingency (15%)	<u>1,120</u>	<u>-</u>	<u>1,120</u>
TOTAL	<u><u>8,584</u></u>	<u><u>4,852</u></u>	<u><u>13,436</u></u>

3. Mini-Hydro Development Program (\$4,668,000)

3.a Program Purpose

The overall purpose of the mini-hydro program proposed in this project is 1) to develop the institutional capability for the selection, design, construction and operation of mini-hydro facilities throughout the D.R., including development of related community organizations, and 2) to test and demonstrate the economic, social, and technical feasibility of mini-hydro operations in different settings. The program will finance technical assistance and training in site evaluation, construction and operation as well as in community organization in order to help develop and support the institutional arrangements necessary for wide scale mini-hydro development in the Dominican Republic.

The institutional procedures to be supported under the program have been developed in close collaboration with the Energy Commission, INDRHI and CDE. It is expected that the institutional arrangement initiated under this program will, if successful, be continued after the project in an expanding effort to develop mini-hydro resources.

The program will also finance the installation and operation of a limited number (3-4) of mini-hydro facilities. The purpose of these sub-projects is two-fold. First, they will help to upgrade the capabilities of the institutions involved through practical experience and set in motion a process of wide scale mini-hydro development. Second, they will demonstrate in a rural Dominican setting the technical, and more importantly, the social and economic feasibility of mini-hydro.

Mini-hydro installations financed under the project will fall in the range of 100 KW to 1 MW. Other preliminary activities in the Dominican Republic have envisioned projects either smaller or larger than this size. Yet it is within this size range that the great bulk of mini-hydro potential in the country appears to lie.

It is also intended that sites constructed under this program will not be primarily for the purpose of supplying power to the national grid, which has been the focus of mini-hydro design in the D.R. thus far, but rather for the purpose of meeting the electricity needs of communities not currently connected to the grid. Of course in some cases communities may be able to sell excess electricity from mini-hydro to the grid, or substitute mini-hydro for electricity purchased from the grid or generated locally. In all cases, it is believed that the social and economic benefits of mini-hydro can be maximized if the value to local communities as well as to the national grid is taken into account.

Likewise, it is believed that the benefits of mini-hydro to a community can be increased by community participation in the construction, operation and maintenance of the mini-hydro facility. Of course the organization and capabilities of different communities will vary greatly, so that in some cases community participation may necessarily be limited. This program will encourage effective community participation in all aspects of mini-hydro development and operation to determine what role community participation should play in an expanded program.

3.b Program Activities

The program involves two phases of activity: Phase I - Site Selection and Design; and Phase II - Construction/Installation and Operation. INDRHI will have the lead institutional responsibility in Phase I, although as will be seen, much of the work will be carried out jointly with CDE. CDE in turn will have the lead responsibility in Phase II, including assistance to communities in organization, operation and maintenance. The role of the Energy Commission throughout the program will be one of supervising and coordinating all program activities, to assure that they comply with both project and national policy objectives. The head of the Hydroelectric Unit of the Commission will be the overall Program Coordinator. It is agreed, however, that the Commission neither can nor should play a principal implementing role in this project or in mini-hydro development in general. The role of overall policy guidance and program coordination is a very important one for the success of this project and can best be played by the Commission. Since funds for this program will be channeled through the Energy Commission, all activities will in effect have to meet with its approval. The Commission will also be directly responsible to A.I.D. for the success of the program.

Mini-Hydro Program Organization

Overall Program Coordinator
National Energy Commission

Phase I
Site Selection and Design

Program Manager
INDRHI

Phase II
Construction/Installation
and Operation

Program Manager
CDE

3.b.1 Phase I - Site Selection and Design
For site selection and design, a joint INDRHI-CDE working team will be established, consisting of the following personnel:

Energy Commission Program Coordinator
Electro-Mechanical Engineer (Team Leader)
Civil Design Engineer
Electro-Mechanical Design Engineer
Cost Engineer
Geologist
Survey Brigade
Sociologist
Environmental Scientist
Draftsmen .

While the working team may not need to function on a daily basis, it will provide a format for continuing interchange between INDRHI and CDE technical personnel and assure that the interests of both institutions are considered and expertise utilized in the evaluation and selection of mini-hydro sites. The team will work under the overall supervision of the Energy Commission Program Coordinator.

Reconnaissance Screening

The first task of the working team will be to make a brief "reconnaissance pass" of the 40-odd sites already identified in the National Inventory which fall within the range of 100 KW to 1 MW. While there are probably many potential mini-hydro sites in the D.R. which have not yet been identified, for purposes of this project it is necessary to begin with a manageable number of possible sites. Therefore, the scope of the project is confined to those already identified in the National Inventory. A brief fly-over or drive-by should be sufficient for purposes of screening out sites which are obviously unsuitable, whether because of location, lack of water, surrounding terrain, etc. It is estimated that reconnaissance screening will eliminate a number of the potential sites listed in the National Inventory. The full working team will not be required for each reconnaissance pass, but can split up to accomplish the reconnaissance more rapidly. All reconnaissance should be completed within a few weeks.

Site Evaluation Studies

For the approximately 20 sites which pass the reconnaissance screening, site evaluation studies will be performed. Sites will be evaluated according to basic technical, economic, financial, social and environmental criteria and eventually ranked or grouped according to overall attractiveness. In evaluating and selecting sites, the working group will follow a detailed site selection methodology prepared by an NRECA consultant team during project preparation in collaboration with Commission, INDRHI, CDE and AID staff.

The principal steps in the site Selection Methodology are:

1. Compilation of Existing Information;
2. Site Visit and Field Survey;
3. Processing of Hydrological Information;
4. Social, Institutional and Environmental Analysis;
5. Demand Calculation and Forecast;
6. Alternative Layout Schemes;
7. Estimation of Power and Energy;
8. Technical Evaluation of Alternative Schemes;
9. Conceptual Design of Preferred Scheme;
10. Project Cost Estimation;
11. Economic and Financial Analyses;
12. Preparation of Site Report.

It is estimated that about one month will be required for completing each site evaluation study. To accelerate the site selection process, it is proposed that a second INDRHI-CDE working team be formed as soon as possible. The second team could share many of the members of the first team who are not needed full time, such as the draftsmen, the surveyors, the environmental analyst and so on. All site evaluation studies should be completed by early in the second year of the project.

Technical assistance will be provided to the working teams throughout the site evaluation and selection process, both in general application, and revision if necessary, of the Site Selection Methodology, and in specialized areas such as hydrometeorology, environmental considerations and processing of generated information. (See Technical Assistance Section below.)

Feasibility Studies

Three to four sites will be selected for detailed feasibility study and eventually design and construction.

The procedure for conducting the feasibility studies will be similar to that employed in conducting the site selection studies, but will provide a greater level of detail for arriving at more precise cost estimates. For example, major equipment pricing will be developed on a more formal basis than in evaluation studies. Additional areas that will be looked at in greater detail than in the site selection studies include:

- Layouts and preliminary designs;
- Availability of access;
- Environmental issues and resolution of problem areas;
- Preliminary schedules for construction and funds allocation.

Whereas site selection studies will generate costs within a 25 percent range, the feasibility studies costs should be dependable, using appropriate contingency costs.

The feasibility studies, which can to a degree be conducted simultaneously, should be completed within 4-6 months.

Final Design and Preparation of Bid Documents

Preparation of final design and bid documents will take an additional 4-6 months. One set of bid documents will be prepared for all electro-mechanical equipment, which will likely be procured off-shore, and another set of bid documents will be prepared for local construction and installation services. Up to two months of technical assistance will be provided in preparation of the final design and bid documents to assure conformance with AID procurement regulations.

Completion of the final design and bid documentation marks the end of Phase I of the program, which should be completed before the end of the second year of the program.

3.b.2 Phase II - Construction/Installation and Operation

CDE will have principal responsibility for supervision and management of Phase II of the program, again under the overall coordination of the Energy Commission. The Program Manager for Phase II will be an employee of the Hydroelectric Development Department of CDE. Of the five specific tasks involved in Phase II - civil engineering works, procurement and installation of electro-mechanical equipment,

construction of transmission and distribution lines, community organization and training, and project operation and monitoring - all but one (civil works) are areas in which CDE has more experience than any other institution. Also, given the need to schedule and coordinate closely the detailed activities of Phase II, it is important that one institution have overall management responsibility. Because the objective of Phase II is ultimately the production of electricity, it is most appropriate that this responsibility lie with CDE.

Civil Engineering Works

Two possible methods have been discussed for execution of the civil works, which include excavation and construction of the dam, canal penstock, headworks, tailrace, and powerhouse and switchboard. The first involves a CDE contract with a local construction firm, of which there are several considered capable of carrying out the work involved. In this case, CDE would provide from its staff a construction supervisory engineer. Local labor would be utilized by the construction contractor as practical.

The second involves execution of the civil works by INDRHI, which has considerable experience in irrigation and other types of civil works, under force account, that is, using its own equipment and personnel. INDRHI would also utilize local community labor where practical. Construction supervision could be provided either by CDE or by a supervisory engineering firm contracted by CDE.

It is virtually impossible to tell in advance which of these methods would be most rapid and economical. It may therefore be appropriate to follow a different method of civil works construction in each of the 3 or 4 sub-projects in order to determine which appears more appropriate for replication on a wide scale. Unless a conclusive consensus is reached otherwise, this is how the project will proceed.

Civil works construction for mini-hydro sites should take from 6 to 12 months per site, depending upon the specific site characteristics.

Procurement and Installation of Electro-Mechanical Equipment

Procurement of all necessary electro-mechanical equipment will be done by CDE in conformance with AID procurement regulations. It is expected that most equipment will come from the United States. Procurement of equipment for each site should take approximately 8 months and installation and additional 4 months.

Technical assistance will be provided to CDE in the installation, testing and start up of the equipment.

Putting in Place of Transmission and Distribution Lines

Transmission and distribution lines will be put in place under the supervision of CDE, which has considerable experience in this area. Local labor will be utilized in this task, where appropriate.

The necessity of transmission and distribution lines will of course vary, depending on the distance of the mini-hydro site from the local population center, whether a distribution system is already in place, and the distance of the site from the national grid, if sell back to the grid is going to take place.

In the 3-4 pilot projects to be undertaken, the initial costs of transmission and distribution lines, including consumer hook-ups, will be financed by the project. Future expansion of the distribution system and additional service connections will be financed by the community.

Community Organization and Training

Community participation in the design, construction, operation and maintenance of the mini-hydro installations is, as mentioned earlier, an important objective of the program.

CDE will provide assistance and training to community members in the following important areas related to mini-hydro: operation and maintenance procedures; tariffs, billing and collection methods; initial service charges; watershed protection; and productive uses of electricity. An Electricity Board will be established in each community served by mini-hydro to assume responsibility for these activities. The Board will be comprised of at least the following members:

- i) The Mayor or other pertinent administrative figure;
- ii) A person who has the respect and confidence of all members of the community (such as a local school teacher, a social worker, a priest or nun);
- iii) A representative of CDE (initially the CDE Program Manager).

The legal structure of the Board (whether a private or public entity, for example,) will be left to the decision of the individual community involved.

In his dealings with the Electricity Board, the CDE Program Manager will be assisted by sociologists of the CDE Planning Department who have considerable experience dealing with communities under rural electrification programs.

Training of local mini-hydro operators should take about 6 months (3 months of theoretical training and 3 months of on the job experience).

Under the Program, 10 months of technical assistance will be provided to CDE in designing and carrying out training and organizational efforts in the communities. (See Technical Assistance Section below.) This is considered to be a key part of the whole program, as the objective eventually is to have individual communities operating, maintaining and benefiting from mini-hydro facilities with minimal support or interference by CDE or other government agencies.

Operation and Monitoring

Operation and monitoring of the 3 or 4 sub-projects should begin in the third year of the program, and will continue for at least one full year before final evaluation. During most of this time CDE training of community members will continue. Otherwise, the role of CDE will be primarily one of trouble shooting major repair or maintenance problems. The Hydroelectric Development Department of CDE will be supported in this effort by the Production Department, which is responsible for operation and maintenance of all CDE major generating facilities.

Final evaluation of the sub-projects will cover all technical, economic and environmental issues as well as questions relating to community organization and participation and the success of the overall institutional arrangement for implementing the projects. The two main questions to be answered will be (1) whether mini-hydro appears to be a truly feasible energy source for Dominican communities and (2) whether the institutional arrangement supported under the program appears appropriate for development of mini-hydro on a broad scale.

For carrying out the above tasks, a total of 5 vehicles will be procured under the project, 3 in the first year for the site evaluation work and initial civil works supervision and 2 additional vehicles in the third year for community training and monitoring of the sub-projects.

3.b.3 Technical Assistance

A total of 54 person months of technical assistance will be provided under the Mini-Hydro Program as follows:

Program Advisor - 30 months

The Program Advisor will work with the Energy Commission, INDRHI and CDE throughout all aspects of implementation. He/she will have an M.S. in electrical engineering and 10 years experience in the design and management of power

systems, including small hydro power plants. He/she will be fully fluent in Spanish and will coordinate shorter term technical assistance. A vehicle will also be procured under the project for the Program Advisor.

Short Term Technical Advisors - 10 months

Planning expert to assist the Energy Commission at the beginning of the program in national planning efforts in mini-hydro development (3 months).

Expert in environmental assessment of mini-hydro projects, soil conservation and water resources management. Will assist in application of site selection methodology and in stages of design and construction of specific sites (3 months).

Expert in stream flow measurement and location of hydrometeorological and runoff gauging stations (2 months).

Computer programmer to assist principally INDRHI in development of appropriate computer software for efficient management of all existing and future pertinent hydrometeorological and hydrological records (2 months).

Technical Assistance to CDE in Community Training - 10 months

Specialist in mini-hydro operation and maintenance to assist CDE in developing and implementing appropriate training for community operators (4 months).

Specialist to assist CDE in determining appropriate policy for tariffs, billing and collection methods for areas served by mini-hydro (2 months).

Specialist to assist CDE in community organization for watershed conservation and improvement (2 months).

Promotional specialist to assist CDE in the design of a training program for the promotion of the productive uses of electricity (2 months).

Preparation of Bid Documents - 2 months

Project Evaluation - 2 months

Two illustrative studies carried out by CNPE, CDE, and INDRHI give a good idea of what it will cost to construct mini-hydro sub-projects under this program - \$855,600 for a 500 KW unit and

\$1,188,200 for a 726 KW unit, or an average cost of about \$1,600 per installed KW. Based on these cost estimates, it has been decided to provide \$3,000,000 (\$2,600,000 in A.I.D. construction and installation funds and \$400,000 in GODR counterpart) for construction of sub-projects under the program. This should be sufficient to assure that 3 or 4 sites of different sizes and characteristics, with different immediate objectives (substitution of grid or other sources or electricity, introduction of electricity to an isolated community, sell back to the grid), will be included in the program.

Summary Budget - Mini-Hydro Development Program
((\$000))

	<u>AID</u>	<u>GODR</u>	<u>TOTAL</u>
Technical Assistance	540	-	540
Vehicles (6)	165	-	165
Mini-Hydro Sub-Projects	2,600	400	3,000
Local Personnel Costs	-	468	468
Inflation and Contingency (15%)	495	-	495
TOTAL	3,800	868	4,668

4. Wood Fuel Development Program (\$2,068,314)

This project will finance a program of research and demonstration to be carried out by the Superior Agricultural Institute in Santiago (ISA) in collaboration with the Energy Commission in the following areas: 1) tree production for energy; and 2) technologies for converting wood to energy. The program is designed in such a way that at the end of five years sufficient information will have been obtained in each of these areas so that large scale efforts in fuel wood production and utilization (involving energy farms, small scale tree production, or perhaps both) can be gotten underway.

Program Activities

i. Tree Production Research Program (\$1,014,189)

The tree research program will involve five closely related activities to be carried out on approximately 400 hectares of land owned by ISA near Mao. The land is largely representative of the dry forest area of the Dominican Republic and includes several types of terrain and soil conditions. A professional forester from ISA will serve as overall Manager for the tree research

program. While ISA staff will have primary responsibility for implementing the program, it is proposed that technicians from FORESTA and the Natural Resources division of the Agriculture Secretariat (SURENA) be "loaned" to the program for periods of up to a year to ensure involvement and support of these key institutions as well as a wider dissemination of technical training in tree research. Discussions among the Energy Commission, ISA, FORESTA, and SURENA have resulted in general agreement on the participation in the program of technicians from these latter institutions.

Nursery Operation

The first activity involves establishment and operation of a nursery for the production of seeds and seedlings to be used in the program. ISA has already initiated a small nursery operation on the Mao site capable of producing 5,000 - 10,000 seedlings a year. Under the program, up to 200,000 seedlings per year will have to be produced, so the existing nursery will be upgraded and expanded. Basic seed handling equipment and nursery supplies will be provided (see Program Budget), as will technical assistance in seedling preparation, transplanting and other nursery techniques. For example, present practice with large black plastic bags and the digging of large planting holes will be tested against use of smaller containers and less drastic and costly planting procedures. An ISA technician will be the full time nursery supervisor and the nursery will employ from 3 laborers in the first year of the program to 5 in the fifth year. The nursery will require a total of 2 hectares.

Main Species Trials

Basic growth and yield tests will be performed for the following 6 species which appear to have promise for good performance in the Dominican Republic:

- Leucaena leucocephala;
- Eucalyptus camaldulensis;
- Azadirachta indica or neem;
- Casuarina equisetifolia;
- Calliandra calothyrsus;
- Prosopis juliflora or cambron.

The main species trials will be conducted on two different types of soil at Mao (wetter, richer vs. drier, poorer). A third trial on significantly drier soil will be undertaken at Azua in the southwest of the country, in collaboration with a regional development organization (Oficina para el Desarrollo Integral Agropecuario del Valle de Azua).

At each site, a randomized block design with at least 4 replications will be used for planting, and spacing will be 2.5 x 2.5 meters. Each plot will consist of 121 trees if square and 128 trees if rectangular. This will provide a 2-row isolation strip and a central measurement plot of 49 trees and 48 trees respectively. A total of about 6 hectares (2 at each of the 3 trial sites) will be required.

The main species trials will begin in the first year of the program. Technical assistance will be provided in land clearing, planting and cultivating as well as in growth measurement and yield calculations. Data on tree performance will be collected on a regular basis and prepared for storage and access through the mini-computer at the Energy Commission procured under the Energy Policy Development Project.

Spacing Trials

Spacing trials of the 6 main species will be undertaken to determine the optimal spacing pattern for tree performance. Using the same random block planting pattern described above, spacings of 1.5 x 1.5, 2.5 x 2.5, 3 x 3 and 4 x 4 meters will be tested. The spacing trials will be performed on only 2 sites at Mao representing higher and lower quality soil. A total of about 18 hectares will be required. The spacing trials will begin in the second year of the program.

Secondary Species Trials

Secondary comparisons of species within a genus and some independent comparisons will be undertaken to refine the information obtained from the main species trials, and determine whether performance can be further improved by particular species or sub-species.

The planting pattern and spacing will be the same as under the main species trials. Two sites of 8 hectares will be required, one at Mao and one at Azua. The secondary species trials will begin in the second year of the program.

Each of the three trials (main, spacing and secondary) will be supervised by an ISA technician. Labor for land clearing, planting, etc. will be contracted locally. Technical assistance will be provided throughout all trials in planting, tending, measurement, and data analysis. Data from all trials will be stored and accessed through the Energy Commission mini-computer.

Plantation

To provide experience in larger scale planting and harvesting techniques, as well as to produce wood for use in the Wood Conversion Program (see below), an area of about 300 hectares will be

planted under the program. Methods of land clearing, fencing, building of access roads, harvesting and hauling of cut wood will be experimented with. The total area will be cleared, fenced and planted in increasing increments, beginning with 25 hectares the first year and increasing to 100 hectares in each of the last two years. All 6 main species will be planted the first year. As information is gained on the performance of the different species in successive years, only the more promising ones will be continued.

An ISA technician will supervise the establishment and operation of the plantation. Technical assistance will be provided in this effort. As most of the species included in the program are known for very fast growth rates, it is expected that during year 3 of the program harvesting of trees from the plantation can be gotten underway.

By the end of the 5-year tree research program, reliable information should be available for making decisions about what type of tree to plant under different soil and climate conditions, how to grow the seedlings and how to plant them, what spacing to use, and when to coppice the stand. There will be enough information available upon which to base the start of wide scale fuelwood production programs. Testing and demonstration, however, should continue on a modest scale beyond the program to keep improving and refining the whole process of growing trees for energy.

ii. Wood Conversion Program (\$1,054,125)

The principal purpose of the wood conversion program is to test and demonstrate improved technologies for converting wood to charcoal and to train a limited number of Dominicans in the construction and efficient operation of those technologies in preparation for a wide scale promotion effort. Testing and demonstration of new, low cost technology for converting wood to electricity on a small scale is also included in the program.

All testing and demonstration will be carried out by Energy Commission and ISA personnel at the same site near Mao where the tree research program will take place. Wood for the conversion program will come initially from the areas cleared for the different tree planting programs and later, beginning about the third year of the project, from harvesting of wood from the plantation.

Activities under the conversion program will include transportation of felled wood from the roadsides where it will be collected under the tree research program to a site of about 1 hectare prepared especially for the conversion program. Site preparation will include land clearing, fencing, water well digging, access road construction, pouring of concrete slabs at the test sites (largely for working convenience) and renovation and expansion of an existing

workshop/storage house. Various hand tools and instruments will also be required. The cost of these is detailed in the program budget below.

The wood conversion program will be implemented by four technicians from ISA, one of whom will serve as Program Manager, and two technicians from the Energy Commission. Local labor will be hired as necessary to assist in site preparation, construction, wood handling and other operational activities.

Actual dissemination and promotion of wood conversion technologies will not be financed under the program. However, once technologies are developed and proven under the program, it is expected that their dissemination will be handled through several channels. The extension service of the Secretariat of Agriculture, for example, is used for the dissemination of products and information developed at the Secretariat's appropriate technology research installation at La Vega. It may also be an appropriate method of dissemination of information concerning small scale charcoaling methods. INDOTEC is also a source of technical assistance and information to a variety of users in both the public and private sectors. INDOTEC will be kept informed and invited to make use of the results of the wood conversion research under this program.

Small Scale Charcoal Production

While a considerable amount of charcoal is now produced in the Dominican Republic, the method used is largely one of earth mound burning of wood in small quantities. Research and experience elsewhere indicates that this is not a very efficient method of converting wood to charcoal. ISA and the Energy Commission will, therefore, test and demonstrate more efficient methods for converting small amounts of wood to charcoal which could be employed by small farmers or entrepreneurs in the Dominican Republic on a wide scale. The testing will eventually be carried out with the different tree species being experimented with, so that any discrepancies in conversion efficiency can be determined.

Specifically, two methods of small scale charcoal production will be examined, each of which involves fairly straightforward technology and has demonstrated good efficiencies in operation in other countries. The first is the so called "Beehive" brick kiln, which was developed and has been operating now for several years in Brazil. The Beehive kiln can be built to almost any size (although some efficiency is lost in very small kilns) and can be operated either as an individual unit or in rows for larger volume production. It is a batch type kiln which is circular in shape, has a domed roof and is built of ordinary firebrick.

Under the program, six Beehive kilns will be constructed and operated. Three will be of a larger size, about 45 cubic meters, and three will be of a smaller size, about 30 cubic meters. All local materials will be used in construction.

The second method of small scale charcoal production involves the so called "Mark IV" metal kiln of the type developed in Uganda. The kiln is portable, that is, it can easily be dismantled in one location and assembled in another. It also gives excellent yields (approximately 60 percent by volume and 25 percent by weight), although it is somewhat more difficult and costly to construct - approximately RD\$4,500 for a capacity of 45 cubic meters.

ISA staff have already constructed a metal kiln on an experimental basis. Under the program, the kiln will be refurbished and transported to the Mao site for operational testing and demonstration.

Technical assistance will be provided to ISA and Energy Commission technicians in construction techniques, operating procedures, wood handling (including drying and storage) and in analysis of operating performance and quality of outputs (charcoal and gas). All kilns should be constructed or refurbished and operating by the second year of the program, at which time emphasis will be placed on analytical work and demonstration of construction and operating techniques to site visitors.

Large Scale Charcoal Production

Another attractive possibility for the D. R. is commercial production of charcoal on a larger scale, for example, on private plantations or large scale energy farms. The most efficient technologies for converting large quantities of wood to charcoal continuously differ from those used for small scale charcoal production, and usually require more capital expenditure. One type of large scale charcoal making kiln which has been proven effective in the United States is the Missouri kiln.

Under the program, one Missouri kiln will be constructed and operated. All local materials will be used. Technical assistance will be provided by a person fully familiar with construction and operation of Missouri kilns. The kiln should begin operation in the third year of the program.

For all the above kiln operations, an accurate assessment of operating efficiencies under different conditions and with different wood stocks will require some more sophisticated analysis of end products, particularly gas, than can be performed at site. Therefore, a small amount of funds are budgeted for laboratory analysis at INDOTEC. INDOTEC has all personnel and equipment necessary for the

analysis required except for a gas chromatographer which will be provided by the project. (See Program budget below.)

Electricity Generation

Under the wood conversion program, a review will be conducted of existing, low cost technologies for electricity production from wood which appear appropriate to the circumstances of the D.R. Funds are budgeted for the procurement fabrication, testing and demonstration of 2 or 3 of the more promising technologies encountered under the wood conversion program.

SUMMARY BUDGET
WOOD FUEL DEVELOPMENT PROGRAM
(\$000)

	<u>A.I.D.</u>	<u>GODR</u>	<u>TOTAL</u>
I. <u>Tree Research Program</u>			
Dominican Personnel/Local Support	-	195	195
Contracted Labor	168	-	168
Equipment and Supplies	90	-	90
Vehicles	60	-	60
Technical Assistance	300	-	300
Training	94	-	94
Inflation and Contingency (15%)	107	-	107
Subtotal	819	195	1,014
II. <u>Wood Conversion Program</u>			
Dominican Personnel/Local Support	-	275	275
Contracted Labor	52	-	52
Charcoal Program			
Site Preparation	35	-	35
Kilns	37	-	37
Instrumentation	10	-	10
Tools and Equipment	8	-	8
Analysis	20	-	20
Training	40	-	40
Electricity Program	175	-	175
Vehicles	60	-	60
Technical Assistance	240	-	240
Inflation and Contingency (15%)	102	-	102
Subtotal	779	275	1054
Total	1,598	470	2,068

5. CDE Technical Assistance Program (\$750,000)

The project will finance technical assistance to the Dominican Electricity Corporation in the following areas which have been identified as priority problem areas in which CDE requires outside assistance urgently in the short term.

i) Coal Procurement

The project will finance the costs of an experienced coal procurement consultant to assist CDE in evaluating potential sources of coal and coal transport and obtaining contracts on as favorable terms to CDE as possible. The consultant will provide on the job training to CDE personnel responsible for fuels procurement so that an institutional capability in this area can be developed. He will be retained as soon after project authorization as possible and will assist CDE for a period of 18 months - full time for the first 6 months and then on an intermittent basis for the next year. He will be assisted on an as needed basis by a lawyer specialized in coal contracts and by a transportation specialist. The total cost of technical assistance in this area is estimated at \$160,000.

ii) Coal Strategy and Materials Handling

The project will finance the services of a Coal Strategist and Materials Handling Consultant who will help CDE to think through and develop alternatives for dealing with the entire range of issues related to coal sources, port facilities, transportation to Itabo and the Haina plants, storage, ash disposal and environmental concerns. He will review existing and ongoing studies, such as the Bechtel report on coal transport and utilization and the feasibility work currently being carried out by PRC Harris on expanded Haina port facilities, and evaluate their results within the overall context of coal utilization. The consultant will be assigned to the Engineering Department of CDE for a period of 12 months. The total cost for his services is estimated at \$125,000.

iii) Transmission and Distribution Engineering

Under the project, a specialist in transmission, distribution and substation systems will provide on-the-job training to CDE engineering staff for a period of approximately six months. The total cost of his services is estimated to be \$50,000.

iv) System Planning

A specialist in system planning will be assigned to the Planning Department for a period of one year, to provide guidance to Department management in overall approaches to system planning as well as on-the-job training to Department personnel for the following purposes:

- conducting generation planning studies, including development of planning criteria, analysis of production costs and economic evaluation of alternatives;
- conducting transmission and distribution planning studies, taking into account optimal land use, load center feeding and transferring, voltage conversion, and costing and evaluation of alternatives;
- use of computer programs in demand and load forecasting;
- performance of transient stability studies; and
- performance of cost of service studies and development of tariffs.

The Planning Consultant will be assisted for short periods of time on an as needed basis by specialists in computer programming and tariffs. The total cost of services in this area is estimated at \$150,000.

v) System Protection and Hot Line Maintenance

There are two areas in which additional training of CDE personnel is urgently needed if overall system reliability is to be improved. The first area is system protection, which involves primarily circuit breakers and relays. A specialist in system protection will provide three months of on-the-job training to personnel of the Operations Department in circuit breaker operation and maintenance, relay and reclosure setting and operation, and other tasks related to system protection. The cost of this in-country training is estimated at \$30,000.

The other operational area in which CDE badly needs assistance is "hot line" maintenance. Three months training will be provided to personnel of the Operations Department in special techniques and precautions required in maintaining lines which are "hot", that is, still conducting electricity, not only for preventive maintenance purposes, but also to minimize the extent and duration of outages when they do occur. Training in "hot line" maintenance is estimated to cost \$25,000.

vi) Lineman Safety

The project will finance 4 months of technical assistance to the Administrative Department of CDE for the purpose of reviewing existing safety policies and training programs, developing improved policies and programs as necessary and supervising the initial application of new safety measures and start up of new training programs. While this activity is not designed to affect directly the overall efficiency and economic performance of CDE, it is still considered to be an urgent requirement of CDE in the short term. The cost of technical assistance for this purpose is estimated at \$40,000.

vii) Financial Reporting

Under the project, a Financial Consultant will assist the Director of Administration of CDE in reviewing all financial reports and statements prepared by CDE, and recommend improvements in the format, content and distribution of those reports. New reporting procedures or instruments will be introduced if appropriate, and specific guidance will be given in the area of financial reporting to current and potential lending institutions.

Technical assistance in this area will be provided over a period of 3 months at an estimated cost of \$30,000.

SUMMARY BUDGET - CDE
TECHNICAL ASSISTANCE PROGRAM

(\$000)

	<u>A. I. D.</u>	<u>GODR</u>	<u>TOTAL</u>
1. Coal Procurement	160	-	160
2. Coal Strategy and Materials Handling	125	-	125
3. Transmission and Distribution Engineering Design	50	-	50
4. System Planning	150	-	150
5. System Protection	30	-	30
6. Hot Line Maintenance	25	-	25
7. Safety	40	-	40
8. Financial Reporting	30	-	30
Local personnel and Materials	-	50	50
Inflation and Contingency (15%)	90	-	90
TOTAL	700	50	750

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A.I.D. LOAN AGREEMENT NO. 517-T-037
517-W-038

STANDARD PROVISIONS

Definitions: As used in this Annex, the "Agreement" refers to the Loan Agreement to which this Annex is attached and of which this Annex forms a part. Terms used in this Annex have the same meaning or reference as in the Agreement.

ARTICLE A

Project Implementation Letters

To assist Borrower in the implementation of the Project, A.I.D. from time to time will issue Project Implementation Letters that will furnish additional information about matters stated in this Agreement. The parties may also use jointly agreed-upon Project Implementation Letters to confirm and record their mutual understanding on aspects of the implementation of this Agreement. Project Implementation Letters will not be used to amend the text of the Agreement, but can be used to record revisions or exceptions which are permitted by the Agreement, including the revision of elements of the amplified description of the Project in Annex 1.

ARTICLE B

General Covenants

SECTION B.1 Consultation. The Parties will cooperate to assure that the purpose of this Agreement will be accomplished. To this end, the Parties, at the request of either, will exchange views on the progress of the Project, the performance of obligations under this Agreement, the performance of any consultants, contractors, or suppliers engaged on the Project, and other matters relating to the Project.

SECTION B.2 Execution of Project. The Borrower will:

1) Carry out the Project or cause it to be carried out with due diligence and efficiency, in conformity with sound technical, financial, and management practices, and in conformity with those documents, plans, specifications, contracts, schedules, or other arrangements, and with any modifications therein, approved by A.I.D. pursuant to this Agreement; and

2) Provide qualified and experienced management for, and train such staff as may be appropriate for the maintenance and operation of the Project, and, as applicable for continuing activities, cause the Project to be operated and maintained in such manner as to assure the continuing and successful achievement of the purposes of the Project.

SECTION B.3 Utilization of Goods and Services.

1) Any resources financed under the Loan will, unless otherwise agreed in writing by A.I.D., be devoted to the Project until the completion of the Project, and thereafter will be used so as to further the objective sought in carrying out the Project.

2) Goods or services financed under the Loan, except as A.I.D. may otherwise agree in writing, will not be used to promote or assist a foreign aid project or activity associated with or financed by a country not included in Code 935 of the A.I.D. Geographic Code Book as in effect at the time of such use.

SECTION B.4 Taxation.

1) This Agreement and the Loan will be free from, and the principal and interest will be paid free from, any taxation or fees imposed under laws in effect in the territory of the Borrower.

2) To the extent that (a) any contractor, including any consulting firm, any personnel of such contractor financed under the Loan, and any property or transactions relating to such contracts, and (b) any commodity procurement transaction financed under the Loan are not exempt from identifiable taxes, tariffs, duties, or other levies imposed under laws in effect in the Dominican Republic, the Borrower will, as and to the extent provided in and pursuant to Project Implementation Letters, pay or reimburse the same with funds other than those provided under the Loan.

3) Ratification of this Agreement by the Congress of the Dominican Republic shall constitute Congressional approval of and authorization for the inclusion of the above-described exemptions in contracts to be financed hereunder, and no further Congressional approval or authorization for such contracts by reason of the inclusion of such exemptions shall be required.

SECTION B.5 Reports, Records, Inspections, Audit. The Borrower will:

- 1) Furnish A.I.D. such information and reports relating to the Project and to this Agreement as A.I.D. may reasonably request;
- 2) Maintain or cause to be maintained, in accordance with generally accepted accounting principles and practices consistently applied, books and records relating to the Project and to this Agreement, adequate to show, without limitation, the receipt and use of goods and services acquired under the Loan. Such books and records will be audited regularly, in accordance with generally accepted auditing standards, and maintained for three years after the date of last disbursement by A.I.D.; such books and records will also be adequate to show the nature and extent of solicitations of prospective suppliers of goods and services acquired, the basis of award of contracts and orders, and the overall progress of the Project toward completion; and
- 3) Afford authorized representatives of a Party the opportunity at all reasonable times to inspect the Project, the utilization of goods and services financed by such Party, and books, records, and other documents relating to the Project and the Loan.

SECTION B.6 Completeness of Information. The Borrower confirms:

- 1) That the facts and circumstances of which it has informed A.I.D., or caused A.I.D. to be informed, in the course of reaching agreement with A.I.D. on the Loan, are accurate and complete, and include all facts and circumstances that might materially affect the Project and the discharge of responsibilities under this Agreement;

2) That it will inform A.I.D. in timely fashion of any subsequent facts and circumstances that might materially affect, or that it is reasonable to believe might so affect, the Project or the discharge of responsibilities under this Agreement.

SECTION B.7 Other Payments. Borrower affirms that no payments have been or will be received by any official of the Borrower in connection with the procurement of goods or services financed under the Loan except fees, taxes, or similar payments legally established in the Dominican Republic.

SECTION B.8 Information and Marking. The Borrower will give appropriate publicity to the Loan and the Project as a program to which the United States has contributed, identify the Project site, and mark goods financed under A.I.D., as described in Project Implementation Letters.

ARTICLE C

Procurement Provisions

SECTION C.1 Special Rules.

1) The source and origin of ocean and air shipping will be deemed to be the ocean vessel's or aircraft's country of registry at the time of shipment.

2) Premiums for marine insurance placed in the Dominican Republic will be deemed and eligible Foreign Exchange Cost, if otherwise eligible under Section C.7.(1).

3) Any motor vehicles financed under the Loan will be of United States manufacture, except as A.I.D. may otherwise agree in writing.

SECTION C.2 Eligible Date. No goods or services may be financed under the Loan which are procured pursuant to orders or contracts firmly placed or entered into, prior to the date of this Agreement, except as the Parties may otherwise agree in writing.

SECTION C.3 Plans, Specifications, and Contracts. In order for there to be mutual agreement on the following matters, and except as the Parties may otherwise agree in writing.

1) The Borrower will furnish to A.I.D. upon preparation:

a) Any plans, specifications, procurement or construction schedules, contracts, or other documentation relating to goods or services to be financed under the Loan, including documentation relating to the prequalification and selection of contractors and to the solicitation of bids and proposals. Material modifications in such documentation will likewise be furnished A.I.D. on preparation;

b) Such documentation will also be furnished to A.I.D., upon preparation, relating to any goods or services which, though not financed under the Loan, are deemed by A.I.D. to be of major importance to the Project. Aspects of the Project involving matters under this subsection (1)(b) will be identified in Project Implementation Letters;

2) Documents related to the prequalification of contractors, and to the solicitation of bids or proposals for goods and services financed under the Loan will be approved by A.I.D. in writing prior to their issuance of same, and their terms will include standards and measurements commonly used in the United States;

3) Contracts and contractors financed under the Loan for engineering and other professional services, for construction services, and for such other services, equipment, or materials as may be specified in Project Implementation Letters, will be approved by A.I.D. in writing prior to execution of the contract. Material modifications in such contracts will also be approved in writing by A.I.D. prior to execution; and

4) Consulting firms used by the Borrower for the Project but not financed under the Loan, the scope of their services and such of their personnel assigned to the Project as A.I.D. may specify, and construction contractors used by the Borrower for the Project but not financed under the Loan shall be acceptable to A.I.D..

SECTION C.4 Reasonable Price. No more than reasonable prices will be paid for any goods or services financed, in whole or in part, under the Loan. Such items will be procured on a fair and, to the maximum extent practicable, on a competitive basis.

SECTION C.5 Notification to Potential Suppliers. To permit all United States firms to have the opportunity to participate in furnishing goods and services to be financed under the Loan, the Borrower will furnish A.I.D. such information with regard thereto, and at such times, as A.I.D. may request in Project Implementation Letters.

SECTION C.6 Shipping.

1) Goods which are to be transported to the Dominican Republic may not be financed under the Loan if transported either:

a) On an ocean vessel or aircraft under the flag of a country which is not included in A.I.D. Geographic Code 935 as in effect at the time of shipment; or

b) On an ocean vessel which A.I.D., by written notice to the Borrower has designated as ineligible; or

c) Under an ocean or air charter which has not received prior A.I.D. approval.

2) Costs of ocean or air transportation (of goods or persons) and related delivery services may not be financed under the Loan, if such goods or persons are carried:

a) On an ocean vessel under the flag of a country not, at the time of shipment, identified under Section 7.1 of Agreement, unless A.I.D. had previously approved it; or

b) On an ocean vessel which A.I.D., by written notice to the Borrower has designated as ineligible; or

c) Under an ocean vessel or air charter which has not received prior A.I.D. approval.

3) Unless A.I.D. determines that privately owned United States-flag commercial ocean vessels are not available at fair and reasonable rates for such vessels:

a) At least fifty percent (50%) of the gross tonnage of all goods (computed separately for dry bulk carriers, dry cargo liners and tankers) financed by A.I.D. which may be transported on ocean vessels will be transported on privately owned United States-flag commercial vessels, and

b) At least fifty percent (50%) of the gross freight revenue generated by all shipments financed by A.I.D. and transported to the Dominican Republic on dry cargo liners shall be paid to or for the benefit of privately owned United States-flag commercial vessels.

Compliance with the requirements of (a) and (b) of this subsection must be achieved with respect to any cargo transported from U.S. ports and also any cargo transported from non-U.S. ports, computed separately.

SECTION C.7 Insurance

1) Marine insurance on goods financed by A.I.D. which are to be transported to the Dominican Republic may be financed as a Foreign Exchange Cost under this Agreement provided:

a) Such insurance is placed at the lowest available competitive rate, and

b) Claims thereunder are payable in the currency in which such goods were financed or in any freely convertible currency. If the Borrower by statute, decree, rule, regulation, or practice discriminates with respect to A.I.D. financed procurement against any marine insurance company authorized to do business in any State of the United States, then all goods shipped to the Dominican Republic financed by A.I.D. hereunder will be insured against marine risks and such insurance will be placed in the United States with a company or companies authorized to do a marine insurance business in a State of the United States.

2) Except as A.I.D. may otherwise agree in writing, the Borrower will insure, or cause to be insured, goods financed under the Loan

imported for the Project against risks incident to their transit to the point of their use in the Project; such insurance will be issued on terms and conditions consistent with sound commercial practice and will insure the full value of the goods. Any indemnification received by the Borrower under such insurance will be used to replace or repair any material damage or any loss of the goods insured or will be used to reimburse the Borrower for the replacement or repair of such goods. Any such replacement will be of source and origin of countries listed in A.I.D. Geographic Code 935 as in effect at the time of replacement, and, except as the Parties may agree in writing, will be otherwise subject to the provisions of the Agreement.

SECTION C.8 U.S.. Government-Owned Excess Property. The Borrower agrees that wherever practicable United States Government-owned excess personal property, in lieu of new items financed under the Loan, should be utilized. Funds under the Loan may be used to finance the costs of obtaining such property for the Project.

ARTICLE D

Termination and Remedies

SECTION D.1 Cancellation by Borrower. The Borrower may, by giving A.I.D. 30 days written notice, cancel any part of the Loan which has not been disbursed or committed for disbursement to third parties.

SECTION D.2 Events of Default; Acceleration. It will be an "Event of Default" if Borrower shall have failed:

1) To pay when due any interest or installment of Principal required under this Agreement, or

2) To comply with any other provision of this Agreement, or
3) To pay when due any interest or installment of Principal or other payment required under any other loan, guaranty or other agreement between the Borrower or any of its agencies and A.I.D. or any of its predecessor agencies. If an Event of Default shall have occurred, then A.I.D. may give the Borrower notice that all or any part of the unrepaid Principal will be due and payable sixty (60) days thereafter, and, unless such Event of Default is cured within that time:

a) Such unrepaid Principal and accrued interest hereunder will be due and payable immediately; and

b) The amount of any further disbursements made pursuant to then outstanding commitments to third parties or otherwise will become due and payable as soon as made.

SECTION D.3 Suspension. If at any time:

1) An Event of Default has occurred; or
2) An event occurs that A.I.D. determines to be an extraordinary situation that makes it improbable either that the purpose of the Loan will be attained or that the Borrower will be able to perform its obligations under this Agreement; or

3) Any disbursement by A.I.D. would be in violation of the legislation governing A.I.D.; or

4) The Borrower shall have failed to pay when due any interest, installment of Principal or other payment required under any other loan, guaranty, or other agreement between the Borrower or any of its agencies and the Government of the United States or any of its agencies;

Then, A.I.D. may:

- 1) Suspend or cancel outstanding commitment documents to the extent they have not been utilized through irrevocable commitments to third parties or otherwise, giving prompt notice thereof to the Borrower;
- 2) Decline to issue additional commitment documents or to make disbursements other than under existing ones; and
- 3) At A.I.D.'s expense, direct that title to goods financed under the Loan be transferred to A.I.D. if the goods are from a source outside the Dominican Republic, are in a deliverable state and have not been offloaded in ports of entry of the Dominican Republic. Any disbursement made under the Loan with respect to such transferred goods will be deducted from Principal.

SECTION D.4 Cancellation by A.I.D. If, within sixty (60) days from the date of any suspension of disbursements pursuant to Section D.3, the cause or causes thereof have not been corrected, A.I.D. may cancel any part of the Loan that is not then disbursed or irrevocably committed to third parties.

SECTION D.5 Continued Effectiveness of Agreement. Notwithstanding any cancellation, suspension of disbursements, or acceleration of repayment, the provisions of this Agreement will continue in effect until the payment in full of all Principal and accrued interest hereunder.

SECTION D.6 Refunds.

- 1) In the case of any disbursement which is not supported by valid documentation in accordance with this Agreement, or which is not made or used in accordance with this Agreement, or which was for goods or

services not used in accordance with this Agreement, A.I.D. notwithstanding the availability or exercise of any other remedies provided for under this Agreement, may require the Borrower to refund the amount of such disbursement in United States dollars to A.I.D. within sixty (60) days after receipt of a request therefor. The right to require such a refund of a disbursement will continue, notwithstanding any other provision of this Agreement, for three (3) years from the date of the last disbursement under this Agreement.

2) Any refund under the preceding subsection, or any refund to A.I.D. from a contractor, supplier, bank, or other third party with respect to goods or services financed under the Loan, which refund relates to an unreasonable price for or erroneous invoicing of goods or services or to goods that did not conform to specifications, or to services that were inadequate, will:

a) Be made available first for the cost of goods and services required for the Project, to the extent justified, and

b) The remainder, if any, will be applied to the installments of Principal in the inverse order of their maturity and the amount of the loan reduced by the amount of such remainder.

SECTION D.7 Nonwaiver of Remedies. No delay in exercising any right or remedy accruing to a Party in connection with its financing under this Agreement will be construed as a waiver of such right or remedy.

PROJECT NUMBER:				
PROJECT:	ACTION	DATES		
CATALOGUE				
ADDRESS				
PC:				