

UNCLASSIFIED

UNITED STATES INTERNATIONAL DEVELOPMENT COOPERATION AGENCY
AGENCY FOR INTERNATIONAL DEVELOPMENT
Washington, D. C. 20523

CARIBBEAN REGIONAL

PROJECT PAPER

DOMINICA RURAL ELECTRIFICATION

AID/LAC/P 215

Project Number:538-0130

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AGENCY FOR INTERNATIONAL DEVELOPMENT PROJECT DATA SHEET	1. TRANSACTION CODE <input type="checkbox"/> A = Add <input type="checkbox"/> C = Change <input type="checkbox"/> D = Delete	Amendment Number _____ DOCUMENT CODE 3
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2. COUNTRY/ENTITY DOMINICA	3. PROJECT NUMBER 538-0130
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4. BUREAU/OFFICE LATIN AMERICA/CARIBBEAN 05	5. PROJECT TITLE (maximum 40 characters) DOMINICA RURAL ELECTRIFICATION
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6. PROJECT ASSISTANCE COMPLETION DATE (PACD) MM DD YY 06 30 87	7. ESTIMATED DATE OF OBLIGATION (Under 'B.' below, enter 1, 2, 3, or 4) A. Initial FY 85 B. Quarter 2 C. Final FY 85
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8. COSTS (\$000 OR EQUIVALENT \$1 =)						
A. FUNDING SOURCE	FIRST FY 85			LIFE OF PROJECT		
	B. FX	C. L/C	D. Total	E. FX	F. L/C	G. Total
AID Appropriated Total						
(Grant) ESF	(4,700)	()	(4,700)	(4,700)	()	(4,700)
(Loan)	()	()	()	()	()	()
Other U.S.						
1.						
2.						
Host Country		360	360		360	360
Other Donor(s)						
TOTALS	4,700	360	5,060	4,700		5,060

9. SCHEDULE OF AID FUNDING (\$000)									
A. APPROPRIATION	B. PRIMARY PURPOSE CODE	C. PRIMARY TECH. CODE		D. OBLIGATIONS TO DATE		E. AMOUNT APPROVED THIS ACTION		F. LIFE OF PROJECT	
		1. Grant	2. Loan	1. Grant	2. Loan	1. Grant	2. Loan	1. Grant	2. Loan
(1) ESF	744	825				4,700		4,700	
(2)									
(3)									
(4)									
TOTALS						4,700		4,700	

10. SECONDARY TECHNICAL CODES (maximum 6 codes of 3 positions each)	11. SECONDARY PURPOSE CODE
12. SPECIAL CONCERNS CODES (maximum 7 codes of 4 positions each)	
A. Code	
B. Amount	

13. PROJECT PURPOSE (maximum 480 characters)

The purposes of the Project are (1) to provide the east coast with access to electricity service through extension of the DOMLEC transmission/distribution system; and (2) to assure that DOMLEC has adequate generation capacity to meet growing system demand and to support the Government's intensive efforts to expand the nation's industrial sector by providing two 750-1100 KW diesel generators.

14. SCHEDULED EVALUATIONS	15. SOURCE/ORIGIN OF GOODS AND SERVICES
Interim MM YY MM YY Final MM YY 03 86 06 87	<input checked="" type="checkbox"/> 000 <input type="checkbox"/> 941 <input checked="" type="checkbox"/> Local <input type="checkbox"/> Other (Specify)

16. AMENDMENTS/NATURE OF CHANGE PROPOSED (This is page 1 of a _____ page PP Amendment.)

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17. APPROVED BY	Signature: <i>James S. Holtaway</i> Title: James S. Holtaway Mission Director	Date Signed MM DD YY 03 04 85	18. DATE DOCUMENT RECEIVED IN AID/W, OR FOR AID/W DOCUMENTS, DATE OF DISTRIBUTION MM DD YY
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PROJECT AUTHORIZATION

NAME OF COUNTRY: Dominica
NAME OF PROJECT: Dominica Rural Electrification
NUMBER OF PROJECT: 538-0130

1. Pursuant to Section 531 of the Foreign Assistance Act of 1961, as amended, I hereby authorize the Rural Electrification Project for Dominica (the "Grantee") involving planned obligations of not to exceed Four Million Seven Hundred Thousand United States "U.S." Dollars (\$4,700,000) in grant funds ("Grant") over a thirty month period from the date of the agreement, subject to the availability of funds in accordance with the A.I.D. OYB/allotment process, to help in financing foreign exchange and local currency costs for the project. The planned life of the project is two and one half years from the date of obligation.

2. The Project ("Project") consists of assisting the Grantee to increase generating capacity and to provide the east coast with access to electricity service. The Project will include procurement and installation of diesel generators, extension of transmission lines, procurement of hardware, tools and equipment required by the Dominica Electric Company (DOMLEC) for the distribution network, related technical services, training, a public information program and environmental activities.

3. The Project Agreement, which may be negotiated and executed by the officer to whom such authority is delegated in accordance with A.I.D. regulations and Delegation of Authority, shall be subject to the following essential terms and covenants and major conditions, together with such other terms and conditions as A.I.D. may deem appropriate:

A. Source and Origin of Commodities

Commodities financed by A.I.D. under the Project shall have their source and origin in Dominica or in the United States, except as A.I.D. may otherwise agree in writing. Except for ocean shipping, the suppliers of commodities or services shall have Dominica or the United States as their place of nationality, except as A.I.D. may otherwise agree in writing. Ocean shipping financed by A.I.D. under the Project shall, except as A.I.D. may otherwise agree in writing, be financed only on flag vessels of the United States.

B. Conditions Precedent to Disbursement

(1) First Disbursement. Prior to the first disbursement under the Grant, or to the issuance by A.I.D. of documentation pursuant to which disbursement will be made, the Grantee will, except as the Parties may otherwise agree in writing, furnish to A.I.D. in form and substance satisfactory to A.I.D.:

(a) An opinion of counsel acceptable to A.I.D. that this Agreement has been duly authorized and/or ratified by, and executed on behalf of, the Grantee, and that it constitutes a valid and legally binding obligation of the Grantee in accordance with all of its terms; and

(b) A statement of the name of the person holding or acting in the office of representative of the Grantee, and of any additional representatives, together with a specimen signature of each person specified in such statement.

(2) Disbursement for Transmission and Distribution Component. Prior to any disbursement under the Grant, or to issuance by A.I.D. of documentation pursuant to which disbursement will be made for the Transmission and Distribution Component of the Project, the Grantee will, except as the Parties may otherwise agree in writing, furnish to A.I.D. in form and substance satisfactory to A.I.D.:

(a) Evidence that DOMLEC has title to rights of way necessary to carry out the Transmission and Distribution Component or that adequate procedures are in place to assure that DOMLEC obtains the necessary rights of way; and

(b) An implementation plan, submitted by DOMLEC for construction of the distribution network, which will include a project organization chart, a financial plan and a time-phased construction schedule, and

(c) A plan for DOMLEC for carrying out the public information component of the project under which safety and other relevant information will be disseminated to potential consumers.

(3) Disbursement for Diesel Generation Units. Prior to any disbursement under the Grant, or to issuance by A.I.D. of documentation pursuant to which disbursement will be made for the diesel generation units, DOMLEC shall, except as the Parties may otherwise agree in writing, identify staff who will participate in the operations and maintenance training program to be carried out under the generator supply/installation contract.

(4) Disbursement for Environmental Program. Prior to any disbursement under the Grant, or to the issuance by A.I.D. of documentation pursuant to which disbursement will be made for the environmental program, the Grantee shall, except as the Parties may otherwise agree in writing, require the Department of Forestry of the Ministry of Agriculture to provide a prioritized, time-phased implementation plan acceptable to A.I.D.

C. Special Covenants

The Grantee and/or DOMLEC shall, except as A.I.D. may otherwise agree in writing, covenant as follows:

(1) Financial. The Grantee and DOMLEC, except as A.I.D. may otherwise agree in writing, covenant to maintain the financial viability of DOMLEC through the application of appropriate rate increases and the conduct of a loss reduction program, as necessary, to assure that DOMLEC can amortize its debts, pay salaries, operating/maintenance costs, depreciate facilities and contribute to future capital expansion"

Approximately one year from the date of the agreement, The Grantee, DOMLEC and A.I.D. will review DOMLEC's financial status, including the affect of current tariffs and requirements for possible revision to those tariffs, through the process of the Project's mid-term evaluation.

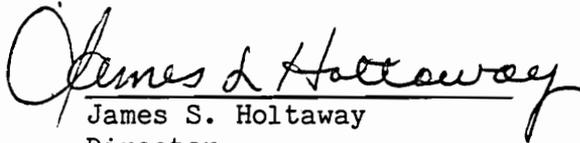
(2) Logistics. The Grantee and DOMLEC, except as A.I.D. may otherwise agree in writing, agree to provide all necessary warehouse facilities and inventory control for the distribution hardware, tools and equipment to be procured for the Project.

(3) Management. The Grantee and DOMLEC agree that no divestiture or partial divestiture of DOMLEC shall occur without prior consultation with A.I.D.

(4) House Connections. DOMLEC, except as A.I.D. may otherwise agree in writing, agrees to provide service cable and meters required to make house connections in the East Coast service area.

(5) Maintenance. The Grantee and DOMLEC, except as A.I.D. may otherwise agree in writing, agree to provide all necessary planning, financial and supervisory measures to assure that all installations financed by this Project are adequately maintained.

(6) Connection Charges. DOMLEC, except as A.I.D. may otherwise agree in writing, agrees to permit consumers, when warranted, to pay connection charges over an extended period of time.


James S. Holtaway
Director

Dated: March 4, 1985

Clearances:

C/ENGR:MDeMetre	(In draft)
D/ENGR:JdBaird	(In draft)
RLA:TCarter	(In draft)
CONT:RLWarin	(In draft)
CPO:JNConnolly	(In draft)
C/DR:POrr	_____
PRM:RCCoulter	_____
D/DIR:TJBrown	<u>113</u>

DOMINICA RURAL ELECTRIFICATION PROJECT

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Abbreviations and Acronyms

DOMLEC	Dominica Electricity Services, Ltd.
GOCD	Government of the Commonwealth of Dominica
CDC	Commonwealth Development Corporation
IPED	Investment Promotion and Export Development Project
PDAP	Project Development Assistance Program
CIDA	Canadian International Development Agency
CDB	Caribbean Development Bank
EDF	European Development Fund
EC\$	Eastern Caribbean Dollar = US\$2.70
NRECA	National Rural Electric Association

KW	Kilowatt
KV	Kilovolt
MW	Megawatt
MWH	Megawatt Hour
KWH	Kilowatt Hour
ROW	Right of Way
IRR	Internal Rate of Return

Glossary of Terms

Line Losses	Energy lost in transmission and distribution.
Power Factor	Ratio of total power in an electrical circuit to total volt amps applied to the circuit.
Base Load	Normal or steady load demand placed on an electrical system.
Load Factor	Ratio of average load to peak load.
Peak Load	Maximum demand placed on an electrical system during a given period.
Load Shedding	Reduction in load when demand exceeds capacity.
Reliability	Ability of an electrical system to provide service.
Loop	Electrical system forming a closed circuit.

I. SUMMARY AND RECOMMENDATIONS

A. Recommendations

1. Funding

RDO/C recommends that an ESF Grant of \$4.7 million be authorized for obligation in FY 1985 for the Dominica Rural Electrification Project with a Project Assistance Completion Date (PACD) of June 30, 1987.

2. Geographic Code

The project authorization will specify that, except as AID may otherwise agree in writing:

a. Goods and services financed by AID under this Project shall have their source and origin in countries included in A.I.D. Geographic Code 000 or Dominica; and

b. Ocean shipping financed by A.I.D. under this project shall be only on flag vessels of the United States or Dominica unless the conditions specified in the project's ocean freight waiver have been complied with and the appropriate certification is made.

3. Waivers

An ocean freight waiver will be obtained from AID/Washington's Office of Commodity Management.

B. Summary Project Description

Lacking basic infrastructure including electricity, the rural East Coast of Dominica has not realized its economic potential, nor have the basic needs of its population been met. In addition, the electrical network which serves the rest of the island lacks sufficient and reliable generating capacity to meet Dominica's existing domestic and industrial needs. The Dominica Rural Electrification Project has been developed to meet the immediate needs of the country, to promote economic development and participation in the benefits of the Caribbean Basin Initiative, and to support the social aims of the Government of the Commonwealth of Dominica (GOCD).

The goal of the Dominica Rural Electrification Project is to promote the development of Dominica, particularly the East Coast. The purposes of the Project are 1) to provide the East Coast with access to electricity service through the extension of the DOMLEC transmission/distribution system, and 2) to assure that DOMLEC has adequate generation capacity to meet growing system demand and support the GOCD's intensive efforts to expand the nation's industrial sector.

The project consists of the procurement and installation of two generators to meet the present electric demand of the entire country,

the procurement of materials and services required to install 22.5 miles of transmission line from the main power station at Trafalgar to the East Coast, thence north and south along the East Coast, and the procurement of materials for 44 miles of distribution line which will permit villagers and local enterprises to connect to the national electricity network. Within the first year after the distribution lines are in place, an estimated 1,000 households, comprising approximately 5,000 persons, will be provided with electrical service. In subsequent years an estimated 2,500 households comprising 12,000 people will have electric service, and nearly every household on the East Coast will have the option to hook up to the network.

In order to support and develop DOMLEC (Dominica Electricity Services, Ltd.), the implementing agency, training will be provided for Dominicans to operate and maintain the generators and for linemen who will install and maintain the lines. DOMLEC will design a public safety program to instruct new electricity consumers in the proper way to install housewiring. A small environmental activities program will assist the Department of Forestry of the Ministry of Agriculture to plan and provide signs and facilities to assure the safety of visitors to the area of the National Park through which the transmission lines will pass.

C. Summary Project Findings

This Project is ready for implementation and is considered to be socially, financially, and economically sound, and technically and administratively feasible.

D. DAEC Concerns and Design Guidelines

The concerns and issues raised at the DAEC review of the Project Identification Document (PID) are as follows:

1. The Project Paper should examine the tariff structure and future character of DOMLEC, which is now government-owned.

During Project development, the tariff structure and future character of DOMLEC was discussed with the utility. As a result of the hydroelectric feasibility study by Shawinigan Engineering Company, Ltd., funded by the World Bank, DOMLEC will likely request rate increases of about 5% a year over the next fifteen years. As part of a projected GOCD expansion of the country's hydroelectric potential, it is anticipated that the tariff schedule will be examined in greater detail. It is a covenant to the Project that the GOCD and DOMLEC maintain the financial viability of DOMLEC through the application of appropriate rate increases and other measures.

DOMLEC was previously owned in part by the Commonwealth Development Corporation (CDC). The GOCD has indicated tentative plans for divestiture, including sale of shares to the public and to a foreign utility who will provide management services, although these ideas are still at a preliminary stage. It is a covenant to the Project that the GOCD will not proceed with divestiture or partial divestiture without prior consultation with A.I.D.

2. Three issues concerning the diesel component: examine 1) if the 1500 KW diesel specified in the PID meets DOMLEC needs and is needed in light of the proposed hydropower development, 2) the possibility of procuring British made, off-the-shelf, rebuilt or reconditioned diesels, and 3) the possibility of funding the procurement of the diesel by another donor.

During PP development, which included the design of the electrical system and the preparation of bid documents, it was determined that the single 1500 KW generator proposed in the PID was not the most appropriate solution. Requests for Proposal have recently been sent to interested suppliers for the procurement and installation of two smaller generators which may range in capacity from 750 to 1100 KW. This alternative was chosen in lieu of the 1500kW unit to increase firm power generating capacity.

After carefully considering the pros and cons of procuring British, off-the-shelf, or used equipment, it was determined that a) with ESF funding the British option was unacceptable; b) the risk posed by procuring used equipment was politically unacceptable under the circumstances. The RFP solicits off-the-shelf units to save time which would be spent in manufacturing the generators to particular specifications.

The other donors active in the eastern Caribbean were queried regarding their willingness to finance the procurement of the generators and indicated that this was not in their regional plan.

3. The PP should examine the feasibility of concrete poles constructed in Dominica, and the availability of surplus property transmission/distribution lines.

It has been determined that the use of concrete poles would not be cost effective, and excess property suitable for the project is not available.

4. Regarding the "Tee" route chosen for the transmission lines, in developing the PP a full environmental assessment will be required.

The regional environmental officer has written a full assessment and has determined that the transmission lines will not endanger the environment of the National Park. However, a small program will be designed to provide signs and other facilities to advise Park visitors of the existence and hazard of the high power transmission lines.

5. The Economic Analysis should be expanded to include estimates of the magnitude of any additional benefits which may be quantified, and qualitative discussion of those which are not easily measured.

The economic analysis has taken into account consumer surplus, fuel cost savings and other factors. (See Economic Analysis.)

6. Grant funds should be used for the whole project but that DOMLEC amortize the grant by paying interest and principal into an account to be used for development purposes by a popular private development entity or entities.

The concept of a development fund was considered. However, it has been determined that even with grant funding for the entire project, that the financial position of DOMLEC is not strong enough to support such a fund. RDO/C received LAC/DR concurrence, prior to project authorization, that the entire project should be grant-funded.

E. Contributors to the Project Paper

The following individuals contributed to the development of the Project Paper:

RDO/C Project Committee

Michael DeMetre, Chief, Office of Engineering and Technology
James Baird, Deputy Chief, Office of Engineering and Technology
Joanne Connolly, Assistant Project Development Officer
Robin Phillips, Economist
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George Karady, EBASCO

Government of the Commonwealth of Dominica

Alleyne Carbon, Minister of Communication and Works
Masterwell Doctrove, Permanent Secretary, Ministry of Communication and Works
Josie Edwards, Department of Forestry, Ministry of Agriculture

Dominica Electricity Services, Ltd., DOMLEC

Cecil Shillingford, General Manager
Cecil Burton, Project Manager
Rawlins Bruney, Deputy Manager
Peter Bannis, Project Engineer

II. PROJECT RATIONALE AND DESCRIPTION

A. Rationale

1. Setting/Background

Dominica is a volcanic, mountainous island of 288 square miles, located in the Windward islands of the eastern Caribbean between Guadeloupe and Martinique. It is one of the poorest countries of the Caribbean. Per capita income of Dominica's 80,000 people averages about US\$989, but average incomes of the 17,000 people in the East Coast parishes of St. David and St. Patrick, in which the project transmission and distribution lines will be installed, are about two thirds the per capita income of the people who live in the capital. Dominica, and particularly its rural East Coast in which subsistence farmers work small plots of land, has not yet realized its economic potential.

The east coast has a variety of untapped resources, as well as arable land for the production of coconuts, bay leaves, arrowroot, cassava, and plantains. Lacking electric power other than small, privately owned generators, the east coast has not been able to attract investors. If electricity were available, Dominica would be better able to attract the capital required to develop industries such as fish processing, sawmills and wood processing, small agro-based industries as well as carpentry and cabinet-making cooperatives and poultry farms. Only if such industry develops will the east coast, and Dominica as a whole, benefit from the economic incentives and advantages provided by the Caribbean Basin Initiative.

Electrification is one important contribution to rural development, but the availability of electricity in a rural area does not, in itself, guarantee development. Programs intended to promote economic activity, improve public services, and raise living standards can be greatly enhanced by providing the basic modern amenity of electricity.

a. Relationship of the Project to Commercial Development

The development of the Dominica private sector and the production of exportable goods to earn foreign exchange and create jobs depends on the development of reliable infrastructure and services. Although the short term GOCD industrial development strategy is to welcome nearly any sort of productive enterprise in order to introduce industrialization and create jobs, the long-term GOCD strategy is to encourage industries based on local resources such as wood, using cheap hydroelectric power.

For foreign investors, the advantages of locating in Dominica include low labor costs, special incentives for LDC's within CARICOM, and the availability of raw materials such as wood and water. A major constraint to investment is the lack of adequate infrastructure.

The GOCD has embarked on a policy of export-oriented industrial development using the financial facilities of the recently reorganized parastatals, the Industrial Development Corporation (IDC) and the Agriculture and Industrial Development (AID) Bank.

Under USAID's Investment Promotion and Export Development Project (IPED), AID is financing a Project Development Assistance Program (PDAP). A Resident Advisor is promoting investment and providing technical assistance to the IDC to institutionalize an investment capability in Dominica. Successful private sector projects to result from this effort include enterprises to grow and process aloe vera for the U.S. market, and enterprises to produce electronics, garments, cut flowers, quarry stone and fresh produce, which are owned by U.S., Far-East, and local investors.

Given the aggressive promotion efforts and top level commitment by the Government to attract foreign investment, which will be further enhanced by the active participation of the local private sector, it is expected that more foreign investors will be convinced to visit the island. Whether they invest, however, will depend in part on whether the needs for industrial space and infrastructure are met.

b. Relationship of Project to Social Development

Electrification of the east coast will serve social as well as economic aims. Without electrification, the towns of the east coast also lack street lights, dependable refrigeration, and water treatment facilities. There are only limited health services because vaccines cannot be refrigerated and medical instruments cannot be properly sterilized. Without lighting, training programs and public meetings can be held only during daylight hours when much of the population is already occupied.

Kerosene and batteries are costly and inadequate sources of energy. Yet kerosene lamps are the only source of light for most families, and battery-powered radios provide the only source of outside entertainment and news. As citizens of a small nation characterized by significant immigration to the capital, the people of the east coast are aware of their isolation from the rest of the country and of their relative lack of public services.

c. The Development of Electricity in Dominica

The capital city of Roseau was partially electrified in 1905, and the city's electric services were gradually expanded. The hydropower plant at Trafalgar came into service in the mid 1950's, permitting reliable service to Roseau and the expansion of the power system south to Grand Bay via Soufriere and north along the coast to St. Joseph and Salisbury. In the early 1970's the northeast coast was electrified as far as Marigot with diesel stations at Blenheim and Melville Hall.

Many agencies have recognized the potential of Dominica and its undeveloped east coast, and have identified the lack of reliable energy as a constraint to the realization of that potential. In 1969, a United Nations team recommended additional hydropower projects and a thorough exploration of the geothermal fields. In 1975, the North of Scotland Hydroelectric Board studied the possibilities for hydropower development in Dominica and recommended a 7500 KW hydroelectric project on the White River, in the southeastern part of the island.

In 1976, Electricite de France expanded the Scottish study and concluded that the hydroelectric potential of Dominica is approximately 17 MW, compared with a current peak load of 4MW. In 1980, Shawinigan Engineering Ltd. of Canada completed a pre-investment study for the Caribbean Development Bank. Shawinigan confirmed the Scottish and French conclusions that several of the large hydro projects were economically viable, and also urged the development of mini-hydro electric power plants for isolated villages.

The French Bureau de Recherches Geologiques et Minieres (BRGM) in 1980 surveyed the geothermal potential of Dominica and concluded that timber industries, cement works, brick works, and even industrial plants to process Guyana's bauxite, all heavy power-consuming industries, could be viable if Dominica's hydro and geothermal energy resources were developed. The BRGM also concluded that Dominica has the potential to produce the cheapest electric power in the Caribbean. It has also been suggested that if the country's energy resources were developed, Dominica could possibly export energy to Guadeloupe and Martinique.

In 1981, the Canadian International Development Agency (CIDA) contracted with Wason Consultants, Ltd., and AID contracted with the National Rural Electric Cooperative Association (NRECA) to investigate the feasibility of providing mini-hydro projects for the east coast. Both studies acknowledged Dominica's hydro potential as well as the resultant benefits, and recommended development of energy resources on the east coast. Furthermore, the NRECA study noted that hydro potential in excess of that required by the east coast could be absorbed by the central system if the transmission system were developed more extensively.

Thus the present proposed AID project to extend the transmission system to the east coast will permit the hydropower potential of the east coast to be used ultimately by the entire country. A multi-donor Upper Roseau Valley hydroelectric project has been considered, but even if the project is in fact carried through, the most optimistic observers see the civil works starting no sooner than 1987 and additional generating capacity not being available until 1990. The diesel generators to be procured under the proposed AID project will provide the interim power required, and will eventually be the source of peaking and backup power if the hydroelectric project is implemented. With the new diesel units, the entire country will be satisfactorily supplied with electricity in the immediate future and the installation

of the transmission line to the east coast will simplify the task of making maximum use of any future new hydro facility located in that region.

2. The Power Sector in Dominica

a. DOMLEC - The Utility Company

Electricity service in Dominica is provided by Dominica Electricity Services Limited (DOMLEC), a utility formed in 1951 when the Dominican Government signed an agreement with the Colonial Development Corporation, now the Commonwealth Development Corporation (CDC), granting them exclusive rights to all rivers and streams on the island to produce and sell electricity.

In 1976 CDC sold 49% of the company's shares to the Government while maintaining responsibility for management and operation of the company. By December 1, 1983, the Government had purchased the remaining shares from CDC. The generation, distribution, and marketing of electrical energy is regulated by the Electricity Supply Act of 1976.

The organization chart of DOMLEC is shown in Exhibit #1, and a description of DOMLEC as an institution is provided in the Institutional Analysis.

b. Generation and Transmission/Distribution Systems

The existing DOMLEC system is small, having the capacity to produce a maximum of 4000-5000 kW, depending on hydrologic conditions and outages for maintenance. The present electrical grid brings power to the west, north, and south coast areas. Sixty five percent of the total system demand is concentrated in the metropolitan Roseau area. A listing of existing generation resources is shown in Exhibit #2, and Exhibit #3 shows the existing transmission/distribution system.

DOMLEC relies on a mixture of hydro and diesel generation resources located at four generation stations: Trafalgar, Padu, Fond Cole, and Melville Hall. The Trafalgar station houses three hydro units, each rated at 320 kW, and two antiquated 200 kW diesel generators, one of which is inoperable. The Padu station contains two 940 kW hydro units. Actual output is, however, constrained by high energy losses in the penstocks.

The Fond Cole station houses three diesel units. Two rated at 1126 kW are reliable, in good condition, and operate efficiently. The third unit is rated at 529 kW but has a safe continuous operating limit of only 300 kW. The Melville Hall station, located in the northeast, houses two 100 kW and one 250 kW unit, used primarily during peak hours and to improve voltage levels in that part of the transmission system.

Hydropower generation is used extensively, accounting for over 80% of total annual energy generation. Diesel is used when demand exceeds the hydropower capability during the evening peak hours and in the dry season, when output from the hydro stations diminishes.

Power is transmitted at 11,000 volts (11kV), and distributed to users at 400/230 volts. Power lines are supported on wood poles, generally of single-pole, single cross-arm construction, but double or triple pole construction is also used. The power system is administered from the diesel station at Fond Cole, which is located just north of Roseau, but is physically operated from the Trafalgar hydroelectric plant.

DOMLEC operations were substantially disrupted by damages caused by Hurricane David in 1979. Most of the transmission/distribution system was destroyed and severe damage was sustained at one of the hydropower stations. Rebuilding of the system through a CDB-financed program has continued through the autumn of 1984, and is now essentially complete.

c. System Demand and Sales

Using existing generation sources, DOMLEC is required to provide energy for a mixture of domestic (53%), commercial (39%), and industrial (8%) consumers. The present system peak load is approximately 4100 kW, and the utility expects to generate a total of 23,000 mwh in 1985. Technical and non-technical losses currently account for approximately 20% of generation, an unusually high figure.

DOMLEC's daily load duration curve is typical of systems serving a high percentage of domestic consumers. The main characteristic is a high peak load during evening hours when the general populace turns on lights and uses domestic appliances. There is a relatively low load factor (presently about 57%), but the utility must maintain substantial excess capacity to meet the evening peak loads. DOMLEC uses diesel generators extensively for this purpose.

DOMLEC's Annual Energy Generation and Peak Load Forecast through the year 2000, as determined by project consultants, are shown in Exhibit #4 and #5. These figures indicate that energy generation requirements will grow at about 4.0% per year, and the annual peak load will increase about 3.6% yearly. The system load factor is expected to improve from its current 56.7% to about 60.5% by the year 2000.

These projections were developed from data which indicates that domestic sales, currently accounting for 53% of total energy sales, will grow at an annual increase of about 3.9%. Commercial sales, now about 39% of total sales, will increase at a 3.7% annual rate; and sales to industrial consumers will experience the highest growth rate of 4.5% annually from its current base of only 8% of total sales. Technical and non-technical system losses, currently 23% of total

energy generated, are expected to decrease to a more reasonable level of 10% by 2000. Loss reductions through implementation of the recommendations contained in the Adair and Brady study, which was financed under the USAID Alternative Energy Project, will result primarily from improvements to the transmission system (addition of capacitors, etc.) and establishment of a meter testing and changeout program.

d. Tariffs

The establishment of tariffs for the supply of electrical energy by DOMLEC is regulated by the 1976 Electricity Supply Act. Under the Act DOMLEC requests for rate increases or alterations, supported by audited financial reports, must be approved by the Minister of Communications and Works before becoming effective. The Act also defines the basic measure of electrical energy usage, the "unit", as one kilowatt-hour.

Following the devastation of Hurricane David in 1979, a flat rate of EC\$0.325 (US\$0.123) per unit was established for all customer classes. This flat rate schedule superceded one which rewarded higher use with a lower unit price and included an installed capacity charge for commercial and industrial users. The new schedule was deemed necessary to finance reconstruction of the transmission and distribution systems.

Rather than being strictly cost-based, current tariff policy has two guiding principles: (1) revenue generated must be adequate to maintain the utility's financial viability and insure access to financing for future capital projects, and (2) tariffs for the various consumer groups may be appropriately modified to support the Government's economic or social objectives, e.g. industrial expansion. The current rates, effective June 1, 1984, include an industrial time-of-use rate which is clearly intended to be promotional, and an inverted block rate for domestic users to encourage conservation. While current tariff levels and policy are adequate and reasonable, future rate changes should be accompanied by a cost of service analysis to prevent revenue erosion which may result from a non cost-based rate schedule.

e. DOMLEC's Changing Role

Following the full acquisition of DOMLEC by the Government of Dominica in 1983, the utility has been called upon to support the social and economic objectives of the Government. This is reflected not only in the utility's current efforts to bring electricity to the rural East Coast region of the Island, but also in the Government's insistence that adequate power infrastructure be available to support the Government's drive to expand the nation's industrial sector.

To meet this growing demand DOMLEC will be required to expand its generation capability. Output from the two run-of-the-river hydro stations is substantially diminished during the

dry season when river flows available for diversion into the systems are minimal. Even when adequate flows are available, output from the plants has been reduced in recent years by significant penstock head losses and mechanical wear and erosion effects on the 20 - 30 year old turbines. The newest additions to the generation plant are the two 1126 kW diesel units installed at Fond Cole in 1971 and 1972. Three of the other diesel units are over thirty years old and due for retirement, and the three high-speed units located at Melville Hall are suitable only for intermittent use to meet peak loads.

Realizing the need to expand their generation capability, DOMLEC and the Government commissioned a CDB-financed study in 1983 to determine the feasibility of developing some of the Island's hydropower sites. It was determined that although there are a number of economically exploitable hydropower sites on the island, development will largely be limited to run-of-the-river type systems and the utility will be required to maintain a substantial diesel capability to fulfill dry season and peak demands. The study has recommended that further development of the Roseau Valley resource be undertaken as the next major addition to DOMLEC's hydro generation capability.

The Upper Roseau Valley Development proposal is currently being reviewed by the Government and external donors, including the World Bank, and may be financed and implemented in some form over the next five years. Additional generation capacity from this source would not be available before 1990, however.

Consequently DOMLEC faces the prospect of increasing generation shortfalls between 1985 and 1990. These shortfalls, which will necessitate increased load-shedding, will result in less reliable electricity service for many users, limit DOMLEC's revenues, and, perhaps most importantly, jeopardize the Government's efforts to attract foreign capital and expand the vital industrial base.

3. Conformity with Dominica's Development Strategy

Dominica is among the poorest of the Eastern Caribbean island nations. This poverty is reflected not only in the low gross national product and low per capita income, but also in the island's badly deteriorated infrastructure and the limited extent of basic social services. Since assuming office in 1980 the current Government has fought to reverse the trend of declining expectations and aspirations and has been successful in mobilizing its own resources as well as those made available by external donors.

Current donor-financed projects include road reconstruction programs funded by CIDA, the EDF, the World Bank, and USAID. Several schools and health clinics have been constructed or refurbished from funds provided under such programs as the USAID/CDB Basic Human Needs Project, and efforts are underway to revitalize the banana industry and expand and diversify the agricultural sector in general.

However, unemployment remains a serious problem in spite of the hundreds of jobs created by the ongoing roads programs, and could rise again upon completion of those projects. Numerous rural villages are without piped water, and a significant portion of the population, including the entire East Coast, does not have access to electricity.

In their continuing effort to correct these problems, the Government is making determined efforts to attract foreign investors and to expand the industrial sector, in order to provide jobs and increase GDP and foreign exchange reserves. The Government is also striving to provide basic services to the entire population. DOMLEC will play an important role in this effort. The utility must provide access to electricity to as many people as possible and provide adequate, reliable electrical power to fuel the expanding industrial sector so vital to Dominica's future.

4. Relationship of the Project to Mission Strategy

The Mission fully supports Dominica's efforts to improve its basic infrastructure, including power generation and distribution. The proposed project is strongly supported by the draft RDO/C program strategy. As part of the priority attention to private enterprise development, RDO/C will continue to support improvements in basic physical infrastructure, including utility improvements, to support increased domestic and foreign investment in the productive sectors. Additionally, the project supports RDO/C human resources development strategy by providing electricity for facilities and equipment needed to deliver services.

The proposed project will assure that Dominica is in a position to take maximum advantage of the Caribbean Basin Initiative. The present electricity supply must be augmented to meet short and medium-term electricity needs partly attributed to industrial expansion of 10 percent per year since 1980. To support the equitable distribution of growth, power supply is needed on the east coast to complement other infrastructure and development programs.

The GOCD's focus on sound fiscal policy, export diversification, and infrastructure development creates favorable prospects for medium-term economic growth. Bilateral ESF assistance to the Government of Dominica is considered by RDO/C to be a fundamental element in our political support for that nation. The Eastern Caribbean governments are, for the most part, pursuing development policies based largely on free-enterprise-led growth. By responding to this development priority, AID will be underscoring support for democratic institutions and a free-enterprise economy.

B. Goal and Purpose

The goal of the Dominica Rural Electrification Project is to promote the development of Dominica and particularly the rural East Coast. The purposes of the Project are (1) to provide the east coast with access to electricity service through extension of the DOMLEC

transmission/distribution system; and (2) to assure that DOMLEC has adequate generation capacity to meet growing system demand and to support the Government's intensive efforts to expand the nation's industrial sector by providing two 750-1100 kW diesel generators.

C. Project Elements

The Project will include the procurement and installation of additional diesel generators, the extension of the 11-KV transmission line from Trafalgar to Rosalie, Castle Bruce and Delices, and the procurement of sufficient distribution materials and tools and equipment to enable DOMLEC to extend the transmission/distribution networks throughout the major population centers along the east coast. Other project elements will include a training program to develop technically qualified linemen to participate in the construction phase of the project, a public information program, and an environmental program in the Trois Pitons National Park.

1. Generation Facilities

Two 750-1100 KW medium speed diesel generators will be procured and installed at the Fond Cole power plant. Space for the new units is available in the existing power house. The procurement will include all required ancillary and electrical equipment. Installation services will be included in the contract, and the supplier will be required to provide training for DOMLEC technicians.

2. Grid Extension

A three phase, 11-KV transmission line will be constructed from the Trafalgar power house to Rosalie on the east coast, a distance of approximately 7.5 miles, thence north and south to Castle Bruce and Delices, respectively. The Rosalie-Castle Bruce segment is 6.0 miles in length, while the Rosalie-Delices segment is approximately 9.0 miles. The total length of the transmission line is thus 22.5 miles. As noted in the implementation plan, construction of the primary transmission line will be carried out by a U.S. contractor who will be responsible for procuring all materials and providing all labor and equipment.

Sufficient distribution materials and tools and equipment will be purchased to enable DOMLEC to extend the 11-KV line and 400/230 volt distribution lines to the population centers, including a 7.5 mile extension from Castle Bruce through Gaulette to the Carib Reserve at Atkinson.

3. Training Program

Approximately fifty persons will be trained as skilled and semi-skilled linemen under this element of the project. Training will be conducted by DOMLEC personnel. The program will be carried out over a two week period and will incorporate field work, lectures, workshop training, and practical and written examinations. Funds for the

training effort have been included under the estimate for construction of the 11kV transmission line.

It is anticipated that some of the personnel successfully completing the program will be employed by the U.S. contractor undertaking construction of the transmission line. Others will be hired by DOMLEC for the construction of the distribution network to be carried out by force account. A more detailed description of the training activity is included in an annex to this paper.

4. Public Information Program

DOMLEC will disseminate information to potential consumers through the Government Information Service, public meetings to be held in the major villages located in the East Coast service area, and other appropriate means. Tariff schedules, the productive uses of electricity, safety standards and codes which must be followed in making house-wiring installations, and other relevant information will be discussed. A detailed plan for conducting the program will be submitted as a Condition Precedent to disbursement for the transmission and distribution component of the Project. Funds required for the program are provided under the Technical Assistance line item of the Distribution materials budget.

5. Environmental Program

The transmission line extension will pass through the Trois Pitons National Park. In order to minimize any possible negative environmental impact resulting from the installation of the lines in the area, RDO/C, the GOCD and DOMLEC have agreed that the following measures will be taken:

(a) The alignment of the lines has been adjusted to minimize aesthetic impact.

(b) National Parks personnel will serve in an advisory capacity during construction to ensure that environmentally compatible techniques will be used in the Park; and

(c) No herbicides will be used for the clearing or maintenance of the trails for the transmission lines.

Also, a small portion of funds is included in the Project for use by the National Parks Division to provide signs and other services to advise Park visitors of the existence of the high power transmission lines to assure visitor safety.

III. COST ESTIMATE AND FINANCIAL PLAN

The total estimated cost of the project is \$5.06 million, of which \$4.7 million will be borne by AID and \$0.360 million by the GOCD. Exhibit 6 provides a summary financial plan by project element, including both US and local currency costs. Exhibits #7, #8, and #9 provide a further breakdown of diesel generator, transmission line and distribution network construction costs. Annex H provides a more detailed analysis of material, equipment and labor costs for transmission line construction and a detailed breakdown of material and tool and equipment costs for distribution line construction, including the extension to Atkinson.

All grant funds are expected to be disbursed by December 31, 1986.

SUMMARY FINANCIAL PLAN

<u>PROJECT ELEMENTS</u>	<u>PROJECT COSTS IN US\$ 000</u>		
	<u>AID</u>	<u>GOCD</u>	<u>TOTAL</u>
Diesel Generators	1,834	-	1,834
11 KV Transmission Line	2,090	-	2,090
Distribution Material and Installation	727	350	1,077
Environmental Activities	<u>30</u>	<u>10</u>	<u>40</u>
<u>PROJECT TOTAL</u> =====	<u>4,681</u> =====	<u>360</u> =====	<u>5,041</u> =====

IV. IMPLEMENTATION PLAN

DOMLEC, the executing agency for this project, has only limited resources to devote to the implementation task. Although the utility is capable of maintaining the existing electrical system and designing and constructing small extensions, the resources required to install over sixty miles of transmission and distribution lines in a timely fashion would severely tax the utility's small pool of managerial, technical, and skilled personnel.

Consequently, although DOMLEC will be fully involved in project design and implementation, considerable external design and construction expertise will be provided. Furthermore, in order to ensure proper and timely installation of the new diesel generators, the supplier will be responsible for the installation and commissioning functions. The Project Implementation Schedule is shown in Exhibit #9.

DOMLEC will have overall management responsibility for implementation of the project and will be directly responsible for the installation of the low-voltage distribution systems in east coast villages. A Project Manager, employed under an AID Personal Services Contract, will assist DOMLEC management in all phases of the project and act as liaison with the AID mission. DOMLEC, assisted by the Project Manager and other locally hired skilled linesmen, is deemed to have the capability to supervise the generator installation and construction of the transmission line, and to undertake construction of the distribution network.

The Project Manager's contract extends through October 1986, by which time installation of the generators and construction of the transmission line will have been completed, and construction of the distribution lines will be substantially completed. DOMLEC has established a Project Implementation Unit under the Project Manager which will be responsible for all construction, contract management, accounting, training, and material control activities.

A. Design

The transmission grid extension into the east coast has been designed by a U.S. electrical engineering firm under a USAID Indefinite Quantity Contract (IQC). The consultant has also developed technical specifications for the diesel generators, distribution materials, and miscellaneous tools and construction equipment required by DOMLEC. This technical information will be incorporated into bid documents for: (1) supply and construction of the transmission system; (2) supply and installation of the diesel generation units; and (3) supply of distribution materials and tools and equipment.

DOMLEC has been involved in project design, will supervise the generator installation and the transmission line construction, and will be fully responsible for maintenance of the extended transmission system and operation of the new generators.

B. Construction

High Voltage Transmission System: A U.S. construction contractor will be employed to install the 22.5 mile East Coast transmission extension. Prequalification has already begun, and eleven firms are expected to be invited to submit bids. The successful bidder will be responsible for the procurement of all materials and provision of all necessary equipment and labor for the construction of the transmission line. Although unskilled and semi-skilled labor can be drawn from East Coast communities, the contractor will be required to import some skilled personnel as well as project management staff. Since construction equipment suitable for the job in Dominica is extremely limited, the contractor will also be required to mobilize his own equipment.

The high-voltage lines will be constructed in accordance with the plans and specifications developed by the IQC design firm. DOMLEC will be responsible for inspection of the contractor's work and will process requests for payment and change orders. These functions will be carried out primarily by the Project Manager, supplemented by additional technical personnel to be hired locally. Funds for the additional supervisory personnel have been included in the Project budget.

Distribution System: The East Coast distribution system, which will consist of 11 kV spurs from the main transmission line into the communities, the low voltage (400/230 V) systems within the communities, and house connections to individual dwellings, will be constructed by DOMLEC using their own laborers. All materials and construction tools and equipment required will be procured through an IFB prepared by the project consultant. Construction will be managed through DOMLEC's existing organizational structure; since installation will be spread over an eighteen month period, the utility's human resources will not be unreasonably strained. Although the Project Manager will retain overall management responsibility for construction of the distribution system, actual supervision of the work will be performed by crew chiefs and area supervisors. Since DOMLEC will be paying all labor associated with installation of the distribution system, only routine internal accounting and reporting procedures will be required.

House Connections and House Wiring: Service drop cable and other materials, including meters, required to make house connections, will be provided by DOMLEC. Connections to individual dwellings are made at no charge if the residence is located within one hundred feet of a distribution line. Present GOCD policy dictates that, where feasible, every effort will be made to extend lines to within that distance to enable consumers to obtain electricity without a connection charge.

Given the typical settlement pattern on the East Coast, in which households are concentrated in villages rather than dispersed, the overwhelming majority of potential consumers will be within 100 feet of the distribution line. However, in those few instances where this is not feasible, the DOMLEC Board of Directors will also consider a proposal to extend credit to consumers further from the distribution network. Under

this plan, connection charges could be paid in installments over a twelve to eighteen month period. DOMLEC has the capability to conduct credit assessments to ascertain that potential consumers have the financial resources to repay the loans.

Housewiring is the responsibility of the individual consumer. The Electricity Supply Act of 1976 requires that housewiring installations conform to codes of practice issued by the British Standard Institute or to the relevant standards of the National Board of Fire Underwriters of the United States of America. Prior to installation of a service drop from the distribution line, housewiring is inspected by an electrical inspector from the Ministry of Communications and Works and a certification issued stating that the housewiring meets the requirements set forth above. The certification must accompany the application for supply of electricity submitted to DOMLEC.

Information on safety and the relevant electrical codes will be disseminated by DOMLEC through public meetings to be held in each of the major villages located in the service area.

Diesel Generation Units: To expedite this element of the project, supply and installation of the two 750-1100 kW diesel generators will be undertaken as a direct-AID contract. This procurement has already been advertised, the RFP was issued in early January, and proposals will be received in early March.

The supply contractor will be responsible for delivery, installation (including all required foundation work), commissioning, and training of local operators. DOMLEC will be responsible for support functions. This turn-key arrangement will eliminate gaps in responsibility and assure that the generators are installed in the shortest possible time. Space for the units is available in the existing Fond Cole Power House.

C. Environmental Program

The Project budget allocates \$30,000 for educational activities in the Trois Pitons National Park. Signs and other facilities will be designed and provided to advise visitors of the existence of the high power transmission lines which traverse the National Park.

A detailed proposal for this program is being developed and will be implemented by the Forestry Division with outside assistance as required. It is anticipated that all necessary labor and materials will be obtained in Dominica.

D. Procurement Plan and Implementation Schedule

As noted earlier, the transmission system will be constructed by a U.S. contractor. Eleven firms have been prequalified, and IFB's

should be issued in early February. Following receipt and evaluation of bids, execution of the contract, and establishment of the financing mechanism, the contractor will commence ordering materials and mobilizing equipment and personnel. Actual construction should begin by July, and is expected to continue for about nine months.

IFB's for the supply of distribution hardware and tools and equipment will be issued in February, and a contract for this procurement should be signed by May 1. Construction will commence following receipt of the materials and be completed by December 1986.

The advertisement for the supply of the generators has already been placed, and proposals for this procurement are due in early March. Since "off the shelf" units are to be purchased, delivery time will be minimal. The generators should be received and installed in mid-1985.

The services of the DOMLEC Project Manager, who will be responsible for project supervision and coordinating DOMLEC's inputs, have already been obtained through an AID Personal Services Contract. The Project Manager is on site in Dominica assisting with project design and will serve for two years until October 30, 1986.

V. SUMMARY OF ANALYSES

A. Technical

A detailed analysis of existing DOMLEC generation facilities and transmission and distribution networks was undertaken by EBASCO Services, Inc. under an IQC work order to determine the need for additional generating capacity and the most appropriate method of extending electrical service to the population centers on the east coast. EBASCO's system analysis report is included in an annex. The information presented here is a summary of the consultants' findings.

1. Load Forecast

In conducting the system analysis, EBASCO reviewed two previous load forecasts, the 1983 DOMLEC projections and the 1984 Shawinigan forecast contained in the feasibility study for the expansion of Dominica's hydropower resources. The consultants' conclusion was that DOMLEC's forecast covered too short a time span to be useful in planning an expansion of the generation system and that Shawinigan's projections, particularly as related to growth of industrial loads, were overly optimistic. As a result, EBASCO developed an alternative "medium growth" load forecast covering the period 1984-2000.

EBASCO's generation forecast projects increases from 18,225 MWh in 1983 to 39,090 in the year 2000. The average annual growth rate from 1984-2000 is about 4%. These projections provide for a reasonable growth in domestic, commercial, and industrial loads and appear to be in accord with current consumption trends in Dominica. The peak load forecast was derived by applying system load factors to generation. Load factors were assumed to improve from about 56.5 percent in 1983 to 60.5 percent in 2000. The peak load is thus predicted to rise from 4.2 MW in 1984 to about 7.4 MW in 2000. The average annual growth rate of peak load is 3.6%. Exhibit #5 provides a comparison of the EBASCO, DOMLEC and Shawinigan gross generation and peak load forecasts. These comparisons are reflected graphically in Exhibit #4. Exhibit #10 provides a detailed analysis of EBASCO's projections for domestic, commercial and industrial sales, and Exhibit #11 provides an analysis of total expected generation growth, including losses, and the peak load forecast. The peak load forecast is shown graphically in Exhibit #12.

2. Diesel Generation

For the immediate future, EBASCO, AID, and DOMLEC have agreed that provision of adequate reserve to permit maintenance of the largest unit without forced load shedding is a reasonable reliability criterion. While falling somewhat short of U.S. standards, which normally consider a forced outage in addition to maintenance, generation facilities in the Eastern Caribbean are generally planned utilizing this method of determining firm power.

Based on this reliability standard, the revised load projections and the availability of existing diesel and hydro capacity as discussed earlier, EBASCO developed Exhibit #13 which compares projected peak loads with existing capacity through 1990 when additional hydro facilities are expected to come on stream. This analysis indicates that difficulties in scheduling maintenance without load shedding can be expected as early as 1985 and that projected shortages will increase as existing diesel units are retired and peak loads continue to grow. By 1990, this shortage will likely be approximately 1700 KW.

Planning criteria discussed above dictate that the addition of a single diesel unit in excess of 1126 KW, the capacity of the largest existing unit, would only increase firm generating capacity by that amount. Hence, provision of a 1500 KW unit is not warranted. While two 750 KW units would satisfy system needs through 1989, the low incremental cost of somewhat larger units might justify their procurement to provide some leeway in planning the new hydro installation and to protect against larger than expected load increases. Hence, the consultant recommends that bids be solicited for two units in the 750-1100 KW range and that award be made on the basis of lowest installed cost with some credit per kilowatt allowed for units in excess of 800 KW. This approach will offer sufficient bidding flexibility to enable DOMLEC to take advantage of unique opportunities.

3. Transmission/Distribution System Expansion

Several variations of the basic "Tee" and "Loop" systems described in the PID were evaluated by the consultant. Alternatives considered are shown in Exhibits #14 and #15 and summarized in Exhibit #16.

The loop alternative consisting of extensions to the Padu-south and Fond Cole-Marigot circuits was immediately discarded because the existing lines are limited-capability circuits and voltage problems are already being experienced at the termini. To improve the system to a point where two-way service could be obtained would be overly complex and costly. The only "loop" system further evaluated by the consultant would consist of an extension of the Padu-south circuit to serve east coast loads. The open loop would not, however, extend as far north as Marigot.

Both 11KV and 33KV transmission lines were considered. The loop system, however, would be an extension of an existing 11KV line and other voltages would not be appropriate. The "Tee" alternative could be 33KV, but there is no economic benefit to offset higher transformer costs at the load levels and distances involved. Hence, a 33KV line cannot be justified.

The only significant difference in capital costs between the "Tee" and "Loop" alternatives is that the former would economically permit the use of single phase extensions to Delices and Atkinson, resulting in a potential 10-20% cost savings and reduced construction time. Total savings, however, would depend upon the extent to which

single phase service or the deferral of service to a particular area is acceptable. All "tee" alternatives, because of anticipated circuit loadings, circuit lengths, power factors, and other considerations, would have lower line losses than the "loop" alternative considered. These factors are discussed in detail in Annex H.

Exhibit #17 provides a comparison of capital costs and loss charges for each of the alternatives evaluated in detail. While the alternatives are not all directly comparable because they serve differing loads and some encompass other than three phase service, the "tee" alternative, nonetheless, shows a consistent advantage over the "loop" alternative.

In summary, the consultant concluded the "tee" alternative would be more reliable because it would split total load among three circuits rather than two; would perform more efficiently because of shorter, more lightly loaded circuits; would provide a more flexible system; and considering capital costs and the value of line losses, would be more economical. Alternative T5 which provides three phase service to Rosalie, Castle Bruce, Delices and intermediate points, as originally envisioned, was ultimately selected.

B. Financial Analysis

1. Present Conditions

A review of DOMLEC's financial performance over the 1977-1983 period was carried out in 1984 by Shawinigan Engineering Company, Ltd. of Montreal as one element of a study to determine the feasibility of expanding Dominica's hydroelectric resources.

Analysis of financial statements covering these years indicates that the financial rate of return during the 1977-1980 period, which was marked by the effects of Hurricane David in 1979, was extremely low, a small profit being shown only in 1978. Subsequent to the major tariff increase in late 1979, when domestic rates were essentially doubled, and fuel surcharge was imposed, the utility's financial position improved significantly. The return on net fixed assets (revalued cost basis) plus working capital was about 6.5% in 1981 and 1982, but declined to 4.87% in 1983.

Including the investment to be made by DOMLEC for new diesel units, Shawinigan also projected new tariff schedules which would be required over the period 1984 to 1998 to finance hydroelectric improvements recommended under the study - an investment estimated at about EC\$25 million. Projected rates were based on two scenarios: 1) the utility self-financing 30% of the investment and maintaining a debt/service ratio of 1.5, and 2) the utility continuing to secure a 6% return on net fixed assets (revalued cost basis). The first would require a rate increase of about 5% per year over 1984-1988, with average tariffs increasing from EC\$0.355 per kWh in 1984 to EC\$0.70 per kWh in 1998; the second requiring an 8% increase from 1984 to 1988 and a 5% annual increase thereafter, with average tariffs increasing from EC\$0.355 per kWh to EC\$0.787 per kWh.

In both instances, the consultant concluded that substantial equity would be required either from the GOCD or external lending agencies to assist DOMLEC in meeting these financial targets.

2. Diesel Generators

Installation of the diesel units and extension of the transmission/distribution networks were considered separate activities for EBASCO's financial analysis.

The financial analyses for the diesel additions assumes operating and maintenance expenses to be 1.2% of fuel costs plus 1% of the capital investment, \$19,000/year, plus labor. Fuel costs are based on a unit heat rate of 75 gallons/MWH and an estimated 1986 fuel price of \$1.44/gallon. (Fuel costs are ultimately passed on to the consumer in the form of a fuel surcharge and are hence recovered.) Incremental increases in general administrative and overhead costs are assumed to be minimal and are not considered. Revenues are based on current basic consumer rates of \$0.127/kWh excluding the fuel surcharge.

Total increased revenues resulting from the generator additions were derived by multiplying this figure by the sales projected in Exhibit #18. The analysis indicates a financial rate of return of about 7.0%.

3. T/D Network Expansion

A similar financial analysis was carried out for the grid extension. In computing operating and maintenance costs, the assumption was made that sales to the East Coast would reflect the average system hydro/diesel generation mix. Revenues were based on sales projected at a basic rate of \$0.127/kWh. The analysis, summarized in Exhibit #20, indicates a slightly negative rate of return.

4. Conclusions Regarding Financial Impact

The Shawinigan study concludes that while DOMLEC is currently financially viable, substantial rate increases and some equity financing will be required over the next decade to enable DOMLEC to finance capital improvements and to maintain a favorable financial position. EBASCO's analyses indicate a marginal return for the generation component of the AID-financed project and a slightly negative return for the transmission/distribution component. To permit DOMLEC to improve its financial position prior to initiating discussions with external donors regarding any proposed major expansion of hydro facilities, grant financing of the proposed project is fully justified.

Given the problematic financial return, a covenant has been included to require that the GOCD take adequate steps, including rate increases, to assure DOMLEC's financial viability. While GOCD approval of rate increases at this time is not possible, DOMLEC has stated rate increases will be made within 12 months. The financial covenant requires that approximately 12 months after signing, an assessment of DOMLEC's financial status will be undertaken.

C. Economic Analysis

1. Diesel Generators

The following economic analysis considers the costs and revenues associated with the two diesels whose purchase is proposed under this project. The economic rate of return is over 20 percent and argues strongly in favor of this component of the project.

a. Costs

Costs calculated below include capital costs of the two diesels, lubricating oil costs, maintenance costs, labor costs, and transmission and distribution costs. These costs (and fuller justification) appear in the financial analysis.

Capital costs (which include installation) are adjusted downward by shadow pricing the cost of unskilled labor used in installation. One half of the wage bill for unskilled labor is used to reflect high unemployment rates in Dominica and the corresponding below-wage opportunity cost. In other words, the opportunity cost of unskilled labor is assumed to be 50 percent of the nominal wage.

Lubricating oil costs are 1.2 percent of fuel costs. (Fuel costs are not included in either the cost or the benefit side of the calculation).

Maintenance costs are calculated as one percent of capital costs.

Labor costs for operations and maintenance are adjusted downward, again to reflect a below-wage opportunity cost of unskilled labor. A percentage of the labor component is assumed to be unskilled, and costs of this labor are treated similarly to the installation labor (above).

Transmission and distribution costs are \$20 per mWh of electricity generated (see financial analysis for explanation).

b. Benefits

Both direct and indirect benefits are attributed to the project. Direct benefits are derived from sales revenues. Indirect benefits are very important, but are difficult to quantify. First, the increased production activity permitted by the higher, more stable electrical generation capacity will stimulate further rounds of economic activity, particularly in the Trade Sector and in other services supporting the production sectors. Second, improved productive efficiency in the economy that arises from stability of power generation made possible by the new generators is not captured in the direct

benefits. Third, increased social cohesion that will result from the improved capability of DOMLEC to deliver stable, increased power for social uses is also not reflected in the direct benefits. Studies of the relationship between direct and indirect benefits in other electrical projects suggest that indirect benefits are at least as great as direct benefits are, in general. To be conservative, we have assumed that these externalities are equivalent in magnitude to the project's direct benefits.

2. Transmission/Distribution Network Expansion

As an addition to DOMLEC's system - and one whose effects can be easily isolated from the system - the Transmission/Distribution (T/D) component may be analyzed separately from the system as a whole. The following analysis assesses costs and benefits associated with the project and discusses the economic viability of a project component whose financial rate of return is slightly negative.

By contrast, the economic rate of return, calculated using opportunity costs (where applicable) and including externalities such as consumer surplus and indirect benefits, is approximately 20 percent. The validity of this analysis depends heavily on the accuracy of the demand analysis for the East Coast. Assuming that the demand analysis is correct, the project is economically viable.

a. Costs

Costs of the proposed T/D component consist of capital costs (including installation), operation and maintenance costs, and the cost of generating the electricity.

Capital costs: Costs of the transmission and distribution equipment are adjusted downward to reflect the heavy labor component in installation. Inasmuch as the installation will be carried out largely by unskilled labor, a shadow wage rate of fifty percent of the nominal wage is used to reflect the opportunity cost of such labor in an economy with relatively high unemployment.

Operation and maintenance costs: These consist of an equipment component which is valued at nominal cost, and a labor component, which is adjusted downward as in capital costs, above.

Generation Cost: As noted in the financial analysis, generating costs are calculated at \$55.44 per mwh, and reflect the 85:15 mix of hydro versus diesel power in the entire DOMLEC system.

b. Benefits

Both direct and indirect benefits are calculated. The former, as was the case in the diesel generator analysis above, are assumed to be adequately represented by the revenues DOMLEC earns on

sales. Indirect benefits include a consumers surplus element inherent in the existence of electrical service where none existed before, as well as other indirect benefits discussed in relation to the diesel generator analysis above.

In the case of consumer surplus, some information is available to at least make a crude estimate of that element. An estimate of the current expenditure per consumer per year (\$100) and the current power consumption per consumer per year (0.36 mwh) on the East Coast of Dominica is available. Taken together, the price per mwh is approximately \$280. Assuming about 1100 consumers exist, total consumption is about 400 mwh at the unit price of \$280. Estimates of East Coast sales, once the T/D component is installed, are 1160 mwh at a unit price of \$127. A rough graphic representation of the demand curve, derived from these two estimated points on that curve, suggests that consumers surplus is approximately equivalent to the value of direct benefits.

In addition, the second-round effects of the provision of electricity to the East Coast are included. As in the case of the generators, we assume that the effects are not less than the equivalent of the direct benefits.

D. Institutional Analysis

1. The Organization

Dominica Electrical Services Limited (DOMLEC) is a wholly owned state corporation controlled by a five member board of directors appointed by the Government which meets four or five times a year. The board makes recommendations on rate levels and increases, but final approval rests with the Prime Minister.

Until recently, the Commonwealth Development Corporation provided both engineering and management expertise. Although the CDC had sold all its shares to the Government of Dominica by 1983, the local utility remained tied to the CDC system. Having relied on the CDC for management capability and engineering support, DOMLEC now appears to be hesitant about assuming full responsibility for management operations. The GOCD has indicated its intention to divest itself of control of DOMLEC and turn its shares over to the general public and a foreign utility, which would also provide management services and technical support. Discussions regarding this possibility are still in the preliminary stages.

2. Management

DOMLEC is headed by a Manager, Deputy Manager and three Senior Managers who are responsible for Generation, Transmission, Distribution and Consumer Services, and Administration. Departmental responsibilities are well identified and there is a well-understood chain of command.

DOMLEC has a clearly defined system for day-to-day operations which covers both administration and engineering functions. Job descriptions define each manager's responsibilities and duties. However, the lack of a personnel officer has resulted in gaps in personnel management.

3. Staffing, Staff Qualifications and Training

There are 128 persons on DOMLEC's staff. The ratio of customers to employees is around 78. In 1983 the utility generated 18,225 Mwh which corresponded to 147Mwh per employee, which is similar to utilities in other OECS states.

The present staff lacks the engineering expertise to design and construct this Project. All design work and bid documents have been prepared by a U.S. consulting engineer, and construction of the transmission system will be completed by a U.S. construction contractor. A Dominican project manager has been contracted to supervise the Project. The contractor who will supply and install the generators will also train generator operators. DOMLEC personnel, under the guidance of the generator engineer, will be responsible for supervising the installation.

In the past, DOMLEC has used its ties with the CDC for training programs. Most off-the-job training has been funded by CIDA. Management in DOMLEC has attended a number of overseas training courses both in management and in technical areas. Some on-the-job training has been given to linemen and diesel operators. However, as DOMLEC has no personnel department there has been little provision made for organized on-the-job training.

Qualifications for many jobs are minimal, although plans are being considered to require technical certificates for certain positions. The company has no regular performance evaluation and salary increases are not predicated on performance. DOMLEC has no management succession plan, which could impede the utility's ability to develop a cadre of future managers.

Recognizing the urgent need for training before construction of the project, DOMLEC plans to implement training programs for linemen and skilled and unskilled workers.

4. Responsiveness

Lack of engineering, purchasing and personnel functions which results from a shortage of qualified personnel, as well as an inadequate meter service facility, hinder the efficient operation of DOMLEC. There are plans to computerize both customer billing procedures and an inventory system. Proposals are also being considered to hire a purchasing officer and to develop direct purchasing procedures for equipment and spare parts.

5. Tariff Policy and Financial Capability

Electricity rates in Dominica are not cost-based. The true cost of service is not known, and needs to be examined in light of DOMLEC's plans for expansion through the year 2000. However, tariff structures are representative of those in a developing country. Industrial rates are promotional, lower than domestic and commercial rates and use an installed KVA capacity charge rather than a demand charge based on the actual level of maximum usage. As industrial usage presently constitutes only 8% of consumers, such a charge may be appropriate for Dominica at this time.

Fifty-five percent of electrical consumers are domestic users. The correct assessment of optimum rates for domestic users is essential to ensure DOMLEC's financial viability after the project is completed. According to DOMLEC, a 12% rate of return is necessary for the utility to achieve a stable financial position. If that rate of return can be achieved and maintained it should generate sufficient internal funds and demonstrate a stable financial position to permit borrowing when necessary. The latter will become increasingly important as the utility begins to seek funding in the international financial market.

DOMLEC currently has two loan debentures, one from the Commonwealth Development Corporation (CDC) at 8.5% annual interest and one from the Caribbean Development Bank (CDB) at 9.5% annual interest. Repayment of principal on the government loan is to begin in 1987. EC\$80,000 will be budgeted for that year. Thus, increased rates, for the most part increased domestic revenues, will be the major source of DOMLEC funding to repay these loans. The true costs of service, assessment of generating capacity needs and forecasting usage will have to be better monitored by DOMLEC if the utility is to remain profitable.

Adair and Brady International Inc. has prepared a draft report outlining a program to reduce technical losses (10%) and service errors (10%) to a 9% overall level by 1990. Losses have a direct impact on the amount and cost of energy which must be produced. Such inefficiencies in conjunction with projected rate increases could impede further electrification. However, implementing recommendations contained in the Adair and Brady Report would increase generating capacity by 10 percent. It is anticipated that DOMLEC will begin to implement these recommendations during 1986.

Summary

It is expected that with the assistance proposed by this project that Dominica Electrical Services Ltd. will be able to successfully deliver electricity to the East Coast of the island and maintain service after the completion of the project.

E. Social Soundness Analysis

1. Socio-Cultural Feasibility

Electrification of the East Coast is a priority for the GOCD. The Prime Minister has indicated this in numerous meetings with donors throughout the past year. As the East Coast is the last significant area to be electrified, the area's relative deprivation has had persistent political overtones. Dominicans have come to expect the provision of electricity and it is viewed as a necessary stage of modernization.

Extension of the grid to the East Coast is also consonant with the overall development programs of the GOCD which include road rehabilitation, agricultural programs, credit union expansion and fisheries development. Electrification is seen as an important component in an integrated rural development program. Secondly, the provision of additional generation and electrification fits into Dominica's plan to expand its hydroelectric generating capacity.

2. Spread Effect

a. Direct Impact

The area to be electrified runs from the Carib Reserve at Atkinson down to the south east coast at Delices. The region as a whole comprises the parishes of St. David and St. Patrick and is sparsely populated. Major villages include the following:

Atkinson	:	1324 persons
Salybia	:	1020 persons
Castle Bruce	:	1864 persons
Good Hope	:	589 persons
Petit Soufriere	:	747 persons
Riviere Cyrique	:	494 persons
La Pleine	:	1400 persons
Delices	:	1600 persons

According to the 1981 census, the parish of St. Patrick comprised 9,802 persons in 2,201 households, while the parish of St. David had 7,477 persons concentrated in 1,516 households. Thus, some 3,700 households are potential users of electricity as a result of the extension of the grid to the East Coast. Ebasco estimates that 3,427 consumers will be connected from Atkinson to Delices by the year 2010.

b. General Impact

Both DOMLEC and the consulting firm Shawinigan are forecasting shortages in electricity from 1985; estimated power shortage is in the range of 200kw in 1985 and up to 1600kw in 1990. There will be no generating capacity for east coast electrification in 1985 if the generators are not procured and installed.

Increased demand for electricity is expected to occur with the establishment of new industrial estates. The private sector and the IDC have embarked on a vigorous campaign for industrial development. A 1983 forecast prepared by Government estimated a total demand for 399,000 square feet of factory space over the next five years. However, the country's ability to fill this space will be predicated on provision of the necessary infrastructure, particularly transport and electricity. Thus increased generation can be seen as a component in Dominica's private sector development.

EBASCO estimates that commercial sales will increase annually to the year 2000 by 3.7%, while industrial sales will grow by 4.5% per annum. Domestic sales are expected to increase by 3.9% per year and the consuming public throughout the country will obviously benefit from an increase in generation capacity which will not only allow for more hook-ups throughout the country, but will also provide more reliable service.

c. Safety and Promotional Programs

DOMLEC has assured AID that it is aware of the necessity of developing promotional and safety campaigns for areas which have hitherto not been electrified. Promotional campaigns through the medium of the Government Information Service programs on radio are an efficient means of suggesting economical usage of electricity. Safety programs will deal with questions of housewiring, appliance overload, etc. During construction DOMLEC will use public meetings to inform residents of the procedures and codes which should be followed for housewiring installation. Submission of the plan will be a condition precedent to disbursement for the transmission/distribution component of the Project.

3. Social Costs and Benefits

a. Employment and Village Life

While it is recognized that the introduction of electricity does not automatically stimulate economic growth, as its contribution is dependent on the level of development of the area and the types of projects which utilize electrical power, there are social and economic benefits to be derived from a cheap, reliable source of energy. As the GOCD intends to extend transmission lines in conjunction with hydroelectric projects, an affordable energy source will become available to the majority of east coast residents by the 1990's.

Economic development of the northeast will occur as electrification is linked to agro-processing and agro-service activities. Farmers in the northeast grow bananas, coconuts, and hot peppers and there are fishing communities located around Marigot, Salybia and Castle Bruce. In the southeast there are also fishing communities and this area produces citrus, bay oil and commercial flowers as well. Both banana and copra production have been increasing since the devastation of Hurricanes

David and Allen. Copra production in particular has good growth potential. The crop fits well into Dominican patterns of intercropping, and the market potential for copra is good. The CARICOM region only produces ten percent of its fats and oils demand, and the CARICOM Essential Oils Agreement provides a sure market. Coconut by-products, manufactured by Dominica Coconut Products Ltd., have become a major industry responsible for half of the total exports of the country. The Fishing industry has been hampered by lack of refrigeration facilities and should benefit from electrification, as there are donor sponsored fishing projects in the pipeline.

Co-operatives are important targets for promotional efforts of electrification. DOMLEC already utilizes co-operative community based credit unions for the collection of customer payments in other parts of the island. Both co-operatives and community based credit unions have become important economic units in Dominican villages because of the lack of capital. Bay oil production, copra drying and banana boxing plants are largely run by co-operatives. There are fishing co-operatives as well; but these are languishing due to problems of refrigeration and marketing mentioned above. Production co-operatives and community based credit unions operate to a greater degree in Dominica than in any other OECS state. There are 14 banana boxing co-operatives, three fishing co-operatives, two copra co-operatives, and a 400 member Bay Oil co-operative. There are also a number of youth co-operatives specializing in food crops for the domestic market.

Co-operatives in the Dominican context are not collectives, but the pooling of resources for specified purposes. Co-operatives and community based credit unions are logical agents for rural development utilizing electricity for productive purposes, for example, in cooperative banana packing sheds.

The Village Councils as well, should be targets of a promotional campaign by DOMLEC to encourage use of village buildings such as schools and clinics at night and to purchase and maintain equipment such as videos, and refrigerators and sterilizers in clinics. Local Government agencies and co-operatives have been highly motivated toward development efforts in Dominica and should be harnessed to the effort of insuring that electrification has a development impact on the East Coast.

Although village society and co-operative endeavours remain an important cornerstone of the Dominican social formation, the poverty of the East Coast has led to widespread emigration of people of working age to Roseau and to the French Dependencies of Marie Galante, Martinique and Guadeloupe. Given the role of electrification in providing better social amenities for community centers, sports and leisure, as well as for social services, such as primary health care, village life should benefit, provided attention is also given to developing the productive sector, particularly agro-industry.

b. Carib Reserve

Some 500 descendants of Carib Indians, the Amerindian population which dominated the Caribbean when Columbus arrived in Dominica in 1493, remain on a Reserve formally established in 1902 in the area from Atkinson to Gaulette on the east coast. Specific boundaries were never set and remain controversial to this day. Carib land is not divided, but individual families work what they can manage. Inter-marriage has taken place between Caribs and Afro-Dominicans, but the inhabitants of the Carib Reserve are conscious of their identity as a distinct ethnic group and enjoy special political status in the Commonwealth of Dominica. The Caribs call themselves "Karifuna" and are headed by a chief or "ubutu", and they are governed by a six member Council. Additionally the Caribs have a territorial representative in the Dominican Parliament.

The Carib issue has tended to assume political dimensions periodically in Dominica. The Caribs are acutely conscious that their Reserve is among the poorest in terms of the provision of social services and amenities. Electrification thus takes on political connotations in the Carib Reserve.

c. Access to Resources

Given the low income levels of Dominicans on the East Coast, electrification will most likely proceed incrementally. Initially, energy demands will not substantially increase, because electrical needs are small. EBASCO projects that approximately one third of households on the East Coast would connect in the first year of transmission. It is hoped that with the provision of free hookups this percentage can be increased.

It is DOMLEC's policy to not charge consumers for connection if they are located within 100 feet of transmission lines, and Government policy presently dictates that, under normal circumstances, lines will be extended to within 100 feet of household known to want electricity. DOMLEC has indicated that they would also be willing to extend lines to areas beyond 100 feet where there are several households desirous of hook-up. Additionally, in isolated areas where single households are beyond the 100 foot limit and it is quite uneconomical to hook-up for free, DOMLEC has indicated a willingness to consider providing credit over a 12 to 18 month period. The utility has the capability of managing a credit assessment for the minority of consumers who would require this service. DOMLEC is also aware that the premature termination of financing for initial hook-ups would result in a disproportionate exclusion of the poor from the benefits of this project and plans on extending the facility of free hook-ups over an indefinite period.

Consumers in the Roseau and Portsmouth areas, where demand, both commercial and domestic, is absolutely greater than the rural East Coast, are better able to pay for electricity. In fact, in many countries extension, of the grid to include sparsely populated low

consumption areas, is effectively subsidizing urban users. However, in this project, most of the financing is in the form of a grant, and RDO/C has estimated that revenues, from early on in the life of the project, will exceed operating and maintenance costs. In the long term, the financial viability of DOMLEC will be dependent on a willingness to increase rates to meet the costs of extending the grid to low consumption areas.

d. Income and Tariff Questions

Most households in Dominica have more than one income and depend to a large extent on subsistence agriculture. If we assume a two person income, the average Dominican household of 5.7 persons would earn around EC \$4000 or US \$1481. On the East Coast this would average EC\$2640 or US\$977.

Income averages for selected occupational groups include the following:

Agricultural Workers	EC\$1,311 per year; \$109.25 per month
Banana Growers Association	EC\$1,625 per year; \$135.41 per month
Trade	EC\$2,836 per year; \$236.33 per month
Domestics	EC\$ 942 per year; \$ 78.50 per month

Government Workers:

Monthly Paid	EC\$7,509 per year; \$625.75 per month
Bi-Weekly Paid	EC\$1,450 per year; \$120.83 per month

Estimates of kWh usage by domestic consumers indicates that those workers at the lower end of the income scale would be paying between 10-13% of their monthly income for electricity.

However, DOMLEC, based on Shawinigan's recommendations, projects an incremental increase in tariffs up to 54% by 1990. Ebasco estimates the necessity of implementing a 7.5% increase in 1985 to maintain financial viability. This should not significantly impede potential consumers from hooking up to the grid. However, DOMLEC may need to analyze its tariff structure with respect to the rates paid by domestic, commercial and industrial users in order to avoid too great a tariff burden being inflicted on domestic users, particularly those at the lower end of the income scale.

e. Household Consumer Surplus Benefits

Existing tariff rates in Dominica are among the lowest in the Commonwealth Caribbean. At present rates, East Coast Dominicans are spending approximately EC\$20-30 per month for alternate energy sources of kerosene and batteries. Additionally, the average household utilizes charcoal for cooking. Household consumption of electricity has been estimated to be around 30kWh per month in other areas of the east coast. With a base rate of approximately EC\$.35 per

Kwh, consumers would spend on average EC\$10.50 per month; this is a significant reduction in present expenses. The Dominican average for domestic users is presently EC\$29.10 a month.

When assessing the cost to the consumer, the cost of the appliances used, and the cost of domestic wiring have to be included. Where there is a connection fee this too would have to be calculated. When this is done, it is not clear that there is an economic cost advantage in every instance. However, there clearly are advantages in terms of time and labor saving devices and reliability. In the case of lighting, electricity is safer, cheaper, cleaner and a better quality of light. Rural electrification projects elsewhere have demonstrated that to consumers considerations of quality and convenience have precedence over straight economic factors. On the East Coast of Dominica, successful electrification should be ensured with the provision of free hook-ups where feasible and where not, the provision of a revolving fund for connection and wiring.

f. Electrification and the Rural Poor

AID Project Impact Evaluations for rural electrification projects in the Philippines and throughout Central America all note that the rural poor have not been able to make adequate use of the installation of electricity in their communities. The consensus is that either they cannot afford to hook-up, or if they do wire their houses, they cannot afford to use the power productively. This is not likely to be the case in rural Dominica. While it is true that subsistence farmers on the East Coast are not likely to use electricity for agriculture as the majority are banana growers and small vegetable gardeners, agro-processing activities and fishing co-ops should benefit. The most likely beneficiaries are those tradesmen such as mechanics and welders and small shopkeepers, and women who sew or smock or engage in other cottage industries which would benefit from electrical lighting.

The poor may indirectly benefit from electrification if social services are expanded, schools are used in the evening and at nights for community and social functions; some streets are lighted, and health clinics provide evening hours.

g. Social Costs

The primary social cost in the electrification project is the necessity of siting transmission lines in the Morne Trois Pitons National Park. The environmental analysis indicates that greater access to the Park is not a major concern due to the nature of construction activities. Unfortunately, the appearance of one of the last primeval rain forests in the Caribbean will be affected. However, DOMLEC, the Forestry Division and the Dominica National Park Service will cooperate to mitigate the negative visual impact of transmission lines. The GOCD also has long-term plans for hydro development within the National Park area, which will involve additional modifications within the Park. This project should be regarded as an opportunity for the GOCD to begin to address the need for impact assessments, and to develop strategies for overall watershed management and protection.

F. Environmental Analysis

The Dominica Rural Electrification Project consists of two main elements: installation of two diesel generation units at an existing DOMLEC power station and extension of the transmission/distribution line into and along the East Coast. The new generation units will have only minor incremental environmental impacts, given that they will be placed in an existing, operating power station. The extension of the transmission grid, however, will have more definite impact, particularly since the lines will pass through the environmentally sensitive Trois Pitons National Park.

1. The Setting

Dominica is of volcanic origin and is exceptionally steep and mountainous, with slopes commonly in excess of 40%. Numerous small rivers and streams, fed by annual rainfalls in excess of 250 inches, drain the central mountain range creating the deeply dissected landscape. Due to the mountainous terrain, young soils, and high rainfall, soil erosion resulting from both natural and man-made occurrences is a widespread problem. This is particularly true when inappropriate farming techniques are used on unsuitable, steep areas.

The Morne Trois Pitons National Park is a 16,000 acre sanctuary established in 1975 to protect important water catchment areas and prevent inappropriate development or exploitation of the biologically sensitive central forest. Terrestrial life zones found in the project area include rain forest and "cloud forest", which are marked by high rainfall at higher elevations where cloud cover moves through on a regular basis. The principle economic and environmental values of this type of forest include critical watershed protection, wildlife habitat, and a limited assortment of forest products. Although locally important game species such as the opossum (manicou) and agouti are commonly encountered, no endangered species are found in the project area and hunting is not permitted in the Park.

The 1975 National Park law does allow for the construction or extension of any work or underaking authorized by the law establishing the electric utility, DOMLEC. To date, this has consisted primarily of the construction and operation of minor hydraulic structures associated with the nearby Trafalgar Hydro-power Station.

2. Environmental Consequences

The environmental impacts associated with the grid extension will result mainly from construction activities required for the installation of transmission poles and lines. Most direct impacts of this type will be highly limited in area and usually temporary and reversible. Actual pole sites are dependent upon line spans and topographic conditions; each pole location will require a clearing of approximately 10 meters radius. Although some clearing of tall trees under the line spans will also be required, this will be limited, particularly in the Fresh Water Lake area where most of the vegetation is

slowly regenerating from the effects of the hurricane. In all, less than one hectare of land will be cleared in the Park. No additional access roads will be constructed in the Park, and labor intensive construction techniques will be utilized extensively.

3. Mitigative Measures

In order to minimize negative environmental impacts resulting from the installation of the transmission lines through the Park, the following mitigative measures will be taken:

- (a) The alignment for the transmission system has been modified to minimize negative aesthetic impacts.
- (b) The use of herbicides for brush clearing or trail maintenance will be strictly prohibited in the Park.
- (c) Personnel from the Forestry Division of the GOCD will take an advisory role during construction in the Park to insure that environmentally sound construction techniques are utilized.
- (d) The project will provide funding for the development of a small safety education program for visitors to the National Park.

VI. CONDITIONS PRECEDENT AND COVENANTS

1. Conditions Precedent to initial disbursements under the Grant will include:

- (A) An opinion of counsel acceptable to AID that this agreement has been duly authorized and/or ratified by, and executed on behalf of, the Grantee, and that it constitutes a valid and legally binding obligation of the Grantee in accordance with all of its terms.
- (B) A statement of the name of the person holding or acting in the office of representative of the Grantee, and of any additional representatives, together with a specimen signature of each person specified in such statement.

2. Conditions Precedent to disbursement for the transmission and distribution component of the Project will require:

- (A) Evidence that DOMLEC has title to rights of way necessary to carry out the transmission and distribution component, or that adequate procedures are in place to assure that DOMLEC obtains the necessary rights of way.
- (B) An Implementation plan, submitted by DOMLEC for construction of the distribution network, which will include a project organization chart, a financial plan, and a time-phased construction schedule.
- (C) A plan for DOMLEC for carrying out the public information component of the project under which safety and other relevant information will be disseminated to potential consumers.

3. A Condition Precedent to disbursement for the diesel generating units will require DOMLEC to identify staff who will participate in the operations and maintenance training program to be carried out under the generator supply/installation contract.

4. A Condition Precedent to disbursement for environmental activities will require the Department of Forestry of the Ministry of Agriculture to submit a prioritized, time-phased implementation plan, acceptable to AID, for this element of the project.

5. Special Covenants will include:

- (A) The Grantee and DOMLEC will maintain the financial viability of DOMLEC through the application of appropriate rate increases and the conduct of a loss reduction program, as necessary, to assure that DOMLEC can amortize its debts, pay salaries and operating/maintenance costs, depreciate facilities, and contribute to future capital expansion.

Approximately one year from the date of the agreement, the Grantee, DOMLEC and A.I.D. will review DOMLEC's financial status, including the effects of current tariffs and requirements for possible revision of tariffs through the process of the midterm evaluation.

- (B) The Grantee and DOMLEC will provide adequate warehouse facilities and inventory control for the distribution hardware, tools and equipment to be procured for the Project,
- (C) The Grantee and DOMLEC will agree that no divestiture or partial divestiture of DOMLEC shall occur without prior consultation with AID.
- (D) The Grantee and DOMLEC will agree to provide service cable and meters required to make house connections in the East Coast service area.
- (E) The Grantee and DOMLEC will agree to provide all necessary planning, financial and supervisory measures and technical personnel needed to ensure that the installations financed in this Project are adequately maintained.
- (F) DOMLEC will permit consumers, when warranted, to pay connection charges over an extended period of time.

VII. EVALUATION ARRANGEMENTS

Approximately one year after Project Authorization, AID and DOMLEC will conduct an interim evaluation to ascertain progress toward attainment of project goals, identify problem areas and make recommendations for resolving these problems. As noted above in Covenant A, the midterm evaluation will include a review of DOMLEC's financial status, including the need for rate increases.

Subsequent to completion of the project, DOMLEC will continue to provide statistical data which will enable AID and the Grantee to assess the development impact of the project. Precise information to be provided will be agreed upon during Project implementation.

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SUBJECT: DOMINICA RURAL ELECTRIFICATION PROJECT PID
 GUIDANCE

1. THE DAEC REVIEW OF THE DOMINICAN RURAL ELECTRIFICATION PID WAS HELD ON JUNE 29, 1984. RDO/C COMMENTS CONTAINED IN BRIDGETOWN 4343 WERE CONSIDERED IN THE REVIEW. BELOW IS THE GUIDANCE ON THE PREPARATION OF THE PROJECT PAPER AND PROJECT DESIGN. THE ISSUES PAPER IS BEING FORWARDED FOR YOUR INFORMATION.

2. AS THE MISSION NOTED IN ITS REVIEW, THE PID FOCUSES ON THE UTILITY SYSTEM HARDWARE AND DOES NOT ADDRESS DEVELOPMENTAL COMPONENTS SUCH AS TARIFF ANALYSIS, THE STRUCTURE OF DOMINICA ELECTRICITY SERVICES (DOMLEC) AND TRAINING NEEDS. THE PP SHOULD EXAMINE THE TARIFF STRUCTURE AND FUTURE CHARACTER OF DOMLEC WHICH IS NOW GOVERNMENT OWNED. IT WAS CONCLUDED THAT TRAINING ASSISTANCE WAS NOT CALLED FOR IN THIS PROJECT BEYOND THAT NECESSARY FOR CONSTRUCTION OF THE TRANSMISSION/DISTRIBUTION LINES AND INSTALLATION OF THE DIESEL ENGINE GENERATOR.

AS A RESULT OF THE TARIFF AND INSTITUTIONAL ANALYSIS, RECOMMENDATIONS MIGHT RESULT THAT WOULD BE USEFUL TO THE GOVERNMENT OF DOMINICA AND DOMLEC. WHETHER OR NOT SUCH FINDINGS SHOULD BE INCLUDED AS CONDITIONS PRECEDENT WILL DEPEND UPON THEIR RELATIONSHIP TO THE AID-FINANCED PROJECT AND THEIR APPROPRIATENESS FOR INCLUSION AS CONDITIONS AS DETERMINED BY RDO/C. HOWEVER, IF THE FINDINGS ARE NOT INCLUDED, THEY SHOULD BE USEFUL TO THE GOVERNMENT WHICH HAS A GOOD TRACK RECORD ON PARASTATAL ORGANIZATIONS. THE RECOMMENDATIONS WILL PROVIDE A BASIS FOR RDO/C POLICY DIALOGUE IF APPROPRIATE.

3. BRIDGETOWN 4343 DESCRIBES TWO OPTIONS FOR PROJECT IMPLEMENTATION. THE FIRST INCLUDES CONTRACTOR CONSTRUCTION OF THE TRANSMISSION LINE AND THE SECOND HAS DOMLEC DOING ALL THE WORK BY FORCE ACCOUNT. THE DAEC CONCLUDED THAT RDO/C IS TO MAKE THE SELECTION OF THE PROPER OPTION DURING THE EARLIEST STAGE OF PP DEVELOPMENT. WE UNDERSTAND RDO/C FAVORS THE FIRST OPTION

AT THIS POINT. WE CONCUR. IT IS WORTHWHILE NOTING THAT EXTENSIVE DISCUSSIONS BETWEEN DOMLEC AND THE PID CONSULTING TEAM INDICATED THAT DOMLEC WOULD BE HARD PRESSED TO PROVIDE MORE THAN TWO LINEMEN FROM THEIR ENTIRE STAFF IN THE NEXT YEAR DUE TO CURRENT WORK COMMITMENTS WHICH INCLUDE CONSTRUCTION OF FIVE AND ONE HALF MILES OF LINE.

4. THREE ISSUES CONCERNING THE DIESEL COMPONENT OF THE PROPOSED PROJECT ARE DISCUSSED BELOW:

(A) THE BASIS FOR THE 1500-KW DIESEL SHOULD BE CLOSELY EXAMINED IN THE FP. TWO LOAD FORECASTS INCLUDED IN THE PID (FIGURE 1) PROVIDED THE BASIS FOR THE 1500-KW MEDIUM SPEED DIESEL. THESE FORECASTS AND THAT OF THE MINISTRY OF COMMUNICATIONS AND WORKS SHOULD BE CAREFULLY EXAMINED TO VERIFY THE 1500 KW SIZE AND THE APPROPRIATENESS OF THE MEDIUM SPEED DIESEL. ALSO, THE ESTIMATION OF FIRM POWER REFLECTED IN FIGURE 1 WAS BASED UPON THE ASSUMPTION THAT THE 1500 KW DIESEL WOULD BE LOST DUE TO UNSCHEDULED OUTAGE. THIS ASSUMPTION SHOULD ALSO BE EXAMINED. IN SUMMARY, JUSTIFICATION SHOULD ESTABLISH THAT THE DIESEL MEETS DOMLEC NEEDS AND IS, IN FACT, NEEDED IN LIGHT OF THE PROPOSED HYDROPOWER DEVELOPMENT. FOR YOUR INFORMATION, NELSON DE FRANCO, WORLD BANK ENGINEER WHO VISITED DOMINICA, WAS CONSULTED CONCERNING THE DIESEL. HE HAD NOT COMPLETED ANY SUBSTANTIVE ANALYSIS AT THIS POINT BUT FELT THAT THIS OUTAGE ASSUMPTION WAS NOT UNREASONABLE. LITTLE WORK IS PLANNED BY THE BANK UNTIL THE SEAWINGAN STUDY IS AVAILABLE IN THE FALL, 1984. DE FRANCO ANTICIPATES PROJECT PRESENTATION TO THE BANK BOARD IN MID-86 AND PROJECT

FUNDING IN FY 87.

(B) AS PART OF THE MISSION'S EFFORT TO IDENTIFY THE LOWEST COST DIESEL, THE VIABILITY SHOULD BE DETERMINED OF PURCHASE OF A REBUILT OR RECONDITIONED DIESEL. THE MISSION SHOULD CONTINUE TO EXPLORE THE AVAILABILITY OF OFF-SHELF DIESELS AVAILABLE IN U.S. AT DISCOUNTED RATES. ALSO, THE COST OF BRITISH DIESELS SHOULD BE DETERMINED TO SEE IF THE COST DIFFERENTIAL IS AS SIGNIFICANT AS INITIALLY INDICATED BY DOMLEC TO THE PID CONSULTANT TEAM. THE MISSION SHOULD ASSUME THAT A WAIVER WILL NOT BE GRANTED FOR THE PURCHASE OF A BRITISH DIESEL EVEN IF IT IS SUBSTANTIALLY CHEAPER (NOT WITHSTANDING AID PARAGRAPH 11, CB. 3, SEC. 2.6.1.3.A.(3) IN VIEW OF LIKELY MANUFACTURER OBJECTIONS). IF FUNDING IS TO BE ESP, SOURCES AND ORIGIN MUST BE U.S. HOWEVER, IF SDA LOAN FUNDS ARE USED 941 SOURCE/ORIGIN WOULD BE ACCEPTABLE.

(C) THE MISSION SHOULD INQUIRE ABOUT THE

AVAILABILITY OF FUNDING FOR THE DIESEL COMPONENT FROM THE EUROPEAN INVESTMENT BANK, CIDA, THE BRITISH AND ANY OTHER LIKELY SOURCES TO SEE IF THIS COMPONENT CAN BE FUNDED ELSEWHERE AT SIMILAR TERMS IN ORDER TO REDUCE PROJECT COSTS. THIS MAY BE THE BEST ALTERNATIVE IF THE COST DIFFERENTIAL IS SUBSTANTIAL BETWEEN U.S. EQUIPMENT AND BRITISH QUOTES. THE OTHER DONORS, HOWEVER, MUST BE ADVISED THAT A SPEEDY DECISION IS NECESSARY.

5. WITH RESPECT TO POLES, THE PP SHOULD EXAMINE THE FEASIBILITY OF CONCRETE POLES CONSTRUCTED IN DOMINICA. ADDITIONALLY, THE AVAILABILITY OF SURPLUS PROPERTY TRANSMISSION OR DISTRIBUTION LINES SHOULD BE EXAMINED.

6. IT APPEARED THAT THE PREFERABLE LINE ROUTE IS THE LOOP OPTION. HOWEVER, THE DAEC REVIEW CONCLUDED THAT SELECTION OF THE ROUTE SHOULD BE DONE BY RDC/C AND CONSULTANTS EARLY IN THE PP PREPARATION IN ORDER TO ALLOW TIME FOR SYSTEM DESIGN.

WHILE THE PID IDENTIFIES SELECTION FACTORS, TWO IN PARTICULAR MUST BE ADDRESSED IN ROUTE SELECTION. FIRST, THE PP MUST EXAMINE THE VOLTAGE REGULATION ISSUE RAISED BY DOMLEC WITH RESPECT TO THE LOOP OPTION. PART OF THE ASSESSMENT SHOULD INCLUDE CONSIDERATION OF THE APPROPRIATENESS OF UTILIZING 33-KV TRANSMISSION LINES INSTEAD OF 11-KV.

SECOND, IF THE T ALTERNATIVE IS SELECTED, A FULL ENVIRONMENTAL ASSESSMENT WILL BE REQUIRED. THE MISSION

SHOULD DETERMINE THAT, IF AN ICC IS USED FOR PP AND DESIGN WORK, THE TEAM HAS THE CAPABILITY TO DO THE ASSESSMENT. THE REGIONAL ENVIRONMENTAL ADVISOR MAY BE AVAILABLE TO WRITE THE STATEMENT OF WORK. IF THE LOOP ALTERNATIVE IS SELECTED IT IS LIKELY THAT ONLY ENVIRONMENTAL GUIDANCE ON CONSTRUCTION WOULD BE NECESSARY.

7. THE PID PRELIMINARY ANALYSIS INDICATES A RATE OF RETURN ON THE DIESEL COMPONENT OF 12.5 AND THE RURAL ELECTRIFICATION COMPONENT SLIGHTLY POSITIVE (LOOP ALTERNATIVE). THE BENEFIT OF THE PROJECT TO THE DISADVANTAGED POPULATION ON THE EAST COAST IS RECOGNIZED. THE DAEC CONCURRED WITH THE PPC FINDING THAT QUOTE THE ARGUMENTS BASED ON THE NEED TO DISTRIBUTE EQUITABLY THE BENEFITS OF DEVELOPMENT, STIMULATE AGRICULTURE AND FISHERIES DEVELOPMENT IN THE EAST COAST, AND GENERALLY ASSIST DOMINICA TO ESTABLISH THE ESSENTIAL PHYSICAL INFRASTRUCTURE FOR ATTRACTING INDUSTRY AND INVESTMENT UNDER THE CPI ARE PERTINENT AND SUFFICIENT TO OVERCOME PREFERENCES FOR A HIGHER ECONOMIC RATE OF RETURN ON THE PROPOSED DISTRIBUTION SYSTEM EXPANSION. NEVERTHELESS, THE PP DESIGN AND FEASIBILITY STUDIES SHOULD BE TASKED TO DETERMINE WAYS IN WHICH BOTHER COSTS

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CAN BE REDUCED OR, PREFERABLY, BENEFITS INCREASED IN THE DISTRIBUTION COMPONENT TO ENHANCE ITS ECONOMIC VIABILITY UNQUOTE. CONSEQUENTLY, THE ECONOMIC ANALYSIS OF THE PROJECT SHOULD BE EXPANDED TO INCLUDE ESTIMATES OF THE MAGNITUDE OF ANY ADDITIONAL BENEFITS WHICH MAY BE QUANTIFIABLE, AND QUALITATIVE DISCUSSION OF THOSE WHICH ARE NOT EASILY MEASURED. EXAMPLES OF BENEFITS WHICH SHOULD BE CONSIDERED ARE CONSUMER SURPLUS, COST SAVINGS (E.G., PURCHASES OF KEROSENE AND BATTERIES) AND ANY EXTERNALITIES WHICH WILL ACCRUE TO THE ECONOMY AS A WHOLE.

8. PREVIOUS TO THE DAEC REVIEW IT WAS ASCERTAINED THROUGH DISCUSSIONS WITH APPROPRIATE OFFICES THAT ESP FUNDS COULD BE UTILIZED IN THIS INSTANCE FOR PREPARATION OF THE PROJECT PAPER, DESIGN WORK AND FOR THE PERSONAL SERVICE CONTRACT FOR THE CONSTRUCTION MANAGER. THE REVIEW RECOMMENDED THAT THESE FUNDS SHOULD BE TAKEN FROM THE \$520,000 IN THE ST. BITTS AGRICULTURAL PROJECT. A CONGRESSIONAL NOTIFICATION NEEDS TO BE FORWARDED BY JULY 23 TO PERMIT FY 84 OBLIGATION FOR THIS PURPOSE. PLEASE SEND ASAP TO LAC/DR.

SUBSEQUENT PROJECT FUNDING WILL COME FROM FY 85 FUNDS. DESPITE THE FY 85 PROJECT FUNDING, PID DOCUMENTS SHOULD BE PUT OUT AS SOON AS POSSIBLE SUBJECT TO THE

AVAILABILITY OF FY 85 PROJECT FUNDS. RDO/C IS REQUESTED TO CALL A SCHEDULE FOR PP PREPARATION AND APPROVAL AND COMPLETION OF DESIGN AND BID DOCUMENTS.

9. THE PID INDICATES GRANT FUNDING FOR THE RURAL ELECTRIFICATION COMPONENT AND CONCESSIONARY LOAN FUNDING FOR THE DIESEL ENGINE GENERATOR. AS A RESULT OF THE DAEC REVIEW IT IS SUGGESTED THAT GRANT FUNDS BE USED FOR THE WHOLE PROJECT BUT THAT DOMLEC AMORTIZE THE GRANT BY PAYING INTEREST AND PRINCIPAL (A MODIFIED TWO-STEP ARRANGEMENT) INTO AN ACCOUNT TO BE UTILIZED FOR DEVELOPMENT PURPOSES BY A POPULAR PRIVATE DEVELOPMENT ENTITY (OR ENTITIES). CRITERIA FOR USE OF THE FUNDS WILL BE AGREED TO BY RDO/C AND GOD. THE RATIONALE FOR SUCH AN ARRANGEMENT IS THAT THERE WILL BE A BROADENING OF PUBLIC

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SUPPORT FOR DOMLEC. WITH VISIBLE DEVELOPMENT ACTIVITY BEING FUNDED BY DOMLEC REVENUES, IT MAY FACILITATE ACCEPTANCE OF DOMLEC TARIFF CHANGES OR INCREASES WHEN THEY ARE NECESSARY.

10. THE MISSION IS GRANTED AUTHORITY TO APPROVE THE PP AS REQUESTED.

11. THE MISSION IS COMMENDED FOR TAKING ON ANOTHER PROJECT GIVEN THE RDO/C CURRENT AND ANTICIPATED WORKLOAD AND SCALE OF EFFORT IN THE RECENT PAST.

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5C(1) - PROJECT CHECKLIST

Listed below are statutory criteria applicable to projects. This section is divided into two parts. Part A. includes criteria applicable to all projects. Part B. applies to projects funded from specific sources only: B.1. applies to all projects funded with Development Assistance loans, and B.3. applies to projects funded from ESF.

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

A. GENERAL CRITERIA FOR PROJECT

1. FY 1985 Continuing Resolution
Sec. 525; FAA Sec. 634A; Sec.
653(b)653(b).

(a) Describe how authorizing and appropriations committees of Senate and House have been or will be notified concerning the project;

a) A Congressional Notification for \$3,000,000 went to the Hill on November 27, 1984

(b) is assistance within (Operational Year Budget) country or international organization allocation reported to Congress (or not more than \$1 million over that amount)?

b) A Congressional Notification for the remaining \$1,700,000 went to the Hill on January 17, 1985.

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

(a) Yes
(b) Yes

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

No further legislation is required.

4. FAA Sec. 611(b); FY 1985 Continuing Resolution Sec 501 If for water or water-related land resource construction, has project met the standards and criteria as set forth in the Principles and Standards for Planning Water and Related Land Resources, dated October 25, 1973, or the Water Resources Planning Act (42 U.S.C. 1962, et seq.)? (See AID Handbook 3 for new guidelines.) N/A
5. FAA Sec. 611(e). If project is capital assistance (e.g., construction), and all U.S. assistance for it will exceed \$1 million, has Mission Director certified and Regional Assistant Administrator taken into consideration the country's capability effectively to maintain and utilize the project? Yes
6. FAA Sec. 209. Is project susceptible to execution as part of regional or multilateral project? If so, why is project not so executed? Information and conclusion whether assistance will encourage regional development programs. The Project is not appropriate for regional execution
7. FAA Sec. 601(a). Information and conclusions whether project will encourage efforts of the country to: (a) increase the flow of international trade; (b) foster private initiative and competition; and (c) encourage development and use of cooperatives, and credit The expansion of Dominica's supply and distribution of electricity is necessary for the continued operation of the industrial and tourism industries and as such will directly support an increased flow in international trade.

unions, and savings and loan associations; (d) discourage monopolistic practices; (e) improve technical efficiency of industry, agriculture and commerce; and (f) strengthen free labor unions.

8. FAA Sec. 601(b). Information and conclusions on how project will encourage U.S. private trade and investment abroad and encourage private U.S. participation in foreign assistance programs (including use of private trade channels and the services of U.S. private enterprise). U.S. goods and services will be used in the project.
9. FAA Sec. 612(b), 636(h); FY 1985 Continuing Resolution Sec 507. Describe steps taken to assure that, to the maximum extent possible, the country is contributing local currencies to meet the cost of contractual and other services, and foreign currencies owned by the U.S. are utilized in lieu of dollars. The host country is providing the labor required to install the distribution lines, and other support services.
10. FAA Sec. 612(d). Does the U.S. own excess foreign currency of the country and, if so, what arrangements have been made for its release? No
11. FAA Sec. 601(e). Will the project utilize competitive selection procedures for the awarding of contracts, except where applicable procurement rules allow otherwise? Yes

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12. FAA 1985 Continuing Resolution Sec. 522. If assistance is for the production of any commodity for export, is the commodity likely to be in surplus on world markets at the time the resulting productive capacity becomes operative, and is such assistance likely to cause substantial injury to U.S. producers of the same, similar or competing commodity? N/A
13. FAA 118(c) and (d). Does the project comply with the environmental procedures set forth in AID Regulation 16. Does the project or program taken into consideration the problem of the destruction of tropical forests? Yes. An environmental assessment has been prepared. It has been determined that the project will have negligible effect on the environment. Nonetheless, the project includes a small national parks program.
14. FAA 121(d). If a Sahel project, has a determination been made that the host government has an adequate system for accounting for and controlling receipt and expenditure of project funds (dollars or local currency generated therefrom)? N/A
15. FY 1985 Continuing Resolution Sec. 536. Is disbursement of the assistance conditioned solely on the basis of the policies of any multilateral institution? No

B. FUNDING CRITERIA FOR PROJECT

1. Development Assistance
Project Criteria

- a. FAA Sec. 102(b), 111, 113, 281(a). Extent to which activity will (a) effectively involve the poor in development, by extending access to economy at local level, increasing labor-intensive production and the use of appropriate technology, spreading investment out from cities to small towns and rural areas, and insuring wide participation of the poor in the benefits of development on a sustained basis, using the appropriate U.S. institutions; (b) help develop cooperatives, especially by technical assistance, to assist rural and urban poor to help themselves toward better life, and otherwise encourage democratic private and local governmental institutions; (c) support the self-help efforts of developing countries; (d) promote the participation of women in the national economies of developing countries and the improvement of women's status, (e) utilize and encourage regional cooperation by developing countries?

N/A. This project is financed with Economic Support Funds.

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- b. FAA Sec. 103, 103A, 104, 105, 106. Does the project fit the criteria for the type of funds (functional account) being used? N/A
- c. FAA Sec. 107. Is emphasis on use of appropriate technology (relatively smaller, cost-saving, labor-using technologies that are generally most appropriate for the small farm, small businesses, and small incomes of the poor)? N/A
- d. FAA Sec. 110(a). Will the recipient country provide at least 25% of the costs of the program, project, or activity with respect to which the assistance is to be furnished (or is the latter cost-sharing requirement being waived for a "relatively least developed country)? N/A
- e. FAA Sec. 110(b). Will grant capital assistance be disbursed for project for more than 3 years? If so, has justification satisfactory to Congress been made, and efforts for other financing, or is the recipient country "relatively least developed"? (M.O. 1232.1 defined a capital project as "the construction, expansion,

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equipping or alteration of a physical facility or facilities financed by AID dollar assistance of not less than \$100,000, including related advisory, managerial and training services, and not undertaken as part of a project of a predominantly technical assistance character."

- f. FAA Sec 122(b). Does the activity give reasonable promise of contributing to the development of economic resources, or to the increase of productive capacities and self-sustaining economic growth? N/A

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

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2. Development Assistance
Project Criteria (Loans Only)

- a. FAA Sec. 122(b). Information on conclusion on capacity of the country to repay the loan, at a reasonable rate of interest. N/A
- b. FAA Sec. 620(d). If assistance is for any productive enterprise which will compete with U.S. enterprises, is there an agreement by the recipient country to prevent export to the U.S. of more than 20% of the enterprise's annual production during the life of the loan? N/A

3. Economic Support Fund Project
Criteria

- a. FAA Sec. 531(a). Will this assistance promote economic and political stability? To the extent possible, does it reflect the policy directions of FAA Section 102? Yes
Yes
- b. FAA Sec. 531(c). Will assistance under this chapter be used for military, or paramilitary activities? No
- c. FAA Sec. 534. Will ESF funds be used to finance the construction of, or the operation or

(17)
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maintenance of, or the
supplying of fuel for, a
nuclear facility? If
so, has the President
certified that such use
of funds is
indispensable to
nonproliferation
objectives?

- d. FAA Sec. 609. If
commodities are to be
granted so that sale
proceeds will accrue to
the recipient country,
have Special Account
(counterpart)
arrangements been made?

N/A

5C)1) - COUNTRY CHECKLIST

Listed below are statutory criteria applicable generally to FAA funds, and criteria applicable to individual fund sources: Development Assistance and economic Support Fund.

A. GENERAL CRITERIA FOR COUNTRY ELIGIBILITY

1. FAA Sec. 481; FY 1985 No
Continuing Resolution
Sec. 528. Has it been determined or certified to the Congress by the President that the government of the recipient country has failed to take adequate measures or steps to prevent narcotic and psychotropic drugs or other controlled substances (as listed in the schedules in Section 202 of the Comprehensive Drug Abuse and Prevention Control Act of 1971) which are cultivated, produced or processed illicitly, in whole or in part, in such country or transported through such country, from being sold illegally within the jurisdiction of such country to United States Government personnel or their dependents, or from entering the United States unlawfully?

2. FAA Sec. 620 (c). If No
assistance is to a government, is the government liable as debtor or unconditional guarantor on any debt to a U.S. citizen for goods or services furnished or ordered where (a) such citizen has exhausted available legal remedies and (b) the debt is denied or contested by such government?

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3. FAA Sec. 620(e) (1). If assistance is to a government, has it (including government agencies or subdivisions) taken any action which has the effect of nationalizing, expropriating, or otherwise seizing ownership or control of property of U.S. citizens or entities beneficially owned by them without taking steps to discharge its obligations toward such citizens or entities? No
4. FAA Sec. 620(a), 620(f), 620(D); FY 1985 Continuing Resolution Sec. 512 and 513. Is recipient country a Communist country? Will assistance be provided to Angola, Cambodia, Cuba, Laos, Syria, Vietnam, Libya, or South Yemen? Will assistance be provided to Afghanistan or Mozambique without a waiver? No
5. FAA Sec. 620(j). Has the country permitted, or failed to take adequate measures to prevent, the damage or destruction by mob action of U.S. property? No
6. FAA Sec 620(l). Has the country failed to enter into agreement with OPIC? No
7. FAA Sec. 620(o); Fishermen's Protective Act of 1967, as amended, Sec. 5.
(a) Has the country seized, or imposed any penalty or sanction against, any U.S. fishing activities in international waters? No

(b) If so, has any deduction required by the Fishermen's Protective Act been made?

8. FAA Sec. 620(q); FY 1985
Continuing Resolution Sec.
518.

(a) Has the government of the recipient country been in default for more than six months on interest or principal of any AID loan to the country?

No

(b) Has the country been in default for more than one year on interest or principal on any U.S. loan under a program for which the appropriation bill (or continuing resolution) appropriates funds?

No

9. FAA Sec. 620(s). If contemplated assistance is development loan or from Economic Support Fund, has the Administrator taken into account the amount of foreign exchange or other resources which the country has spent on military equipment? (Reference may be made to the annual "Taking into Consideration" memo: "Yes, taken into account by the Administrator at time of approval of Agency OYB." This approval by the Administrator of the Operational Year Budget can be the basis for an affirmative answer during the fiscal year unless significant changes in circumstances occur.)

Yes

10. FAA Sec. 620(t). Has the country severed diplomatic relations with the United

No

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States? If so, have they been resumed and have new bilateral assistance agreements been negotiated and entered into since such resumption?

11. FAA Sec. 620(u). What is the payment status of the country's U.N. obligations? If the country is in arrears, were such arrearages taken into account by the AID Administrator in determining the current AID Operational Year Budget? (Reference may be made to the Taking into Consideration memo.) No
12. FAA Sec. 620A; FY 1985 Continuing Resolution Sec. 521. Has the country aided or abetted, by granting sanctuary from prosecution to, any individual group which has committed an act of international terrorism? Has the country aided or abetted, by granting sanctuary from prosecution to, any individual or group which has committed a war crime? No
13. FAA Sec. 666. Does the country object, on the basis of race, religion, national origin or sex, to the presence of any officer or employee of the U.S. who is present in such country to carry out economic development programs under the FAA. No

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14. FAA Sec. 669, 670. Has the country, after August 3, 1977, delivered or received nuclear enrichment or reprocessing equipment, materials, or technology, without specified arrangements or safeguards? Has it transferred a nuclear explosive device to a non-nuclear weapon state, or if such a state, either received or detonated a nuclear explosive device? (FAA Sec. 620E permits a special waiver of Sec. 669 for Pakistan.) No
15. ISDCA of 1981 Sec. 720. Was the country represented at the Meeting of Ministers of Foreign Affairs and Heads of Delegations of the Non-Aligned Countries to the 36th General Assembly of the U.N. of September 25 and 28, 1981, and failed to disassociate itself from the communique issued? If so, has the President taken it into account? (Reference may be made to the Taking into Consideration memo.) No
16. FY 1985 Continuing Resolution. If assistance is from the population functional account, does the country (or organization) include as part of its population planning programs involuntary abortion? N/A

17. FY 1985 Continuing Resolution Sec. 530. Has the recipient country been determined by the President to have engaged in a consistent pattern of opposition to the foreign policy of the United States? No

B. FUNDING SOURCE CRITERIA FOR COUNTRY ELIGIBILITY

1. Development Assistance Country Criteria

FAA Sec. 116. Has the Department of State determined that this government has engaged in a consistent pattern of gross violations of internationally recognized human rights? If so, can it be demonstrated that contemplated assistance will directly benefit the needy? N/A

2. Economic Support Fund Country Criteria

FAA Sec. 502B. Has it been determined that the country has engaged in a consistent pattern of gross violations of internationally recognized human rights? If so, has the country made such significant improvements in its human rights record that furnishing such assistance is in the national interest? No

5C(3) - STANDARD ITEM CHECKLIST

Listed below are statutory items which normally will be covered routinely in those provisions of an assistance agreement dealing with its implementation, or covered in the Agreement by imposing limits on certain uses of funds.

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

A. Procurement

1. FAA Sec. 602. Are there arrangements to permit U.S. small business to participate equitably in the furnishing commodities and services financed? Yes
2. FAA Sec. 604(a). Will all procurement be from the U.S. except as otherwise determined by the President or under delegation from him? Yes
3. FAA Sec. 604(d). If the cooperating country discriminates against marine insurance companies authorized to do business in the U.S., will commodities be insured in the United States against marine risk with such a company? Yes
4. FAA Sec. 604(e); ISDCA of 1980 Sec. 705(a). If offshore procurement of agricultural commodity or product is to be financed, is there provision against such procurement when the domestic price of such commodity is less than parity? (Exception where commodity financed could not reasonably be procured in U.S.) N/A

5. FAA Sec. 604(g). Will construction or engineering services be procured from firms of countries which are direct aid recipients and which are otherwise eligible under Code 941, but which have attained a competitive capability in international markets in one of these areas? Do these countries permit United States firms to compete for construction or engineering services financed from assistance programs of these countries? No
6. FAA Sec. 603. Is the shipping excluded from compliance with requirement in section 901(b) of the Merchant Marine Act of 1936, as amended, that at least 50 per centum of the gross tonnage of commodities (computed separately for dry bulk carriers, dry cargo liners, and tankers) financed shall be transported on privately owned U.S. flag commercial vessels to the extent such vessels are available at fair and reasonable rates? A transportation source waiver will be requested.
7. FAA Sec. 621. If technical assistance is financed, will such assistance be furnished by private enterprise on a contract basis to the fullest extent practicable? If the facilities of other Federal agencies will be utilized, are they particularly Yes
N/A

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

International Air Transportation Fair Competitive Practices Act, 1974. If air transportation of persons or property is financed on grant basis, will U.S. carriers be used to the extent such service is available? Yes

FY 1985 Continuing Resolution Sec. 504. If the U.S. Government is a party to a contract for procurement, does the contract contain a provision authorizing termination of such contract for the convenience of the United States? Yes

B. Construction

1. FAA Sec. 601(d). If capital (e.g., construction) project, will U.S. engineering and professional services be used? Yes

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

3. FAA Sec. 620(k). If for construction of productive enterprise, will aggregate value of assistance to be furnished by the U.S. not exceed \$100 million (except for productive enterprises in Egypt that were described in the CP)? N/A

C. Other Restrictions

1. FAA Sec. 122(b). If development loan, is interest rate at least 2% per annum during grace period and at least 3% per annum thereafter? N/A

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

3. FAA Sec. 620(h). Do arrangements exist to insure that United States foreign aid is not used in a manner which, contrary to the best interests of the United States, promotes or assists the foreign aid projects or activities of the Communist-bloc countries? Yes

4. Will arrangements preclude uses of financing:
 - a. FAA Sec. 104(f); FY 1985 Continuing Resolution Sec. 527. (1) To pay for performance of abortions as a method of family planning or to motivate or coerce persons to practice abortions; (2) to pay for performance of involuntary sterilization as method of family planning, or to coerce or provide financial incentive to

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any person to undergo sterilization; (3) to pay for any biomedical research which relates, in whole or part, to methods or the performance of abortions or involuntary sterilizations as a means of family planning; (4) to lobby for abortion?

- b. FAA Sec. 620(g). To compensate owners for expropriated nationalized property? N/A
- c. FAA Sec. 660. To provide training or advice or provide any financial support for police, prisons or other law enforcement forces, except for narcotics programs? N/A
- d. FAA Sec. 662; For CIA activities? N/A
- e. FAA Sec. 636(i). For purchase, sale, long-term lease, exchange or guaranty of the sale of motor vehicles manufactured outside U.S., unless a waiver is obtained? Yes
- f. FY 1985 Continuing Resolution, Sec. 503. To pay pensions, annuities, retirement pay, or adjusted service compensation for military personnel? N/A

- g. FY 1985 Continuing Resolution, Sec. 505. N/A
To pay U.N. assessments, arrearages or dues?
- h. FY 1985 Continuing Resolution, Sec. 506. N/A
To carry out provisions of FAA section 209(d) (Transfer of FAA funds to multilateral organizations for lending)?
- i. FY 1985 Continuing Resolution, Sec. 510. N/A
To finance the export of nuclear equipment, fuel, or technology or to train foreign nationals in nuclear fields?
- j. FY 1985 Continuing Resolution, Sec. 511. No
Will assistance be provided for the purpose of aiding the efforts of the government of such country to repress the legitimate rights of the population of such country contrary to the Universal Declaration of Human Rights?
- k. FY 1985 Continuing Resolution, Sec. 516. No
To be used for publicity or propaganda purposes within U.S. not authorized by Congress?

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CERTIFICATION PURSUANT TO SECTION 611(e) OF THE
FOREIGN ASSISTANCE ACT OF 1961, AS AMENDED

I, James Holtaway, as Director of the Regional Development Office/Caribbean of the Agency for International Development, having taken into account, among other things, the maintenance and utilization of projects in the Caribbean region previously financed or assisted by the United States, do hereby certify that in my judgement the Government of the Commonwealth of Dominica has both the financial capacity and the human resources capability to use effectively and to maintain the goods and services procured under the proposed capital assistance grant project entitled Dominica Rural Electrification Project.

This judgement is based upon the implementation record of externally financed projects, including AID-financed projects, in Dominica, the commitment from the Government of the Commonwealth of Dominica, and the quality of the planning which has gone into this new project. The specifications for the procurement and installation of the generators, the design of the transmission lines, and the specifications for transmission/distribution materials have been prepared by an American firm. The Dominican electric utility has designed the distribution lines, and has considerable successful experience in the operation and maintenance of the existing electricity system. The Project Agreement includes provisions designed to ensure the future financial viability of the electric utility. The Government of the Commonwealth of Dominica appreciates the economic and social importance of the Project and is fully committed to its proper implementation and utilization.

(Signed): James R. Holtaway

James Holtaway
Director

(Date): March 4, 1985



OFFICE OF THE PRIME MINISTER
CABINET SECRETARIAT

Telegrams: External, Dominica,
Telex 613 EXT. DO
Reference: P30/1 - 86

GOVERNMENT HEADQUARTERS,
ROSEAU,
COMMONWEALTH OF DOMINICA,
WEST INDIES.

March 8, 1984

Mr William Wheeler
Director
USAID Office
Bridgetown
BARBADOS

Dear Mr Wheeler,

I am enclosing in triplicate our request for extension of our present hydro system to the East Coast and justification for a new back-up diesel A.C. generating set.

Yours faithfully,
OFFICE OF THE PRIME MINISTER

M. Eugenia Charles
Prime Minister

MEC:db

For cost estimate see Annexure 2.

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1 Development Objective of Project

- (a) The towns and villages situated along the Eastern (Atlantic) coast of Dominica between Marigot in the North and Grandbay in the South, have never enjoyed the benefits of electricity. The existing 11,000 volts transmission system operated by Dominica Electricity Services Limited (Domlec) serves only the southern, western and north-eastern parts of the island.
- (b) The need for rural electrification is of paramount importance in order to enable the section of the island's population located on the East Coast to improve their quality of everyday life. The reservoir of potential skills - technical and entrepreneurial - in the rural areas is large and this can be exploited for the common good by introducing electricity into their houses, schools and workshops.
- (c) The Government of the Commonwealth of Dominica (GODC) therefore attaches the highest priority and importance to the rural electrification of remote and coastal communities in Eastern Dominica by increasing the installed generating capacity of power stations located on the Caribbean Sea side of the island in order to transmit power to the East Coast locations and distributing the power to a number of towns, villages and communities.
- (d) For two years now we have considered the installation of two mini-hydro power stations on the East Coast to serve the needs of the people in approximately twelve (12) villages. The estimated population of that area of the island is 7,895.
- (e) The Government of Dominica has ongoing studies for the increase of hydro generating capacity in the present location on the West Coast and it is expected that within three years this should be in place.
- (f) A comparison of the cost of installation of two mini-hydro plants which will serve only three villages of 4,354 persons as against the cost of transmission lines to the East Coast which will serve many more villages indicates that there would be a saving of \$211,760.
- (g) To maintain the electricity supply now necessary on the West Coast and to ensure that there is an appropriate backup facility, the Government of Dominica must acquire immediately, a diesel A.C. generating set.
- (h) It has also been established that installation of the two mini-hydro plants could not be completed to commence generation under two years while transmission from the West Coast could reach the first village within six (6) months and then rapidly encompass the other villages.
- (i) It has been established that with the new backup plant the East Coast could be satisfactorily supplied with electricity in the immediate future and the installation of the transmission lines to the East Coast could make the task of connecting up to the additional hydro-generated electricity simple in the future.
- (j) The current operating costs would not be augmented by transmission lines to the East Coast since management would remain the same and the expertise required for maintenance of transmission lines would be less costly than that required for the maintenance of mini-hydro.

The following details of costing will ^{illustrate} the point:-

(A)	(B)	(C)
Mini-Hydro Castle Bruce	Mini-Hydro Delices	Domlec - New Diesel set and Transmission Lines
\$2,130,000	\$1,259,000	\$3,177,240

We are therefore requesting from U S A I D a grant of US \$1.2 million to allow us to bring electricity to the East Coast of Dominica . .

We would be grateful for your urgent attention to this request since we have explained earlier that time is of the essence.

We await your favourable reply to this request.

.....
M E CHARLES
Prime Minister

March 2 1984

Sl. No.	Particulars Of Work	(A)	(B)
		Castle Bruce: 200kw EC \$	Delices: 150kw EC\$
1.	<u>Civil Works</u> Access, Weir, Intake, Sand Trap, low pressure pipeline, storage pond, penstock, power house, tail-race & Contractor's fees.	615,200	298,400
2.	<u>Electro-mechanical Equipment</u> Turbine, generator, controls and switchgear	537,600	295,700
	Total Direct Costs	<u>1,152,800</u>	<u>594,100</u>
3.	Engineering and Project Management (15%)	173,000	89,100
4.	Contingencies (20%)	230,600	118,800
	Total Generating Plant Costs:	<u>1,556,400</u>	<u>802,000</u>
5.	Transmission (11kv) and Distribution (400v) System	<u>573,600</u>	<u>457,000</u>
	Total Project Cost	<u>2,130,000</u>	<u>1,259,000</u>
	<u>TOTAL COST OF BOTH PROJECTS:</u>	<u>3,389,000</u>	

(C)

ESTIMATED COST OF 1500KW DIESEL GENERATING SET FOR DOMINICA
ELECTRICITY SERVICES LTD. FOR INSTALLATION AT FOND COLE

	<u>EC Dollars</u>
1. Diesel Engine Driven, A.C. Generating Set rated 1875 KVA, 1875 KVA, 1500 KW, 3.3 KV, 750 rpm, 3 Phase, 0.8 power factor, complete with engine auxiliaries, radiator, starting air compressor and receiver, control switchgear	1,455,740.00
2. Civil Works such as modifications to existing building, trenches, ducts etc.....	25,000.00
3. Foundation for Set	50,000.00
4. Transformer 2000KVA, 3.3 KV/11 KV	30,000.00
5. Engineering and Project Management	30,000.00
6. Installation and Commissioning	<u>111,500.00</u>
➔ TOTAL FOR DIESEL SET:	1,702,240.00 ✓
7. Transmission and Distribution	1,555,600.00
<i>11 kv line</i>	
8. LESS: Amount provided for in Company Budget	80,000.00
Grand Total:	<u>EC\$ 3,177,240.00</u>
Equivalent:	<u>US\$ 1,176,755.00</u>

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**PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK**

Life of Project:
From FY 85 to FY 87
Total U.S. Funding \$4.7 million
Date Prepared: Jan 8, 1985

Project Title & Number: Dominica Rural Electrification 538-0130

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS																		
<p>Program or Sector Goal: The broader objective to which this project contributes:</p> <p>To promote the development of Dominica and particularly of the rural east coast</p>	<p>Measures of Goal Achievement:</p> <p>Increased economic activity in Dominica and increased economic opportunity and social services in the east coast parishes of St. David and St. Patrick.</p>	<p>GOCD's annual data on increased and new commercial/industrial activity nationwide; GOCD annual statistics for St. David and St. Patrick parishes.</p>	<p>Assumptions for achieving goal targets:</p> <p>GOCD will remain stable and promote economic growth.</p> <p>No major natural disasters.</p>																		
<p>Project Purpose:</p> <p>1) To assure that DOMLEC has adequate generation capacity to meet growing system demand and support GOCD's efforts to expand the industrial sector;</p> <p>2) To provide the east coast with access to electricity through the extension of the transmission/distribution (T/D) system.</p>	<p>Conditions that will indicate purpose has been achieved: End of project status.</p> <p>1) End of load shedding; 2) Increased use of electricity nationwide; 3) Access to electricity service in St. David and St. Patrick villages; 4) DOMLEC financial status enhanced.</p>	<p>DOMLEC Reports; Project Evaluation.</p>	<p>Assumptions for achieving purpose:</p> <p>Load forecasts are reasonably accurate; Rate increases and loss reduction programs are implemented; GOCD maintains commitment to stable, self sustaining DOMLEC.</p>																		
<p>Outputs:</p> <p>1) Increased supply and reliability of electric power; 2) Increased availability of electric services to east coast parishes; 3) Increased number of households with electricity services; 4) Increased DOMLEC capability; 5) Increased awareness of national park.</p>	<p>Magnitude of Outputs:</p> <p>1) Two new 750-1100 kv generators; 2) 22.5 miles of T/D line; 3) 1,000 east coast households connected within 1 year of distribution line completion. 2,500 households in subsequent years; 4) Ten linemen trained; 5) Trails marked, brochures printed.</p>	<p>DOMLEC Reports; Project Reports; Project Evaluation.</p>	<p>Assumptions for achieving outputs:</p> <p>Materials equipment and labor available within time and cost limits; Households want hook-ups; Cost of fuel to run generators remains stable.</p>																		
<p>Inputs:</p> <p>Diesel generators 11 kv transmission line Distribution line Environmental activities</p>	<p>Implementation Target (Type and Quantity)</p> <table border="1"> <thead> <tr> <th>AID</th> <th>GOCD</th> <th>TOTAL</th> </tr> </thead> <tbody> <tr> <td>\$1.834</td> <td>0</td> <td>1.834</td> </tr> <tr> <td>\$2.090</td> <td>0</td> <td>2.090</td> </tr> <tr> <td>\$.727</td> <td>.350</td> <td>1.077</td> </tr> <tr> <td>\$.030</td> <td>.010</td> <td>.040</td> </tr> <tr> <td>\$4.681(4.7)</td> <td>.360</td> <td>5.041</td> </tr> </tbody> </table>	AID	GOCD	TOTAL	\$1.834	0	1.834	\$2.090	0	2.090	\$.727	.350	1.077	\$.030	.010	.040	\$4.681(4.7)	.360	5.041	<p>USAID Disbursement records; DOMLEC records.</p>	<p>Assumptions for providing inputs:</p> <p>GOCD provides adequate labor and financial support.</p>
AID	GOCD	TOTAL																			
\$1.834	0	1.834																			
\$2.090	0	2.090																			
\$.727	.350	1.077																			
\$.030	.010	.040																			
\$4.681(4.7)	.360	5.041																			

ACTION AID INFO AMB DCM PE CHRON

ANNEX G

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RR RUEFWN
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ZNR UUUUU 22H
R 121852Z SEP 84
FM SECSTATE WASHDC
TO AMEMBASSY BRIDGETOWN ROUTINE
BT
UNCLAS STATE 270507

LOC: 11 421
13 SEP 84 0115
CN: 01317
CHRG: AID
DIST: AIDP

PORT AU PRINCE 6614

AIDAC PORT AU PRINCE FOR J TALBOT

E.C. 12306: N/A

TAGS:

SUBJECT: DOMINICA RURAL ELECTRIFICATION ENVIRONMENTAL
ASSESSMENT 538-0130,

1. LAC CHIEF ENVIRONMENTAL OFFICER HAS REVIEWED SUBJECT
ENVIRONMENTAL ASSESSMENT EA, AND APPROVES IT SUBJECT TO
ITS RECOMMENDATIONS BEING INCORPORATED INTO FINAL
PROJECT DESIGN.

2. EA IS WELL WRITTEN AND TALBOT IS CONGRATULATED ON
GOOD WORK. SHULTZ

BT
#0507

UNCLASSIFIED

STATE 270507

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COMMONWEALTH DOMINICA

DEVELOPMENT OF NATIONAL PARK - INTERPRETATION

PROJECT TITLE : Development of Interpretive Facilities for Beeri and Freshwater Lakes - Marne Trois Pitons National Park.

IMPLEMENTING AGENCY : Ministry of Agriculture Lands and Fisheries

DURATION OF PROJECT : 1 year

TOTAL PROJECT COST : EC\$69,209.80

NATIONAL BACKGROUND

Dominica is a volcanic island of the Lesser Antilles lying equidistant from the French Departments of Guadeloupe and Martinique. The terrain is characterized by its rugged topography, well watered valleys and gorges and dense tropical rain forest. Because of these unique natural features 16,000 ac. (6477 ha.) have been designated a national park.

Basic facilities which were installed at the inception of the Park to satisfy visitors needs were destroyed through national disasters (Hurricanes 1979, 1980).

Much of the literature produced at the inception of the park was mainly for orientation of a people who were newly introduced to the park idea. Now information has to be produced to coincide with park development. Interpretation is the most critical aspect of the Park and the objective is to expose people to the values of the park to ensure support and development of the National Park System. To accomplish this, the immediate and long term benefits of the Park must be realized by the users.

The survival of the Park will also depend on the contribution it can make to the economic development of the island. It is in this light that effort is being made to provide interpretive and other visitor facilities for the Beeri and Freshwater Lake areas, to encourage visitation in the Park. Emphasis is being placed on the development of tourism. The areas mentioned are easily accessible and in close proximity to the main town, Roseau.

OBJECTIVES

1. To provide basic facilities to park users.
2. To provide information so as to enhance basic understanding of the Park concept and to encourage public support for the park.
3. To help public appreciate basic ecological/geological aspects of the areas.
4. To contribute to the economic development of the areas.

PROJECT DESCRIPTION

The Freshwater and Boeri Lakes and environs are unique. Being 2500 ft. above sea level, they sustain a variety of forest systems ranging from hydrophytic to secondary forest to elfin woodland. In addition to this, the area has the highest rainfall 250-300 inches of rain per annum (6390-7620 mm) and has two of the largest crater lakes in Dominica.

Facilities and services are needed for the development and proper public use of the area. They include access, recreation and interpretation. Basic access trails are available but inadequate. The project seeks to develop self guiding trails which will expose visitors to the many unique aspects of the area and to provide interpretive facilities for various levels of visitors.

Interpretation will take into account the different interpretive themes that are identified and will utilize different but relevant approaches to providing the information to the visitor.

In addition services such as picnic shelter, garbage disposal, containers, and simple toilet facility are envisaged to ensure that a certain measure of comfort is afforded to the visitors.

Freshwater and Boeri Lake areas are easily accessible and hence have a higher visitation rate than other areas within the National Park. The area could dually serve as a model unit within the Morne Trois Pitons National Park.

INTERPRETIVE PLANNING GUIDE

CATEGORIES OF USERS

TOURIST

Day Users
Naturalist groups
Extended stay visitors

LOCAL USERS

School groups
Day Users
Organized groups

Site: Boeri and Freshwater Lakes and Environs.

INTERPRETIVE UNITS

Vegetation/land use:	Hydrophytic	Nature trails
	Rainforest	Exhibits
	Montane Forest	Pamphlets
	Sifia woodland	Interpretive
	Ferns	Signs
Geology:	History of lake	Nature trails
	Volcanism	Pamphlets
		Exhibits
Hydrology:	Hydrologic cycle	Brochure
		Pamphlet
Wildlife:	Birds/Insects	Brochure
	Aquatic life	Exhibits

METHOD/PLAN OF ACTION

Scientific information will be collated for use in production of booklets and brochures. Available research literature will be utilized and actual field work will be carried out. This will involve the utilization of local resource persons - geologists/ecologists/biologist/hydrologist. This will precede the development of informational booklets and brochures (see 'interpretive planning guide').

The existing trail will be upgraded and other trails will be constructed in the Boeri and Freshwater Lake area to incorporate other ecological features of the Park. This will involve the construction of loop trails as opposed to open end trails that are now in existence. Approximately 2 miles of trails will be constructed.

Interpretive signs will be developed to communicate specific values - ecological/geological processes and systems of the general environment, to the visitor/public. These will include the identification signs and interpretive stories on fixed signs along the trails and illustrative media.

Facilities to be erected will include 2 picnic shelters one at each of the lake and one toilet which will basically be a simple pit latrine type. Garbage bins will be placed at specific areas. Wooden structures will be constructed for housing these in an effort to blend the physical structures with the environment.

PROJECT COST

Facilities requested and the construction of trails will be for two crater lakes. The project will be executed through the Ministry of Agriculture and supervision of the work will be done by technical personnel from the Ministry. The total amount of money requested is EC\$69,209.80

<u>MATERIAL</u>	<u>COST EC\$</u>
Exhibits/signs	8,000.00
Guidebooks/Brochures Pamphlets	20,000.00
Ramshelters/Foilet	
<u>CONSTRUCTION MATERIALS</u>	<u>5,702.00</u>
1676 ft. lumber	3,352.00
6000 shingles	1,500.00
cement/nails aggregate	<u>850.00</u>
	5,702.00
<u>LABOUR</u>	
2 carpenters \$36.00/day 20 days	1,440.00
2 apprentices \$22.40/dy 20 days	896.00
<u>TRAIL CONSTRUCTION</u>	
10 men for 120 days \$22.40/dy	26,880.00
Garbage Bins/stands	800.00
	62,918.00
Contingency	<u>6,291.80</u>
	<u>69,209.80</u>

TOTAL	

DOMINICA RURAL ELECTRIFICATIONU S A I D PROJECT No 538-0000

The PID proposed that a training programme be executed for the training of skilled and semi-skilled linesman.

The following is a proposed plan and estimate for the implementation of the programme.

Fifty-four persons have been selected and are being trained, The training period shall be four (4) weeks with participants being divided into two (2) groups, each group following a two (2) week programme.

The training is being conducted by Mr Martin Richards of Domlec assisted by Messrs:- W Dorsett - Trainee Engineer

J Daniel - Chargehand

C Belleau - Linesman

A Andrew - Observer

The programme commenced on January 21, and will end on February 15, 1985.

The programme is made up as follows:-

- (1) Field Work
- (2) Lectures of a semi-technical nature
- (3) Workshop training
- (4) Practical and oral examination

COURSE CONTENT

1. Field Work

- (1) Erecting a short length of overhead line on the training ground;
- (2) Instructions on the shape of excavation for various supports;
- (3) The reason and method of reinforcing foundations with baulks;
- (4) Assembly of supports before erection and the correct method of assembly;
- (5) Erection of supports with proper use of tools and the fixing of guy ropes etc;
- (6) Instructions in the use of climbing irons, ladders, safety belts and climbing short poles - heights to be increased as necessary;
- (7) Instructions on the field assembly and erection of insulator sets;
- (8) Instructions on the running-out of conductors and the use of various tools and equipment to be used;

2. Lectures - Subject to be dealt with

- (1) Rights and obligations of a field gang as it affects land ownership and occupation in constructing and maintaining overhead lines and sub-stations.
- (2) Conductors - Types and reasons for using the various types; statutory clearances; spacing and arrangements; reading of sag-tensions charts; clamps and earth-wire bending.
- (3) Conductor Jointing - Dangers of directly jointing different metals; joints in everyday use; importance of fitting joints; types of mechanical joints, danger of jointing conductors with opposit lays.
- (4) Insulators - Types in use; single and duplicate sets; reason for using arcing horns and causes which lower efficiency; insulator pollution and cleaning; methods of testing.
- (5) Insulator binding - Sizes and types of binding wires; methods of binding; binders to use with various types of conduction.
- (6) Supports - Types, wood, steel; testing of supports in service.
- (7) Conductor Termination - Importance of measuring correct length of tension sets; connection to transformers; fuse gear; and tee-off positions.
- (8) Staying - stay wires; types in everyday use; stay make-offs; importance of painting splices; correct setting of stays; stay rods, travel & bow type, baulks, wood and concrete; use of temporary stays, importance of using proper types.
- (9) Earthing - Importance of earthing; methods employed; cleaning of earth connections.
- (10) Conductor Erection - Types of running blocks, precaution in running out conductors; mounting of drums; connections to fuses transformers etc.
- (11) Steelwork Bonding - Bonding of steelwork on LV and all insulated lines.
- (12) Painting - Importance of cleaning surface with methods in everyday use; types of paint to use; galvanising and sheridising.
- (13) Safety Regulations - Earthing requirements prior to working on a line.

3. Workshop Training

In this period trainees will be given practical instructions in the following:-

- (1) Jointing - Making of various types of joints; eg Britannia, nozzle compression, cone type;

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Workshop Training Cont.

- (2) Binding, clamping and Insulator Assembly - Binding of 11kV LV conductors to insulators, stirrup binding, assembly of various types of clamps; assembly of insulator sets complete with arcing horns.
- (3) Stay Fixing - Splicing 7/14 and 7/8 stay wires, fitting of wood stay insulators and LV porcelain insulators.
Soldering -
Conductor Erection - Reading of sag tension charts for the various conductors.

4. Practical and Oral Examination

The practical examination should last approximately one day. Each trainee should be given certain parts to assemble, and when these are complete the work should be judged relative to the specimen parts in the workshop.

The oral examination consists of asking each candidate certain questions relative to lectures, workshop and field training. Each trainee should be asked between 6 to 10 questions. The questions should be related to the field and workshop sections.

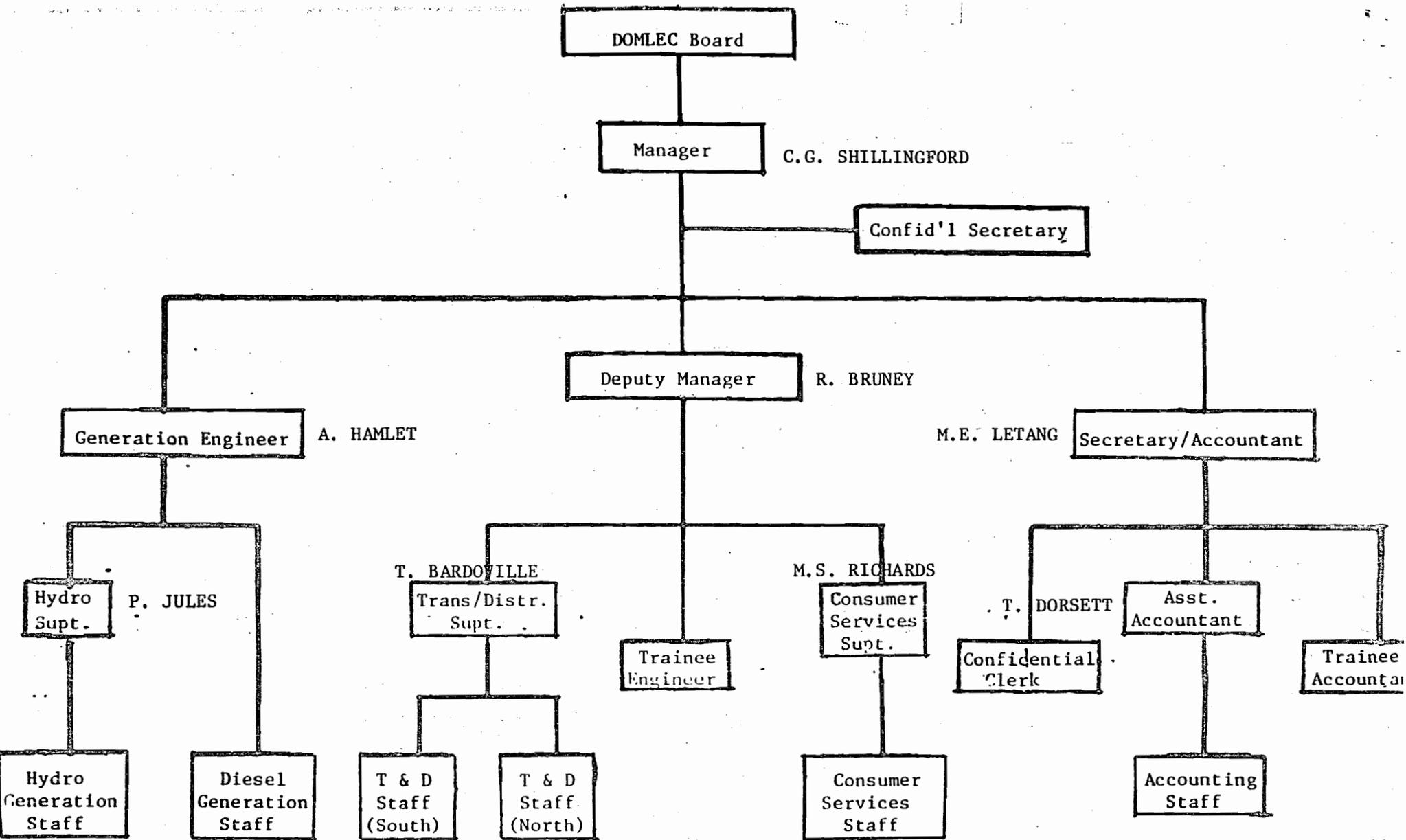
TRAINING ESTIMATE

Item	Description	Quantity	Unit Cost		Cost	
			\$	c	\$	c
1	<u>Wages</u>					
	Trainees for two weeks	4,320 M.H.I.	1.25		5,400.00	
	Linesman Instructor 2 wks	80 M.H.I.	6.79		543.20	
	Charge Hand	40 M.H.I.	7.26		290.40	
	Lecturer's Fees - Trainer	4 weeks			2,041.00	
	Assistant	4 weeks			1,600.00	
2	<u>Rent</u>					
	Hall (Convention Centre) 2 periods (opening & closing)	3 hours	126.00		252.00	
	Chairs (WAWU)	30				
	Tables (Raffoul)	3				

...../cont.

Item No	Description	Quantity	Unit Cost		Cost	
			\$	c	\$	c
3	<u>C/F Stationery</u>				12,736.60	
	File Folders (sixty)	60	0.80		48.00	
	Pencils (sixty)	5 pkts	4.00		20.00	
	Paper (3 reams)	3 reams	19.00		57.00	
	Rulers (thirty)	10	1.50		45.00	
4	<u>Protective Footwear</u>					
	Three pairs boots	3 pairs	120.00		360.00	
5	<u>Loose Tools</u>					
	Pliers (thirty)	30 pairs	15.00		450.00	
	Screw Driver - 4 sets	4 sets	21.00		84.00	
6	<u>Refreshments</u>					
	Soft Drinks - (per day)		20.00		400.00	
	Opening ceremony				700.00	
	Closing				700.00	
	Contingencies	10%			1,299.06	
					<u>14,289.66 (EC)</u>	
					<u>=====</u>	
					<u>\$5,315.69 (US)</u>	

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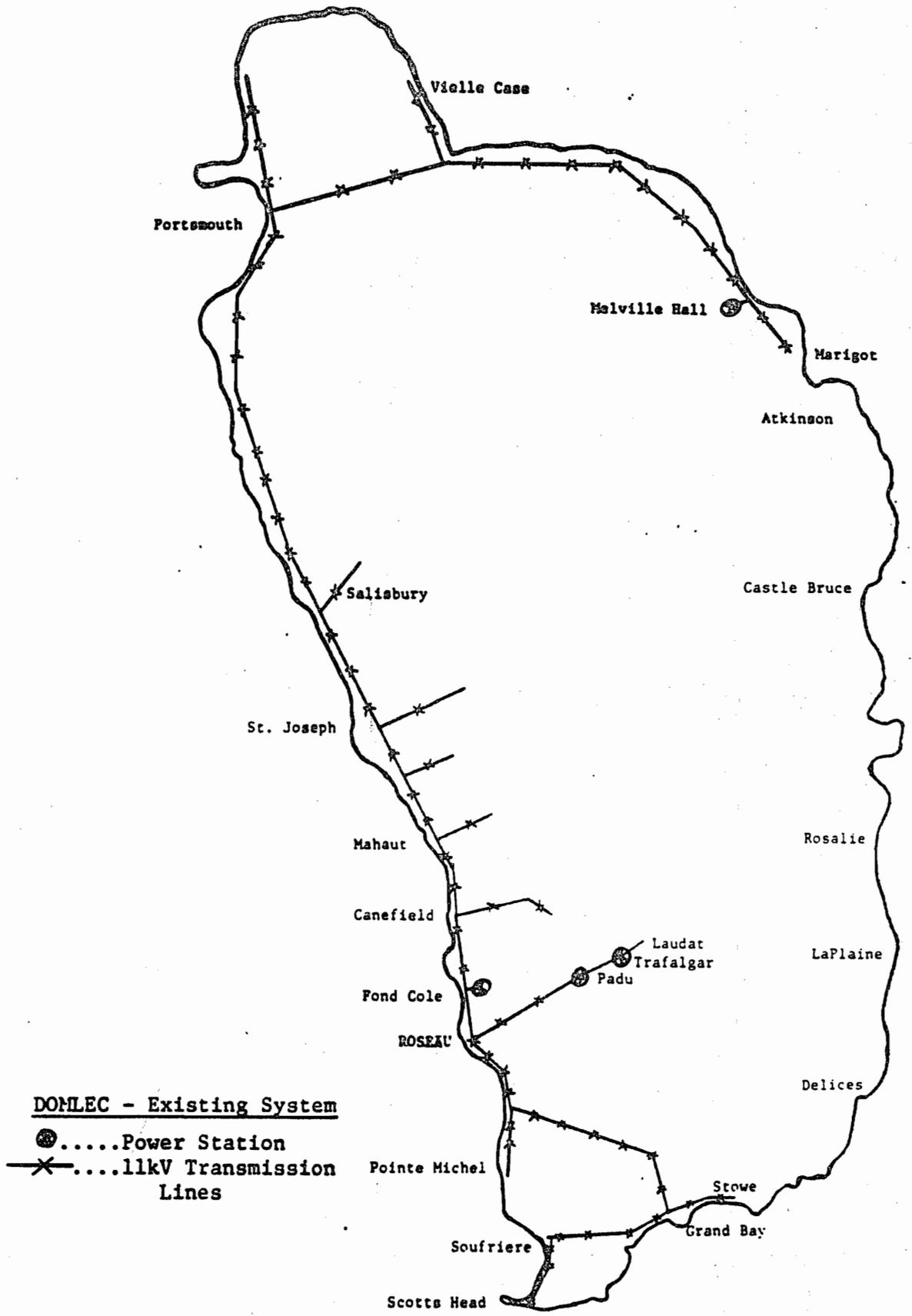
1984
DOMLEC GENERATING CAPABILITY

Unit	Year Installed ¹	Name Plate Rating (kW) (kW)	Effective Annual Capability (kW)
Trafalgar 1	1961	320	
Trafalgar 2	1952	320	
Trafalgar 3	1952	320	
Padu 1	1967	940	
Padu 2	1967	<u>940</u>	<u> </u>
Total Hydro		2,840	2,150 ²
Trafalgar 5	1963(1950)	200	200
Fond Cole 1	1970(1952)	588	400
Fond Cole 2	1971	1,126	1,126
Fond Cole 3	1972	1,126	1,126
Melville Hall 1	1970	110	100
Melville Hall 2	1970	110	100
Melville Hall 3	1970	<u>250</u>	<u>250</u>
Total Diesel		3,510	3,302
GRAND TOTAL		6,350	5,452

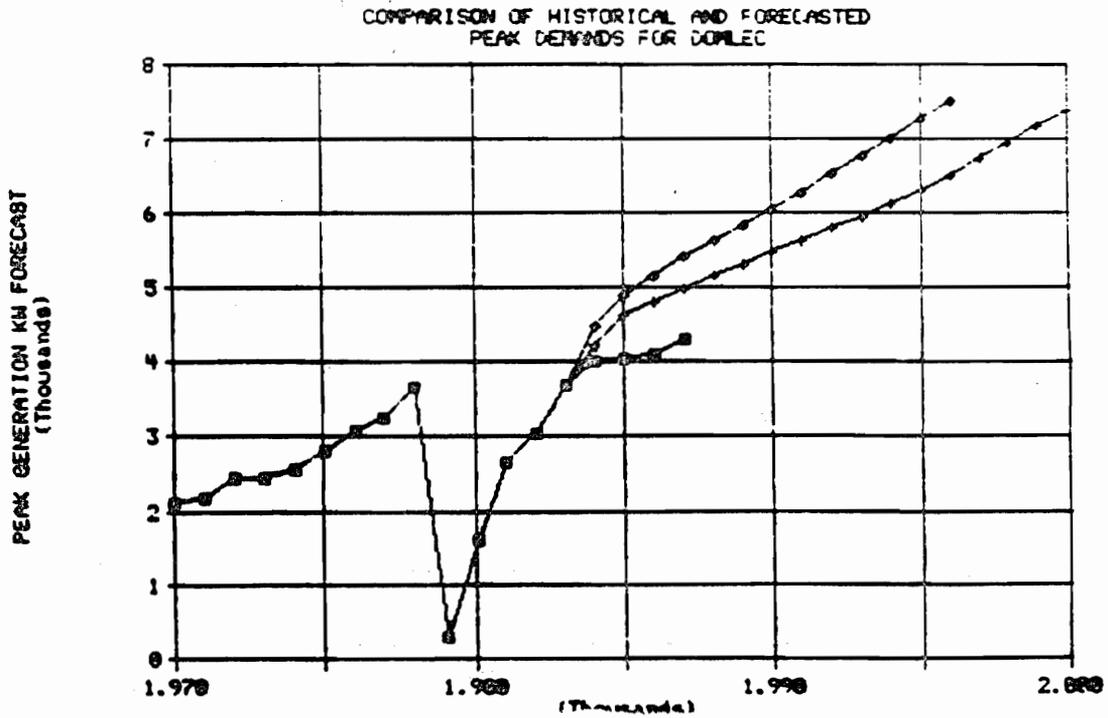
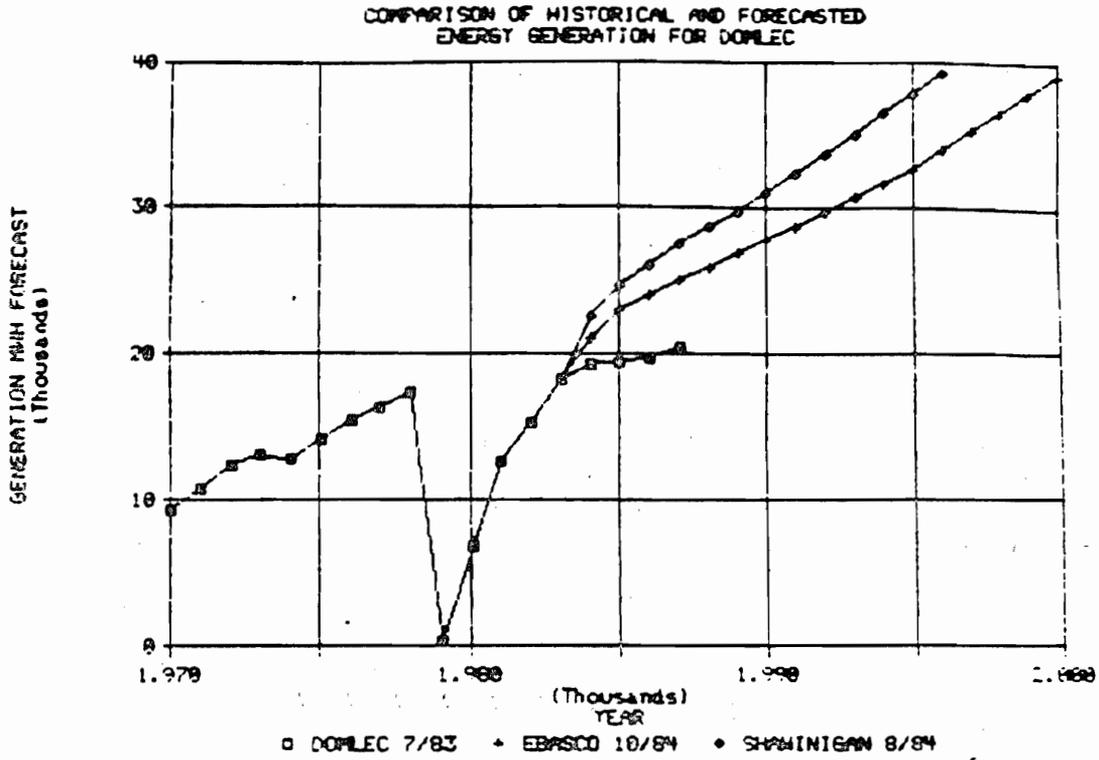
¹ Year in brackets indicates approximate age of second-hand equipment.

² Ebasco estimate. Dry season capability is about 1,900 kW. Wet season capability is up to 2,500 kW, but not dependable. Maximum plant output at Trafalgar is 900 kW on three units. Maximum output at Padu is 1,600 kW on two units, 900 kW on one unit.

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COMPARISON OF LOAD AND ENERGY FORECASTS FOR DOMLEC

GROSS GENERATION FORECASTS					PEAK LOAD FORECASTS			
YEAR	DOMLEC 7/83	EBASCO 10/84	SHAWINIGAN 8/84		YEAR	DOMLEC 7/83	EBASCO 10/84	SHAWINIGAN 8/84
1970	9,251	9,251	9,251	^	1970	2,130	2,130	2,130
1971	10,758	10,758	10,758	^	1971	2,170	2,170	2,170
1972	12,405	12,405	12,405	^	1972	2,450	2,450	2,450
1973	13,051	13,051	13,051	^	1973	2,450	2,450	2,450
1974	12,771	12,771	12,771	^	1974	2,550	2,550	2,550
1975	14,070	14,070	14,070	^	1975	2,800	2,800	2,800
1976	15,406	15,406	15,406	^	1976	3,050	3,050	3,050
1977	16,276	16,276	16,276	^	1977	3,250	3,250	3,250
1978	17,357	17,357	17,357	^	1978	3,660	3,660	3,660
1979	260	260	260	^	1979	280	280	280
1980	6,701	6,701	6,701	^	1980	1,620	1,620	1,620
1981	12,614	12,614	12,614	^	1981	2,660	2,660	2,660
1982	15,273	15,273	15,273	^	1982	3,040	3,040	3,040
1983	18,225	18,225	18,225	HISTORICAL	1983	3,684	3,684	3,684
1984	19,275	20,956	22,442	PROJECTED	1984	3,990	4,219	4,475
1985	19,445	22,958	24,537	!	1985	4,040	4,603	4,872
1986	19,695	24,002	25,995	!	1986	4,100	4,792	5,139
1987	20,455	25,009	27,443	!	1987	4,280	4,973	5,407
1988		25,944	28,700	!	1988		5,138	5,632
1989		26,867	29,731	!	1989		5,299	5,813
1990		27,787	31,020	!	1990		5,458	6,043
1991		28,706	32,334	!	1991		5,618	6,278
1992		29,681	33,672	!	1992		5,783	6,516
1993		30,664	35,035	!	1993		5,951	6,758
1994		31,656	36,422	!	1994		6,119	7,004
1995		32,659	37,833	!	1995		6,288	7,254
1996		33,937	39,270	!	1996		6,508	7,508
1997		35,237		!	1997		6,731	
1998		36,500		!	1998		6,945	
1999		37,784		!	1999		7,171	
2000		39,090		!	2000		7,380	

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PROJECT COSTS - DIESEL GENERATORS (\$000)

<u>ITEM</u>	<u>EXPENSE CATEGORY</u>	<u>US</u>	<u>LOCAL</u>	<u>TOTAL</u>
1.00	CONTRACTOR			
1.21	MANAGER/SUPERINTENDENT	24	7	31
1.22	DIESEL ENGR.	40	12	52
1.23	ACCOUNTANT		2	2
1.24	CLERK		3	3
1.30	MATERIAL			
1.31	DIESEL GENERATOR & AUX	1200		1200
1.32	ELECTRICAL EQUIPMENT	100		100
1.33	CIF ROSEAU	70		70
1.34	PORT CHG, LOCAL TRANSP		12	12
1.35	LOCAL MATERIAL/TOOLS		18	18
1.40	INSTALLATION			
1.41	CONSTR. EQUIP. RENTAL		12	12
1.42	LABOR		20	20
1.50	MISCELLANEOUS			
1.51	TRAINING	5	3	8
	SUBTOTAL:	1,439	88	1,528
	CONTINGENCY (20%):	288	18	306
		-----	---	-----
	DIESEL GEN. TOTAL (AID):	1,727	107	1,834
	=====	=====	===	=====

PROJECT COSTS - 11 KV TRANSM. LINE (\$000)

<u>ITEM</u>	<u>EXPENSE CATEGORY</u>	<u>US</u>	<u>LOCAL</u>	<u>TOTAL</u>
2.00	11 KV TR LINE			
2.10	MOBILIZATION	21		21
2.20	CONTRACTOR			
2.21	MANAGER/SUPERINTENDENT	90	15	105
2.22	FIELD ENGR	63	15	78
2.23	ACCOUNTANT		10	10
2.24	CLERK		8	8
2.25	MATERIAL/ADMINISTR.		12	12
2.26	2 LINEMEN	106	31	137
2.27	SURVEYOR	45	13	58
2.30	MATERIAL			
2.31	LINE MATERIAL	561		561
2.32	CIF ROSEAU	60		60
2.33	PORT, CHG, LOCAL TRNSP		12	12
2.34	LOCAL MATERIAL		20	20
2.40	INSTALLATION			
2.41	EQUIPM. & TOOLS RENTAL	232	20	252
2.42	CIF ROSEAU/ORIGIN	40		40
2.43	OPERATION & MAINTENANCE		82	82
2.44	LABOR		280	280
2.50	TRAINING		5	5
	SUBTOTAL:	1,218	523	1,741
	CONTINGENCY (20%):	243	105	348
		-----	---	-----
	11 KV TR. LINE TOTAL (AID):	1,461	628	2,089
	=====	=====	===	=====

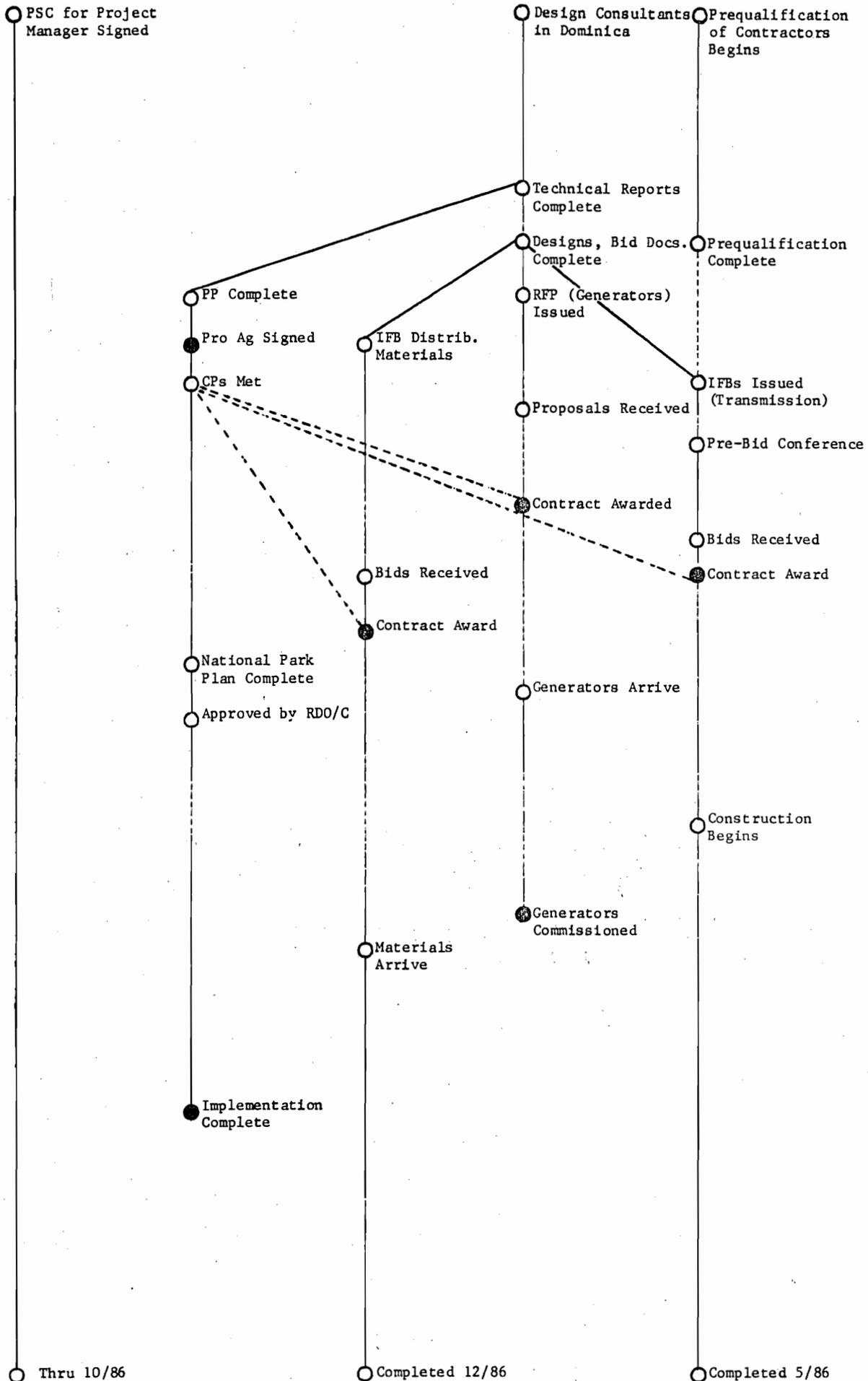
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EXHIBIT 8

PROJECT COSTS - DISTRIBUTION MATERIAL (\$000)

<u>ITEM</u>	<u>EXPENSE CATEGORY</u>	<u>US</u>	<u>LOCAL</u>	<u>TOTAL</u>
3.00	DISTRIBUTION MATERIAL			
3.10	TECHNICAL ASSISTANCE		50	50
3.30	MATERIAL			
3.31	PRIMARY (W/O ATKINSON)	159		159
3.32	LV (W/O ATKINSON)	116		116
3.33	PRIMARY (ATKINSON)	103		103
3.34	LV ATKINSON)	65		65
3.30	CIF ROSEAU	44		44
3.30	PORT & HANDLING		12	12
3.30	EQUIPMENT & TOOLS			
3.31	EQUIPMENT & TOOLS	101		101
3.32	CIF ROSEAU	6		6
3.33	PORT & HANDLING		4	4
	SUBTOTAL:	594	66	660
	CONTINGENCY (10%):	60	7	67
		---	---	---
	DISTR MATERIAL TOTAL (AID):	654	73	727
3.34	LABOR (DOMLEC)		350	350
		---	---	---
	GRAND TOTAL (AID):	654	423	1,077
	=====	===	===	=====

EXHIBIT 9



1984

1985

OCTOBER
NOVEMBER
DECEMBER
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER

Thru 10/86

Completed 12/86

Completed 5/86

at

EBASCO LOAD FORECAST - MEDIUM VERSION

DOMESTIC LOAD FORECAST

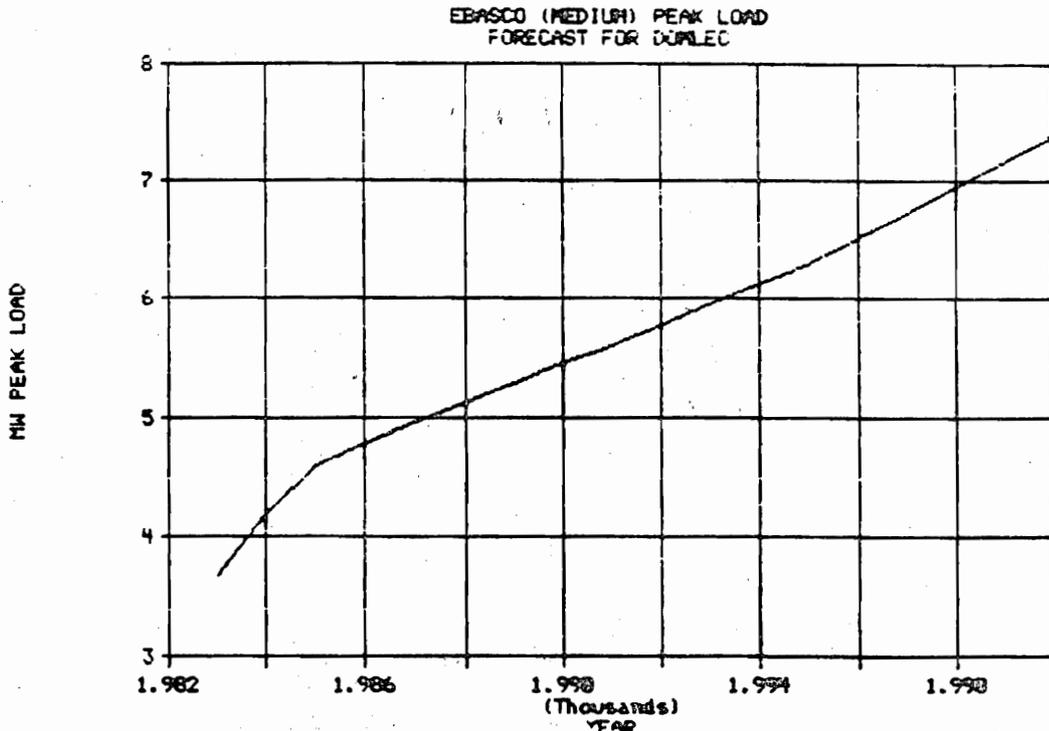
YEAR	NEW CUSTOMER ADDITION	TOTAL NUMBER CUSTOMERS	USAGE RATE KWH/C	MWH DOMES. SALES	COMERCL SALES MWH	INDUS. SALES MWH	TOTAL SALES MWH
1983		8,766	910	7,977	5,880	537	14,394
1984	900	9,666	960	9,279	6,756	1,372	17,408
1985	350	10,016	1,010	10,116	7,319	1,510	18,945
1986	300	10,316	1,020	10,522	7,592	1,610	19,725
1987	300	10,616	1,030	10,934	7,870	1,710	20,514
1988	275	10,891	1,040	11,327	8,134	1,810	21,270
1989	275	11,166	1,050	11,724	8,401	1,910	22,035
1990	275	11,441	1,060	12,127	8,672	2,010	22,810
1991	275	11,716	1,070	12,536	8,947	2,110	23,593
1992	275	11,991	1,080	12,950	9,226	2,210	24,386
1993	275	12,266	1,090	13,370	9,508	2,310	25,188
1994	275	12,541	1,100	13,795	9,794	2,410	25,999
1995	275	12,816	1,110	14,226	10,084	2,510	26,820
1996	275	13,091	1,130	14,793	10,466	2,610	27,869
1997	275	13,366	1,150	15,371	10,855	2,710	28,935
1998	275	13,641	1,170	15,960	11,251	2,760	29,971
1999	275	13,916	1,190	16,560	11,655	2,810	31,025
2000	275	14,191	1,210	17,171	12,066	2,860	32,097

EBASCO LOAD FORECAST- MEDIUM VERSION OCT. 1984
 =====

YEAR	FORCST SALES W/O LOSS REDUCTN	FORCST ADJUST. GROWTH RATE	ADJUST. SALES MMH	NON-TECH. LOSSES MMH	TECH LOSS %	TECH LOSS MMH	N. TECH LOSS REDUC	MMH LOSS RECOV	SALES AFTER RECOV	MMH TOTAL GENER	% CHANGE	LOAD FACTOR	MMH PEAK LOAD
1983	14,370			1,648	11.5	1,842	0	0	14,370	18,225		0.565	3,684
1984	17,408	21.14	17,408	1,071	11.3	2,088	607	577	17,985	20,956	14.99	0.567	4,219
1985	18,945	8.83	19,573	696	11.1	2,250	395	375	19,948	22,958	9.55	0.569	4,603
1986	19,725	4.12	20,769	453	10.9	2,313	257	244	21,013	24,002	4.55	0.572	4,792
1987	20,514	4.00	21,853	294	10.7	2,370	167	158	22,012	25,009	4.20	0.574	4,973
1988	21,270	3.69	22,823	191	10.5	2,416	108	103	22,926	25,944	3.74	0.576	5,158
1989	22,035	3.60	23,750	124	10.3	2,459	70	67	23,917	26,867	3.56	0.579	5,299
1990	22,810	3.52	24,655	81	10.1	2,498	46	44	24,698	27,787	3.42	0.581	5,458
1991	23,593	3.43	25,546	55	9.9	2,534	30	28	25,574	28,706	3.20	0.583	5,616
1992	24,386	3.36	26,434	34	9.9	2,620	19	18	26,452	29,681	3.40	0.586	5,783
1993	25,188	3.29	27,322	22	9.9	2,707	13	12	27,334	30,664	3.31	0.588	5,951
1994	25,999	3.22	28,214	14	9.9	2,795	8	8	28,222	31,656	3.23	0.591	6,119
1995	26,820	3.16	29,113	9	9.9	2,883	5	5	29,118	32,659	3.17	0.593	6,288
1996	27,660	3.11	30,056	6	9.9	2,996	3	3	30,260	33,937	3.91	0.595	6,508
1997	28,935	3.85	31,418	4	9.9	3,111	2	2	31,420	35,237	3.83	0.598	6,731
1998	29,971	3.58	32,545	3	9.9	3,222	1	1	32,547	36,500	3.58	0.600	6,945
1999	31,025	3.52	33,691	2	9.9	3,336	1	1	33,692	37,784	3.52	0.602	7,161
2000	32,097	3.46	34,856	1	9.9	3,451	1	1	34,857	39,090	3.46	0.605	7,380

BEST AVAILABLE COPY

EXHIBIT 12



gm

FORECAST LOAD/CAPACITY COMPARISONS

<u>Line</u>	<u>Description</u>	<u>Loads or Generation in kW for Year:</u>						
		<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>1990</u>
1	Dry Season Peak	3,620	4,372	4,552	4,724	4,881	5,034	5,185
2	Wet Season Peak	4,219	4,603	4,792	4,973	5,138	5,299	5,458
3	Dry Hydro Cap	1,900	1,900	1,900	1,900	1,900	1,900	1,900
4	Wet Hydro Cap	2,150	2,150	2,150	2,150	2,150	2,150	2,150
5	Dry Diesel Requirement	1,720	2,472	2,652	2,824	2,981	3,134	3,258
6	Wet Diesel Requirement	2,069	2,453	2,642	2,823	2,988	3,149	3,308
7	Existing Diesel Cap	3,302	3,302	2,702	2,702	2,702	2,702	2,702
8	After Maintenance	2,176	2,176	1,576	1,576	1,576	1,576	1,576
9	Expected Shortage During Maintenance W/O New Diesels	0	277	1,066	1,247	1,405	1,558	1,682

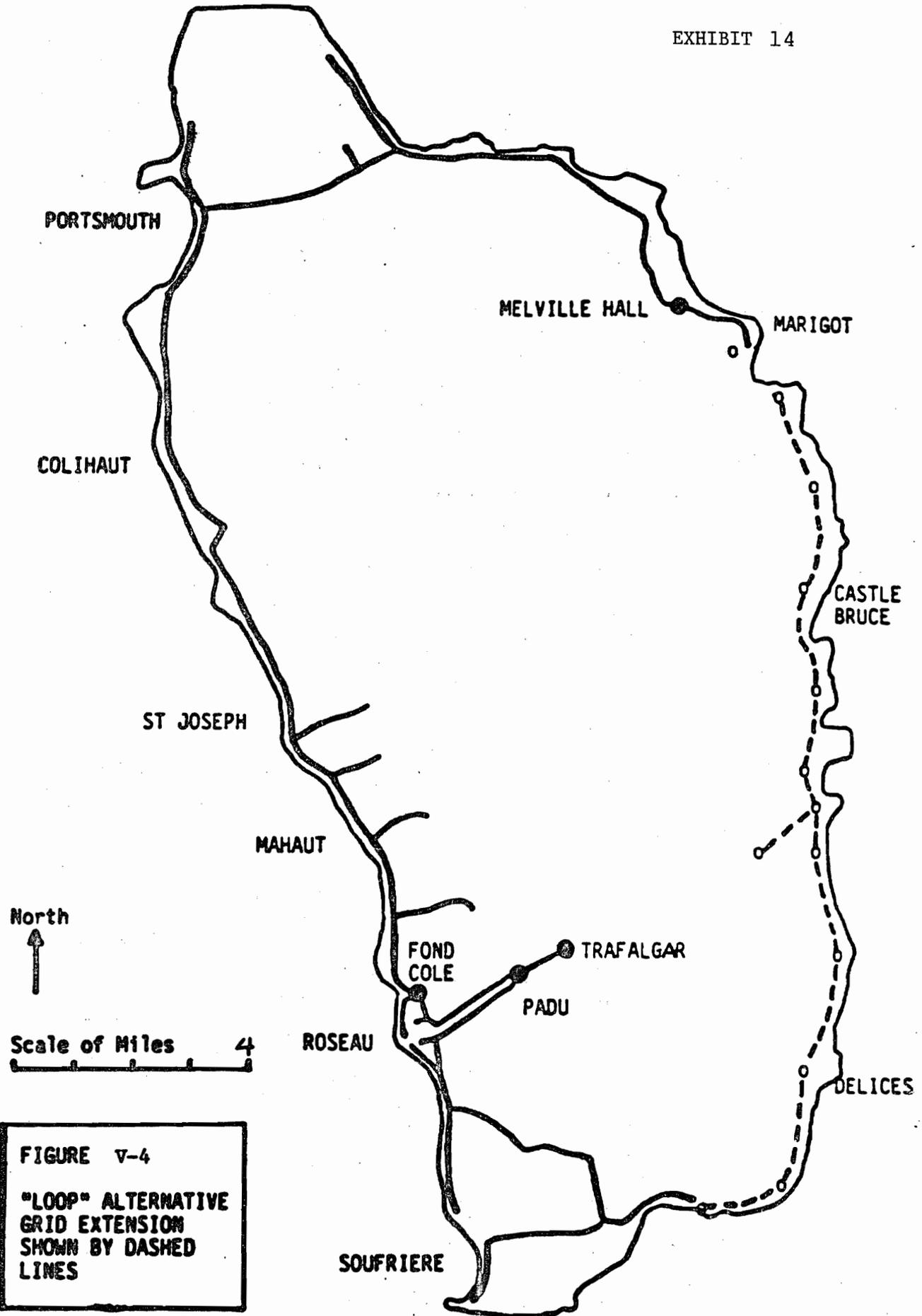


FIGURE V-4
"LOOP" ALTERNATIVE
GRID EXTENSION
SHOWN BY DASHED
LINES

GS

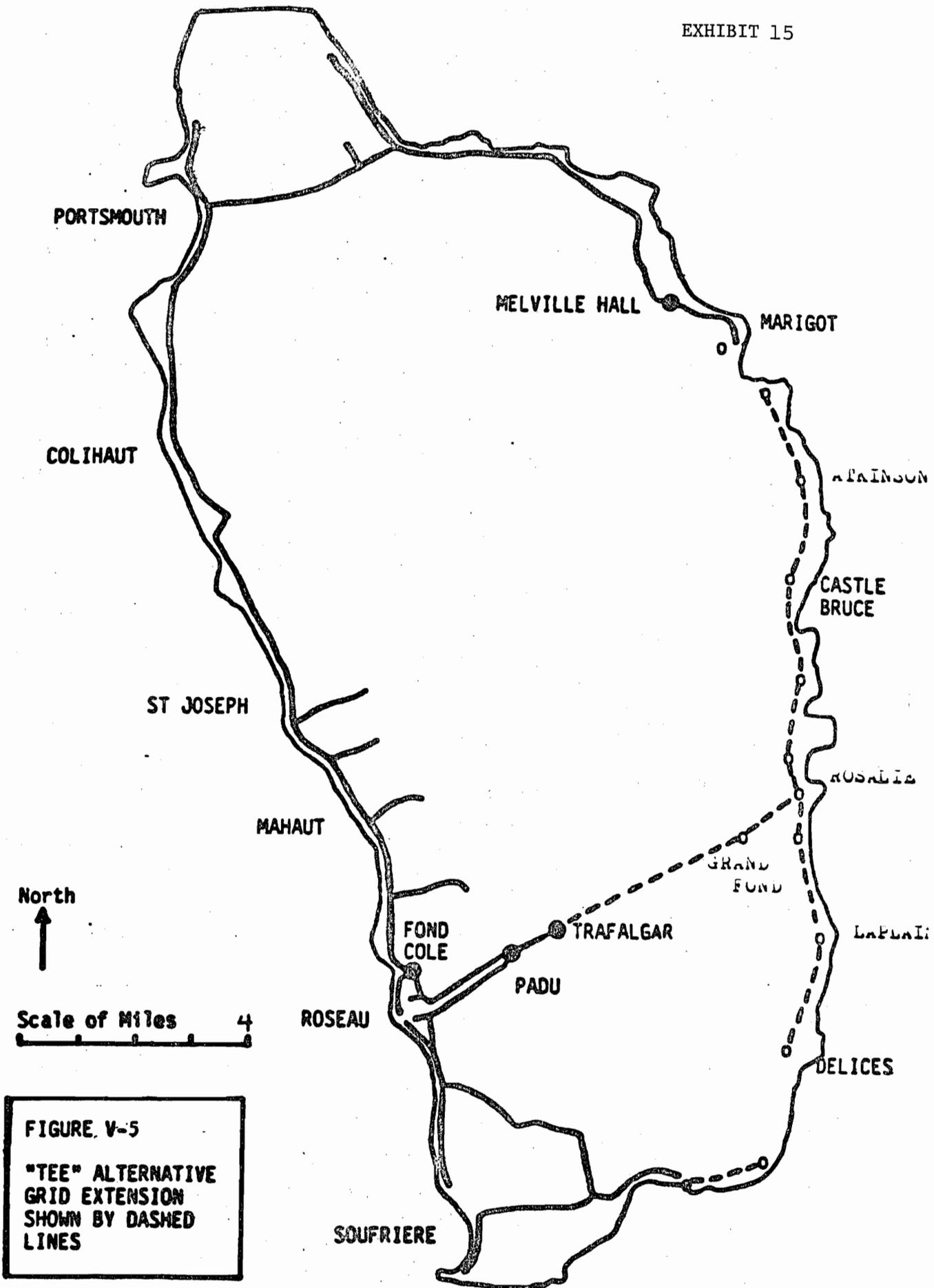


FIGURE V-5
"TEE" ALTERNATIVE
GRID EXTENSION
SHOWN BY DASHED
LINES

9.6

ALTERNATIVE TRANSMISSION LINE CONNECTIONS AND PRIMARY COSTS

SECN NO.	PLACE	DISTANCE (MI)	ALTERNATIVES							
			L1	L3	T1	T2	T3	T4	T5	
1	Marigot (North End)	2.0				111				
	Atkinson		111	1	111	111	1			
2	Gaulette	4.0	111	1	111	111	1			
3	Castle Bruce	3.5	111	1	111	111	1			
4	Good Hope	2.5	111	111	111	111	111	111	111	
5	Petite Soufriere	1.5	111	111	111	111	111	111	111	
6	Rosalie	2.0	111	111	111	111	111	111	111	
7	Riviere Ciriques	1.5	111	111	111	111	1	1	111	
8	La Plaine	4.0	111	111	111	111	1	1	111	
9	Delices	3.5	111	111	111	111	1	1	111	
10	Petite Savane	3.5	111	111	111	111	1			
11	Stowe	3.0	111	111	111	111	1			
	Rosalie		111	1	111	111	111	111	111	
12	Grand Fond	2.5	111	1	111	111	111	111	111	
13	Trafalgar Hydro	5.0			111	111	111	111	111	
	Total 3PH, 3W (MI)*		31.5	21.5	33.0	35.0	13.5	13.5	22.5	
	Total 1PH, 2W (MI)		-	-	-	-	-	-	-	
	Total 1PH, 1W (MI)		-	10	-	-	19.5	9.0	-	
	Total Length:		31.5	31.5	33.0	32.0	33.0	22.5	22.5	
	Total Inst. Line Cost (\$1000)**		1647	1493	1707	1786	1407	1152	1291	

*PH - phase, W - wire.

**Approximate, direct material and labor only; used for comparative cost evaluation only.

Note: 1 Represents a single phase line.
111 Represents a three phase line.

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**ECONOMIC COMPARISON
OF ALTERNATIVES**

Alternative	L1	L3	T1	T2	T3	T4	T5
Areas Served 3PH	Stowe to Atkinson, Grand Fond	Stowe to Castle Bruce	Stowe to Petite Savane, Delices to Atkinson, Grand Fond	Stowe to Petite Savane, Delices to Marigot, Grand Fond	Grand Fond To Castle Bruce	Grand Fond To Castle Bruce	Delices to Castle Bruce, Grand Fond
Areas Served 1PH	-	Grand Fond, Gaultette - Atkinson	-	-	Stowe to Petite Savane, Rosalie to Delices, Gaultette to Atkinson	Rosalie To Delices	-
Primary^a Costs (\$000)	1647	1493	1707	1786	1407	1152	1291
Present Worth (1984) of Carrying Charges (\$Millions)	2.785	2.524	2.886	3.020	2.379	1.948	2.183
Present Worth of Losses (\$Millions)	1.507	1.507	1.168	0.928	1.168	1.118	1.118
Total Present Worth (\$Millions)	4.292	4.031	4.054	3.948	3.547	3.066	3.301
Relative Cost	1.40	1.31	1.32	1.29	1.16	Base	1.08

^a Appropriate, direct material and labor only. Used for comparative cost evaluation only.

TABLE 1

DIESEL GENERATORS

FINANCIAL ANALYSIS

IRR = 6.7%

<u>Year</u>	<u>New Diesel Generation MWH</u>	<u>New Diesel Sales MWH</u>	<u>Lube Oil Cost US\$</u>	<u>Mainten. Cost US\$</u>	<u>Labor Cost US\$</u>	<u>T&D Cost US\$</u>	<u>Total O&M, T&D US\$</u>	<u>New Diesel Revenue US\$</u>	<u>Capital Costs US\$</u>	<u>New Diesel Total Cost US\$</u>	<u>New Diesel Cash Flow US\$</u>
1985	967	840	1253	18580	8000	16804	44637	106707	1858000	1902637	-1795930
1986	2485	2174	3220	18580	8000	43496	73297	276205		73297	202907
1987	2767	2435	3587	18580	8000	48716	78883	309347		78883	230464
1988	3056	2696	3960	18580	8000	53935	84476	342490		84476	258014
1989	3356	2978	4350	18580	8000	59576	90506	378308		90506	287801

1990	396	352	514	18580	8000	7054	34148	44794		34148	10646
1991	512	457	663	18580	8000	9146	36390	58079		36390	21688
1992	614	547	796	18580	8000	10952	38329	69550		38329	31220
1993	766	683	993	18580	8000	13665	41239	86778		41239	45539
1994	887	791	1149	18580	8000	15822	43551	100471		43551	56919
1995	1037	924	1344	18580	8000	18499	46424	117473		46424	71048
1996	1371	1222	1777	18580	8000	24448	52805	155244		52805	102439
1997	1606	1432	2082	18580	8000	28648	57310	181914		57310	124604
1998	1877	1674	2433	18580	8000	33480	62993	212598		62993	150104
1999	2131	1900	2762	18580	8000	38000	67342	241300		67342	173957
2000	2423	2160	3140	18580	8000	43216	72936	274421		72936	201484
2001	3029	2701	3926	18580	8000	54020	84526	343027		84526	258500
2002	3029	2701	3926	18580	8000	54020	84526	343027		84526	258500
2003	3029	2701	3926	18580	8000	54020	84526	343027		84526	258500
2004	3029	2701	3926	18580	8000	54020	84526	343027		84526	258500
2005	3029	2701	3926	18580	8000	54020	84526	343027	-185800	-101273	444300

1. Amount of total diesel generation attributed to new diesels: 15.6% in 1985; 35.7% in 1986-1995; 40% in 1996-2000; and 50% in 2001-2005.
2. Lube oil cost = 1.2% of fuel cost.
3. Transmission/Distribution cost based on \$20/MWH.
4. Revenues taken based on \$0.127/kWh.
5. ----- Assumes new hydro on line in 1989.

EAST COAST TRANSMISSION SYSTEM

FINANCIAL ANALYSIS

IRR = 0%

<u>Year</u>	<u>E. Coast Sales MWH</u>	<u>E. Coast Revenue US\$</u>	<u>Capital Cost US\$</u>	<u>O&M Labor Cost US\$</u>	<u>Repair Cost US\$</u>	<u>Total D&M US\$</u>	<u>Generation Cost US\$</u>	<u>Total Cost US\$</u>	<u>Cash Flow US\$</u>
1985			3090000					3090000	-3090000
1986	1160	147320		52000	13730	65730	64310	130040	17279
1987	1320	167640		52000	13730	65730	73180	138910	28729
1988	1490	189230		52000	13730	65730	82605	148335	40894
1989	1650	209550		52000	13730	65730	91476	157206	52344
1990	1820	231140		52000	13730	65730	100900	166630	64509
1991	1930	245110		52000	54920	106920	106999	213919	31190
1992	2050	260350		52000	54920	106920	113652	220572	39778
1993	2180	276860		52000	54920	106920	120859	227779	49080
1994	2300	292100		52000	54920	106920	127512	234432	57668
1995	2420	307340		52000	54920	106920	134164	241084	66255
1996	2580	327660		52000	54920	106920	143035	249955	77704
1997	2700	342900		52000	54920	106920	149688	256608	86292
1998	2840	360680		52000	54920	106920	157449	264369	96310
1999	2980	378460		52000	54920	106920	165211	272131	106328
2000	3135	398145		52000	54920	106920	173804	280724	117420
2001	3135	398145		52000	54920	106920	173804	280724	117420
2002	3135	398145		52000	54920	106920	173804	280724	117420
2003	3135	398145		52000	54920	106920	173804	280724	117420
2004	3135	398145		52000	54920	106920	173804	280724	117420
2005	3135	398145	-1545000	52000	54920	106920	173804	-1264275	1662420
									-26111

1. Revenue based on US\$0.127 per kWh.
2. Repair Cost = 1% CIF value of materials years 1986-90, 4% thereafter.
3. Salvage Value after 20 years = 50% of installed cost.
4. Generation Cost = US\$0.05544 per kWh of sales, based on 85% hydro, 15% diesel.
5. East Coast Sales determined from projected peak demands and a load factor of 57%.